03A

Letting February 27, 2026

Notice to Bidders, Specifications and Proposal

WARNING: FAA Buy American Preference provisions apply to this contract. Failure to submit a "Certification of Compliance with FAA Buy American Preference – Construction Projects" form in accordance with the bidding procedures set forth herein (Appendix A3) will result in the bid being declared non-responsive.

Illinois Department of Transportation

Springfield, Illinois 62764

Contract No. SO087
Southern Illinois Airport
Carbondale, Illinois
Jackson County
Illinois Project No. MDH-5177
SBG Project No. 3-17-SBGP-249

(Printed by authority of the State of Illinois)

Illinois Department of Transportation

NOTICE TO BIDDERS

1. **TIME AND PLACE OF OPENING BIDS.** Electronic bids are to be submitted to the electronic bidding system (iCX-Integrated Contractors Exchange). All bids must be submitted to the iCX system prior to 12:00 p.m. on February 27, 2026, at which time the bids will be publicly opened from the iCX SecureVault.

2. **DESCRIPTION OF WORK**. The proposed improvement is identified and advertised for bids in the Invitation for Bids as:

   Contract No. SO087
   Southern Illinois Airport
   Carbondale, Illinois
   Jackson County
   Illinois Project No. MDH-5177
   SBG Project No. 3-17-SBGP-249

   Reconstruct Runway Lights on 18L/36R

   For engineering information, please contact Barry Stolz, P.E. of Hanson Professional Services, Inc. at 314.942.5288.

3. **INSTRUCTIONS TO BIDDERS**.

   (a) This Notice, the invitation for bids, proposal and letter of award shall, together with all other documents in accordance with Article 10-23 of the Standard Specifications for Construction of Airports (Adopted March 22, 2023), become part of the contract. Bidders are cautioned to read and examine carefully all documents, to make all required inspections, and to inquire or seek explanation of the same prior to submission of a bid.

   (b) State law, and, if the work is to be paid wholly or in part with Federal-aid funds, Federal law requires the bidder to make various certifications as a part of the proposal and contract. By execution and submission of the proposal, the bidder makes the certification contained therein. A false or fraudulent certification shall, in addition to all other remedies provided by law, be a breach of contract and may result in termination of the contract.

4. **AWARD CRITERIA AND REJECTION OF BIDS**. This contract will be awarded within 90 calendar days to the lowest responsive and responsible bidder considering conformity with the terms and conditions established by the Department in the rules, Invitation for Bids and contract documents. The issuance of plans and proposal forms for bidding based upon a prequalification rating shall not be the sole determinant of responsibility. The Department reserves the right to determine responsibility at the time of award, to reject any or all proposals, to readvertise the proposed improvement, and to waive technicalities.

5. **PRE-BID CONFERENCE.** N/A

6. **DISADVANTAGED BUSINESS POLICY.** The DBE goal for this contract is 0.0%.

7. **SPECIFICATIONS AND DRAWINGS.** The work shall be done in accordance with the Standard Specifications for Construction of Airports (Adopted March 22, 2023), the Special Provisions dated January 9, 2026, and the Construction Plans dated January 9, 2026 as approved by the Illinois Department of Transportation, Division of Aeronautics.

8. **BIDDING REQUIREMENTS AND BASIS OF AWARD.** When alternates are included in the proposal, the following shall apply:

   a. Additive Alternates

      (1) Bidders must submit a bid for the Base Bid and for all Additive Alternates.

      (2) Award of this contract will be made to the lowest responsible qualified bidder computed as follows:

      The lowest aggregate amount of (i) the Base Bid plus (ii) any Additive Alternate(s) which the Department elects to award based on the availability of funding.

      Award of this contract will be limited to the following bid alternate combinations:

      I. Base Bid
      II. Base Bid + Additive Alternate 1
      III. Base Bid + Additive Alternate 1 + Additive Alternate 2
      IV. Base Bid + Additive Alternate 1 + Additive Alternate 2 + Additive Alternate 3

      The Department may elect not to award any Additive Alternates. In that case, award will be to the lowest responsible qualified bidder of the Base Bid.

   b. Optional Alternates

      (1) Bidders must submit a bid for the Base Bid and for either Alternate A or Alternate B or for both Alternate A and Alternate B.

      (2) Award of this contract will be made to the lowest responsible qualified bidder computed as follows:

      The lower of the aggregate of either (i) the Base Bid plus Alternate A or (ii) the Base Bid plus Alternate B.

9. **CONTRACT TIME.** The Contractor shall complete all work within the specified contract time. Any calendar day extension beyond the specified contract time must be fully justified, requested by the Contractor in writing, and approved by the Engineer, or be subject to liquidated damages.

   The contract time for this contract is Base Bid: 90 calendar days; Additive Alternate #1: 5 additional calendar days; Additive Alternate #2: 5 additional calendar days.

10. **INDEPENDENT WEIGHT CHECKS.** The Department reserves the right to conduct random unannounced independent weight checks on any delivery for bituminous, aggregate or other pay item for which the method of measurement for payment is based on weight. The weight checks will be accomplished by selecting, at random, a loaded truck and obtaining a loaded and empty weight on an independent scale. In addition, the department may perform random weight checks by obtaining loaded and empty truck weights on portable scales operated by department personnel.

11. **MATERIAL COST ADJUSTMENTS.** Federal Aviation Administration rules prohibit the use of escalation clauses for materials. Therefore, the Illinois Department of Transportation, Division of Aeronautics cannot offer any material cost adjustment provisions for projects that utilize Federal Funds.

12. **GOOD FAITH COMPLIANCE.** The Illinois Department of Transportation has made a good faith effort to include all statements, requirements, and other language required by federal and state law and by various offices within federal and state governments whether that language is required by law or not. If anything of this nature has been left out or if additional language etc. is later required, the bidder/contractor shall cooperate fully with the Department to modify the contract or bid documents to correct the deficiency. If the change results in increased operational costs, the Department shall reimburse the contractor for such costs as it may find to be reasonable.

By Order of the
Illinois Department of Transportation

Gia Biagi,
Secretary

ILLINOIS DEPARTMENT OF TRANSPORTATION
DIVISION OF AERONAUTICS

REQUIRED CONTRACT PROVISIONS FOR STATE FUNDED AIRPORT CONSTRUCTION PROJECTS

The following provisions are State of Illinois requirements and are in addition to the REQUIRED CONTRACT PROVISIONS FOR AIRPORT IMPROVEMENT PROGRAM AND FOR OBLIGATED SPONSORS

DISADVANTAGED BUSINESS POLICY

NOTICE: This proposal contains the special provision entitled "Disadvantaged Business Participation." Inclusion of this Special Provision in this contract satisfies the obligations of the Department of Transportation under federal law as implemented by 49 CFR 23 and under the Illinois "Minority and Female Business Enterprise Act."

POLICY: It is public policy that the businesses defined in 49 CFR Part 23 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with State or Federal funds. Consequently, the requirements of 49 CFR Part 23 apply to this contract.

OBLIGATION: The Contractor agrees to ensure that the businesses defined in 49 CFR Part 23 have the maximum opportunity to participate in the performance of this contract. In this regard, the Contractor shall take all necessary and reasonable steps, in accordance with 49 CFR Part 23, to ensure that the said businesses have the maximum opportunity to compete for and perform portions of this contract. The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

The Contractor shall include the above Policy and Obligation statements of this Special Provision in every subcontract, including procurement of materials and leases of equipment.

DBE/WBE CONTRACTOR FINANCE PROGRAM: On contracts where a loan has been obtained through the DBE/WBE Contractor Finance Program, the Contractor shall cooperate with the Department by making all payments due to the DBE/WBE Contractor by means of a two-payee check payable to the Lender (Bank) and the Borrower (DBE/WBE Contractor).

BREACH OF CONTRACT: Failure to carry out the requirements set forth above and in the Special Provision shall constitute a breach of contract and may result in termination of the contract or liquidated damages as provided in the special provision.

SPECIAL PROVISION FOR SUBCONTRACTOR MOBILIZATION PAYMENTS (BDE)
Effective: November 2, 2017
Revised: April 1, 2019

To account for the preparatory work and the operations necessary for the movement of subcontractor personnel, equipment, supplies, and incidentals to the project site and for all other work or operations that must be performed or costs incurred when beginning work approved for subcontracting according to Section 80-01 of the Standard Specifications, the Contractor shall make a mobilization payment to each subcontractor.

This mobilization payment shall be made at least seven days prior to the subcontractor starting work. The amount paid shall be at the following percentage of the amount of the subcontract reported on form AER 260A submitted for the approval of the subcontractor's work.

Value of Subcontract Reported on Form AER 260A	Mobilization Percentage
Less than $10,000	25%
$10,000 to less than $20,000	20%
$20,000 to less than $40,000	18%
$40,000 to less than $60,000	16%
$60,000 to less than $80,000	14%
$80,000 to less than $100,000	12%
$100,000 to less than $250,000	10%
$250,000 to less than $500,000	9%
$500,000 to $750,000	8%
Over $750,000	7%

The mobilization payment to the subcontractor is an advance payment of the reported amount of the subcontract and is not a payment in addition to the amount of the subcontract; therefore, the amount of the advance payment will be deducted from future progress payments.

This provision shall be incorporated directly or by reference into each subcontract approved by the Department.

SPECIAL PROVISION FOR PAYMENTS TO SUBCONTRACTORS
Effective: November 2, 2017

Federal regulations found at 49 CFR §26.29 mandate the Department to establish a contract clause to require Contractors to pay subcontractors for satisfactory performance of their subcontracts and to set the time for such payments.

State law also addresses the timing of payments to be made to subcontractors and material suppliers. Section 7 of the Prompt Payment Act, 30 ILCS 540/7, requires that when a Contractor receives any payment from the Department, the Contractor shall make corresponding, proportional payments to each subcontractor and material supplier performing work or supplying material within 15 calendar days after receipt of the Department payment. Section 7 of the Act further provides that interest in the amount of two percent per month, in addition to the payment due, shall be paid to any subcontractor or material supplier by the Contractor if the payment required by the Act is withheld or delayed without reasonable cause. The Act also provides that the time for payment required and the calculation of any interest due applies to transactions between subcontractors and lower-tier subcontractors and material suppliers throughout the contracting chain.

This Special Provision establishes the required federal contract clause, and adopts the 15 calendar day requirement of the State Prompt Payment Act for purposes of compliance with the federal regulation regarding payments to subcontractors. This contract is subject to the following payment obligations.

When progress payments are made to the Contractor according to Article 90-07 of the Standard Specifications, the Contractor shall make a corresponding payment to each subcontractor and material supplier in proportion to the work satisfactorily completed by each subcontractor and for the material supplied to perform any work of the contract. The proportionate amount of partial payment due to each subcontractor and material supplier throughout the contracting chain shall be determined by the quantities measured or otherwise determined as eligible for payment by the Department and included in the progress payment to the Contractor. Subcontractors and material suppliers shall be paid by the Contractor within 15 calendar days after the receipt of payment from the Department. The Contractor shall not hold retainage from the subcontractors. These obligations shall also apply to any payments made by subcontractors and material suppliers to their subcontractors and material suppliers; and to all payments made to lower tier subcontractors and material suppliers throughout the contracting chain. Any payment or portion of a payment subject to this provision may only be withheld from the subcontractor or material supplier to whom it is due for reasonable cause. If reasonable cause is asserted, written notice shall be provided to the applicable subcontractor and/or material supplier and the Engineer within five days of the Contractor receiving payment. The written notice shall identify the contract number, the subcontract or material purchase agreement, a detailed reason for refusal, the value of payment being withheld, and the specific remedial actions required of the subcontractor and/or material supplier so that payment can be made.

This Special Provision does not create any rights in favor of any subcontractor or material supplier against the State or authorize any cause of action against the State on account of any payment, nonpayment, delayed payment, or interest claimed by application of the State Prompt Payment Act. The Department will not approve any delay or postponement of the 15 day requirement except for reasonable cause shown after notice and hearing pursuant to Section 7(b) of the State Prompt Payment Act. State law creates other and additional remedies available to any subcontractor or material supplier, regardless of tier, who has not been paid for work properly performed or material furnished. These remedies are a lien against public funds set forth in Section 23(c) of the Mechanics Lien Act, 770 ILCS 60/23(c), and a recovery on the Contractor's payment bond according to the Public Construction Bond Act, 30 ILCS 550.

SPECIAL PROVISION FOR SUBCONTRACTOR AND DBE PAYMENT REPORTING (BDE)
Effective: April 2, 2018

Subcontractor and Disadvantaged Business Enterprise Payment Reporting

The Contractor shall report all payments made to the following parties:

(a) first tier subcontractors;

(b) lower tier subcontractors affecting disadvantaged business enterprise (DBE) goal credit;

(c) material suppliers or trucking firms that are part of the Contractor's submitted DBE utilization plan.

The report shall be made through the Department's on-line subcontractor payment reporting system within 21 days of making the payment.

SPECIAL PROVISION FOR ADDITIONAL STATE REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION CONTRACTS
Effective: February 1, 1969
Revised: January 1, 2017

EQUAL EMPLOYMENT OPPORTUNITY

In the event of the Contractor's noncompliance with the provisions of this Equal Employment Opportunity Clause, the Illinois Human Rights Act, or the Illinois Department of Human Rights Rules and Regulations, the Contractor may be declared ineligible for future contracts or subcontracts with the State of Illinois or any of its political sub-divisions or municipal corporations, and the contract may be cancelled or voided in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulation.

During the performance of this Contract, the Contractor agrees as follows:

(1) That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, marital status, order of protection status, national origin or ancestry, citizenship status, age, physical or mental disability unrelated to ability, military status, or an unfavorable discharge from military service; and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.

(2) That, if it hires additional employees in order to perform this contract or any portion hereof, it will determine the availability (in accordance with the Illinois Department of Human Rights Rules and Regulations) of minorities and women in the area(s) from which it may reasonably recruit and it will hire for each job classification for which employees are hired in such a way that minorities and women are not underutilized.

(3) That, in all solicitations or advertisements for employees placed by it or on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, sexual orientation, marital status, order of protection status, national origin or ancestry, citizenship status, age, physical or mental disability unrelated to ability, military status, or an unfavorable discharge from military service.

(4) That it will send to each labor organization or representative of workers with which it has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the Contractor's obligations under the Illinois Human Rights Act and the Illinois Department of Human Rights Rules and Regulations. If any labor organization or representative fails or refuses to cooperate with the Contractor in its efforts to comply with such Act and Rules and Regulations, the Contractor will promptly so notify the Illinois Department of Human Rights and IDOT and will recruit employees from other sources when necessary to fulfill its obligations thereunder.

(5) That it will submit reports as required by the Illinois Department of Human Rights Rules and Regulations, furnish all relevant information as may from time to time be requested by the Illinois Department of Human Rights or IDOT, and in all respects comply with the Illinois Human Rights Act and the Illinois Department of Human Rights Rules and Regulations.

(6) That it will permit access to all relevant books, records, accounts, and work sites by personnel of IDOT and the Illinois Department of Human Rights for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and the Illinois Department of Human Rights Rules and Regulations.

(7) That it will include verbatim or by reference the provisions of this clause in every subcontract it awards under which any portion of the contract obligations are undertaken or assumed, so that the provisions will be binding upon the subcontractor. In the same manner as with other provisions of this contract, the Contractor will be liable for compliance with applicable provisions of this clause by subcontractors; and further it will promptly notify IDOT and the Illinois Department of Human Rights in the event any subcontractor fails or refuses to comply with these provisions. In addition, the Contractor will not utilize any subcontractor declared by the Illinois Human Rights Commission to be ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

SPECIAL PROVISION FOR SUBMISSION OF PAYROLL RECORDS (BDE)
Effective: April 1, 2021
Revised: November 2, 2023

STATEMENTS AND PAYROLLS

The payroll records shall include the worker's name, social security number, last known address, telephone number, email address, classification(s) of work actually performed, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof), daily and weekly number of hours actually worked in total, deductions made, and actual wages paid.

The Contractor and each subcontractor shall submit certified payroll records to the Department each week from the start to the completion of their respective work, except that full social security numbers, last known addresses, telephone numbers, and email addresses shall not be included on weekly submittals. Instead, the payrolls need only include an identification number for each employee (e.g., the last four digits of the employee's social security number). The submittals shall be made using LCPtracker Pro software. The software is web-based and can be accessed at https://lcptracker.com/. When there has been no activity during a work week, a payroll record shall still be submitted with the appropriate option ("No Work", "Suspended", or "Complete") selected.

SPECIAL PROVISION FOR NPDES CERTIFICATION

In accordance with the provisions of the Illinois Environmental Protection Act, the Illinois Pollution Control Board Rules and Regulations (35 Ill. Adm. Code, Subtitle C, Chapter I), and the Clean Water Act, and the regulations thereunder, this certification is required for all construction contracts that will result in the disturbance of one or more acres total land area.

The bidder certifies under penalty of law that he/she understands the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit (ILR100000) that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

The Airport Owner or its Agent will:

1) prepare, sign and submit the Notice of Intent (NOI)

2) conduct site inspections and complete and file the inspection reports

3) submit Incidence of Non-Compliance (ION) forms

4) submit Notice of Termination (NOT) form

Prior to the issuance of the Notice-to-Proceed, for each erosion control measure identified in the Storm Water Pollution Prevention Plan, the contractor or subcontractor responsible for the control measure(s) must sign the above certification (forms to be provided by the Department).

SPECIAL PROVISION FOR COMPLETION TIME VIA CALENDAR DAYS

It being understood and agreed that the completion within the time limit is an essential part of the contract, the bidder agrees to complete the work within Base Bid: 90 calendar days; Additive Alternate #1: 5 additional calendar days; Additive Alternate #2: 5 additional calendar days, unless additional time is granted by the Engineer in accordance with the provisions of the specifications. In case of failure to complete the work on or before the time named herein, or within such extra time as may have been allowed by extensions, the bidder agrees that the Department of Transportation shall withhold from such sum as may be due him/her under the terms of this contract, the costs, as set forth in Section 80-09 Failure to Complete on Time of the Standard Specifications, which costs shall be considered and treated not as a penalty but as damages due to the State from the bidder by reason of the failure of the bidder to complete the work within the time specified in the contract.

ILLINOIS WORKS APPRENTICESHIP INITIATIVE – STATE FUNDED CONTRACTS (BDE)
Effective: June 2, 2021
Revised: April 2, 2024

Illinois Works Jobs Program Act (30 ILCS 559/20-1 et seq.). For contracts having an awarded contract value of $500,000 or more, the Contractor shall comply with the Illinois Works Apprenticeship Initiative (30 ILCS 559/20-20 to 20-25) and all applicable administrative rules. The goal of the Illinois Apprenticeship Works Initiative is that apprentices will perform either 10% of the total labor hours actually worked in each prevailing wage classification or 10% of the estimated labor hours in each prevailing wage classification, whichever is less. Of this goal, at least 50% of the labor hours of each prevailing wage classification performed by apprentices shall be performed by graduates of the Illinois Works Pre-Apprenticeship Program, the Illinois Climate Works Pre-Apprenticeship Program, or the Highway Construction Careers Training Program.

The Contractor may seek from the Department of Commerce and Economic Opportunity (DCEO) a waiver or reduction of this goal in certain circumstances pursuant to 30 ILCS 559/20-20(b). The Contractor shall ensure compliance during the term of the contract and will be required to report on and certify its compliance. An apprentice use plan, apprentice hours, and a compliance certification shall be submitted to the Engineer on forms provided by the Department and/or DCEO.

SPECIAL PROVISION FOR SUBMISSION OF BIDDERS LIST INFORMATION (BDE)
Effective: January 2, 2025
Revised: March 2, 2025

In accordance with 49 CFR 26.11(c) all DBE and non-DBEs who bid as prime contractors and subcontractors shall provide bidders list information, including all DBE and non-DBE firms from whom the bidder has received a quote or bid to work as a subcontractor, whether or not the bidder has relied upon that bid in placing its bid as the prime contractor.

The bidders list information shall be submitted with the bid using the link provided within the “Integrated Contractor Exchange (iCX)” application of the Department’s “EBids System”.

State of Illinois
Department of Transportation

SPECIAL PROVISION
FOR
SECTION 80 PROSECUTION AND PROGRESS

This Special Provision amends the provisions of the Standard Specifications for Construction of Airports (Adopted March 22, 2023) and shall be construed to be a part thereof, superseding any conflicting provisions thereof applicable to the work under the contract.

80-09 Failure to complete on time.

ADD:

Schedule of Deductions for Each Day of Overrun in Contract Time			
Original Contract Amount		Daily Charges	
From More Than	To and Including	Calendar Day	Work Day
$ 0	$ 100,000	$ 475	$ 675
100,000	500,000	750	1,050
500,000	1,000,000	1,025	1,425
1,000,000	3,000,000	1,275	1,725
3,000,000	6,000,000	1,425	2,000
6,000,000	12,000,000	2,300	3,450
12,000,000	And over	6,775	9,525

State of Illinois
Department of Transportation

SPECIAL PROVISION
FOR
SECTION 90 MEASUREMENT AND PAYMENT

This Special Provision amends the provisions of the Standard Specifications for Construction of Airports (Adopted March 22, 2023) and shall be construed to be a part thereof, superseding any conflicting provisions thereof applicable to the work under the contract.

90-07 Partial payments.

DELETE: The entire section.

ADD: Partial payments will be made to the Contractor at least once each month as the work progresses. The payments will be based upon estimates, prepared by the Resident 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 the Section 90-08 PAYMENT FOR MATERIALS ON HAND. From the amount of partial payment so determined on Federal-Aid projects, there shall be deducted an amount up to ten percent of the cost of the completed work which shall be retained until all conditions necessary for financial closeout of the project are satisfied. The amount of the estimate approved as due for payment will be vouchered by the Department and presented to the State Comptroller for payment. No amount less than $1,000.00 will be approved for payment other than the final payment. A final voucher for under $5.00 shall not be paid except through electronic funds transfer. (15 ILCS 405/9(b-1))

It is understood and agreed that 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, 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 Department 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 Section 90-09 ACCEPTANCE AND FINAL PAYMENT.

Progress payments may be reduced by liens filed pursuant to Section 23(c) of the Mechanics Lien Act, 770 ILCS 60/23(c).

If a Contractor or subcontractor has defaulted on a loan issued under the Department's Disadvantaged Business Revolving Loan Program (20 ILCS 2705/2705-610) progress payments may be reduced pursuant to the terms of that loan agreement. In such cases, the amount of the estimate related to the work performed by the Contractor or subcontractor, in default of the loan agreement, will be offset, in whole or in part, and vouchered by the Department to the Working Capital Revolving Fund or designated escrow account. Payment for the work shall be considered as issued and received by the Contractor or subcontractor on the date of the offset voucher. Further, the amount of the offset voucher shall be a credit against the Department's obligation to pay the Contractor, the Contractor's obligation to pay the subcontractor, and the Contractor's or subcontractor's total loan indebtedness to the Department. The offset shall continue until such time as the entire loan indebtedness is satisfied. The Department will notify the Contractor and Fund Control Agent in a timely manner of such offset. The Contractor or subcontractor shall not be entitled to additional payment in consideration of the offset.

In accordance with 49 USC § 47111, the Department will not make payments totaling more than 90 percent of the contract until all conditions necessary for financial closeout of the project are satisfied.

The failure to perform any requirement, obligation, or term of the contract by the Contractor shall be reason for withholding any progress payments until the Department determines that compliance has been achieved.

90-09 Trust agreement option.

DELETE: The entire section.

APPENDIX A – FEDERAL AVIATION ADMINISTRATION (FAA) REQUIRED CONTRACT PROVISIONS

A1 ACCESS TO RECORDS AND REPORTS

A1.1 CONTRACT CLAUSE

ACCESS TO RECORDS AND REPORTS

The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the Owner, the Federal Aviation Administration and the Comptroller General of the United States or any of their duly authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

A2 BREACH OF CONTRACT TERMS

A2.1 CONTRACT CLAUSE

This provision is required for all contracts that exceed the simplified acquisition threshold as stated in 2 CFR Part 200, Appendix II (A). This threshold is occasionally adjusted for inflation and is $350,000.

BREACH OF CONTRACT TERMS

Any violation or breach of terms of this contract on the part of the Contractor or its subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement.

Owner will provide Contractor written notice that describes the nature of the breach and corrective actions the Contractor must undertake in order to avoid termination of the contract. Owner reserves the right to withhold payments to Contractor until such time the Contractor corrects the breach or the Owner elects to terminate the contract. The Owner's notice will identify a specific date by which the Contractor must correct the breach. Owner may proceed with termination of the contract if the Contractor fails to correct the breach by the deadline indicated in the Owner's notice.

The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder are in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

A3 BUY AMERICAN PREFERENCE

A3.1 SOLICITATION CLAUSES

A3.1.1 Certification of Compliance with FAA Buy American Preference Statement

FAA BUY AMERICAN PREFERENCE

The Contractor certifies that its bid/offer is in compliance with 49 U.S.C. § 50101, BABA and other related Made in America Laws[1], U.S. statutes, guidance, and FAA policies, which provide that Federal funds may not be obligated unless all iron, steel and manufactured goods used in AIP funded projects are produced in the United States, unless the Federal Aviation Administration has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

The bidder or offeror must complete and submit the certification of compliance with FAA's Buy American Preference, BABA and Made in America laws included herein with their bid or offer. The Illinois Department of Transportation, Division of Aeronautics will reject as nonresponsive any bid or offer that does not include a completed certification of compliance with FAA's Buy American Preference and BABA.

The bidder or offeror certifies that all constructions materials, defined to mean an article, material, or supply other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber; or drywall used in the project are manufactured in the U.S.

The bidder or offeror certifies procurement of certain rolling stock using FAA grant funds will prohibit airports from using Federal financial assistance to procure buses or rail car vehicle rolling stock from covered entities.

[1]Per Executive Order 14005 "Made in America Laws" means all statutes, regulations, rules, and Executive Orders relating to federal financial assistance awards or federal procurement, including those that refer to "Buy America" or "Buy American," that require, or provide a preference for, the purchase or acquisition of goods, products, or materials produced in the United States, including iron, steel, and manufactured products offered in the United States.

A3.1.2 Illinois Department of Transportation, Division of Aeronautics Requirements

The bidder shall submit the completed and signed "Certification of Compliance with FAA Buy American Preference – Construction Projects" form with the bid. The required form must be uploaded in the "Miscellaneous Documents" area as a single .pdf file in the "Integrated Contractor Exchange (iCX)" application within the Department's "EBids System".

The Department will not accept a "Certification of Compliance with FAA Buy American Preference – Construction Projects" form if it does not meet the bidding procedures set forth herein and the bid will be declared non-responsive. In the event the bid is declared non-responsive,

the Department may elect to cause the forfeiture of the penal sum of the bidder's proposal guaranty and may deny authorization to bid the project if re-advertised for bids.

Any and all steel products used in the performance of this contract by the Contractor, subcontractors, producers, and suppliers are required to adhere to the Illinois Steel Products Procurement Act (30 ILCS 565/), which requires that all steel items be of 100 percent domestic origin and manufacture. Any products listed under the Federal Aviation Administration's (FAA) nationwide approved list of "Equipment Meeting Buy American Requirements" shall be deemed as meeting the requirements of the Illinois Steel Products Procurement Act.

All FAA Buy American Waivers are the responsibility of the Contractor, must be obtained prior to the Notice to Proceed, and must be submitted to the Illinois Department of Transportation, Division of Aeronautics for review and approval before being forwarded to the FAA. Any products used on the project that cannot meet the domestic requirement, and for which a waiver prior to the Notice to Proceed was not obtained, will be rejected for use and subject to removal and replacement with no additional compensation, and the contractor deemed non-responsive.

A3.1.3 Certification of Compliance with FAA Buy American Preference – Construction Projects

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with its proposal. The bidder or offeror must indicate how it intends to comply with 49 U.S.C. § 50101, BABA and other related Made in America Laws, U.S. statutes, guidance, and FAA policies, by selecting one of the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (i.e., not both) by inserting a checkmark (✓) or the letter "X".

☐ Bidder or offeror hereby certifies that it will comply with 49 U.S.C. § 50101, BABA and other related U.S. statutes, guidance, and policies of the FAA by:

a) Only installing iron, steel and manufactured products produced in the United States;

b) Only installing construction materials defined as: an article, material, or supply – other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives that are or consist primarily of non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); lumber or drywall that have been manufactured in the United States.

c) Installing manufactured products for which the Federal Aviation Administration (FAA) has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or

d) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

a) To provide to the Illinois Department of Transportation, Division of Aeronautics and the FAA evidence that documents the source and origin of the iron, steel, and/or manufactured product.
b) To faithfully comply with providing U.S. domestic products.
c) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.
d) Certify that all construction materials used in the project are manufactured in the U.S.

☐ The bidder or offeror hereby certifies it cannot comply with the 100 percent Buy American Preferences of 49 U.S.C. § 50101(a) but may qualify for a Type 3 or Type 4 waiver under 49 U.S.C. § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

a) To submit to the Illinois Department of Transportation, Division of Aeronautics and the FAA within 15 calendar days of being selected as the responsive bidder, a formal waiver request and required documentation that supports the type of waiver being requested.
b) That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
c) To faithfully comply with providing U.S. domestic products at or above the approved U.S. domestic content percentage as approved by the FAA.
d) To furnish U.S. domestic product for any waiver request that the FAA rejects.
e) To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 2 Waiver (Nonavailability) - The iron, steel, manufactured goods or construction materials or manufactured goods are not available in sufficient quantity or quality in the United States. The required documentation for the Nonavailability waiver is

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire

b) Record of thorough market research, consideration where appropriate of qualifying alternate items, products, or materials including;

c) A description of the market research activities and methods used to identify domestically manufactured items capable of satisfying the requirement, including the timing of the research and conclusions reached on the availability of sources.

Type 3 Waiver – The cost of components and subcomponents produced in the United States is more than 60 percent of the cost of all components and subcomponents of the "facility/project." The required documentation for a Type 3 waiver is:

a) Completed Content Percentage Worksheet and Final Assembly Questionnaire including;
b) Listing of all manufactured products that are not comprised of 100 percent U.S. domestic content (excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety).
c) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly and installation at project location.
d) Percentage of non-domestic component and subcomponent cost as compared to total "facility" component and subcomponent costs, excluding labor costs associated with final assembly and installation at project location.

Type 4 Waiver (Unreasonable Costs) - Applying this provision for iron, steel, manufactured goods or construction materials would increase the cost of the overall project by more than 25 percent. The required documentation for this waiver is:

a) A completed Content Percentage Worksheet and Final Assembly Questionnaire from
b) At minimum two comparable equal bids and/or offers;
c) Receipt or record that demonstrates that supplier scouting called for in Executive Order 14005, indicates that no domestic source exists for the project and/or component;
d) Completed waiver applications for each comparable bid and/or offer.

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date	Signature
Company Name	Title

A4 CIVIL RIGHTS - GENERAL

A4.1 CONTRACT CLAUSES

A4.1.1 General Clause that is used for Contracts, Lease Agreements, and Transfer Agreements

GENERAL CIVIL RIGHTS PROVISIONS

In all its activities within the scope of its airport program, the Contractor agrees to comply with pertinent statutes, Executive Orders, and such rules as identified in Title VI List of Pertinent Nondiscrimination Acts and Authorities to ensure that no person shall, on the grounds of race, color, national origin, creed, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

A4.1.2 Specific Clause that is used for General Contract Agreements

The above provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract.

A5 CIVIL RIGHTS – TITLE VI ASSURANCE

A5.1 SOLICITATION CLAUSE

A5.1.1 Title VI Solicitation Notice

Title VI Solicitation Notice:

As a condition of a grant award, the Sponsor shall demonstrate that it complies with the provisions of Title VI of the Civil Rights Act of 1964 (42 U.S.C. §§ 2000d et seq) and implementing regulations (49 CFR part 21) including amendments thereto, the Airport and Airway Improvement Act of 1982 (49 U.S.C. § 47123), the Age Discrimination Act of 1975 (42 U.S.C. 6101 et seq.), Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794 et seq.), the Americans with Disabilities Act of 1990 (42 U.S.C. § 12101, et seq.), U.S. Department of Transportation and Federal Aviation Administration (FAA) Assurances, and other relevant civil rights statutes, regulations, or authorities, including any amendments or updates thereto. This may include, as applicable, providing a current Title VI Program Plan to the FAA for approval, in the format and according to the timeline required by the FAA, and other information about the communities that will be benefited and impacted by the project. A completed FAA Title VI Pre-Grant Award Checklist is required for every grant application, unless excused by the FAA. The Sponsor shall affirmatively ensure that when carrying out any project supported by this grant that it complies with all federal nondiscrimination and civil rights laws based on race, color, national origin, sex, creed, age, disability, genetic information, in consideration for federal financial assistance. The Department's and FAA's Office of Civil Rights may provide resources and technical assistance to recipients to ensure full and sustainable compliance with Federal civil rights requirements. Failure to comply with civil rights requirements will be considered a violation of the agreement or contract and be subject to any enforcement action as authorized by law.

A5.2 CONTRACT CLAUSES

A5.2.1 Title VI List of Pertinent Nondiscrimination Acts and Authorities

Title VI List of Pertinent Nondiscrimination Acts and Authorities

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

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq*., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR Partpart 21 (Non-discrimination in Federally-Assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964) including amendments thereto;
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794 *et seq*.), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27 (Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance);
- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 *et seq*.) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 U.S.C. § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (P.L. 100-259) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990 (42 U.S.C. § 12101, et seq) (prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities) as implemented by U.S. Department of Transportation regulations at 49 CFR Parts 37 and 38;
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. § 1681, et seq).

A5.2.2 Nondiscrimination Requirements/Title VI Clauses for Compliance

Compliance with Nondiscrimination Requirements:

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

1. **Compliance with Regulations:** The Contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Nondiscrimination:** The Contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin), creed, sex, age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21 including amendments thereto.
3. **Solicitations for Subcontracts, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.
4. **Information and Reports:** The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the Sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a Contractor's noncompliance with the non-discrimination provisions of this contract, the Sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:
    a. Withholding payments to the Contractor under the contract until the Contractor complies; and/or
    b. Cancelling, terminating, or suspending a contract, in whole or in part.

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

A6 CLEAN AIR AND WATER POLLUTION CONTROL

A6.1 CONTRACT CLAUSE

This provision is required for all contracts and lower tier contracts that exceed $150,000.

CLEAN AIR AND WATER POLLUTION CONTROL

Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 U.S.C. §§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. §§ 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

Contractor must include this requirement in all subcontracts that exceed $150,000.

A7 CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS

A7.1 CONTRACT CLAUSE

This provision applies to all contracts and lower tier contracts that exceed $100,000, and employ laborers, mechanics, watchmen, and guards.

CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS

1. Overtime Requirements.

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; Liability for Unpaid Wages; Liquidated Damages.

In the event of any violation of the clause set forth in paragraph (1) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract

for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this clause, in the sum of $29 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this clause.

3. Withholding for Unpaid Wages and Liquidated Damages.

The Federal Aviation Administration (FAA) or the Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this clause.

4. Subcontractors.

The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this clause.

A8 COPELAND "ANTI-KICKBACK" ACT

A8.1 CONTRACT CLAUSE

This provision applies to all construction contracts and subcontracts financed under the AIP that exceed $2,000.

COPELAND "ANTI-KICKBACK" ACT

Contractor must comply with the requirements of the Copeland "Anti-Kickback" Act (18 USC 874 and 40 USC 3145), as supplemented by Department of Labor regulation 29 CFR part 3. Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled. The Contractor and each Subcontractor must submit to the Owner, a weekly statement on the wages paid to each employee performing on covered work during the prior week. Owner must report any violations of the Act to the Federal Aviation Administration.

A9 DAVIS-BACON REQUIREMENTS

A9.1 CONTRACT CLAUSE

This provision is to be incorporated into all construction contracts and subcontracts that exceed $2,000 and include funding from the AIP.

DAVIS-BACON REQUIREMENTS

1. Minimum Wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under regulations implementing the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be

sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers, or mechanics to be employed in the classification, or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding. The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to the Contractor, Sponsor, Applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and Basic Records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR § 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at *https://www.dol.gov/agencies/whd/government-contracts/construction/payroll-certification* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker and shall provide them upon request to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, Sponsor, or Owner, as the case may be, for transmission to the Federal Aviation Administration, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, Sponsor, or Owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i), and that such information is correct and complete;

(2) That each laborer and mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Sponsor, the Federal Aviation Administration, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, Sponsor, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR § 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR § 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at no less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination that provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

5. Compliance with Copeland Act Requirements.

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.

The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR §§ 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR § 5.5.

7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR § 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

(i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR § 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 USC § 1001.

A10 DEBARMENT AND SUSPENSION

A10.1 CERTIFICATION CLAUSES

A10.1.1 Bidder or Offeror Certification

CERTIFICATION OF OFFERER/BIDDER REGARDING DEBARMENT

By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

A10.1.2 Lower Tier Contract Certification

CERTIFICATION OF LOWER TIER CONTRACTORS REGARDING DEBARMENT

The successful bidder, by administering each lower tier subcontract that exceeds $25,000 as a "covered transaction", must confirm each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally-assisted project. The successful bidder will accomplish this by:

Checking the System for Award Management at website: http://www.sam.gov.

Collecting a certification statement similar to the Certification of Offeror /Bidder Regarding Debarment, above.

Inserting a clause or condition in the covered transaction with the lower tier contract.

If the Federal Aviation Administration later determines that a lower tier participant failed to disclose to a higher tier participant that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedies, including suspension and debarment of the non-compliant participant.

A11 DISADVANTAGED BUSINESS ENTERPRISE

A11.1 REQUIRED PROVISIONS

A11.1.1 Solicitation Language (Solicitations with a DBE Contract Goal)

The Owner's award of this contract is conditioned upon Bidder or Offeror satisfying the good faith effort requirements of 49 CFR § 26.53.

As a condition of responsiveness, the Bidder or Offeror must submit the following information with its proposal on the forms provided herein:

(1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
(2) A description of the work that each DBE firm will perform;
(3) The dollar amount of the participation of each DBE firm listed under (1);
(4) Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal
(5) Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
(6) If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR Part 26 including any amendments thereto. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

A11.1.2 Solicitation Language (Solicitations with No DBE Contract Goal)

The requirements of 49 CFR Part 26 including any amendments thereto apply to this contract. It is the policy of the Illinois Department of Transportation to practice nondiscrimination based on race, color, sex, or national origin in the award or performance of this contract. The Owner encourages participation by all firms qualifying under this solicitation regardless of business size or ownership.

A11.1.3 Prime Contracts (Projects covered by a DBE Program)

Contract Assurance (49 CFR § 26.13) –

The Contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 including any amendments thereto in the award and administration of DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

1) Withholding monthly progress payments;
2) Assessing sanctions;
3) Liquidated damages; and/or
4) Disqualifying the Contractor from future bidding as non-responsible.

A12 DISTRACTED DRIVING

A12.1 CONTRACT CLAUSE

TEXTING WHEN DRIVING

In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving", (10/1/2009) and DOT Order 3902.10, "Text Messaging While Driving", (12/30/2009), the Federal Aviation Administration encourages recipients of Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or subgrant.

In support of this initiative, the Owner encourages the Contractor to promote policies and initiatives for its employees and other work personnel that decrease crashes by distracted drivers, including policies that ban text messaging while driving motor vehicles while performing work activities associated with the project. The Contractor must include the substance of this clause in all sub-tier contracts exceeding $15,000 that involve driving a motor vehicle in performance of work activities associated with the project.

A13 PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

A13.1 CONTRACT CLAUSE

PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

Contractor and Subcontractor agree to comply with mandatory standards and policies relating to use and procurement of certain telecommunications and video surveillance services or equipment in compliance with the National Defense Authorization Act P.L. 115-232, § 889(f)(1)).

A14 FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

A14.1 SOLICITATION CLAUSE

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

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

A15 LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

A15.1 CERTIFICATION CLAUSE

This provision is required for all contracts that equal or exceed $100,000.

CERTIFICATION REGARDING LOBBYING

The Bidder or Offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

A16 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

A16.1 CONTRACT CLAUSE

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

A17 PROCUREMENT OF RECOVERED MATERIALS

A17.1 CONTRACT CLAUSE

PROCUREMENT OF RECOVERED MATERIALS

Contractor and subcontractor agree to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, and the regulatory provisions of 40 CFR Part 247. In the performance of this contract and to the extent practicable, the Contractor and subcontractors are to use products containing the highest percentage of recovered materials for items designated by the Environmental Protection Agency (EPA) under 40 CFR Part 247 whenever:

a) The contract requires procurement of $10,000 or more of a designated item during the fiscal year; or

b) The contractor has procured $10,000 or more of a designated item using Federal funding during the previous fiscal year.

The list of EPA-designated items is available at www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products.

Section 6002(c) establishes exceptions to the preference for recovery of EPA-designated products if the contractor can demonstrate the item is:

a) Not reasonably available within a timeframe providing for compliance with the contract performance schedule;

b) Fails to meet reasonable contract performance requirements; or

c) Is only available at an unreasonable price.

A18 RIGHT TO INVENTIONS

A18.1 CONTRACT CLAUSE

RIGHTS TO INVENTIONS

Contracts or agreements that include the performance of experimental, developmental, or research work must provide for the rights of the Federal Government and the Owner in any resulting invention as established by 37 CFR part 401, Rights to Inventions Made by Non-profit Organizations and Small Business Firms under Government Grants, Contracts, and Cooperative Agreements. This contract incorporates by reference the patent and inventions rights as specified within 37 CFR § 401.14. Contractor must include this requirement in all sub-tier contracts involving experimental, developmental, or research work.

A19 SEISMIC SAFETY

A19.1 CONTRACT CLAUSE

A19.1.1 Construction Contracts

SEISMIC SAFETY

The Contractor agrees to ensure that all work performed under this contract, including work performed by subcontractors, conforms to a building code standard that provides a level of seismic safety substantially equivalent to standards established by the National Earthquake Hazards Reduction Program (NEHRP). Local building codes that model their code after the current version of the International Building Code (IBC) meet the NEHRP equivalency level for seismic safety.

A20 TAX DELINQUENCY AND FELONY CONVICTIONS

A20.1 CERTIFICATION CLAUSE

CERTIFICATION OF OFFERER/BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

Certifications

1) The applicant represents that it is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

2) The applicant represents that it is not a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

Note

If an applicant cannot comply with the two (2) above-listed certifications, the applicant is ineligible to receive an award unless the Sponsor has received notification from the agency suspension and debarment official (SDO) that the SDO has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The applicant therefore must provide information to the owner about its tax liability or conviction to the Owner, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

The applicant agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts.

Term Definitions

Felony conviction: Felony conviction means a conviction within the preceding twenty four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the U.S. Code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 USC § 3559.

Tax Delinquency: A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

A21 TERMINATION OF CONTRACT

A21.1 CONTRACT CLAUSE

A21.1.1 Termination for Convenience

TERMINATION FOR CONVENIENCE (CONSTRUCTION & EQUIPMENT CONTRACTS)

The Owner may terminate this contract in whole or in part at any time by providing written notice to the Contractor. Such action may be without cause and without prejudice to any other right or remedy of Owner. Upon receipt of a written notice of termination, except as explicitly directed by the Owner, the Contractor shall immediately proceed with the following obligations regardless of any delay in determining or adjusting amounts due under this clause:

1. Contractor must immediately discontinue work as specified in the written notice.
2. Terminate all subcontracts to the extent they relate to the work terminated under the notice.
3. Discontinue orders for materials and services except as directed by the written notice.
4. Deliver to the Owner all fabricated and partially fabricated parts, completed and partially completed work, supplies, equipment and materials acquired prior to termination of the work, and as directed in the written notice.
5. Complete performance of the work not terminated by the notice.
6. Take action as directed by the Owner to protect and preserve property and work related to this contract that Owner will take possession.

Owner agrees to pay Contractor for:

1. Completed and acceptable work executed in accordance with the contract documents prior to the effective date of termination;
2. Documented expenses sustained prior to the effective date of termination in performing work and furnishing labor, materials, or equipment as required by the contract documents in connection with uncompleted work;
3. Reasonable and substantiated claims, costs, and damages incurred in settlement of terminated contracts with Subcontractors and Suppliers; and
4. Reasonable and substantiated expenses to the Contractor directly attributable to Owner's termination action.

Owner will not pay Contractor for loss of anticipated profits or revenue or other economic loss arising out of or resulting from the Owner's termination action.

The rights and remedies this clause provides are in addition to any other rights and remedies provided by law or under this contract.

A21.1.2 Termination for Default

TERMINATION FOR CAUSE (CONSTRUCTION)

Section 80-09 of FAA Advisory Circular 150/5370-10 establishes standard language for conditions, rights, and remedies associated with Owner termination of this contract for cause due to default of the Contractor.

A22 TRADE RESTRICTION CERTIFICATION

A22.1 SOLICITATION CLAUSE

TRADE RESTRICTION CERTIFICATION

By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror –

1) is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (USTR);

2) has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the USTR; and

3) has not entered into any subcontract for any product to be used on the Federal project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18 USC § 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR § 30.17, no contract shall be awarded to an Offeror or subcontractor:

1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR; or
2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list; or
3) who incorporates in the public works project any product of a foreign country on such USTR list.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. The Contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by USTR, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration (FAA) may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

A23 VETERAN'S PREFERENCE

A23.1 CONTRACT CLAUSE

VETERAN'S PREFERENCE

In the employment of labor (excluding executive, administrative, and supervisory positions), the Contractor and all sub-tier contractors must give preference to covered veterans as defined within 49 U.S.C. § 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 U.S.C. § 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

A24 DOMESTIC PREFERENCES FOR PROCUREMENTS

A24.1 CERTIFICATION CLAUSE

CERTIFICATION REGARDING DOMESTIC PREFERENCES FOR PROCUREMENTS

The Bidder or Offeror certifies by signing and submitting this bid or proposal that, to the greatest extent practicable, the Bidder or Offeror has provided a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including, but not limited to, iron, aluminum, steel, cement, and other manufactured products) in compliance with 2 CFR § 200.322.

A25 PROHIBITION OF COVERED UNMANNED AIRCRAFT SYSTEMS (UAS)

A25.1 CONTRACT CLAUSE

The Bidder or Offeror certifies that they are aware of and comply with relevant Federal statutes and regulations, including those from the Federal Aviation Administration (FAA), for operating unmanned aircraft systems (UAS) in accordance, and in compliance with all related requirements in the FAA Reauthorization Act of 2024 (Public Law 118-63), section 936 (49 U.S.C. § 44801 note).

Contractor warrants that all UAS operations will be conducted in full compliance with all applicable Federal Aviation Administration (FAA) regulations, including but not limited to 14 CFR Part 107, and any other applicable local, state, or Federal laws and regulations.

Sponsors and subgrant recipients cannot use AIP grant funds to enter into, extend, or renew a contract related to covered unmanned aircraft systems (UAS). This includes both procurement and operational contracts, as well as contracts with entities that operate such systems.

SECTION III

Southern Illinois Airport (MDH)

Carbondale/Murphysboro, Illinois

Reconstruct Runway Lights on 18L/36R
Illinois Project No. MDH-5177
SBG Proj. No. 3-17-SBGP-TBD

01/09/2026
Expires: 11/30/27

Prepared By:

Hanson Professional Services Inc.
1525 South Sixth Street
Springfield, Illinois 62703

For Bid Documents
January 9, 2026

Letting Date: February 27, 2026

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Refer to IDOT Division of Aeronautics Policy Memorandums (as applicable):

96-1A, “Item 610, Structural Portland Cement Concrete: Job Mix Formula Approval & Production Testing (2022).

FOREWORD

These Special Provisions, together with applicable Standard Specifications, Rules and Regulations, Contract Requirements for Airport Improvement Projects, Payroll Requirements and Minimum Wage Rates, which are hereto attached or which by reference are herein incorporated, cover the requirements of the State of Illinois, Department of Transportation (IDOT), Division of Aeronautics (IDA) for the following improvement project at the **Southern Illinois Airport (MDH), Carbondale/Murphysboro, Illinois,** including the following:

SCOPE OF WORK

The project scope includes replacement of the airfield lighting system for Runway 18L/36R, including lights, REILS, cables, conduits, associated Airport Electrical Vault work, and incidentals. This project will include Additive Alternate 1; removal and replacement of the existing airport rotating beacon with a new beacon furnished by the Airport and installed by the Contractor along with associated mounting hardware, cabling, lightning protection, grounding, obstruction lights, electrical upgrades, and incidentals. This project will also include Additive Alternate 2; removal and replacement of the supplemental wind cones located on Runway 18L/36R, furnished by the Owner and installed by the Contractor along with associated cabling, grounding and incidentals.

GOVERNING SPECIFICATIONS AND RULES AND REGULATIONS

The State of Illinois Department of Transportation, Division of Aeronautics, Standard Specifications for Construction of Airports, **adopted March 22, 2023 (latest revision)**, shall govern the project, except as otherwise revised or noted in these Special Provisions. All references to IDOT Specifications refer to Standard Specifications for Road and Bridge Construction, Illinois Department of Transportation, adopted January 1, 2022, as revised. In the event of inconsistencies between the Standard Specifications and the Special Provisions, the Special Provisions shall govern. The Contractor shall maintain a minimum of one printed copy of the relevant sections of the Standard Specifications for Construction of Airports on the project site at all times. The Standard Specifications for Construction of Airports is available online at the following address link:

https://idot.illinois.gov/doing-business/procurements/engineering-architectural-professional-services/consultant-resources/standard-specifications.html

REFERENCES

The following Federal Aviation Administration Advisory Circulars are referenced on the Plans and/or Special Provision Specifications in regard to safety on airports. These Advisory Circulars are available on the FAA web site at http://www.faa.gov/regulations_policies/advisory_circulars

A. FAA AC No. 70/7460-1L (or most current issue) “Obstruction Marking and Lighting.”

B. FAA AC No. 150/5210-5D (or most current issue) “Painting, Marking, and Lighting of Vehicles Used on an Airport.”

C. FAA AC No. 150/5300-13B (or most current issue) “Airport Design.”

D. FAA AC No. 150/5370-2G (or most current issue) “Operational Safety on Airports During Construction.”

Part 1 – General Contract Provisions

Section 50. Control of Work

50–06 Construction Layout Stakes. Revise the first paragraph to read:

"The Contractor shall be responsible for all construction layout and any extension of the control network provided in the plans necessary to properly complete the work."

50–14 Final Acceptance. Revise the first sentence of the first paragraph to read:

"Upon due notice to the Resident Engineer/Technician by the Contractor of presumptive completion of the entire project, the charging of Contract Time shall be suspended and the Engineer and Owner will make an inspection."

END OF SECTION 50

Section 70. Legal Regulations and Responsibility to Public

70-09 Construction Safety and Phasing Plan (CSPP). Add the following paragraphs to this section:

"The Southern Illinois Airport has three paved runways (18L-36R, 18R-36L, and 6-24) with a supporting taxiway system. This project will require the temporary closure of Runway 18L-36R, Runway 6-24, and some of the taxiways. Refer to the Phasing and Site and Safety Plans and Notes for additional information regarding the temporary closures during construction.

Runway 18L-36R and/or Runway 6-24 will be closed any time the Contractor is working within the existing runway safety area as depicted on the Phasing Plans. Runway closures shall be completed in accordance with the details shown in the Construction Plans. Prior to opening the Runway, a Representative of the Airport, the Contractor, and the Resident Engineer/Technician will inspect the respective runway to be sure the pavement is clean, all holes and trenches have been backfilled, and all equipment and materials are at least 250 feet from the Runway centerline. Any deficiencies noticed will be corrected before the Contractor will be allowed to re-open the runway.

The Contractor shall coordinate with the Airport and the Resident Engineer/Technician to turn off any airfield lighting circuits and/or Navaids temporarily affected by the construction work. When the work is completed, these circuits must be re-activated.

When a runway is closed the runway lighting system shall be shut off and the associated Navaids for that runway shall also be shut off. When a taxiway is closed the taxiway lighting system shall be shut off.

Except where shown otherwise on the plans, work within 81 feet of an active taxilane centerline shall require closure of that taxilane using barricades in accordance with the Phasing Plans.

Except where shown otherwise on the plans, work within 93 feet of an active taxiway centerline shall require closure of that taxiway using barricades in accordance with the Construction Safety Plan.

All work included in opening and closing the airfield pavements will be considered incidental to the Project and no additional compensation will be allowed.

The Airport Manager/Director shall be notified a minimum of **72 hours** in advance of any work that would require the closure of airfield pavements. It will be the responsibility of the Contractor to properly mark the closed runway, and when the runway is re-opened, to remove the marking. The appropriate marking for a closed runway is a cross at both ends of the runway. The legs of the cross will be 60 ft. in length and 10 ft. in width. The crosses will be constructed of any suitable, locally available materials, such as fabric, plywood, or other similar material. They will be held in place in a manner locally determined to be suitable. The crosses must be properly lighted during darkness and periods of reduced visibility. The Contractor will be responsible for placing and removing the crosses as the runways are closed and opened. The Contractor will provide the Engineer with a proposed schedule of when and length of time for all closures. The Project Engineer of Record must review and approve this schedule before any construction begins. The placement, maintenance and removal of the crosses will be considered as an incidental item to the contract and no additional compensation will be allowed.

Extreme care will be taken not to impose on the operations of any open runway or taxiway. The proposed Phasing Plan Sheets, as outlined on the Construction Plans and in the Special Provisions, will maximize safety and attempt to minimize disruption to Airport daily operations.

When the Contractor's vehicles are on Airport property, they shall be properly marked. The markings shall consist of a 3-ft sq. flag consisting of a checkered pattern of international orange and white squares of not less than 1 ft on each side displayed in full view above the vehicle. Contractor vehicles engaged in continuous hauling operations will not be required to display a flag.

The Contractor will be responsible for placing barricades and/or traffic cones at the locations shown on the Construction Plans, or as directed by the Airport Manager/Director. It will be the Contractor's responsibility to furnish and maintain the barricades equipped with red flashing or red, steady-burn lights and 20-in. sq. orange flags throughout the duration of this project.

The barricades and their maintenance will be considered as an incidental item to the contract, and no additional compensation will be allowed. Any cost of labor and equipment, which is necessary to ensure safety at the Airport during the duration of the project, will be considered incidental to the contract, and no additional reimbursement for these items of work will be received.

All runway closures and taxiway closures will be coordinated with the Airport Manager. The runway and/or taxiway will be closed in accordance with the procedures set forth on the Proposed phasing and Site and Safety Plans and Notes. Prior to re-opening the runway and/or taxiway, the Contractor will insure the following:

1. All holes/trenches have been backfilled.
2. All equipment has been moved outside the Runway Safety Area.
3. All trucks have their beds lowered and all cranes have their booms lowered.
4. There is no material stockpiled within the Runway Object Free Area.
5. All active pavements have been swept of foreign material.
6. All lighting circuits associated with the pavement being re-opened are active and functioning correctly.
7. Representatives of the Contractor, Airport Manager and Resident Engineer/ Technician shall inspect the pavement prior to re-opening. Anything noted will be corrected prior to re-opening."

Add the following:

70-26 Airport Security Notes. Airport security will be maintained at all times. The Contractor will monitor the site access to the proposed job site to insure no one will enter the access gate that is not authorized to be on the construction site or on the air side of the airport.

70-27 Maintaining Operation of Airfield Lighting and Navaids. Shutdown of airfield lighting and/or Navaids on an active pavement shall only be permitted during daylight hours and must be coordinated with and approved by the Airport Manager. All airfield lighting and Navaid circuits for an active pavement shall be operational at night fall. The Contractor shall not leave the runway lighting, taxiway lighting, or any other airfield lighting circuit inoperable overnight unless the respective pavement is closed. The Contractor shall provide temporary cable (in conduit where located above grade), connections and any manual operations of airfield lighting

to keep them in operation overnight. The Contractor shall secure, identify, and place temporary exposed wiring in conduit, duct, or unit duct to prevent electrocution and fire ignition sources in conformance with the requirements of FAA AC 150/5370-2G “OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION”.

70-28 Site Inspection. The Contractor shall be responsible for an on-site inspection prior to submitting a bid on this project. Upon receipt of a bid, it shall be assumed that the Contractor is fully familiar with the construction site.

70-29 Safety Plan Compliance Document (SPCD). Prior to the issuance of a construction Notice-to-Proceed (NTP), the Contractor shall be responsible for preparing and submitting a Safety Plan Compliance Document in accordance with FAA Advisory Circular 150/5370-2G, paragraph 2.4.2, or equivalent section in subsequent/current issue. The Airport Manager/Director shall approve this document and submit it to the Division of Aeronautics for approval prior to the NTP issuance.

END OF SECTION 70

SECTION 80. PROSECUTION AND PROGRESS

80-13 Work Area, Storage Area and Sequence of Operations. Add the following to this section:

The Contractor's personnel and equipment shall not traverse outside the designated work areas to other locations on the Airport. The designated haul route will be the only vehicular access to the construction site. It will be the responsibility of the Contractor to maintain the proposed haul route and equipment parking area for the duration of the project.

The Contractor will be responsible for obtaining any permits necessary to use the State/County/Township/City roads. All work required in complying with the above requirement will be considered incidental to the Contract, and no additional compensation will be allowed.

Failure to use the prescribed haul routes and equipment parking area or adhere to the safety requirements will result in the suspension of work.

Add the following:

80-14 Employee Parking. The Contractor’s employees shall park their personal vehicles in the designated Equipment Parking Area as shown on the Proposed Safety and Phasing Plan Sheets. The Contractor will transport the workers from the parking area to the work area. Only Contractor vehicles needed for construction will be allowed outside of the proposed equipment parking area. No employee vehicle will be allowed onto the proposed construction site.

80-15 Equipment Parking and Material Storage. The Contractor will be allowed to park equipment and store material in the Proposed Staging Area shown on the Safety and Phasing Plan Sheets. The Contractor will maintain this area throughout the duration of the project and restore it to its original condition upon completion of the project. This work will be considered incidental to the Contract and no additional compensation will be allowed.

END OF SECTION 80

Part 2 General Construction Items

Item 105 Mobilization

BASIS OF PAYMENT

105-3.1 Add the following to this section:

“Payment will be made under:

Item AR150520 Mobilization - per L. SUM”

END OF ITEM 105

Item 150 Resident Engineer Field Office

CONSTRUCTION METHODS

150-2.1 Revise the following in the list of equipment and furniture required in the office:

"b. One two-drawer legal letter size filing cabinet with lock and an Underwriter's Laboratories insulated file device 350 degrees one hour rating.

g. A functional internet Wi-Fi device such as a mobile hot spot providing hi-speed broadband internet access to the field office. Dial up, or equivalent, internet service will not be acceptable.

METHOD OF MEASUREMENT

150-3.1 Add the following to this section:

"The mobile hot spot, wireless Aircard, internet access and associated charges will be included in the contract unit price per lump sum for Engineer's Field Office. This price shall include all utility costs and shall reflect the salvage value of the building or buildings, equipment, and furniture which remain the property of the Contractor after release by the Engineer."

BASIS OF PAYMENT

150-4.1 Add the following to this section:

"Payment will be made under:

Item AR150510 Engineer's Field Office - per L. SUM"

END OF ITEM 150

ITEM 150530 TRAFFIC MAINTENANCE

DESCRIPTION

150530-1.1 This item of work shall consist of furnishing, installing, maintaining and removing traffic control devices as indicated on the plans and described herein.

CONSTRUCTION METHODS

150530-2.1 The Contractor shall erect and maintain all traffic control devices and personnel - signs, barricades, closure crosses, flag persons, etc., as indicated on the plans.

Unless specified otherwise, the following standards for traffic control will be applicable:

1. Manual of Uniform Traffic Control Devices for Streets and Highways, including the Illinois Supplement, latest edition.

2. FAA AC 150/5370-2, Operational Safety on Airports During Construction, latest edition.

The Contractor shall phase his operations as indicated on the plans.

The number and placement of barricades may be altered as determined by the Resident Engineer/Technician at no additional cost to the contract.

BASIS OF PAYMENT

150530-3.1 Payment will be made at the contract unit price per lump sum for traffic maintenance as specified above and on the construction plans. This price shall be full compensation for furnishing, installing, maintaining and removal of all materials, for all labor, equipment, and incidentals necessary to complete this item of work.

Payment will be made under:

Item AR150530 Traffic Maintenance - per L. SUM

END OF ITEM 150530

PART 13 – LIGHTING INSTALLATION

Item 101 Airport Rotating Beacons

DESCRIPTION

101-1.1 Add the following:

"**The L-802A(L) airport rotating beacon will be furnished by the Airport and installed by the Contractor. The contractor will be responsible for mounting hardware and platform to install the new beacon on the existing tower.**

The Contractor shall field-verify existing conditions to determine the extent of the work. The Contractor shall furnish a crane and all associated hoisting and rigging equipment as applicable for removal and/or installation of an airport rotating beacon. This work shall include the associated mounting hardware to interface the beacon to the pole, electrical equipment, conduit, wiring, grounding, site preparation, and all materials and incidentals necessary to place the airport rotating beacon in proper operating condition as a completed unit to the satisfaction of the Airport and the Engineer."

EQUIPMENT AND MATERIALS

101-2.1 General. Paragraph d. Add the following:

"The Contractor shall furnish shop drawings for approval before ordering equipment and/or materials. Shop drawings are required for each wire, conductor, and/or cable type to be used on the project. **Shop drawings shall be clear and legible. Copies that are illegible will be rejected.** Shop drawings shall include the following information:

(1) Certification of compliance with the AIP (Airport Improvement Program) Buy American Preferences for all materials and equipment. Do not submit ARRA (American Recovery and Reinvestment Act) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Do not submit NAFTA (North American Free Trade Agreement) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Shop drawings submitted without certification of compliance with the Airport Improvement Program Buy American Preferences or without certification of manufacture in the United States of America in accordance with the AIP Buy American Requirements will be rejected. See the FAA website at: http://www.faa.gov/airports/aip/buy_american/ for more information on the AIP Buy American Preferences requirements. FAA approved equipment that is on the FAA Buy American Conformance List or the list of Nationwide Buy American Waivers Issued by the FAA complies with the AIP Buy American Preferences and will not require additional waiver paperwork for AIP projects. See the FAA website at: http://www.faa.gov/airports/aip/buy_american/ for a list of Nationwide Buy American Waivers Issued by the FAA.

(2) In order to expedite the shop drawing review, inspection and/or testing of materials, the Contractor shall furnish complete statements to the Project Engineer as to the origin, composition, and manufacturer of all material to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

101-2.2 Beacon. Add the following:

"The airport rotating beacon shall be a new FAA approved L-802A(L) high intensity airport beacon, Class II (with heater), 120 VAC, with LED (Light Emitting Diode) lighting, and bird spikes in accordance with FAA Advisory circular 150/5345-12F (or current issue in effect) Specification for Airport and Heliport Beacons, **to be furnished by the Airport and installed by the Contractor**, as detailed on the Plans. The Contractor shall furnish and install surge protector. Contractor shall furnish and install a tell-tale relay for interface and control of obstruction lights. The obstruction lights shall illuminate when the beacon is off or when the beacon lamp fails. The Contractor will be responsible for mounting hardware and platform to install the new beacon on the existing tower."

101-2.6 Electrical wire and cable. Add the following:

"Wiring from the safety switch disconnect near the base of the beacon pole to the airport rotating beacon will be considered incidental to the beacon. Wire for power and control circuits shall be THWN Copper conductors. Cable shall be single conductor sized in accordance with National Electrical Code (NEC) 75ºC ampacity tables and/or as detailed herein. Cable shall comply with Underwriters' Laboratories Standard UL-83 and shall be UL-listed as VW-1. Conductor shall be soft-annealed, uncoated Copper, and shall comply with ASTM B3 and B8. Insulation shall be rated for 600-Volt. Insulation shall be polyvinyl-chloride conforming to Underwriters' Laboratories requirements for Type THW. The outer covering shall be nylon conforming to Underwriters' Laboratories for type THHN or THWN-2. Cable shall be UL-listed and marked THWN-2."

101-2.7 Conduit. Add the following:

"Liquid-Tight Flexible Metal Conduit. Liquid-tight, flexible metal conduit shall consist of polyvinyl jacket over flexible hot-dip, galvanized steel tubing. The flexible conduit shall be completely sealed from liquids, dust, dirt, and fumes and be resistant to oil, gasoline, grease, and abrasion. Jacket shall also be sunlight-resistant. Liquid-tight, flexible metal conduit shall be UL-listed, suitable for use as a grounding conductor, and comply with Article 350 of the NEC. Liquid-tight, flexible metal conduit and associated fittings shall be UL-listed to meet the requirements of NEC 350.6. Liquid-tight, flexible metal conduit shall be Anaconda Sealtite Type UA as manufactured by Anamet Electrical Inc., Liquatite Type LA as manufactured by Electri-Flex Company, Liquid-Tuff Type LFMC as manufactured by Atkore International AFC Cable Systems, or approved equal. Do not install liquid-tight, flexible metal conduit that is not UL listed. Confirm liquid-tight, flexible metal conduit bears the UL label prior to installation."

Add the following:

"101-2.10 Obstruction lights. Obstruction lights shall be FAA Type L-810(L) with infrared option single unit 120 VAC, steady burning red obstruction light, and shall comply with FAA AC 150/5345-43 (current issue in effect) and shall be on the current list of FAA-approved equipment noted in

FAA AC 150/5345-53D, Appendix 3 Addendum latest revision. Obstruction lights shall be manufactured in the United States of America to comply with the Airport Improvement Program Buy American Requirement or be on the Federal Aviation Administration list of Equipment meeting Buy American Requirements or on the list of Nationwide Buy American Waivers Issued by the FAA. Obstruction light fixtures shall include terminals for equipment ground wires.

101-2.11 Panelboard and Load Centers. Furnish and install a new panelboard or load center to replace the existing load center located at the platform on top of the beacon tower. The panelboard or load center shall be as detailed on the Plans and specified herein. Panelboards and/or load centers shall be manufactured in the United States to comply with the Airport Improvement Program Buy American Preferences requirements. Please note on recent projects Contractors have reported difficulty in obtaining load centers that are manufactured in the USA. Therefore, a panelboard might be required to comply with comply with the Airport Improvement Program Buy American Preferences requirements.

CONSTRUCTION METHODS

101-3.1 Placing the beacon. Add the following:

> "The beacon shall be mounted on the beacon tower/pole in accordance with the beacon manufacturer's recommendations and instructions."

101-3.6 Beacon mounting platform. Add the following:

> "The proposed beacon shall be mounted to the beacon plate-mounting on top of the beacon tower/pole. The Contractor shall make any necessary modifications to the beacon plate in order to bolt the proposed beacon to the beacon plate and interface to the existing beacon tower."

101-3.7 Wiring. Add the following:

> "The Contractor shall furnish and install all electrical materials necessary for complete and operational installation, as stipulated in this respective Item. The complete installation and wiring shall be done in a neat, workmanlike manner. All electrical work shall comply with the requirements of the NFPA 70 – National Electrical Code (NEC), most current issue in force. Equipment shall be installed, in conformance with the respective manufacturer's directions and recommendations for the respective application. Any installations which void the UL listing, ETL/Intertek Testing Services verification/listing (or other third-party listing), and/or the manufacturer's warranty of a device will not be permitted."

Add the following:

101-3.15 Installation of Panelboards and Load Centers. Panelboards shall be thoroughly inspected for physical damage, proper alignment, anchorage, and grounding. The exterior finish shall be inspected for blemishes, nicks, and bare spots and touched up, as required, using matching touch-up paint. Inspections shall be made for proper installation and tightness of connections for circuit breakers. Install panelboards, as shown on the Plans and in accordance with NEMA PB1.1. Maximum distance from floor to highest breaker shall not exceed 6 ft-6 in. Install panelboards plumb. Install circuit breakers in panelboards in conformance with the

respective manufacturer's directions. Connect only one wire/cable to each breaker terminal unless the breaker is rated for multiple conductors. Provide filler plates for unused spaces in panelboards. Provide typed circuit directory for each branch circuit panelboard to identify the respective device fed by each circuit breaker. Revise directory to reflect circuiting changes, as required. Provide legend plates for all panelboards to identify the panelboard designation, the power source, and the voltage system. Legend plates shall be weatherproof and abrasion-resistant, phenolic material. Lettering shall be black on white background. Panelboards shall be thoroughly tested after installation and connection to respective loads.

101-3.16 Safety. It is recommended that the beacon work and access to the beacon tower platform be performed with the use of a high lift bucket truck and approved safety equipment. Under no circumstances should the beacon tower be climbed without standard climbing safety equipment.

Contractor shall coordinate work and any power outages with the Airport Superintendent or respective Airport personnel. Any shutdown of existing systems shall be scheduled with and approved by the Airport Superintendent prior to shut down. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures, including, but not limited to, 29 CFR Section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment, the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on the system.

The Contractor shall comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

101-3.17 Locate existing underground utilities and cables. The location, size, and type of material of existing underground and/or aboveground utilities indicated on the Plans are not represented as being accurate, sufficient, or complete. Neither the Owner nor the Engineer assumes any responsibility whatever in respect to the accuracy, completeness, or sufficiency of the information. There is no guarantee, either expressed or implied, that the locations, size, and type of material 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 service connections to underground utilities. Prior to construction, the Contractor shall notify the utility companies of his operational plans, and shall obtain from the respective utility companies detailed information and assistance relative to the location of their facilities and the working schedule of the companies for removal or adjustment, where required. In the event an unexpected utility interference is encountered during construction, the Contractor shall immediately notify the utility company of jurisdiction. The Owner's Representative and/or the Resident Engineer/Resident Technician shall also be immediately notified. Any damage to such mains and services shall be restored to service at once and paid for by the Contractor at no additional cost to the Contract.

All utility cables and lines shall be located by the respective utility. **Contact JULIE (Joint Utility Location Information for Excavators) for utility information, phone: 1-800-892-0123.** Contact the FAA (Federal Aviation Administration) for assistance in locating FAA cables and utilities. Location of FAA power, control, and communication cables shall be coordinated with and/or located by the FAA. Also contact Airport Manager/Director/Superintendent and Airport

Personnel for assistance in locating underground Airport cables and/or utilities. Also coordinate work with all aboveground utilities.

101-3.18 Beacon removal. The Contractor shall comply with the following regarding beacon removal.

a. Contractor shall coordinate removal of the existing beacon with installation of the new beacon to minimize the time the Airport is without an operational beacon.

b. Contractor shall examine the site to determine the extent of the work.

c. Contractor shall coordinate work and any power outages with the Airport Superintendent, the respective Airport personnel, and the Resident Engineer/Resident Technician. Any shutdown of existing systems shall be scheduled with and approved by the Airport Superintendent prior to shut down. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures, including, but not limited to, 29 CFR Section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment, the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on the system.

d. Contractor shall comply with the requirements of FAA AC No. 150/5370-2 (current issue in effect) “OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION”.

e. Contractor shall comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

f. Power for the respective beacon shall be disconnected at the respective power source prior to removing the beacon. **Power for the existing beacon is understood to be powered from the Airport Electrical Vault.** Contractor shall field verify to confirm the respective power source for the beacon.

g. The Contractor shall coordinate with and notify the Airport Superintendent and the Resident Engineer/Resident Technician and provide a schedule for beacon removal and the installation of the new beacon. The existing electrical cables from the vault shall be disconnected and abandoned in place or removed to accommodate new construction.

h. Existing cables associated with beacon removal shall be removed where accessible and abandoned in place elsewhere. If the Contractor elects to salvage the cable within the circuit to be removed, shown in the Construction Plans as cable to be abandoned, any cost associated with removal of the cable shall be considered incidental to the Contract and no additional compensation will be allowed.

i. The existing beacon shall be carefully removed to ensure the safety of personnel and property. Per the direction of the Airport the existing beacon shall be removed from the Airport site and disposed of by the Contractor.

METHOD OF MEASUREMENT

101-4.1. Add the following:

"The L-802A(L) airport rotating beacon will be furnished by the Airport and installed by the Contractor. The quantity to be paid for shall be the number of beacons installed as completed units in place, accepted, and ready for operation. This item shall be measured for payment as a unit price per each and shall consist of the installation of the airport rotating beacon on top of the beacon tower/pole and all labor, materials, equipment, panelboard, load center and/or safety switch with support structure, surge protection, lightning protection, conduit, wiring, grounding, site preparation, electrical work, tools, operational instructions, coordination, mounting, mounting hardware and platform for the beacon, leveling, adjusting, painting, servicing, testing, and all incidentals necessary to place the respective installation into proper working order to the satisfaction of the Airport and the Engineer. The cables and conduits from the base of the beacon tower/pole to the beacon shall be incidental to this item.

Removal of the existing beacon will be paid for on a per each basis and shall include removal of the beacon and associated wiring from the power source to the beacon. This item shall include all equipment, tools, labor, safety procedures, coordination, and incidental to safely remove the beacon.

All lockout/tagout procedures to ensure and maintain safety of personnel will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed."

BASIS OF PAYMENT

101-5.1. Add the following:

Payment will be made under:

Item AS101515 High Intensity Airport Beacon - per EACH"

Item AS101900 Beacon Removal - per EACH"

END OF ITEM 101

Item 103 Airport Beacon Towers

EQUIPMENT AND MATERIALS

103-2.2 Tower. Add the following:

"Tower for the beacon is an existing steel tubular tower approximately 51 feet in height with platform at top to accommodate a 36-inch (or smaller) airport rotating beacon.

103-2.3 Lightning protection. Add the following:

"Air terminals shall be UL-listed, Class II (1/2" minimum diameter), and Nickel-plated Copper with blunt tips. Lightning rods shall extend 10" minimum above the top of the airport rotating beacon and obstruction lights to conform to NFPA 780, 4.6.2 Air Terminal Height. Lightning rods shall be manufactured by Thompson Lightning Protection, Inc., Robbins Lightning Protection, Harger Lightning Protection/Grounding Equipment, or approved equal.

Lightning protection down conductor shall have 32 strands of #17 tinned copper wire, 7/16" overall diameter, braided smooth twist, 65,500 circular mils, and at net weight of approximately 215 pounds per 1,000 feet, Thompson Lightning Protection Cat. No. 32, Robbins Lightning Protection Catalog Number 1, Harger Part Number 32T, or approved equal. Include a flexible connection for the lightning protection down conductor at the hinge location on the pole.

Ground rods shall be 3/4-inch diameter by 20-feet long, UL-listed, Copper-clad with 10-mils minimum Copper coating. Steel used to manufacture ground rods shall be 100 percent domestic steel"

CONSTRUCTION METHODS

103-3.4 Lightning protection. Add the following:

"Ground rods shall be located at least 2 feet from the tower foundation and shall not be spaced less than one rod length apart (20 feet for ground rods that are 20 feet in length). The ground rods shall be driven into the earth so that the top of the rod is at least 12 inches below finish grade. If there are difficulties encountered when installing the grounding electrode system, contact the Project Engineer of Record for further directions. The tower shall be bonded to the ground rods with a #2 AWG bare stranded copper conductor. Connections to the ground rods shall be with exothermic weld type connectors, Cadweld by nVent Erico Products, Inc., Thermoweld by Continental Industries, Inc., Ultraweld by Harger, or approved equal. The resistance to ground of any part of the lightning protection system shall not exceed 25 Ohms. The Contractor shall test the made electrode ground rods with an instrument specifically designed for testing ground field systems. If ground resistance exceeds 25 Ohms, first check to make sure the earth ground resistance tester is properly calibrated, the batteries are in good working order, and the tester is being properly used in accordance with the manufacturer's instructions. If ground resistance still exceeds 25 Ohms, then check to make sure connections are good and secure, and correct where applicable. If ground

resistance still exceeds 25 Ohms, contact the Project Engineer for further directions. The Beacon Tower is specified to have multiple ground rods to as recommended by NFPA 780 Annex B ‘‘Principles of Lightning Protection” and National Electrical Code requirements where a single grounding electrode does not achieve ground resistance of 25 Ohms or less. Copies of ground system test results shall be furnished to the Resident Engineer and the Project Engineer of Record. Grounding is considered incidental to the respective item for which it is required.”

Add the following:

103-3.6 Locate existing underground utilities and cables. The location, size, and type of material of existing underground and/or aboveground utilities indicated on the Plans are not represented as being accurate, sufficient, or complete. Neither the Owner nor the Engineer assumes any responsibility whatever in respect to the accuracy, completeness, or sufficiency of the information. There is no guarantee, either expressed or implied, that the locations, size, and type of material 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 service connections to underground utilities. Prior to construction, the Contractor shall notify the utility companies of his operational plans, and shall obtain from the respective utility companies detailed information and assistance relative to the location of their facilities and the working schedule of the companies for removal or adjustment, where required. In the event an unexpected utility interference is encountered during construction, the Contractor shall immediately notify the utility company of jurisdiction. The Owner’s Representative and/or the Resident Engineer/Resident Technician shall also be immediately notified. Any damage to such mains and services shall be restored to service at once and paid for by the Contractor at no additional cost to the Contract.

All utility cables and lines shall be located by the respective utility. **Contact JULIE (Joint Utility Location Information for Excavators) for utility information, phone: 1-800-892-0123.** Contact the FAA (Federal Aviation Administration) for assistance in locating FAA cables and utilities. Location of FAA power, control, and communication cables shall be coordinated with and/or located by the FAA. Also contact Airport Director/Manager/Superintendent and Airport Personnel for assistance in locating underground Airport cables and/or utilities. Also coordinate work with all aboveground utilities.

METHOD OF MEASUREMENT

103-4.1 Add the following:

“Replacements of electrical, lightning protection, and grounding associated with the beacon and beacon tower will be considered incidental to the item for which it is necessary, and no additional compensation will be provided.

All lockout/tagout procedures to ensure and maintain safety of personnel will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.”

END OF ITEM 103

ITEM 107 Airport Wind Cones

DESCRIPTION

107-1.1 Add the following:

"**The L-806(L) supplemental wind cone(s) will be furnished by the Airport and installed by the Contractor. The existing foundations and L-867tranformer cans shall be reused in place. Contractor will be responsible for the series isolation transformer, extension cords, frangible couplings and mounting hardware, wiring, connections, grounding, and associated incidentals to replace the existing wind cones and install new wind cone(s).**"

EQUIPMENT AND MATERIALS

107-2.1 General. Paragraph d. Add the following:

"The Contractor shall furnish shop drawings for approval before ordering equipment and/or materials. Shop drawings are required for each wire, conductor, and/or cable type to be used on the project. **Shop drawings shall be clear and legible. Copies that are illegible will be rejected.** Shop drawings shall include the following information:

(1) Provide cut sheets with manufacturer's name, catalog number, dimensions, material and UL listing for each type and size ground rod. Include certification of manufacture in the United States of America from 100% domestic steel for ground rods.

107-2.2 Wind cones. Add the following:

"**The L-806(L) supplemental wind cone(s) will be furnished by the Airport and installed by the Contractor.** The supplemental L-806(L) wind cones shall be manufactured in compliance with Federal Aviation Administration (FAA) Specification AC 150/5345-27 (most current issue in effect) and shall be FAA approved (ETL/Intertek Testing Services - Certified). Wind cone shall be a Type L-806(L), Style I-B (internally lighted) with lighting emitting diode illumination, Size 1 (18 inches diameter by 8 feet long) orange nylon windsock, 6.6 Amp series circuit power, mounted on a frangible base pole. The pole and support structure shall be factory-painted "Aviation Orange". Wind cone shall be equipped with an L-810(L) obstruction light mounted on the top of the mast. Overall height of wind cone and support assembly shall not exceed 10 feet. Wind cone lighting shall provide constant-brightness series circuit power adapter suitable for operation on a five step (2.8 Amp. 3.4 Amp, 4.1 Amp, 5.2 Amp, and 6.6 Amp) series circuit or a three step (4.8 Amp, 5.5 Amp, and 6.6 Amp) series circuit. Include a series circuit isolation transformer rated for the respective wind cone and compatible with the respective series circuit power.

Add the following:

107-2.9 Ground rods. Ground rods shall be 3/4-inch diameter by 20-feet long UL listed copper clad with 10 mils (minimum) copper coating (two 3/4-inch diameter by 10-feet long ground rods coupled together to form a ground rod 20 feet in length). Two 3/4-inch diameter by 20-feet long ground rods spaced a minimum of one rod length apart (20 feet for a ground rod that is 20 feet in length) shall be furnished and installed for each wind cone. Ground rods shall be manufactured in the United States of America. Steel used to manufacture ground rods shall be 100 percent domestic steel to comply with the Airport Improvement Program Buy American Requirements.

CONSTRUCTION METHODS

107-3.1 Installation. Add the following to this section:

a. The support pole shall be installed on a concrete foundation, as detailed on the Plans. The Contractor shall furnish and install all electrical materials necessary for complete and operational installation of each wind cone, as detailed herein and in accordance with the manufacturer's instructions. The complete installation and wiring shall be done in a neat, workmanlike manner. All electrical work shall comply with the requirements of NFPA 70 - National Electrical Code (NEC), most current issue in force. Wind cones shall be installed in conformance with the respective manufacturer's directions and recommendations for the respective application. Any installations which void the UL listing, ETL/Intertek Testing Services verification/listing (or other third-party listing), and/or the manufacturer's warranty of a device will not be permitted.

b. Per the requirements of FAA AC 150/5340-26C, Chapter 3, Section 3.6.6 Use of Original Equipment Manufacturer (OEM) Part, it notes the following: "***The use of non-OEM parts or lamps in FAA approved equipment is strongly discouraged. The FAA has strict specifications for approval of all airport lighting equipment and use of non-OEM parts or lamps in such equipment or systems can render the equipment to be functionally non-FAA approved. This could possibly lead to serious liability consequences in case of an aircraft incident at an airport following these practices. In the case of runway and taxiway lighting fixtures, the use of a generic, non-approved lamp can render the photometric output of the fixture out of specification and adversely affect the safety of low visibility operations."***

c. The Contractor shall keep a copy of the latest NEC in force on site at all times during construction for use as a reference.

d. The Contractor should examine the proposed site to evaluate the complexity of the work.

e. Contractor shall coordinate work and any power outages to airfield lighting systems, buildings or facilities located on the Airport with the Airport Manager. Where FAA facilities are affected, the Contractor shall coordinate work and any power outages with the Airport Manager and the respective FAA personnel. Any shutdown of existing systems shall be scheduled with and approved by the Airport Manager prior to shutdown. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow OSHA 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures, including, but not limited to,

29 CFR Section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment, the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on the system.

f. Contractor shall comply with the requirements of FAA AC No. 150/5370-2F (or most current issue) "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION".

g. Contractor shall comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

h. The Contractor shall be responsible for furnishing and setting all anchor bolts required to install his equipment.

107-3.15 Ground Connect and Ground Rod

Add the following:

"Grounding for Wind Cones shall conform to the respective Wind Cone manufacturer's installation instructions, as detailed on the Plans, and as specified herein. Furnish and install two 3/4-inch diameter by 20-feet long UL listed Copper-clad ground rods spaced not less than one rod length apart (20 feet) at each wind cone. Bond each wind cone support pole and the wind cone transformer base can to the respective ground rod in accordance with the manufacturer's instructions with a #6 AWG bare stranded copper grounding electrode conductor. The grounding electrode conductor shall be continuous from the wind cone support pole to the ground rods. Connect the ground rod furthest from the wind cone to the equal potential grounding system for the runway airfield lighting. Top of ground rods shall be buried 30 inches below grade. All connections to ground rods shall be exothermic weld as manufactured by Cadweld, Thermoweld, Ultraweld, or approved equal. Connection to wind cone support pole shall be with a UL listed pipe grounding clamp or with the wind cone manufacturer's ground lug. For each Wind cone, and splice/transformer/base can, the Contractor shall test and record the earth ground resistance for the made electrode ground system with an instrument specifically designed for testing ground systems. Test results shall be recorded for each wind cone and splice/transformer/base can. **If there are difficulties encountered when installing the grounding electrode system, contact the Project Engineer of Record for further directions. If ground resistance exceeds 25 Ohms, first check to make sure the earth ground resistance tester is properly calibrated, the batteries are in good working order, and the tester is being properly used in accordance with the manufacturer's instructions. If ground resistance still exceeds 25 Ohms, then check to make sure connections are good and secure, and correct where applicable. If ground resistance still exceeds 25 Ohms, check to make sure the ground rod(s) are connected to the equal potential grounding system (ground ring). At least two ground rods are required for each wind cone to comply with 2023 NEC 250.53(A)(2) "Supplemental Electrode Required". Contact the Project Engineer of Record for further directions, where applicable. Copies of ground system test results shall be furnished to the Resident Engineer and the Project Engineer of Record. Grounding is considered incidental to the respective item for which it is required."**

Add the following:

107-3.10 Restoration. All turf areas disturbed by the installation of the wind cone and associated work shall be restored, graded, and seeded to establish a stand of grass to the satisfaction of the Resident Engineer and will be considered as incidental to the installation of each wind cone.

107-3.11 Instruction of airport staff. Contractor shall provide instruction to airport staff in regard to the operation and maintenance of the wind cones and associated equipment. Contractor shall demonstrate operating procedures, lamp changing procedures, and items requiring maintenance. Contractor shall furnish operation and maintenance manuals for wind cones and associated equipment.

107-3.12 Locating existing underground utilities and cables. The location, size, and type of material of existing underground and/or aboveground utilities indicated on the Plans are not represented as being accurate, sufficient, or complete. Neither the Owner nor the Engineer assumes any responsibility whatever in respect to the accuracy, completeness, or sufficiency of the information. There is no guarantee, either expressed or implied, that the locations, size, and type of material 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 service connections to underground utilities. Prior to construction, the Contractor shall notify the utility companies of his operational plans and shall obtain from the respective utility companies detailed information and assistance relative to the location of their facilities and the working schedule of the companies for removal or adjustment, where required. In the event an unexpected utility interference is encountered during construction, the Contractor shall immediately notify the utility company of jurisdiction. The Owner's Representative and/or the Resident Engineer shall also be immediately notified. Any damage to such mains and services shall be restored to service at once and paid for by the Contractor at no additional cost to the Contract.

All utility cables and lines shall be located by the respective utility. Contact JULIE (Joint Utility Location Information for Excavators) for utility information, phone: 1-800-892-0123. Contact the FAA (Federal Aviation Administration) for assistance in locating FAA cables and utilities. Location of FAA power, control, and communication cables shall be coordinated with and/or located by the FAA. Also contact Airport Director/Manager and Airport Personnel for assistance in locating underground Airport cables and/or utilities. Also coordinate work with all aboveground utilities.

Contractor shall locate and mark all existing cables within 10 ft of proposed excavating/trenching area. Any cables found interfering with proposed excavation or cable/trenching shall be hand dug and exposed. Any damaged cables shall be immediately repaired to the satisfaction of the Resident Engineer at the Contractor's expense. The Resident Engineer and Owner shall be notified immediately if any cables are damaged.

Payment for locating and marking underground utilities and cables will not be paid for separately but shall be considered incidental to the respective wind cone, cable, and/or duct installation.

107-3.14 Remove Wind Cone.

a. The Contractor shall examine the site to determine the extent of the work. Contractor shall field verify existing site conditions. Contractor shall field verify the respective circuits and

power sources prior to removing, disconnecting, relocating, working on, or connecting the respective Wind Cone unit, NAVAID, circuit, Vault equipment, or other device. Power for the Wind Cone system shall be disconnected at the respective power source prior to removing the unit. Power for the existing supplemental wind cones located on the main Runway 18L-36R are understood to be powered from the respective constant current regulators located in the Airport Electrical Vault.

b. Contractor shall coordinate work and any power outages with the Airport Manager, the respective Airport personnel, and the Resident Engineer/Resident Technician. Any shutdown of existing systems shall be scheduled with and approved by the Airport Manager prior to shutdown. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures, including, but not limited to, 29 CFR Section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment, the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on the system.

c. Contractor shall comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

d. Removal of the Wind Cone shall include the removal of the Wind Cone and support hardware. The existing wind cone foundation(s) shall remain in place and be reused with the replacement wind cone(s). The Airport shall retain the salvage rights for the Wind Cone. In the event the Airport does not want the Wind Cone the Contractor shall remove and dispose of the Wind Cone off the Airport site in a legal manner. The Contractor shall coordinate with and notify the Airport Manager and the Resident Engineer/Resident Technician and provide a schedule for Wind Cone removal and installation of the new primary wind cone. The existing electrical cables from the airport electrical vault shall be disconnected, removed where accessible or in conflict with new work and abandoned in place elsewhere. The disturbed area will be restored, graded, and seeded to the satisfaction of the Engineer, and will be considered as an incidental item to the removal of the Wind Cone.

METHOD OF MEASUREMENT

107-4.1. Add the following:

"**The L-806(L) supplemental wind cone(s) will be furnished by the Airport and installed by the Contractor. The existing foundations and L-867tranformer cans shall be reused in place. Contractor will be responsible for the series isolation transformer, extension cords, frangible couplings and mounting hardware, wiring, connections, grounding, and associated incidentals to replace the existing wind cones and install new wind cone(s).**

Ground resistance tests for the made electrode ground system at each wind cone will be considered incidental to the respective wind cone pay item and no additional compensation will be allowed.

Testing the airfield lighting systems and the associated cable tests will be considered incidental to the Contract and no additional compensation will be allowed.

Conduits, conduit nipples, conduit couplings, and other conduit fittings needed to interface the replacement wind cones to the respective runway lighting series circuit, will be considered incidental to the respective item for which they are installed, and no additional compensation will be made.

Ground rods, grounding electrode conductors, connections, and associated grounding work included with airfield lights, taxi guidance signs, and/or splice cans will be considered incidental to the respective item for which they are installed, and no additional compensation will be made.

All lockout/tagout procedures to ensure and maintain safety of personnel will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

Where the Additive Alternate Bid items for Remove Wind Cone and Replace Wind Cone are awarded the **Item AR125400 Replace Isolation Transformer** will be deducted from the base bid pay items for the respective transformers to be used with existing wind cones."

BASIS OF PAYMENT

107-5.1. Add the following:

"Payment will be made under:

Item AT107900	Remove Wind Cone – per EACH
Item AT107920	Replace Wind Cone - per EACH"

REFERENCES

Add the following:

National Fire Protection Association (NFPA)

NFPA 70E Standard for Electrical Safety in the Workplace.

Occupational Safety and Health Administration

OSHA 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures.

END OF ITEM 107

Item 108 Underground Power Cable for Airports

EQUIPMENT AND MATERIALS

108-2.1 General. Paragraph d. Add the following:

"The Contractor shall furnish shop drawings for approval before ordering equipment and/or materials. Shop drawings are required for each wire, conductor, and/or cable type to be used on the project. **Shop drawings shall be clear and legible. Copies that are illegible will be rejected.** Shop drawings shall include the following information:

(1) Certification of compliance with the AIP (Airport Improvement Program) Buy American Preferences for all materials and equipment. Do not submit ARRA (American Recovery and Reinvestment Act) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Do not submit NAFTA (North American Free Trade Agreement) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Shop drawings submitted without certification of compliance with the Airport Improvement Program Buy American Preferences or without certification of manufacture in the United States of America in accordance with the AIP Buy American Requirements will be rejected. See the FAA website at: http://www.faa.gov/airports/aip/buy_american/ for more information on the AIP Buy American Preferences requirements. FAA approved equipment that is on the FAA Buy American Conformance List or the list of Nationwide Buy American Waivers Issued by the FAA complies with the AIP Buy American Preferences and will not require additional waiver paperwork for AIP projects. See the FAA website at: http://www.faa.gov/airports/aip/buy_american/ for a list of Nationwide Buy American Waivers Issued by the FAA.

(2) In order to expedite the shop drawing review, inspection and/or testing of materials, the Contractor shall furnish complete statements to the Project Engineer of Record as to the origin, composition, and manufacturer of all material to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

(3) Illinois Department of Transportation Division of Aeronautics requires the following: ***"Under the FAA Buy American Preference, the contractor is required to submit certification that assures only domestic steel, domestic materials and domestic manufactured products are used. The Buy American statement must come from the producer, not the supplier. Producer verification must state that the items are produced in the United States and are made from 100% domestic materials. Statements that solely refer to the "Buy American Act" or "ARRA" or any federal purchasing act other than Title 49 United States Code (USC), Section 50101 will be rejected. Producers may use the Illinois Department of Transportation Domestic Material Compliance Certification Form AER 25 to satisfy this requirement."***

(4) Indicate the pay item number for each respective cable and/or cable in unit duct.

(5) Shop drawings shall include wire/conductor/cable cut sheets with type, size, specifications, Intertek Testing Services verification/ETL listing or UL listing,

manufacturer, and catalog or part number.

(6) Where cable is required to have colored coded insulation, provide information on the color coding for the respective conductors.

108-2.1 General. Paragraph f. Add the following:

"All cable shall be FAA approved or UL-listed as suitable for installed application. Cable furnished on this project shall comply with the requirements of the "Airport Improvement Program Buy American Preference requirements. All conductors shall be Copper."

108-2.2 Cable. Add the following:

"Cable for use with airfield lighting series circuits (including runway lighting, taxiway lighting and taxi guidance signs) shall be one conductor No. 8, 5,000-Volt, FAA L-824, Type C, stranded.

XLP-USE Wire. Cable shall comply with UL Standard 44, UL Standard 854, and Federal Specification A-A-59544. The conductor shall be concentric-strand, soft Copper, conforming to ASTM B8 and Underwriters' Laboratories Standard UL44 for Rubber Insulated Wires. Insulation shall be rated for 600-Volt. Insulation shall be cross-linked polyethylene conforming to Underwriters Laboratories Requirements for Type USE-2 insulation. Cable shall be UL-listed and marked USE-2.

Color-coding: Color-code phase and neutral conductor insulation for No. 6 AWG or smaller. Provide colored marking tape or colored insulation for phase and neutral conductors for No. 4 AWG and larger. Insulated ground conductors shall have green colored insulation for all conductor sizes (AWG and/or KCMIL) to comply with NEC 250.119. Neutral conductors shall have white colored insulation for No. 6 AWG and smaller to meet the requirements of NEC 200.6. Standard colors for power wiring and branch circuits for 120/240 VAC, 1-Phase, 3-Wire system shall be Phase A – Black, Phase B – Red, Neutral – White, and Ground – Green.

Item AS108088, 1/C #8 XLP-USE shall consist of 1/C #8 AWG, XLP-USE, 600 Volt cable or 1/C #8 AWG, FAA L-824, Type C, 5,000 Volt or 600 Volt cable. Conductor insulation for 120/240 VAC, 1 phase, 3-wire with ground circuits shall be color-coded: Phase A – Black, Phase B – Red, Neutral -White, and Ground – Green. This conductor shall be used to feed the airport rotating beacon from the airport electrical vault to the load center at the top of the beacon tower platform.

Item AR108108, 1/C #8 5KV UG Cable shall be one conductor No. 8 AWG, 5,000-Volt, FAA L-824, Type C, stranded copper cable.

108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods) Add the following:

"Item AR108756 1/C #6 Ground shall be #6 AWG bare tinned solid Copper ground wire conforming to ASTM B3. Where the #6 ground is run with the respective series circuit conductor and terminates on the interior of a base/splice/junction can, it may be stranded or solid. Item AR108756 1/C #6 Ground shall be used to bond together each ground rod at the respective airfield light fixtures, base, splice/junction cans, and taxi

guidance signs to form a ground ring for the respective airfield lighting system."

108-2.4 Cable connections. Add the following to this section:

"All below grade splices shall be installed in splice cans, handholes, or manholes. Splice cans shall be L-867, Class IA, Size D (16 in. diameter), 24 in. deep, with ½ in. thick, galvanized steel cover and stainless-steel bolts, unless shown otherwise on the Plans. Larger-sized splice cans shall be provided, as applicable, for specific equipment applications or manufacturer's recommendations, and/or where detailed on the Plans. Splice cans located in areas subject to heavy aircraft or vehicle loading shall be L-868 type. The Engineer shall approve all splice locations before work commences. The furnishing and installing of splice cans for new homerun cables shall be incidental to the respective cable pay item, and no additional compensation will be allowed."

108-2.5 Splicer qualifications. Add the following to comply with the requirements of FAA Advisory Circular Number 150/5370-10H Standards for Specifying Construction of Airports, Item L-108 Underground Power Cable for Airports:

"Every airfield lighting cable splicer shall be qualified in making cable splices and terminations on cables rated at and/or above 5000 Volts AC. The Contractor shall submit to the Project Engineer of Record proof of the qualifications of each proposed cable splicer for the cable type and voltage level to be worked on, prior to any cable splicing work. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable."

CONSTRUCTION METHODS

108-3.1 General. Add the following to this section:

"Keep all work, power outages, and/or shut down of existing systems coordinated with the Airport Director/Manager and the Resident Engineer. Any shutdown of existing systems shall be scheduled with and approved by the Airport Director/Manager prior to shut down. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment, the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on the system.

Examine the site to determine the extent of the work. Contractor shall field verify existing site conditions.

Verify respective circuits, power sources, and site conditions prior to removing, disconnecting, relocating, installing, connecting, or working on the respective airfield lighting, taxi sign, NAVAID, Vault equipment or other device. Identify each respective circuit prior to performing work on that circuit.

If the Contractor wishes to lay cable on a line other than that shown on the Plans, he shall obtain approval of the Project Engineer of Record before doing so and coordinate with the Resident Engineer. Any additional cable needed because of such a change will be at the Contractor's expense.

New airfield lighting series circuit cables shall be installed a minimum of 18 inches below grade to comply with NEC 300.5 Underground Installations. Deeper depths might be required to avoid obstructions, or where detailed herein.

Locate and identify all existing underground utilities located within the area where the proposed cables are being installed and take all precautions to protect these utilities from damage. Care shall be taken so as not to damage any existing circuits. Any existing circuits damaged shall be immediately repaired to the satisfaction of the Engineer and/or the respective utility or owner where applicable. Any underground utility damaged will be repaired or replaced at the Contractor's own expense. Any repairs of existing cables will be considered incidental to the contract, and no additional compensation will be allowed.

In areas where there is a congestion of buried cables or where the proposed cable crosses an existing cable, the Contractor will be required to hand dig and/or carefully excavate the trench necessary for the proposed cable. At other locations, the proposed cable in unit duct, or conduit may be trenched or plowed into place. Hand digging, trenching, and/or plowing will be considered incidental to the proposed cables and no additional compensation will be allowed.

Grounding work and modifications shall not be performed during a thunderstorm or when a thunderstorm is predicted in the area. Grounding for airfield lights and taxi signs shall be as detailed on the Plans and as specified herein.

Homerun cables for a respective circuit that are installed in conduit or duct shall be run together in the same raceway or duct.

The respective personnel performing airfield lighting work, vault work, and/or tests shall be familiar with, and qualified to work on 5000-volt airfield lighting series circuits, constant current regulators and associated airport electrical vault equipment. Please understand that airfield lighting series circuits are dangerous and only qualified personnel should be permitted to work on them and safety procedures need to be followed. NFPA 70 - National Electrical Code defines a Qualified Person as "***One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has revied safety training to recognize and avoid the hazards involved."*** NFPA 70E Standard for Electrical Safety in the Workplace defines a Qualified Person as "***One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk."*** OSHA (Occupational Safety and Health Administration), Part Number 1910 Occupational Safety and Health Standards, Subpart S, Electrical, Standard Number 1910.399 defines Qualified person as follows: "***Qualified person. One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the***

hazards involved." Safety of personnel is the top priority. Follow safety procedures for all work. Only qualified and experienced personnel should be permitted to work on airfield lighting series circuits.

FAA requires that every airfield lighting cable splicer shall be qualified in making cable splices and terminations on cables rated at and/or above 5000 Volts AC and shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

Only cable in unit duct may be plowed or directional-bored.

Obey and comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

The Contractor shall comply with the requirements of FAA AC No. 150/5370-2 (current issue in effect) "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION".

In the event a conflict is determined with respect to manufacturer installation instructions, National Electrical Code, and/or the Contract Documents, contact the Project Engineer of Record for further directions.

Secure, identify and place any above ground temporary wiring in conduit to prevent electrocution and fire ignition sources in conformance with the requirements of FAA AC 150/5370-2G, Part 2.18.3 "Lighting and Visual NAVAIDs". All temporary installations shall comply with National Electrical Code Article 590 – "Temporary Installations."

Existing ducts and cables associated with removal work shall be abandoned in place unless it conflicts with the installation of the airfield light, sign, duct, cable, handhole, manhole, site work, pavement or other work, then it shall be disconnected, removed, and disposed of off the site at no additional cost to the Contract. Contractor may remove abandoned cables at no additional cost to the Contract and shall have the salvage rights to abandoned cables.

Other construction projects might be in progress on the Airport at the same time as this project. The Contractor will be required to cooperate with all other contractors and the Airport Director/Manager in the coordination of the work.

Relocation of existing cables and/or cable in unit duct will require careful excavation of the cables to prevent damage to them. The cables and/or cable in unit duct shall be excavated and exposed and then relocated to a different depth and/or route to accommodate the respective site work.

The cable quantities as shown on the Construction plans are based on straight-line measurement. All other cable lengths, such as slack or waste, will not be measured for payment.

All cables installed by the Contractor shall be properly labeled and tagged at all points of access (handholes, manholes, terminal panels, control panels, and the respective wireway in the vault).

All changes to the airfield lighting system shall be documented by the Contractor and provided to the Resident Engineer."

108-3.5 Splicing. Add the following:

"In-line connections for existing 600 Volt cables cut during construction shall be repaired with a cast splice kit. cast splice kit. The Contractor shall have a minimum of ten splice kits for each type of splice, on the job site at all times for emergency repairs. Cast splice kits shall be specified in paragraph 108-2.4, a.

In-line connections for existing 5,000 Volt series circuit cables cut during construction shall be repaired with an FAA approved L-823 connector kit properly sized for the respective cables. The Contractor shall have a minimum of ten splice kits for each type of splice, on the job site at all times for emergency repairs. FAA approved L-823 connector kits shall be specified in paragraph 108-2.4, b.

Splice cans shall be provided for existing cables cut and repaired for each splice in cables not to be abandoned. Where a splice can is not readily available at the time of the cable damage, splice markers shall be temporarily installed over each splice in cables not to be abandoned, then these splices shall later be replaced with new splices in an L-867 splice can. Costs associated with splice cans for accidental cable cuts caused by the Contractor, repairs and/or shortages of cables will be the responsibility of the Contractor and no additional compensation will be allowed.

There shall be no splices between series lighting circuit isolation transformers. In the event that a series lighting circuit cable is cut between isolation transformers, the entire length of cable between these isolation transformers shall be replaced, at the Contractor's own expense.

The Contractor shall use a cable stripper/penciller whenever cable connections are made.

All splices and connections will be considered incidental to the respective cable."

108-3.6 Bare counterpoise wire installation for lightning protection and grounding.

Revise this section to read as follows:

"In accordance with manufacturer requirements and for lightning protection per FAA AC 150/5340-30J and NFPA 780, each light fixture L-867 base, and fixture base plate shall be solidly bonded to an earth electrode system. A ground rod will be installed at each light fixture, taxi guidance sign and L-867/L-868 base. The purpose of the light base ground is to provide a degree of protection for maintenance personnel from possible contact with an energized light base or mounting stake that may result from a shorted power cable or isolation transformer. A light base ground shall be installed at each transformer base/light can associated with runway lights, taxiway lights, lighted taxi guidance signs, junction cans, REILS and wind cones. A light base ground shall be installed and connected to the metal frame of each taxi guidance sign as detailed on the plans and in accordance with the respective taxi guidance sign manufacturer recommendations. The light base ground shall be a #6 AWG bare tinned copper

conductor bonded to the ground lug on the respective L-867 transformer base/light can or mounting stake and a 3/4-inch diameter by 20 foot long (minimum) UL listed copper clad ground rod. Connections to ground lugs on the L-867 transformer base/light can or mounting stake shall be with a UL listed grounding connector or as recommended by the respective light base or mounting stake manufacturer. Connections to ground rods shall be made with exothermic weld type connectors: Cadweld by Pentair Erico products, inc., Thermoweld by Continental Industries, inc., Ultraweld by Harger, or approved equal. Exothermic weld connections shall be installed in conformance with the respective manufacturer's directions using molds as required for each respective application. Bolted connections will not be permitted at ground rods. Top of ground rods shall be buried 12 inches minimum below grade, unless specified otherwise herein, for respective applications.

Per National Electrical Code Article 250.53 "Grounding Electrode System Installation" resistance from the ground rod/electrode must be 25 Ohms or less via measurement with a ground tester. This is a safety issue for protection of personnel. Based on site observations, the Southern Illinois Airport has sandy soil due to its location near the Big Muddy River and appears to have a water table that varies in depth and sometimes is more than 10 feet depth, which impairs the resistance to ground for individual ground rods. Therefore, the soil conditions and water table will require additional grounding to comply with NEC 250.53 and for the safety of personnel. The grounding system described below is an equipotential grounding system developed by Kevin Lightfoot in 2009 to accommodate airport sites with sandy soil and/or dirt mixed with rock conditions and water tables extending deeper than 10 feet. This affects the soil resistivity. A #6 AWG bare solid tinned copper ground wire shall be installed to bond together each ground rod, airfield light fixture, L-867 or L-868 base, and taxi guidance sign to form a ground ring for the respective airfield lighting system. The #6 AWG bare solid tinned copper ground conductor shall be direct burial in trench with or above the #8 FAA L-824 5,000-volt cable in conduit. The #6 AWG bare solid tinned copper ground conductor shall be connected to each respective ground rod with an exothermic weld connection. Where running through a conduit under a pavement the ground wire will be run with the series circuit conductor and terminated at a ground rod in a handhole, at a ground lug in a splice/junction can, or at a ground lug in a light base. The completed ground wire installation will provide a ground ring system for the respective airfield lighting circuit. The ground wire will not be installed with the homerun cables for the respective airfield lighting circuit. This is to help accomplish a ground resistance of 25 Ohms or less for the ground rod at each light fixture for safety of personnel. This is similar to but not the same as an equal potential counterpoise lightning protection system as specified by the FAA, however studies have shown that this grounding method also does reduce lightning damage to airfield lighting systems.

108-3.10 Testing. Add the following.

“Note existing cables scheduled for removal and replacement are required to be tested prior to removal. This is required per the following:

- Documenting existing cable and CCR conditions will help protect personnel that are out on the airfield. Regarding the cable testing, it is important to obtain and record the condition of the existing cables regardless of if they are designated for replacement. This information is important for the safety of personnel and to

determine the condition of the existing circuits. Where circuits are in very poor to dangerous condition this needs to be identified. Dangerous condition indicates lighting failures, ground faults, transformer failures, bad connections, unsafe conditions, risk of electric shock, injury and/or death, and other failure conditions can be expected or presently exist. Personnel are at risk of electric shock, injury, and death when on the airfield areas that contain the lighting systems. The airfield lighting series circuit cables are unsafe, and that being near them with standing water on the ground could be life-threatening. Caution needs to be exercised when working on or around these circuits. The airfield lighting series circuits are in such bad condition that they are a safety hazard to personnel working on the airfield, and safety measures need to be performed when working around these circuits. This needs to be determined for the safety of personnel.

- As a professional engineer it is required that Engineers shall hold paramount the safety, health, and welfare of the public.

- IDOT IDA Standard Specifications for Construction of Airports, Item 108, require that the ***"The Contractor shall furnish all necessary equipment and appliances for test the airport electrical systems and underground cable circuits before and after installation".***

- FAA Standard Specifications for Construction of Airports (AC 150/5370-10H), Item L-108, require that the ***"The Contractor shall furnish all necessary equipment and appliances for test the airport electrical systems and underground cable circuits before and after installation".***

- Documenting and recording the condition of existing cables helps to determine the life expectancy for the new cables. Knowing the age and condition of the cables that have met their useful life, will help determine the future life expectancy of the replacement cable and possibly help determine what is considered a normal cable insulation resistance deterioration rate for a respective time frame. Be aware that cables installed in the same manner at different airports will not have the same life expectancy. There are several factors that affect the life of cables.

j. Follow safety procedures for all tests. Prior to operating each CCR (Constant Current Regulator), confirm each CCR frame is grounded to the Vault grounding electrode system/ground bus with a minimum #6 AWG copper conductor and UL listed grounding connector with secure and tight connections. Correct where missing, for safety of personnel. Furnish and install #6 green insulated equipment ground wire with output series circuit conductors from each CCR frame to the respective cutout/disconnect enclosure frame. Cutout enclosures are required to be grounded and bonded per NEC Article 250.4 "General Requirements for Grounding and Bonding".

k. Prior to beginning excavations, airfield lighting modifications, cable installation, and/or any other work that might possibly affect airfield lighting circuits, all existing series circuit lighting cables in the areas of work shall be Megger tested with an insulation resistance tester and recorded at the respective airport electrical vault. The respective series circuit cable loops shall have the resistance measured with an

Ohmmeter and recorded for each circuit at the vault. Each constant current regulator shall be tested with results recorded. The Contractor is responsible to employ the services of personnel qualified, familiar with, and trained to perform the respective tests, and qualified to work on 5000 Volt airfield lighting series circuits, constant current regulators, and associated airport electrical vault equipment. Please understand that airfield lighting series circuits are dangerous and only qualified personnel should be permitted to work on them and safety procedures need to be followed. NFPA 70 - National Electrical Code defines a Qualified Person as ***"One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved."*** NFPA 70E - Standard for Electrical Safety in the Workplace defines a Qualified Person as ***"One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk."*** Safety of personnel is the top priority. Follow safety procedures for all work. Only qualified and experienced personnel are permitted to work on airfield lighting series circuits. Contractor shall provide a True RMS Ammeter for current measurements. Copies of test results shall be provided to the Resident Engineer and the respective Project Engineer of Record within five business days of conducting the respective set of tests. See the testing forms included in the **Appendix**. **These tests are required to protect the Owner and the Contractor and to identify existing conditions and any defective cables, circuits, and/or constant current regulators. Failure to comply with this requirement might result in the Contractor being responsible for defective cable and circuit conditions (where previously not identified) and the associated corrective work at no additional cost to the Contract. The Contractor is responsible to perform the tests, record the test results and submit the test results to the Engineer of Record.**

l. Personnel shall coordinate work and any power outages with the Owner's Designated Representative(s). Any shutdown of existing systems should be scheduled with and approved by the Owner's Designated Representative(s) prior to shut down. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on this system. Compliance with Lockout/Tagout Procedures and all other safety procedures and requirements are the responsibility of the Contractor.

m. Personnel are recommended to comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

n. Provide personnel protective equipment for all personnel working on or testing electrical systems suitable for the respective application. Provide protective equipment for personnel to keep them safe in the event of an arc flash or other electrical accident. Refer to NFPA 70E "Standard for Electrical Safety in the

Workplace", Article 250 "Personal Safety and Protective Equipment" and "Informative Annex H Guidance on Selection of Protective Clothing and Other Personal Protective Equipment (PPE)" for additional information on personal protective equipment.

o. Demonstrate all features and functions of all systems and instruct the Owner's personnel in the proper and safe operation of the systems.

p. Insulation resistance testing equipment for use with 5,000 Volt series circuit cables shall use an insulation resistance tester capable of testing the cables at 5,000 Volts. New 5,000 Volt rated airfield lighting series circuit cables shall be tested at not less than 5,000 Volts. Existing older series circuit cables and/or cables in poor condition may require the test voltage to be performed at a voltage lower than 5,000 Volts to obtain an insulation resistance reading (Example 1,000 Volts, 500 Volts, or less than 500 Volts). Insulation resistance testing equipment often has the feature to adjust the test voltage corresponding to the condition of the cable. The respective test voltages shall be recorded for each cable insulation resistance test result. Measuring the cable insulation resistance of existing conductors/cables is important to document the condition of existing conductors/cables and help determine if there are existing hazards and/or unsafe conditions that will need to be addressed for protection of personnel.

q. Insulation resistance testing equipment for use with 600 Volt rated cables shall use a 500 Volt insulation resistance tester. The respective test voltage shall be recorded for each cable insulation resistance test result.

r. It is recommended to use the same insulation resistance test equipment throughout the project to ensure reliable comparative readings at the beginning of the project and at the completion of the project.

s. Disconnect the airfield lighting series circuit cables from the constant current regulator when performing cable insulation resistance tests (Megger Tests). Test the cables that go to the airfield for the respective airfield lighting series circuit. Connect the cable insulation resistance tester to one of the airfield lighting series circuit cables and to a good ground in the airport electrical vault such as the airport vault ground bus. Conduct the cable insulation resistance test on each respective cable for not less than 90 seconds. Record the test results at the end of the time duration for the test.

t. FAA Advisory Circular 150/5340-26C Maintenance of Airport Visual Aid Facilities provides guidance on Insulation Resistance Tests. Also refer to the user manual for the respective cable insulation resistance tester. Reasonably new series circuit cables and transformers with good connections should read 500 Mega-Ohms to 1,000 Mega-Ohms or higher. The readings should decrease with age. The resistance value declines over the service life of the circuit; a 10-20 percent decline per year may be considered normal. A yearly decline of 50 percent (4 percent monthly) or greater indicates the existence of a problem, such as a high resistance ground, serious deterioration of the circuit insulation, lightning damage, bad connections, bad splices, cable insulation damage, or other failure. FAA Advisory Circular 150/5340-26C notes ***"Generally speaking, any circuit that measures less than 1 megohm is certainly destined for rapid failure."*** Airfield lighting series circuits with cable insulation readings of less than 1 megohm are not uncommon for

older circuits that are 20 years or more of age.

u. Based on information in FAA AC No. 150/5340-26C Maintenance of Airport Visual Aid Facilities, the cable insulation resistance value inevitably declines of the service life of the circuit; a 10-20 percent decline per year may be considered normal. In the event that the cable insulation resistance readings have declined more than 2 percent per month it might indicate cable damage due to lightning or damage as a result of Contractor operations. Where the cable insulation resistance readings have declined more than 2 percent per month over the project construction duration as a result of Contractor operations, Contractor will need to investigate, address, and repair the respective cable circuits.

v. Please beware, where the respective series circuit cable insulation resistance test voltage is less than the operating voltage of the circuit, the cable needs to be replaced and is considered very poor to dangerous condition. For example, if a 30 KW, 6.6 Amp circuit cable insulation resistance tests less than 1 Mega-ohm at 450 volts, this cable is considered very poor to dangerous condition. A 30 KW, 6.6 Amp constant current regulator may output 4500 Volts where it is loaded near capacity. A cable that tests less than the operating voltage is considered dangerous and in need of replacement. Where the cable insulation resistance test voltage is less than the cable insulation rating it is unacceptable for continued use. A 5,000 Volt rated series circuit conductor that needs to be suitable to operate and be tested at 5,000 Volts, also needs to be capable of being tested at 5,000 Volts. Anything less indicates the cable insulation is starting to fail and/or is in dangerous condition. Dangerous condition indicates lighting failures, ground faults, transformer failures, bad connections, unsafe conditions, risk of electric shock, injury and/or death, and other failure conditions can be expected or presently exist. Personnel are at risk of electric shock, injury, and death when on the airfield areas that contain the lighting systems, when the lighting systems are in operation. The airfield lighting series circuit cables are unsafe, and that being near them with standing water on the ground could be life-threatening. Caution needs to be exercised when working on or around these circuits. The airfield lighting series circuits are considered to be in such bad condition that they are a safety hazard to personnel working on the airfield, and safety measures need to be performed when working around these circuits. These circuits need immediate replacement. The respective lighting system can be expected to fail at any time. **THE SAFETY OF PERSONNEL MUST BE AND IS THE PRIORITY. When the airfield lighting circuits become dangerous, they need to be replaced immediately to help protect the pilots, airport staff, maintenance personnel, contractors, the public, and others that use or visit the airport.**

w. All existing series circuit cable loops shall also have the resistance measured with an Ohmmeter and recorded for each circuit at the vault. The resistance of the series circuit loop with connections using #8 AWG copper conductor should be approximately 0.8 to 1 Ohm per thousand feet of cable length. The resistance of the series circuit loop with connections using #6 AWG copper conductor should be approximately 0.5 to 0.7 Ohm per thousand feet of cable length. The number of series circuit transformers and connections will affect the overall resistance of the series circuit loop and therefore the measurements might be slightly higher than the calculated resistance for the respective length of cable.

x. When test results for constant current regulators indicate readings that are outside the acceptable tolerances calibrate and adjust the regulator to be within acceptable output current levels. Adjustments and calibrations shall be in accordance with the respective regulator manufacturer recommendations and instructions. Provide a true RMS Ammeter for measuring input and output currents on constant current regulators.

y. After airfield lighting modifications, additions, and/or upgrades have been completed, series circuit cables shall be Megger tested with an insulation resistance tester and recorded at the respective vault. Megger tests results shall include insulation resistance for each cable under test, the test voltage, and testing duration in minutes. All series circuit cable loops shall have the resistance measured with an Ohmmeter and recorded for each circuit at the respective vault. Each constant current regulator shall be tested with results recorded. Contractor shall provide a True RMS Ammeter for current measurements. Copies of test results shall be provided to the Resident Engineer and the respective Engineer of Record. See the testing forms included in the Appendix. **The Contractor is responsible to perform the tests, record the test results and submit the test results to the Project Engineer of Record.**

z. The Contractor is responsible for employing qualified personnel that are capable of properly conducting the required tests to the satisfaction of the Project Engineer of Record. Tests that provide unsatisfactory results shall be reviewed to determine the possible cause of unsatisfactory results, corrections shall be made, and the tests shall be conducted again.

aa. See Appendix A – “Cable and Constant Current Regulator Testing Forms” for additional information on testing requirements for airfield lighting systems. All testing will be considered incidental to the respective work items for which they ae required and no additional compensation will be allowed.”

Add the following:

108-3.12 Separation of high-voltage and low-voltage wiring. High-voltage circuit wiring (airfield lighting 5000 Volt series circuits and/or other circuits rated above 600 Volts) and low-voltage circuit wiring (rated 600 Volts and below) shall maintain separation from each other, to comply with 2023 National Electrical Code 300.3(C)(2). This is also required by “Airport Lighting Engineering Regional Supplement” issued by Great Lakes Region. High-voltage wiring and low-voltage wiring shall not be installed in the same wireway, conduit, duct, raceway, handhole, or junction box. Where necessary provide split flexible duct around low voltage cables located in a handhole with high voltage cables, to isolate the cables from possible contact with each other.

108-3.13 Identification of cables. At electrical handholes and manholes, identify and label each cable originating in the vault with respect to the system or device served. Provide identification tags rated suitable for the respective locations with permanent markings.

METHOD OF MEASUREMENT

108-4.1. Revise this section as follows:

"Trenching including the excavation, backfill, dewatering and restoration shall not be measured for payment, but shall be considered incidental to the respective pay item for which it is required."

108-4.2. Add the following:

"The footage of cable and/or cable in unit duct installed in duct, conduit, or raceway to be paid for shall be the number of linear feet of cable installed in duct, conduit, or raceway measured in place by direct measurement, completed, ready for operation and accepted as satisfactory with no allowance being made for overrun due to slack, turns, splices, etc. Slack cable required to perform cable splices outside of the respective splice cans, handholes, or manholes, shall be incidental to the respective cable pay item and no additional measurement for payment will be made. Coring and interface to handholes, manholes, or junction structures shall be incidental to the respective cable pay item and no additional measurement for payment will be made. The relocation, interface, and/or adjustment of existing cable and/or cable in unit duct will be considered incidental to the work for which it is required, and no additional compensation will be allowed. Cable will be measured for payment from the respective termination or splice point in the field up to the vault or respective termination point.

Coring and interface to handholes, manholes, or junction structures shall be incidental to the respective cable pay item and no additional measurement for payment will be made.

The relocation, interface, and/or adjustment of existing cable and/or cable in unit duct will be considered incidental to the work for which it is required, and no additional compensation will be allowed.

Removal of existing cable to accommodate new work will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

Trenching including the excavation, backfill, dewatering and restoration shall not be measured for payment, but shall be considered incidental to the respective cable pay item for which it is required.

Interface and connections to new and/or existing light bases, junction/splice/transformer cans, signs, Navaids, or other devices associated with the equal potential grounding system will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed. Ground rods associated with the equal potential grounding system will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

All lockout/tagout procedures to ensure and maintain safety of personnel will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

All cable and constant current regulator testing will be considered incidental to the

respective item for which it is required."

108-4.4 Testing the airfield lighting systems and associated cable tests and constant current regulator tests will be considered incidental to the respective item for which it is required or will be paid for under AR800564 Cable and CCR Testing and Calibration.

BASIS OF PAYMENT

108-5.1. Add the following:

""Payment will be made at the contract unit price per lin. ft. of cable completed and accepted by the Resident Engineer. This price shall be full compensation for furnishing all materials, and for all preparation, assembly, and installation of these materials; for all plowing, trenching, directional-boring, coring of manholes or handholes, installation in ducts, raceways, conduits, splice cans, handholes, or manholes, and for all excavation and backfilling; for all site restoration (topsoiling, grading, seeding, mulching) and pavement restoration; and for all labor, equipment, tools, testing, and incidentals necessary to complete this Item.

This shall include all cable and conductor removals.

Payment will be made under:

Item AR108108	1/C #8 5KV UG Cable – per FOOT
Item AR108756	1/C #6 Ground – per FOOT.
Item AS108088	1/C #8 XLP-USE"

REFERENCES

Add the following:

Federal Aviation Administration Advisory Circulars (AC). Note: where FAA Advisory circulars are referenced that shall be the current issue or issues in effect.

AC 150/5370-2	OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION.

Federal Aviation Administration Standard (FAA STD)

FAA STD-019f	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

Federal Specifications

A-A-59544	Cable and Wire, Electrical (Power, Fixed Installation).
A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic.

National Fire Protection Association (NFPA)

NFPA 70E Standard for Electrical Safety in the Workplace.

NFPA 2638645-1 = National Fire Protection Association IDN.

Occupational Safety and Health Administration

OSHA 29 CFR Part Number 1910; Occupational Safety and Health Standards, Standard Number 1910.147; The control of hazardous energy (lockout/tagout).

Underwriters Laboratories (UL)

UL Standard 44 Thermoset-Insulated Wires and Cables.

UL Standard 83 Thermoplastic-Insulated Wires and Cables.

UL Standard 854 Service Entrance Cables.

END OF ITEM 108

Item 109 Airport Transformer Vault and Vault Equipment

DESCRIPTION

109-1.1. Add the following:

"Install Electrical Equipment" shall consist of furnishing and installing electrical equipment and materials inside the vault as detailed on the Plans and specified herein. This item shall include all labor, materials, transportation, equipment, wiring, raceways, grounding, warranties, tools, coordination, removals, relocations, operational instructions, labeling, testing, and all incidentals required to place the vault and associated equipment into proper working order as a completed unit to the satisfaction of the Owner and Resident Engineer.

Included under this item shall be the following:

a. Field verification of existing site conditions to determine the complexity of the proposed work.

b. Coordinating all work with the Airport Director/Manager and/or designated Airport Maintenance Staff, the respective FAA personnel and the Resident Engineer.

c. Furnishing and installing all associated electrical equipment, materials, and support hardware in the vault as detailed on the Plans and specified herein.

d. Furnishing and installing all raceways, conduits, pull boxes, and ducts in, beneath, and adjacent to the vault. Conduits and ducts from the vault to handholes or junction structures near the vault will be included with this item.

e. Furnishing and installing all necessary cable and wiring at the vault as detailed on the Plans and specified herein.

f. Furnishing and installing all grounding and surge protection as detailed on the Plans and specified herein.

g. Locating, identifying, relocating, and/or replacing existing airfield lighting cables, power cables, and/or control wiring, as necessary to disconnect these respective cables and wiring from the existing equipment and reconnect, replace and/or interface these respective cables to the new or relocated equipment. All work shall be coordinated with the Airport Director/Manager and shall be coordinated to minimize down time to the respective airfield systems.

h. Removal and/or relocation of existing equipment and/or materials.

i. Furnishing and installing lockout/tagout kits and following lockout/tagout procedures for safety of personnel.

j. Furnishing and installing UL listed fire stop material at each series plug cutout enclosure conduit entry and exit.

k. Furnishing and installing and install fire extinguishers in the Vault.

l. Furnishing shop drawings for new equipment and materials.

m. Testing, adjusting, and retesting, where applicable, all new equipment and modifications to existing systems for proper operation.

n. Labeling all electrical equipment and incidentals necessary to place all of the equipment in operation as a complete unit acceptable to the Owner and Resident Engineer.

o. Furnishing operation, maintenance, and installation manuals for all new equipment.

Add the following:

109-1.2. Item AR800564 "Cable and CCR (Constant Current Regulator) Testing and Calibration" shall consist of testing the airfield lighting systems and the associated cable tests, constant current regulator tests and calibration.

Included under this item shall be the following:

a. Field verification of existing site conditions to determine the complexity of the proposed work. Prior to operating each CCR (Constant Current Regulator), confirm each CCR frame is grounded to the Vault grounding electrode system/ground bus with a minimum #6 AWG copper conductor and UL listed grounding connector with secure and tight connections. Correct where missing, for safety of personnel. Furnish and install #6 green insulated copper equipment ground wire with output series circuit conductors from each CCR frame to the respective cutout/disconnect enclosure frame. Cutout enclosures are required to be grounded and bonded per 2023 NEC Article 250.4 "*General Requirements for Grounding and Bonding*".

b. Coordinating all work with the Airport Director/Manager and/or designated Airport Maintenance Staff, the respective FAA personnel (where applicable) the Resident Engineer, and the Project Engineer of Record. Prior to beginning excavations, airfield lighting modifications, cable installation, and/or any other work that might possibly affect airfield lighting circuits, all existing series circuit cables and constant current regulators shall be tested. Contractor shall contact the Project Engineer of Record and arrange testing schedule so that the Project Engineer may be present to observe and record tests.

c. This item shall include lockout/tagout procedures and lockout/tagout kits.

d. Testing, adjusting, and retesting, where applicable, respective equipment and modifications to existing systems for proper operation.

e. Calibration of constant current regulators where test results identify output current settings that are outside the accepted tolerances. Coordinate these efforts with the Project Engineer of Record.

f. Submitting test reports to the Resident Engineer and the Project Engineer of Record.

EQUIPMENT AND MATERIALS

109-2.1 General. Paragraph d. Add the following:

"Shop drawings are required for vault equipment and materials to be used on the project. Shop drawings shall be clear and legible. Copies that are illegible will be rejected. The preferred shop drawing submittal format shall be electronic (PDF) copies. Shop Drawings shall clearly indicate proposed items, capacities, characteristics, and details in conformance with the Plans and Specifications. The respective manufacturer shall certify capacities, dimensions, special features, etc. When a submittal is marked "Revise and Resubmit", "Rejected", and/or "Not Approved", do not proceed with that part of the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations, resubmit, and repeat if necessary to obtain a different action mark such as "No Exceptions Taken" or "Furnish as Corrected". Contractor is responsible for compliance with the specified characteristics. Contractor's responsibility for errors and omissions in submittals is not relieved by the Engineer's review of submittals. Accompany each submittal with a transmittal letter that includes the date, project title and number, Contractor's name and address, the number of Shop Drawings, product data and/or samples submitted, notification of any deviations from the Contract, and any other pertinent information. Shop drawings shall include the following information:

(1) Certification of compliance with the AIP (Airport Improvement Program) Buy American Preferences for all materials and equipment. Do not submit ARRA (American Recovery and Reinvestment Act) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Shop drawings submitted without certification of compliance with the Airport Improvement Program Buy American Preferences or without certification of manufacture in the United States of America in accordance with the AIP Buy American Requirements will be rejected. See the FAA website at: http://www.faa.gov/airports/aip/buy_american/ for more information on the AIP Buy American Preferences requirements. FAA approved equipment that is on the FAA Buy American Conformance List or the list of Nationwide Buy American Waivers Issued by the FAA complies with the AIP Buy American Preferences and will not require additional waiver paperwork.

(2) In order to expedite the shop drawing review, inspection and/or testing of materials and equipment, the Contractor shall furnish complete statements to the Project Engineer of Record as to the origin and manufacturer of all materials and equipment to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials and equipment.

(3) Cut sheets with specifications, manufacturer, part number, options, and list of spare parts for each constant current regulator.

(4) Provide cut sheets for Type S-1 Cutouts and cutout enclosures.

(5) Provide shop drawings for fire extinguishers."

109-2.17 FAA-approved equipment. Add the following:

FAA approved equipment shall also comply with the requirements of the Airport Improvement Program Buy American Requirement. Proposed FAA approved equipment shall be as follows:

a. **Primary Constant Current Regulator for Runway 18L-36R.** Primary Constant Current Regulator for Runway 18L-36R shall be a Type L-828 or Type L-829 constant current regulator, Class 1 - 6.6 Amps output current, Style 2 - five brightness steps (2.8, 3.4, 4.1, 5.2, and 6.6-Amps), **20 KW**, **240 VAC,** single-phase, 60 Hertz input. Constant current regulator shall comply with FAA AC 150/5345-10G for Type L-828 or Type L-829 regulator and shall be FAA Approved. Constant current regulator shall properly operate the respective airfield lighting system it is powering. Constant current regulator shall be suitable for use and capable of properly operating pulsing load such as a pair of L-849I(L) LED REILS with the runway lighting system. Constant current regulator must cause the minimum possible radiated or conducted electromagnetic interference (EMI) to airport and FAA Equipment (example; computers, radars, instrument landing systems, radio receivers, VHF Omni-directional Range, etc.) that may be located on or near an airport. Constant current regulator shall include open circuit protection, over current protection, output current ammeter, output voltmeter, and arresters of the proper rating to protect the CCR from lightning induced voltage and current surges installed at both the input and output terminals of the CCR. Constant current regulators shall also include a remote/local control feature with selections for “Remote, Off, 10% Brightness, 30% Brightness, and 100% Brightness”. Control voltage shall be 120 VAC (internal/external). Constant current regulator shall be dry-type ferro-resonant regulator, dry-type ferromagnetic reactor regulator, or approved equal. Include the following spare components:

    1. One spare control circuit board for each type in the constant current regulator
    2. Primary switch contactor
    3. Lightning arresters (input and two output)
    4. Control circuit fuses or breaker

    Note the requirement for spare parts is based on FAA AC 150/5340-26C Maintenance of Airport Visual Aid Facilities, Part 5.2 Constant Current Regulators (CCRs) which notes the following in regard to a backup regulator and/or spare parts: “*Most constant current regulators manufactured today are reliable and reasonably trouble-free. However, do not be lulled into complacency when considering preventative maintenance of the vital components in the airport lighting electrical system. A regulator failure without a spare backup regulator or spare parts on hand can shut down a vital runway or taxiway indefinitely. Many times otherwise conscientious electricians have been surprised by a sudden failure or lack of spare parts for a piece of equipment. Unlike other elements of the electrical system that use commonly available parts, when a failure in a CCR, it is most likely that a printed circuit (PC) board will need to be replaced. The CCR manufacturer may not have replacement parts readily available.*”

Note the requirement for the constant current regulator to be capable of properly operating a pair of Type L-849I(L) REILS with the runway lighting system, is based on the REIL loads for this project. FAA AC 150/5340-30J, Chapter 7 "ECONOMY APPROACH AIDS", Part 7.5 "Design", 7.5.2 REIL, Subpart 7.5.2.1.2 "Power Supply and Wiring", Paragraphs 4 and 5 note "If using a CCR for REIL primary power, ensure that the regulator will accommodate a pulsing load that may have reactive components. Consult the manufacturers of both the CCR and REIL before making a final decision."

109-2.18 Other electrical equipment. Add the following:

"Proposed electrical equipment and materials for the vault shall be as follows:

a. Type S-1 Series Plug Cutouts. Provide series plug cutouts for respective constant current regulator(s) as detailed on the Plans. Series plug cutouts shall be Type S-1, rated 5KV, 20-Amps, and shall comply with FAA AC 150/5340-30J. Please be aware that all series circuit cutouts are not equal and do not operate in the same manner. There are currently no known FAA approval requirements, no Intertek Testing Services Verification/ETL listing requirement, no UL listing, no FM approval, nor any other National Recognized Testing Lab Requirement for series circuit cutouts used with airfield lighting series circuits. Careful evaluation needs to be done to determine if the respective series circuit cutout is suitable for the application. Cutouts shall be certified in writing by the manufacturer as suitable for the respective applications. Cutouts shall disconnect the input from the output, short the input terminals, and short the output terminals when the handle/plug is removed. Type S-1 series circuit cutouts shall be suitable for normal operation with the handle plug removed to accommodate a manual transfer pair of constant current regulators. Series cutouts where the manufacturer has noted their cutouts are not recommended to operate with the handle pulled/removed are not acceptable. 2023 National Electrical Code, Article 110.3 (B) "Installation and Use" notes the following: "*Equipment that is listed, labeled, or both, or identified for use shall be installed and used in accordance with any instructions included in the listing, labeling, or identification."* Other cutouts, that do not function as detailed on the Plans or that are not suitable for the respective application, are not acceptable. In FAA Order 5100.38D, Change 1, Airport Improvement Program Handbook, Appendix U, Part U-11 (2 CFR 200.319 – Competition), it notes the following: "*When it is impractical or uneconomical to make a clear and accurate description of the technical requirements, a "brand name or equivalent" description may be used as a means to define the performance or other salient requirements of procurement.*" Again, there are currently no known FAA approval requirements for series circuit cutouts used with airfield lighting series circuits. Therefore, examples of Type S-1 cutouts verified by each respective manufacturer as suitable for the applications detailed herein are provided. Series plug cutouts shall be Crouse-Hinds, Type S-1, Model 2, Catalog Number 30775, Manairco Catalog Number MRS1, and Hughey and Phillips Catalog Number MRS1, or an approved equal. Install the series plug cutouts in a NEMA 12 painted steel enclosure adequately sized to house the cutout(s), with a hinged cover and back panel to mount the cutouts. All enclosures shall be pad lockable. Where existing cutout enclosures are used, provide pad lock kits for each existing enclosure.

b. Circuit Breakers. Circuit breakers, to be installed in the existing vault panelboards, shall be compatible with the existing panelboard. Circuit breakers shall be bolt-on type

with an amp interrupting capacity of 22,000 Amps minimum at 120/240 VAC, unless noted otherwise on the Plans. Circuit breakers, to be installed in the existing vault busway, shall be compatible with the existing busway system and by the same manufacture as the busway. Circuit breakers for the busway system shall have amp interrupting capacity of 25,000 Amps minimum at 120/240 VAC, unless noted otherwise on the Plans. Circuit breaker amperage trip settings and number of poles shall be as detailed on the Plans.

c. **Liquid-Tight Flexible Metal Conduit.** Liquid-tight, flexible metal conduit shall consist of polyvinyl jacket over flexible hot dip galvanized steel tubing. The flexible conduit shall be completely sealed from liquids, dust, dirt, and fumes and be resistant to oil, gasoline, grease, and abrasion. Jacket shall also be sunlight-resistant. Liquid-tight flexible metal conduit shall be UL-listed, suitable for use as a grounding conductor, and comply with Article 350 of the NEC. Liquid-tight flexible metal conduit and associated fittings shall be UL-listed to meet the requirements of NEC 350.6. Liquid-tight flexible metal conduit shall be Anaconda Sealtite Type UA as manufactured by Anamet Electrical Inc., Liquatite Type LA as manufactured by Electri-Flex Company, Liquid-Tuff Type LFMC as manufactured by Atkore International AFC Cable Systems, or approved equal. Do not install liquid-tight, flexible metal conduit that is not UL listed. Confirm liquid-tight, flexible metal conduit bears the UL label prior to installation.

d. **Lockout/Tagout Kit.** Provide a Lockout Station suitable for wall mounting, with 10 lockout padlocks each with a different key, 5 lockout hasps to accommodate multiple padlocks, and 100 lockout tags. Lockout station and components shall comply with OSHA Standard 1910.147. Include hardware to mount on the vault interior wall. Include key rings with identification tags numbered 1 through 10 corresponding to the respective key and lock. Provide identification numbering on each lock.

e. **Fire Barrier Moldable Material**. Provide UL listed fire barrier moldable putty suitable for use with electrical box protection at electrical conduit penetrations. The fire stop material shall be designed to prevent the spread of fire, smoke and noxious gases. The fire stop material shall be pliable, conformable, and shapeable to accommodate the respective coverage and application. Fire stop material shall be manufactured by 3M, Hilti, or approved equal."

f. **Fire Extinguishers**. Provide two 10-pound UL rated 10B:C Carbon Dioxide fire extinguishers. Provide two 10-pound UL rated 1A:10B:C Halotron fire extinguishers. Fire extinguishers shall be made in the United States of America to comply with the Buy American Preference Requirements. Provide wall mounting brackets for each fire extinguisher. Confirm model numbers with the respective fire extinguisher manufacturer.

g. **Pull Boxes.** Junction and pull boxes shall be sized, as required for conductors and splices and per 2023 NEC Article 314. Boxes shall be UL-listed. Pull boxes shall be as detailed on the Plans. Exterior pull boxes (located in non-hazardous areas) shall be NEMA 4X stainless steel enclosures with hinger cover and pad lock feature, sized as detailed on the Plans and manufactured by Hoffman, E-Box, Saginaw Control & Engineering, or approved equal.

h. **Other equipment**. Other equipment not listed herein the Special Provisions shall be as detailed on the Plans."

109-2.19 Electrical wire and cable, Paragraph b. Power circuits. Add the following:

"All power wiring, 600-Volts and below, shall be the type, size, and number of conductors, as noted on the Plans. Cable types shall include the following:

(1) THWN Wire. Cable shall comply with Underwriters' Laboratories Standard UL-83 and Federal Specification A-A-59544. Conductor shall be soft-annealed, uncoated copper and shall comply with ASTM B3 and B8. Insulation shall be rated for 600-Volts. Insulation shall be polyvinyl-chloride conforming to Underwriters' Laboratories requirements for Type THW. The outer covering shall be nylon-conforming to Underwriters' Laboratories for type THHN or THWN. Cable shall be UL-listed and marked THWN.

(2) XHHW Wire. Cable shall comply with UL Standard 44, ICEA S-95-658/NEMA WC70 and Federal Specification A-A-59544. Conductors shall be Class B, stranded-annealed, uncoated copper per UL Standard 44. Insulation shall be rated for 600-Volts. Insulation shall be cross-linked polyethylene complying with the physical and electrical requirements of UL Standard 44 for Type XHHW-2. Cable shall be UL-listed and marked XHHW-2.

(3) XLP-USE Wire. Cable shall comply with UL Standard 44, UL Standard 854, and Federal Specification A-A-59544. Conductor shall be concentric-strand, soft Copper, conforming to ASTM B8 and Underwriters' Laboratories Standard UL44 for Rubber-Insulated Wires. Insulation shall be rated for 600-Volts. Insulation shall be cross-linked polyethylene conforming to Underwriter's Laboratories Requirements for Type USE-2 insulation. Cable shall be UL-listed and marked USE-2.

(4) Series Circuit 5000-Volt Cable. Cable for use with series circuit airfield lighting shall be FAA-L-824, Type C cable complying with Item L-108. L-824 cable shall be FAA approved and listed in the current AC150/5345-53D, AIRPORT LIGHTING EQUIPMENT CERTIFICATION PROGRAM Appendix 3 Addendum. Circuits for use with constant current regulator outputs (runway or taxiway lighting circuits) shall use 5000-Volt rated cable.

(5) Grounding electrode conductors and/or bonding jumpers shall be copper of the size and type, as detailed on the Plans. Ground wire for bonding constant current regulator housings, cutout enclosures, and other vault equipment frames to the vault ground bus shall be #6 AWG (minimum) stranded Copper."

CONSTRUCTION METHODS

INSTALLATION OF EQUIPMENT IN VAULT OR PREFABRICATED METAL HOUSING

109-4.1 General. Add the following:

"The Contractor shall furnish and install all equipment and materials necessary for complete and operational installation of all vault equipment, as specified herein and as shown on the Plans. The complete installation and wiring shall be done in a neat, workmanlike manner. All electrical work shall comply with the requirements of NFPA 70 - National Electrical Code (NEC) most current issue in force, and all other applicable

local codes, laws, ordinances, and requirements in force. Electrical equipment shall be installed in conformance with the respective manufacturer's directions and recommendations for the respective application. Any installations which void the UL listing, Intertek Testing Services verification/ETL listing, (or other third-party listing) and/or the manufacturer's warranty of a device, will not be permitted.

a. Keep a copy of the latest NEC in force on site, at all times during construction for use as a reference. Contractor shall keep a copy of the Plans, Special Provision Specifications including any addenda, and copies of any change orders on site at all times during construction.

b. Examine the site to determine the extent of the work. Contractor shall field verify existing site conditions.

c. Verify respective circuits and power sources prior to removing, disconnecting, relocating, installing, connecting, or working on the respective service, feeder, branch circuit, airfield lighting system, Navaid, or other device.

d. Identify each respective circuit prior to performing work on that circuit.

e. New work shall be coordinated with the Airport Director/Manager and to minimize downtime to existing systems. Contractor shall coordinate work and any power outages with the Airport Director/Manager and the Resident Engineer. Any shutdown of existing systems shall be scheduled with and approved by the Airport Director/Manager prior to shutdown. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment, the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on the system.

f. Locate Existing Underground Utilities and Cables. The location, size, and type of material of existing underground and/or aboveground utilities indicated on the Plans are not represented as being accurate, sufficient, or complete. Neither the Owner nor the Engineer assumes any responsibility whatever in respect to the accuracy, completeness, or sufficiency of the information. There is no guarantee, either expressed or implied, that the locations, size, and type of material 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 service connections to underground utilities. Prior to construction, the Contractor shall notify the utility companies of his operational plans, and shall obtain, from the respective utility companies, detailed information and assistance relative to the location of their facilities and the working schedule of the companies for removal or adjustment, where required. In the event an unexpected utility interference is encountered during construction, the Contractor shall immediately notify the utility company of jurisdiction. The Owner's Representative and/or the Resident Engineer shall also

be immediately notified. Any damage to such mains and services shall be restored to service at once and paid for by the Contractor at no additional cost to the Contract. All utility cables and lines shall be located by the respective utility. **Contact JULIE (Joint Utility Location Information for Excavators) for utility information, phone: 1-800-892-0123.** Contact the FAA (Federal Aviation Administration) for assistance in locating FAA cables and utilities. Location of FAA power, control, and communication cables shall be coordinated with and/or located by the FAA. Also contact Airport Director/Manager and Airport Personnel for assistance in locating underground Airport cables and/or utilities. Also coordinate work with all aboveground utilities.

g. In areas where there is a congestion of buried cables or where the proposed duct, cable, or work crosses an existing cable, the Contractor will be required to hand dig and/or carefully excavate the trench necessary for the proposed duct, cable, or other work.

h. Grounding work and modifications shall not be performed during a thunderstorm or when a thunderstorm is predicted in the area.

i. Homerun cables for a respective circuit that are installed in conduit, duct, or raceway shall be run together in the same conduit, duct or raceway.

j. The respective personnel performing airfield lighting work, vault work, and/or tests shall be familiar with, and qualified to work on 5000-volt airfield lighting series circuits, constant current regulators and associated airport electrical vault equipment. Please understand that airfield lighting series circuits are dangerous and only qualified personnel should be permitted to work on them and safety procedures need to be followed. NFPA 70 - National Electrical Code defines a Qualified Person as "***One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has revied safety training to recognize and avoid the hazards involved."*** NFPA 70E Standard for Electrical Safety in the Workplace defines a Qualified Person as "***One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk."*** OSHA (Occupational Safety and Health Administration), Part Number 1910 Occupational Safety and Health Standards, Subpart S, Electrical, Standard Number 1910.399 defines Qualified person as follows: "***Qualified person. One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved."*** Safety of personnel is the top priority. Follow safety procedures for all work. Only qualified and experienced personnel should be permitted to work on airfield lighting series circuits.

k. Feeder circuit conductors, branch circuit conductors, power wiring, control wiring, airfield lighting series circuit conductors, and other wiring at the Vault shall be installed in conduit, duct, wireways, pull boxes, junction boxes, or raceways. No exposed power or control wiring will be permitted.

l. Obey and comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

m. Other construction projects might be in progress on the Airport at the same time as this project. The Contractor will be required to cooperate with all other contractors and the Airport Director/Manager in the coordination of the work.

n. The Contractor shall comply with the requirements of FAA AC No. 150/5370-2G (or most current issue) "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION".

o. In the event a conflict is determined with respect to manufacturer installation instructions, National Electrical Code, and/or the Contract Documents, contact the Project Engineer of Record for further directions.

p. Secure, identify, and place temporary exposed wiring in conduit, duct, or unit duct to prevent electrocution and fire ignition sources in conformance with the requirements of FAA AC 150/5370-2G, Part 2.18.3 "Lighting and Visual NAVAIDs". All temporary installations shall comply with National Electrical Code Article 590 – "Temporary Installations".

q. Equipment installed by the Contractor shall be properly labeled, and all cables must be tagged.

r. Obtain approval from the Airport Director/Manager prior to shutting down a runway or taxiway. When a respective Runway is closed the respective runway lighting and NAVAIDS for the runway shall be shut off. Keep respective Navaids active during times when the runway is open. Navaids receiving maintenance shall be shut off until operating properly. When a respective taxiway is closed the respective taxiway lighting for that taxiway shall be shut off.

s. Record and document all changes to the airfield lighting system and provide this information to the Resident Engineer.

109-4.2 Power supply equipment. Add the following:

a. Constant current regulators. Install constant current regulators in conformance with the manufacturer's recommendations, as detailed on the Plans and as specified herein. Maintain working clearances in front of constant current regulators per the requirements of NEC 110.26 and 110.34. Maintain clearance around constant current regulators for air flow and cooling per the respective manufacturer's recommendations. Confirm circuit breaker sizes for constant current regulators are sized in conformance with the respective manufacturer's recommendations and/or requirements and NEC. Where necessary to accommodate the respective constant current regulator input amperage requirements, circuit breakers, conductors, and conduits shall be adjusted (increased in size) to meet the manufacturer's recommendations and/or requirements and the NEC. High-voltage wiring shall enter each respective regulator at the high-voltage/series circuit output section of the regulator. 208 VAC or 240 VAC input power wiring shall enter each respective regulator at the low-voltage/input power section of the regulator. Control wiring shall enter each respective regulator at the control section of the regulator. Conduit connections to constant current regulators shall be with UL-listed,

liquid-tight, flexible metal conduit. Include an external bonding jumper or internal equipment ground wire with each piece of liquid-tight, flexible metal conduit that is connected to a constant current regulator to comply with NEC 350.60. Bond each constant current regulator enclosure frame, to the vault ground bus with a #6 AWG (minimum), bare-stranded, copper-bonding jumper. Confirm the constant current regulator has a good frame ground prior to energizing and operating the unit. Your safety may depend on the regulator having a good frame ground."

109-4.3 Switchgear and panels. Add the following:

a. Series circuit plug cutouts. Install series circuit plug cutouts in conformance with the manufacturer's recommendations, as detailed on the Plans and as specified herein. Series circuit plug cutouts/disconnects shall only be used on airfield lighting series circuits in accordance with the respective manufacturer's instructions. Verify ratings and applications with each respective series plug cutout manufacturer. Make sure the cutout contacts are in good condition and aligned properly. Where contacts have become weak or have high resistance connections replace the cutout with a new cutout. For Type S-1 cutouts the normal resistance across the cutout contacts with the handle removed is 0.1 to 0.2 Ohms measured with an Ohmmeter. Also observe the cable lugs to determine if there is apparent heat damage, arcing damage, lightning damage, or deterioration. Where the cutout is observed to have deterioration or damage replace it immediately. Consult with the respective cutout manufacturer regarding maintenance and testing. Provide NEMA 12 painted steel enclosures adequately sized for the cutouts and cables with hinged cover and back panel to mount the plug cutouts. Cutout enclosures shall be pad lockable to comply with OSHA 29 CFR, section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where existing cutout enclosures are used, provide pad lock kits for each existing enclosure. The installation of series circuit cutouts is required to accommodate lockout/tagout to help address safety hazards and for protection of personnel. Provide adequate working space in front of each cutout enclosure to meet National Electrical Code working space requirements. Refer to National Electrical Code Article 110.34 "Work Space and Guarding" and Table 110.34(A) "Minimum Depth of Clear Working Space at Electrical Equipment". Cutout enclosures are required to be grounded and bonded per National Electrical Code Article 250.4 "General Requirements for Grounding and Bonding". Include an equipment ground wire (6 AWG minimum for 6.6 Amp series circuits and/or 20 Amp series circuits) with the output series circuit conductors from the respective constant current regulator frame to the cutout enclosure frame. Provide UL listed firestop material at each conduit entry or exit to a cutout enclosure, to help reduce spread of fire in the event of a cutout fire or constant current regulator fire. Series circuit disconnects are required for each constant current regulator in accordance with FAA AC 150/5340-30J "*Design and Installation Details for Airport Visual Aids*". The following practices are recommended and/or required for series circuit cutouts/disconnects and the associated airfield lighting series circuit wiring.

1. The Type S-1 Series Plug Cutout is a series circuit disconnecting device installed at the output side of a constant current regulator (CCR). With the handle plug assembly removed, the cutout isolates the CCR output from airfield lighting series circuit loop for maintenance and personnel safety. The S-1 cutout also shorts the series loop and shorts the regulator secondary for helping with servicing, maintenance, and troubleshooting.

2. Provide series plug cutouts for each constant current regulator as detailed on the Plans. Series plug cutouts shall be Type S-1, rated 5KV, 20-Amps, and shall comply with FAA AC 150/5340-30J. Cutouts shall be certified in writing by the manufacturer as suitable for the respective applications. Cutouts shall disconnect the input from the output, short the input terminals, and short the output terminals when the handle/plug is removed. Series circuit plug cutouts shall be installed and used in accordance with the respective manufacturers' instructions, recommendations and requirements.

3. Install the series plug cutouts in a NEMA 12 painted steel enclosure adequately sized to house the cutout(s), with a hinged cover and back panel to mount the cutouts. All enclosures shall be pad lockable. Where existing cutout enclosures are used provide pad lock kits for each existing enclosure. The installation of series circuit cutouts shall accommodate lockout/tagout for safety of personnel.

4. Never remove or insert a series circuit plug cutout/disconnect with the circuit energized. Removal of a series circuit plug cutout/disconnect on an energized circuit can result in an arc flash that may cause injury, burns, and harm to personnel. Always shutoff and lockout input power to the respective constant current regulator prior to pulling or inserting a series plug cutout.

5. Series circuit plug cutouts/disconnects shall only be used on airfield lighting series circuits in accordance with the respective manufacturer's instructions, recommendations and requirements. Verify ratings and applications with each respective series plug cutout manufacturer. Note, observe, and verify the differences in applications for the different manufacturer series plug cutouts. Confirm ratings and suitability for the respective application with each respective cutout manufacturer. Some manufacturers' Type S-1 series circuit cutouts might not be suitable for the same applications as other manufacturer's Type S-1 series circuit cutouts.

6. Know the difference between Type S-1 series circuit plug cutouts and Type SCO series circuit plug cutouts. Type SCO cutouts do not operate the same as Type S-1 cutouts. Examples of Type S-1 cutouts include (but are not limited to) Crouse-Hinds, Type S-1, Model 2, Catalog Number 30775, Manairco Catalog Number MRS1, Hughey and Phillips Catalog Number MRS1, and Airport Lighting Company Catalog Number S1. Examples of Type SCO cutouts are ADB Safegate Part Number 1475.92.030 and Part Number 1475.92.030-1. Refer to the respective installation instructions for each type of cutout. This is important for the safety of personnel.

7. Series circuit wiring shall be installed in enclosed raceways. No exposed airfield lighting series circuit cables (L-824) will be permitted in the Airport Electrical Vault. In accordance with 2023 National Electrical Code Article 305 "*General Requirements for wiring Methods and Materials for Systems Rated Over 1000 Volts ac, 1500 Volts dc, Nominal,* Part 305.3 "*Other Articles*", Exception, it notes: ***"Airfield lighting cable used in series circuits that are powered by regulators and installed in restricted airport lighting vault shall be permitted as exposed cable installations."*** An Airport Electrical Vault is a restricted access facility limited to access by qualified persons only. Often airport electrical vault buildings do not

have provisions to limit access to only qualified personnel. Therefore, no exposed airfield lighting series circuit cables will be permitted in the Airport Electrical Vault.

8. Maintain separation of high-voltage airfield lighting 5000 Volt series circuits from low-voltage circuit wiring (120 VAC, 208 VAC, 240 VAC, 480 VAC or other wiring rated 600 Volts and below). High-voltage wiring and low-voltage wiring shall not be installed in the same wireway, conduit, duct, raceway, junction box, handhole, or manhole. High-voltage airfield lighting 5000 Volt series circuits wiring shall enter each respective regulator at the high-voltage/series circuit output section of the regulator. 208 VAC, 240 VAC, or 480 VAC input power wiring shall enter each respective regulator at the low-voltage/input power section of the regulator. Control wiring shall enter each respective regulator at the control section of the regulator.

109-4.5 Wiring and connections. Add the following:

High-voltage circuit wiring (airfield lighting 5000 Volt series circuits and/or other circuits rated above 600 Volts) and low-voltage circuit wiring (rated 600 Volts and below) shall maintain separation from each other, to comply with 2023 National Electrical Code 300.3(C)(2). This is also required by "Airport Lighting Engineering Regional Supplement" issued by Great Lakes Region. High-voltage wiring and low-voltage wiring shall not be installed in the same wireway, conduit, duct, raceway, handhole, or junction box.

109-4.6 Marking and labeling. Add the following:

c. Legend plates shall be provided for all equipment. Legend plates shall be provided to identify the equipment controlled, the power source, and the function of each device. Legend plates shall be weatherproof and abrasion-resistant phenolic/plastic engraved material and fastened with contact type permanent adhesive, screws, or rivets. Installation shall not break, crack, or deform the legend plate. Lettering shall be ¼ in. high, black on a white background, unless noted otherwise.

d. Danger high voltage keep out labels, markings, and/or signs. Furnish and install "DANGER – HIGH VOLTAGE KEEP OUT" signs or labels for equipment rated over 1000 Volts AC, (this applies to airfield lighting series circuit wiring and the respective enclosures, equipment and raceways including but not limited to airport electrical vaults, high voltage sections of constant current regulators, series circuit disconnects/cutout enclosures, high voltage wireways, high voltage pull boxes, high voltage junction boxes, high voltage electrical handholes, and high voltage electrical manholes). Place signs in a conspicuous location, usually on the outside of equipment. "DANGER – HIGH VOLTAGE KEEP OUT" signs and labels are required in accordance with the following:

- 2020/2023 NEC 110.34 "Work Space and Guarding", (C) "Locked Rooms or Enclosures"
- 2020 NEC 300.45 "Danger Signs"
- 2023 NEC 305.12 "Danger Signs"
- 2020/2023 NEC 314.72 "Construction and Installation Requirements", (E) "Suitable Covers"

- 2020 NEC 490.35 “Accessibility of Energized Parts”, (A) “High Voltage Equipment”
- 2023 NEC 495.35 “Accessibility of Energized Parts”, (A) “High Voltage Equipment”
- 2023 NEC 495.63 “Enclosures”
- FAA AC No. 150/5340-26C “MAINTENANCE OF AIRPORT VISUAL AID FACILITIES”,

e. Furnish and install “DANGER – HIGH VOLTAGE UNAUTHORIZED PERSONNEL KEEP OUT” signs on each door to the Airport Electrical Vault to comply with the requirements of 2023 National Electrical Code Article 110.34 “Work Space and Guarding”, Paragraph (C) “Locked Rooms or Enclosures”.

f. **Label series circuit cutouts**. Each plug cutout cabinet shall be furnished with a phenolic-engraved legend plate that identifies the respective circuit or regulator and the voltage system (5000-Volts). Label the input side connection and the output side connection for each series circuit plug cutout.

g. **CCR’s.** Each constant current regulator shall be furnished with a phenolic-engraved legend plate that identifies the regulator number designation, the runway or taxiway served, and the power source and circuit number. Each CCR shall include a legend plate labeled “NOTICE THIS CCR HAS AN ADDITIONAL 120 VAC CONTROL POWER CIRCUIT FEEDING IT. DISCONNECT ALL POWER SOURCES TO CCR BEFORE SERVING.” Each CCR shall also include a legend plate installed on the top of the unit labeled “KEEP CLEAR – DO NOT STORE MATERIALS ON TOP OF CCR.”

h. **Cable tags.** At electrical handholes and manholes, identify each cable originating in the vault with respect to the system or device served.

i. **Arc flash hazard warning.** Furnish and install weatherproof warning label for each meter socket, enclosed circuit breaker, disconnect switch, switchboard, cutout, panelboard, load center, motor control center, and control panel to warn persons of potential electric arc flash hazards, per the requirements of 2023 NEC 110.16 “Arc-Flash Hazard Warning”. Labels shall also conform to ANSI Z535.4-2002 “American National Standard for Product Safety Signs and Labels”. 2023 NEC 110.16 requires that switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of potential arc flash hazards. The markings shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment. This new requirement is intended to help reduce the occurrence of serious injury or death due to arcing faults to those working on or near energized electrical equipment. The warning labels are to indicate to a qualified worker who intends to open the equipment for analysis of work that a serious hazard exists, and that the worker should follow appropriate work practices and wear appropriate personal protective equipment (PPE) for the specific hazard. Labels shall be as detailed on the Plans or shall include at least the following information: “Warning - Potential Arc-Flash Hazards exist while working on this energized equipment. Appropriate PPE Required.

j. Arc flash risk labels. Provide appropriate labels on electrical equipment in accordance with NFPA 70E "Standard for Electrical Safety in the Workplace", Article 130 Work Involving Electrical Hazards, Part 130.5 Arc Flash Risk Assessment, (H) Equipment Labeling. Where maximum calculated fault current exceeds 25,000 Amps at 240 VAC, contact the Project Engineer for further directions. **Fault current calculations have been performed for the utility transformer secondary and service equipment at the Sothern Illinois Airport Electrical Vault and been determined to be less than 25,000 Amps at 240 VAC, as of October 13, 2025**

k. Color-code phase and neutral conductor insulation for No. 6 AWG or smaller. Provide colored marking tape for phase and neutral conductors for No. 4 AWG and larger. **Insulated ground conductors shall have green colored insulation for all conductor sizes (AWG and/or KCMIL) to comply with NEC 250.119. Neutral conductors shall have white colored insulation for No. 6 AWG and smaller to meet the requirements of NEC 200.6.** Standard colors for power wiring and branch circuits for 240/120 VAC, 3-Phase, 4-Wire system with high leg shall be Phase A – Black, Phase B (high leg) – Red or Orange, Phase C – Blue, Neutral – White, and Ground – Green.

l. Workspace Clearance Warning. "CAUTION - AREA IN FRONT OF THIS ELECTRICAL PANEL MUST BE KEPT CLEAR FOR 36 INCHES – OSHA-NEC REGULATIONS." The 36 inches clearance requirement applies to equipment with nominal voltage to ground of 0 to 150 Volts, per 2023 NEC Table 110.26(A)(1) "Working Spaces". Adjust/increase clearance requirements for higher voltages in accordance with National Electrical Code and the respective application.

m. Workspace Clearance Warning for Cutout Enclosures. "CAUTION - AREA IN FRONT OF THIS ELECTRICAL PANEL MUST BE KEPT CLEAR FOR 60 INCHES – OSHA-NEC REGULATIONS." This is required for series circuit disconnect/cutout enclosures.

n. Warning Label for Cutout Operation. "CAUTION – ONLY OPERATE CUTOUTS WITH CCR's SHUT OFF." This is required for series circuit disconnect/cutout enclosures.

o. Per 2023 NEC 110.22 "Identification of Disconnecting Means" each disconnection means shall be legibly marked to indicate its purpose and identify the power source that supplies the disconnection means.

p. Per 2023 NEC 408.4 "Field Marking Required", Part (B) "Source of Supply", all switchboards, switchgear, and panelboards supplied by a feeder(s) shall be permanently marked to indicate each device of equipment where the power originates.

Add the following:

109-4.9 Testing airfield lighting systems. Cable and constant current regulator testing, and calibration shall include the following:

a. Follow safety procedures for all tests. Prior to operating each CCR (Constant Current Regulator), confirm each CCR frame is grounded to the Vault grounding electrode system/ground bus with a minimum #6 AWG copper conductor and UL listed grounding connector with secure and tight connections. Correct where missing, for safety of personnel. Furnish and install #6 green insulated copper equipment ground wire with output series circuit conductors from each CCR frame to the respective cutout/disconnect enclosure frame. Cutout enclosures are required to be grounded and bonded per 2023 NEC Article 250.4 "*General Requirements for Grounding and Bonding*". **PLEASE BE AWARE THAT GROUNDING DOES NOT GUARANTEE YOU WILL NOT RECEIVE A SHOCK, BE INJURED, OR KILLED FROM DEFECTIVE EQUIPMENT OR MATERIALS. PROPER GROUNDING WILL HOWEVER SIGNIFICANTLY REDUCE THE POSSIBILITY OF SHOCK, INJURY, OR DEATH. PLEASE FOCUS ON SAFETY OF PERSONNEL AT ALL TIMES.**

b. The respective personnel performing tests shall be familiar with the respective test equipment and the use and operation of the test equipment. The Contractor is responsible to employ the services of personnel qualified to perform the respective tests and qualified to work on 5000 Volt airfield lighting series circuits, constant current regulators, and associated airport electrical vault equipment. The Contractor is required to employ qualified personnel that are familiar with and capable of properly conducting the required tests and calibrations for the respective cables and equipment.

c. Prior to beginning excavations, airfield lighting modifications, cable installation, and/or any other work that might possibly affect airfield lighting circuits, all existing series circuit cables shall be Megger tested with an insulation resistance tester and recorded at the respective vault. All existing series circuit cable loops shall have the resistance measured with an Ohmmeter and recorded for each circuit at the vault. Each constant current regulator shall be tested with results recorded. Contractor shall provide a True RMS Ammeter for current measurements. The Contractor is responsible to employ the services of personnel qualified, familiar with, and trained to perform the respective tests, and qualified to work on 5000 Volt airfield lighting series circuits, constant current regulators, and associated airport electrical vault equipment. Please understand that airfield lighting series circuits are dangerous and only qualified personnel should be permitted to work on them and safety procedures need to be followed. National Electrical Code defines a Qualified Person as ***"One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved."*** Safety of personnel is the top priority. Follow safety procedures for all work. Only qualified and experienced personnel are permitted to work on airfield lighting series circuits.

d. Personnel shall coordinate work and any power outages with the Owner's Designated Representative(s). Any shutdown of existing systems should be scheduled with and approved by the Owner's Designated Representative(s) prior to shut down. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment the respective personnel will be responsible for providing the appropriate lockout/tagout equipment.

Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on this system.

e. Personnel are recommended to comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

f. Provide personnel protective equipment for all personnel working on or testing electrical systems suitable for the respective application. Provide protective equipment for personnel to keep them safe in the event of an arc flash or other electrical accident. Refer to NFPA 70E "Standard for Electrical Safety in the Workplace", Article 250 "Personal Safety and Protective Equipment" and "Informative Annex H Guidance on Selection of Protective Clothing and Other Personal Protective Equipment (PPE)" for additional information on personal protective equipment.

g. Insulation resistance testing equipment for use with 5,000 Volt series circuit cables shall use an insulation resistance tester capable of testing the cables at 5,000 Volts. New 5,000 Volt rated airfield lighting series circuit cables shall be tested at not less than 5,000 Volts. Existing older series circuit cables and/or cables in poor condition may require the test voltage to be performed at a voltage lower than 5,000 Volts to obtain an insulation resistance reading (Example 1,000 Volts, 500 Volts, or less than 500 Volts). Insulation resistance testing equipment often has the feature to adjust the test voltage corresponding to the condition of the cable. The respective test voltages shall be recorded for each cable insulation resistance test result. Measuring the cable insulation resistance of existing conductors/cables is important to document the condition of existing conductors/cables and help determine if there are existing hazards and/or unsafe conditions that will need to be addressed for protection of personnel.

h. Insulation resistance testing equipment for use with 600 Volt rated cables shall use a 500 Volt insulation resistance tester. The respective test voltage shall be recorded for each cable insulation resistance test result.

i. It is recommended to use the same insulation resistance test equipment throughout the project to ensure reliable comparative readings at the beginning of the project and at the completion of the project.

j. Disconnect the airfield lighting series circuit cables from the constant current regulator when performing cable insulation resistance tests (Megger Tests). Test the cables that go to the airfield for the respective airfield lighting series circuit. Connect the cable insulation resistance tester to one of the airfield lighting series circuit cables and to a good ground in the airport electrical vault such as the airport vault ground bus. Conduct the cable insulation resistance test on each respective cable for not less than 90 seconds. Record the test results at the end of the time duration for the test.

k. FAA Advisory Circular 150/5340-26C Maintenance of Airport Visual Aid Facilities provides guidance on Insulation Resistance Tests. Also refer to the user manual for the respective cable insulation resistance tester. Reasonably new series circuit cables and transformers with good connections should read 500 Mega-Ohms to 1,000 Mega-Ohms or higher. The readings should decrease with age. The resistance value declines over

the service life of the circuit; a 10-20 percent decline per year may be considered normal. A yearly decline of 50 percent (4 percent monthly) or greater indicates the existence of a problem, such as a high resistance ground, serious deterioration of the circuit insulation, lightning damage, bad connections, bad splices, cable insulation damage, or other failure. FAA Advisory Circular 150/5340-26C notes "*Generally speaking, any circuit that measures less than 1 megohm is certainly destined for rapid failure."* Airfield lighting series circuits with cable insulation readings of less than 1 megohm are not uncommon for older circuits that are 20 years or more of age.

l. Based on information in FAA AC No. 150/5340-26C MAINTENANCE OF AIRPORT VISUAL AID FACILITIES, the cable insulation resistance value inevitably declines over the service life of the circuit; a 10-20 percent decline per year may be considered normal. In the event that the cable insulation resistance readings have declined more than 2 percent per month it might indicate cable damage due to lightning or damage as a result of Contractor operations. Where the cable insulation resistance readings have declined more than 2 percent per month over the project construction duration as a result of Contractor operations, Contractor will need to investigate, address, and repair the respective cable circuits.

m. All existing series circuit cable loops shall also have the resistance measured with an Ohmmeter and recorded for each circuit at the vault. The resistance of the series circuit loop with connections using #8 AWG copper conductor should be approximately 0.8 to 1 Ohm per thousand feet of cable length. The resistance of the series circuit loop with connections using #6 AWG copper conductor should be approximately 0.5 to 0.7 Ohm per thousand feet of cable length. The number of series circuit transformers and connections will affect the overall resistance of the series circuit loop and therefore the measurements might be slightly higher than the calculated resistance for the respective length of cable.

n. When test results for constant current regulators indicate readings that are outside the acceptable tolerances calibrate and adjust the regulator to be within acceptable output current levels. Adjustments and calibrations shall be in accordance with the respective regulator manufacturer recommendations and instructions. Provide a true RMS Ammeter for measuring input and output currents on constant current regulators.

o. Copies of test results shall be provided to the Resident Engineer and the respective Project Engineer of Record within five business days of conducting the respective set of tests. See the testing forms included in the Appendix. **These tests are required to protect the Owner and the Contractor and to identify existing conditions and any defective cables, circuits, and/or constant current regulators. Failure to comply with this requirement might result in the Contractor being responsible for defective cable and circuit conditions (where previously not identified) and the associated corrective work at no additional cost to the Contract. The Contractor is responsible to perform the tests, record the test results and submit the test results to the Engineer of Record.**

p. After airfield lighting modifications, additions, and/or upgrades have been completed, series circuit cables shall be Megger tested with an insulation resistance tester and recorded at the respective vault. All series circuit cable loops shall have the resistance

measured with an Ohmmeter and recorded for each circuit at the respective vault. Each constant current regulator shall be tested with results recorded. Contractor shall provide a True RMS Ammeter for current measurements. Copies of test results shall be provided to the Resident Engineer and the respective Project Engineer of Record. See the testing forms included in Appendix A. The Contractor is responsible to perform the tests, record the test results and submit the test results to the Engineer of Record.

q. See Appendix A – "Constant Current Regulator and Cable Testing Forms" for additional information on testing requirements for airfield lighting systems. All testing will be considered incidental to the respective work items and no additional compensation will be allowed.

109-4.10 Lockout/Tagout Procedures. Lockout/Tagout Procedures shall include the following:

a. The Contractor shall provide a copy of their electrical energy source Lockout/Tagout Procedures document to the Airport Director/Manager, Resident Engineer and the Engineer. The Lockout/Tagout Procedures document shall include the contact information with 24-hour phone numbers for the Contractor and the Electrical Contractor Superintendent and/or the respective licensed Journeyman Electricians on the project site.

b. Contractor shall coordinate work and any power outages with the Airport Director/Manager and the Resident Engineer. Any shutdown of existing systems shall be scheduled with and approved by the Airport Director/Manager prior to shutdown. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on the respective system.

c. Where existing electrical equipment does not have features for lockout/tagout the Contractor will be responsible for providing the appropriate lockout/tagout equipment and measures to ensure the safety of personnel.

d. Contractor shall comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

e. Compliance with Lockout/Tagout Procedures and all other safety procedures and requirements are the responsibility of the Contractor.

109-4.11 Grounding requirements. Grounding shall conform to the following as applicable: The Contractor shall furnish and install all grounding shown on the Contract Documents, as required by the latest NFPA 70 – National Electrical Code (NEC) in force, other applicable codes, and in accordance with the respective equipment manufacturer's recommendations, instructions, and requirements for the priority of protection of personnel and additionally for the

protection of equipment. All personnel are recommended to also comply with NFPA 70E "Standard for Electrical Safety in the Workplace". The reliability of the grounding system is dependent on careful, proper installation, and choice of materials. Improper preparation of surfaces to be joined to make an electrical path, loose joints, or corrosion can introduce impedance that will seriously impair the ability of the ground path to protect personnel and equipment and to absorb transients that can cause noise in communications circuits. The following functions are particularly important to ensure a reliable ground system:

a. All products associated with the grounding system shall be UL-listed and labeled.

b. All bolted or mechanical connections shall be coated with a corrosion preventative compound before joining, Sanchem Inc. "NO-OX-ID "A-Special" compound, Burndy Penetrox E, or equal.

c. Metallic surfaces to be joined shall be prepared by the removal of all non-conductive material, per 2023 NEC Article 250-12. All copper bus bars must be cleaned prior to making connections to remove surface oxidation.

d. Metallic raceway fittings shall be made up tight to provide a permanent low impedance path for all circuits. Metal conduit terminations in enclosures shall be bonded to the enclosure with UL-listed fittings suitable for grounding. Provide grounding bushings with bonding jumpers for all metal conduits entering service equipment (meter base, CT cabinet, main service breaker enclosure, etc.), generator breaker enclosures, and automatic transfer switch enclosures. Provide grounding bushings with bonding jumpers for all metal conduits entering an enclosure through concentric or eccentric knockouts that are punched or otherwise formed so as to impair the electrical connection to ground. Standard locknuts or bushings shall not be the sole means for bonding where a conduit enters an enclosure through a concentric or eccentric knockout.

e. Furnish and install ground rods and ground rings at all locations where shown on the Plans or specified herein. Ground rods shall be 3/4-in. diameter, 10 ft. long, UL-listed, stainless steel, unless detailed otherwise on the Plans. Longer ground rods shall be required where detailed on the Plans and/or as specified herein to accommodate respective soil conditions or respective applications. Ground rods shall have 10 mil minimum copper coating. Top of ground rods shall be a minimum of 12 inches below finish grade unless otherwise noted on the Plans. Ground rods shall be spaced, as detailed on the Plans, and in no case spaced less than one-rod length apart. All connections to ground rods and/or ground rings shall be made with exothermic weld type connectors, Cadweld by Erico Products, Inc., Thermoweld by Continental Industries, Inc., Ultraweld by Harger, or approved equal. Exothermic weld connections shall be installed in conformance with the respective manufacturer's directions using molds as required for each respective application. Bolted connections will not be permitted at ground rods or at buried grounding electrode conductors. Grounding electrode conductors shall be bare copper (stranded or solid) sized, as detailed on the Plans.

f. All connections located above grade, between the different types of grounding conductors shall be made using UL-listed, double-compression, crimp-type connectors or UL-listed, bolted ground connectors. For ground connections to enclosures, cases, and frames of electrical equipment not supplied with ground lugs,

the Contractor shall drill required holes for mounting a bolted, ground connector. All bolted, ground connectors shall be Burndy, Dossert Corporation, ILSCO Corporation, Penn-Union Corporation, Thomas and Betts, or approved equal. Tighten connections to comply with tightening torques in UL Standard 486A to assure permanent and effective grounding.

g. All metal equipment enclosures, conduits, cabinets, boxes, receptacles, etc. shall be bonded to the respective grounding system. Provide grounding bushings at all conduits entering service entrance equipment (meter bases, service disconnects, service panelboards, etc.) and distribution panels or load centers and ground wire from bushing to ground bus in the respective service entrance equipment or distribution panel.

h. Each feeder circuit and/or branch circuit shall include an equipment ground wire. Metal raceway or conduit shall not meet this requirement. The equipment ground wire from equipment shall not be smaller than allowed by 2023 NEC Table 250-122 “Minimum Size Conductors or Grounding Raceway and Equipment.” When conductors are adjusted in size to compensate for voltage drop, equipment-grounding conductors shall be adjusted proportionately according to circular mil area. All equipment ground wires shall be copper, either bare or insulated green in color. Where the equipment grounding conductors are insulated, they shall be identified by the color green, and shall be the same insulation type as the phase conductors.

i. All utility transformer bank grounds shall be installed in accordance with the serving utility company’s recommendation and in accordance with the NEC.

j. Bond the main electrical service neutral to ground at the main service disconnect. Bond the service neutral to ground at one location only per the NEC. A grounding connection shall not be made to any neutral circuit conductor on the load side of the service disconnecting means, except as permitted by 2023 NEC 250-24.

k. The secondary neutral of all transformers (separately derived system transformers) shall be grounded in accordance with the NEC. The respective grounding electrode conductor shall be connected to the neutral point of the transformer between the transformer and the output disconnecting means. Size of the grounding electrode conductor shall be in accordance with 2023 NEC Article 250-66 and Table 250-66 unless shown larger on the Drawings. A bond shall be provided between the neutral and transformer case, or other metal that is part of the AC equipment grounding system, so as to complete a circuit for fault current to the transformer winding from the AC equipment grounding system. Size of the neutral bonding conductor shall be in accordance with 2023 NEC Article 250-102.

l. Make sure each constant current regulator has a good and secured frame ground connection from the regulator housing to the respective vault ground bus and grounding electrode system, prior to energizing each regulator. Prior to operating each constant current regulator (CCR), confirm each CCR frame is grounded to the Airport Electrical Vault grounding electrode system with a minimum #6 AWG Copper conductor and UL listed grounding connector with secure and tight connections. Correct where missing. Failure to properly ground this equipment presents a dangerous hazard for personnel working on this system. Test and confirm that the Airport Electrical Vault grounding electrode earth resistance is not greater than 10

Ohms. FAA AC 150/5340-30J Appendix E, Part E.1.4 Equipment Grounding, Paragraph 4 notes "The resistance to ground of the vault grounding system with the commercial power line neutral disconnected must not exceed 10 Ohms." Where the ground resistance is greater than 10 Ohms, corrective action will be necessary. Contact the Engineer of Record for further directions where applicable. **The Vault ground bus and grounding electrode system is an existing system at MDH Southern Illinois Airport.**

m. Include an equipment ground wire with each feeder/branch circuit from the respective power source to the respective constant current regulator. Include an equipment ground wire with the control wiring circuit conductors from the respective control panel to the respective constant current regulator.

n. Furnish and install a #6 AWG (minimum) equipment ground wire with the output series circuit conductors from the respective constant current regulator to the respective cutout enclosure, for 6.6 Amp circuits. Furnish and install a #6 AWG (minimum) equipment ground wire with the output series circuit conductors from the respective constant current regulator to the respective cutout enclosure, for 20 Amp circuits. Bond the equipment ground wire to the constant current regulator frame and the cutout enclosure frame. Cutout enclosures are required to be grounded and bonded per National Electrical Code Article 250.4 "*General Requirements for Grounding and Bonding*". Failure to properly ground this equipment presents a dangerous hazard for personnel working on this system.

o. All exterior metal conduit, where not electrically continuous because of manholes, handholes, non-metallic junction boxes, etc., shall be bonded to all other metal conduit in the respective duct run, and at each end, with a copper-bonding jumper sized in conformance with 2023 NEC 250-102. Where metal conduits terminate in an enclosure (such as a motor control center, switchboard, etc.) where there is not electrical continuity with the conduit and the respective enclosure, provide a bonding jumper from the respective enclosure ground bus to the conduit sized per 2023 NEC 250-102.

p. Where acceptable to the Authority of Jurisdiction, install grounding electrode conductors and/or individual ground conductors in Schedule 80 PVC conduit. Where grounding electrode conductors or individual ground conductors are run in PVC conduit, do not completely encircle conduit with ferrous and/or magnetic materials. Use non-metallic, reinforced fiberglass strut support. Where metal conduit clamps are installed, use nylon bolts, nuts, washers, and spacers to interrupt a complete metallic path from encircling the conduit.

q. If local codes dictate that individual grounding conductors must be run in metal conduit or raceway, then the conduit or raceway must be bonded at each end of the run with a bonding jumper sized equal to the individual grounding conductor or as required by 2023 NEC 250-102. Note: this does not apply to AC equipment ground conductors run with AC circuits. Confirm requirements with the Authority of Jurisdiction.

r. Grounding work affecting operations at a facility shall be coordinated with the Owner's Representative and to minimize downtime to existing systems. Contractor shall coordinate work and any power outages with the Owner's Representative. Any

shutdown of existing systems shall be scheduled with and approved by the Owner's Representative prior to shutdown. All power systems (AC or DC) shall have provisions to lockout and tagout any circuit to help ensure the circuit is safe to work on for protection of personnel. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where a facility does not have lockout/tagout kits the Contractor shall provide adequate quantities of lockout/tagout kits suitable for use with the respective equipment. Where existing electrical equipment does not have features for lockout/tagout the Contractor will be responsible for providing the appropriate lockout/tagout equipment and measures to ensure the safety of personnel. All padlocks for use with lockout/tagout procedures shall have a different key. Provide lockout hasps to accommodate multiple padlocks where multiple people are working on the same system. Include lockout tags for each piece of equipment requiring servicing and shutdown. Compliance with Lockout/Tagout Procedures and all other safety procedures and requirements are the responsibility of the respective personnel working at the facility.

s. Never remove, alter, or attempt to repair conductors or conduit systems providing grounding or electrical bonding for any electrical equipment until all power is removed from the equipment. Warn all personnel of the ungrounded condition of the equipment. Display appropriate warning signs, such as danger tags, to warn personnel of the possible hazards.

t. Grounding work and modifications shall not be performed during a thunderstorm or when a thunderstorm is predicted in the area.

u. Per NFPA 70E Standard for Electrical Safety in the Workplace it defines Electrically Safe Work Condition as "A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to verify the absence of voltage, and, if necessary, temporarily grounded for personnel protection." Prior to conducting tests or working on equipment, verify equipment enclosures and frames have a good and secure ground connection for the safety of personnel.

v. Where a conflict is determined with respect to grounding requirements per manufacturer installation instructions, National Electrical Code, and/or the Contract Documents, or there are other questions or concerns about the grounding requirements contact the Project Engineer of Record: Kevin Lightfoot for further directions. Safety of personnel is the top priority.

w. PLEASE BE AWARE THAT GROUNDING DOES NOT GUARANTEE YOU WILL NOT RECEIVE A SHOCK, BE INJURED, OR KILLED FROM DEFECTIVE EQUIPMENT OR MATERIALS. PROPER GROUNDING WILL HOWEVER SIGNIFICANTLY REDUCE THE POSSIBILITY OF SHOCK, INJURY, OR DEATH. PLEASE FOCUS ON SAFETY OF PERSONNEL AT ALL TIMES.

109-4.12 Restoration. Any and all trenches and disturbed areas will be backfilled and restored to a smooth grade and seeded to the satisfaction of the Resident Engineer. All trench settlement or disturbed areas shall be corrected for a period of one year. Restoration, grading,

and seeding of areas disturbed during the installation of the proposed vault work and/or vault removal work will be incidental to the respective 109 Pay Item. The vault interior shall be cleaned to remove dust, dirt, debris, metal shavings, scrap materials, and waste materials. The Vault floor shall be swept and/or vacuumed to clean. The vault interior shall be cleaned and disinfected.

109-4.13 Safety practices with airfield lighting series circuits. Please understand that airfield lighting series circuits are dangerous and only qualified personnel should be permitted to work on them and safety procedures need to be followed. Safety of personnel is the top priority. Follow safety procedures for all work. Only qualified and experienced personnel should be permitted to work on airfield lighting series circuits. See **125-3.10 Safety practices with airfield lighting series circuits** for additional information and requirements for safety practices.

METHOD OF MEASUREMENT

Add the following

109-5.3 Add the following:

> "The quantity of vault equipment to be paid for under Item AR109200 "Install Electrical Equipment" shall be made on a lump sum basis wherein no measurement will be made and shall consist of furnishing and installing all electrical equipment and materials at the vault, as detailed on the Plans and specified herein. This item shall include all labor, materials, transportation, equipment, wiring, raceways, grounding, warranties, tools, coordination, relocations, lockout/tagout procedures, operational instructions, labeling, testing, cleaning, and all incidentals required to place the vault and associated equipment into proper working order.
>
> Relocation of the existing constant current regulators within the vault or from the vault to a designated storage facility located on the Airport, will be considered incidental to this item, and no additional compensation will be allowed.
>
> All lockout/tagout procedures to ensure and maintain safety of personnel will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.
>
> Cables inside or at the Airport Electrical Vault Building will be considered incidental to this item, and no additional compensation will be allowed. Conduits inside, adjacent to, interfacing to, or at the Airport Electrical Vault Building will be considered incidental to this item, and no additional compensation will be allowed. Disconnecting and removing existing designated equipment and materials will be considered incidental to this item, and no additional compensation will be allowed. Relocation of existing equipment to storage will be considered incidental to this item, and no additional compensation will be allowed.
>
> Removals, relocations, rewiring, and/or adjustments to existing equipment in the vault will be considered incidental to this item, and no additional compensation will be allowed.
>
> Furnishing and installing labeling for equipment will be considered incidental to this item, and no additional compensation will be allowed.

Furnishing and installing UL listed fire stop material at each series plug cutout enclosure conduit entry and exit will be considered incidental to this item, and no additional compensation will be allowed.

Furnishing and installing fire extinguishers in the Vault will be considered incidental to this item, and no additional compensation will be allowed.

Add the following:

109-5.4 Testing the airfield lighting systems and the associated cable tests, constant current regulator tests and calibration will be paid for on a per lump sum basis and shall include all testing prior to beginning excavations, airfield lighting modifications, cable installation, and/or any other work that might possibly affect airfield lighting circuits and all testing after airfield lighting modifications, additions, and/or upgrades have been completed. Testing of the airfield lighting systems and the associated cable tests and constant current regulator tests and calibration shall include all labor, transportation, equipment, tools, and measuring devices; all coordination with the Airport Manager, Airport Staff, FAA personnel, Contractor staff, and the Resident Engineer; all recording of the test results and submission of the test results to the Resident Engineer and the Project Engineer of Record; all calibration and adjusting of constant current regulators where test results indicate regulator output currents that are not within accepted tolerances; all retesting where test results indicate unsatisfactory conditions or incorrect testing procedures; and all other incidentals necessary to complete this item. This item shall include lockout/tagout procedures and lockout/tagout kits. Based on the contract lump sum price for Cable and Constant Current Regulator Testing, partial payments will be allowed as follows:

a. Upon completion of all testing prior to beginning excavations, airfield lighting modifications, cable installation, and/or any other work that might possibly affect airfield lighting circuits, submission of testing results to the Resident Engineer and the Project Engineer of Record, and acceptance of the testing results by the Project Engineer of Record, 50 percent of the lump sum payment will be allowed.

b. Upon completion of all testing after airfield lighting modifications, additions, and/or upgrades have been completed, submission of testing results to the Resident Engineer and the Project Engineer of Record, and acceptance of the testing results by the Project Engineer of Record, the remaining 50 percent of the lump sum payment will be allowed.

All lockout/tagout procedures and lockout/tagout kits to ensure and maintain safety of personnel will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

BASIS OF PAYMENT

109-6.1 Add the following:

Payment will be made under:

Item AR109200 Install Electrical Equipment per L. SUM.

Add the following:

109-6.2. "Payment for Cable and Constant Current Regulator Testing and Calibration will be made at the contract unit price per lump sum and shall include all labor, transportation, equipment, tools, and measuring devices; all coordination with the Airport Director/Manager, Airport Staff, FAA personnel, Contractor staff, and the Resident Engineer; calibration and adjusting constant current regulators; all recording of the test results and submission of the test results to the Resident Engineer and the Project Engineer of Record; all retesting where test results indicate unsatisfactory conditions or incorrect testing procedures; and all other incidentals necessary to complete this item."

Payment will be made under:

Item AR800564 Cable and CCR Testing and Calibration – per L. SUM.

REFERENCES

Add the following:

Federal Aviation Administration Advisory Circulars (AC). Note: where FAA Advisory circulars are referenced that shall be the current issue or issues in effect.

AC 150/5340-26C MAINTENANCE OF AIRPORT VISUAL AID FACILITIES.

AC 150/5370-2 OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION.

National Fire Protection Association (NFPA)

NFPA 2638645-1 = National Fire Protection Association IDN.

Occupational Safety and Health Administration

OSHA 29 CFR Part Number 1910; Occupational Safety and Health Standards, Standard Number 1910.147; The control of hazardous energy (lockout/tagout).

Underwriters Laboratories (UL)

UL Standard 44 Thermoset-Insulated Wires and Cables.

UL Standard 83 Thermoplastic-Insulated Wires and Cables.

UL Standard 467 Grounding and Bonding Equipment.

UL Standard 486A-486B Wire Connectors.

UL Standard 854 Service Entrance Cables.

END OF ITEM 109

Item 110 Airport Underground Electrical Duct Banks and Conduits

EQUIPMENT AND MATERIALS

110-2.1 General, Paragraph d. Add the following to the end of paragraph d:

The Contractor shall furnish shop drawings for approval before ordering equipment and/or materials. Shop drawings are required for each type of conduit or duct to be used on the project. **Shop drawings shall be clear and legible. Copies that are illegible will be rejected.** Shop drawings shall include the following information:

A. Certification of compliance with the AIP (Airport Improvement Program) Buy American Preferences for all materials and equipment. Do not submit ARRA (American Recovery and Reinvestment Act) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Do not submit NAFTA (North American Free Trade Agreement) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Shop drawings submitted without certification of compliance with the Airport Improvement Program Buy American Preferences or without certification of manufacture in the United States of America from Domestic materials in accordance with the AIP Buy American Requirements will be rejected. See the FAA website at: http://www.faa.gov/airports/aip/buy_american/ for more information on the Airport Improvement Program Buy American Preferences requirements.

B. In order to expedite the shop drawing review, inspection and/or testing of materials and equipment, the Contractor shall furnish complete statements to the Project Engineer of Record as to the origin and manufacturer of all materials and equipment to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials and equipment.

C. Illinois Department of Transportation Division of Aeronautics requires the following: ***"Under the FAA Buy American Preference, the contractor is required to submit certification that assures only domestic steel, domestic materials and domestic manufactured products are used. The Buy American statement must come from the producer, not the supplier. Producer verification must state that the items are produced in the United States and are made from 100% domestic materials. Statements that solely refer to the "Buy American Act" or "ARRA" or any federal purchasing act other than Title 49 United States Code (USC), Section 50101 will be rejected. Producers may use the Illinois Department of Transportation Domestic Material Compliance Certification Form AER 25 to satisfy this requirement."***

D. Indicate the pay item number for each respective conduit or duct.

E. Shop drawings shall include conduit and/or duct cut sheets with type, size, specifications, UL listing, manufacturer, and catalog or part number.

F. Provide certification that the respective plastic conduits used on this project are manufactured from domestic materials.

110-2.3 Plastic conduit. Add the following to the end of this section:

e. Conduits for concrete encasement shall be Schedule 40 PVC, UL-listed, rated for 90°C cable, conforming to NEMA Standard TC-2 and UL 651, listed suitable for concrete encasement or Schedule 40 (minimum) HDPE conduit, UL-listed or ETL listed, conforming to NEMA Standard TC-7 and UL 651B and listed suitable for concrete encasement. Conduits shall be suitable for underground applications encased in concrete or direct burial, and suitable for exposed applications aboveground.

f. Conduits for directional boring shall be Schedule 40 PVC or Schedule 80 PVC conduit, UL-listed or ETL listed, rated for 90°C cable-conforming to NEMA Standard TC-2 and UL 651 and suitable for directional boring installation, Schedule 40 HDPE or Schedule 80 HDPE conduit, UL-listed, conforming to NEMA Standard TC-7 and UL 651B and suitable for directional boring installation, or Wall Type SDR 11 (minimum) HDPE conduit manufactured in accordance with ASTM D-3350 (Specification of Polyethylene Plastics Pipe and Fittings Materials) and ASTM F2160 (Standard Specification for Solid Wall, High-Density Polyethylene Conduit Based on Controlled Outside Diameter), and suitable for directional boring installation. **Per 2023 NEC 300.5 (K), raceways installed using directional boring equipment shall be approved for the purpose. Provide manufacturer's literature confirming the respective duct is suitable for directional boring with the respective Shop Drawing submittal.**

g. Conduits for direct burial in earth shall be PVC Schedule 40 (minimum wall thickness), UL-listed, rated for 90°C cable-conforming to NEMA Standard TC-2 and UL 651, listed suitable for direct burial in earth, or HDPE Schedule 40 (minimum wall thickness), conforming to NEMA Standard TC-7 and UL 651B, or HDPE SDR 13.5 (minimum wall thickness) manufactured in accordance with ASTM D-3350 (Specification of Polyethylene Plastics Pipe and Fittings Materials) and ASTM F2160 (Standard Specification for Solid Wall, High-Density Polyethylene Conduit Based on Controlled Outside Diameter). Conduits shall be suitable for direct burial in earth and/or concrete encasement.

h. Conduit for Item AR110202; 2" PVC Conduit, Direct Bury shall be Schedule 40 PVC (minimum), UL-listed or ETL listed, rated for 90°C cable, conforming to NEMA Standard TC-2 and UL 651 or Schedule 40 (minimum) HDPE, UL-listed, conforming to NEMA Standard TC-7 and UL 651B. Conduits shall be suitable for underground applications direct burial in earth or concrete."

CONSTRUCTION METHODS

110-3.1 General. Add to this section:

"The proposed conduits and ducts shall be constructed at the locations and in accordance with the details shown on the Construction Plans. Ducts shall be installed 18 in. minimum below grade. Ducts located in area subject to farming shall be 42 in minimum below grade. Where detailed on the Plans or where required to avoid obstructions, ducts shall be buried deeper. Where concrete-encased duct interfaces to directional-bored duct at a pavement crossing, the concrete encasement shall be installed up to the respective pavement edge. Where concrete-encased duct interfaces to an electrical handhole or manhole, the concrete encasement shall be installed up to

the respective handhole or manhole. Provide bushings or bells at conduit terminations in electrical handholes or manholes.

Underground ducts installed by directional-boring method shall be installed in a manner that will not damage any existing underground utilities and shall not disturb or damage the respective pavement or roadway surface. Ducts shall be directional bored at the locations shown on the Construction Plans. The ducts will be bored at a minimum depth of 36 inches below the bottom of the pavement or ten times the reamer diameter measured from the top of the pavement to the top of the reamer, whichever is deeper. Deeper depths may be required by respective utilities or to avoid disturbing the pavement surface. Contractor shall be responsible for restoration for any damage caused by heaving, settlement, separation of pavement, escaping drilling fluid, or the directional drilling operation at no additional cost to the Contract. Ducts installed under paved areas and roadways shall extend a minimum of 10 feet beyond the respective pavement or roadway surface, unless detailed otherwise on the Plans. A pull wire will be left in the conduit if it is to be left vacant. The ends of the conduit will be sealed with approved plugs.

The Contractor will determine if there is a conflict between the installation of the proposed electrical ducts and any existing/proposed utilities. He will make all necessary adjustments in depth of installation to avoid any and all existing/proposed underground improvements.

Provide conduit bushings or bells at duct terminations in handholes and manholes."

110-3.7 Restoration. Add to this section:

"Any and all disturbed pavement areas will be restored to original or better condition. Restoration of pavement areas disturbed during the installation of the proposed ducts will be incidental to the respective pay item for which the duct is installed. The restoration of concrete pavement will be completed in accordance with Item 610 for sidewalks and concrete pavement but will be incidental to the respective pay item for which the duct is installed."

Add the following:

110-3.8 Locating of existing underground utilities and cables. The location, size, and type of material of existing underground and/or aboveground utilities indicated on the Plans are not represented as being accurate, sufficient, or complete. Neither the Owner nor the Engineer assumes any responsibility whatever in respect to the accuracy, completeness, or sufficiency of the information. There is no guarantee, either expressed or implied, that the locations, size, and type of material 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 service connections to underground utilities. Prior to construction, the Contractor shall notify the utility companies of his operational plans, and shall obtain from the respective utility companies detailed information and assistance relative to the location of their facilities and the working schedule of the companies for removal or adjustment, where required. In the event an unexpected utility interference is encountered during construction, the Contractor shall immediately notify the utility company of jurisdiction. The Owner's Representative and/or the Resident Engineer shall also be immediately notified. Any damage to such mains and services shall be restored to service at once and paid for by the

Contractor at no additional cost to the Contract.

All utility cables and lines shall be located by the respective utility. **Contact JULIE (Joint Utility Location Information for Excavators) for utility information, phone: 1-800-892-0123.** Contact the FAA (Federal Aviation Administration) for assistance in locating FAA cables and utilities. Location of FAA power, control, and communication cables shall be coordinated with and/or located by the FAA. Also contact Airport Director/Manager and Airport Personnel for assistance in locating underground Airport cables and/or utilities. Also coordinate work with all aboveground utilities.

Contractor shall locate and mark all existing cables within ten (10) feet of proposed excavating/trenching area. Any cables found interfering with proposed excavation or cable/trenching shall be hand dug and exposed. Any damaged cables shall be immediately repaired to the satisfaction of the Resident Engineer at the Contractor's expense. The Resident Engineer and Owner shall be notified immediately if any cables are damaged.

Due to the quantities of existing utilities and lines in the proposed areas of work, the Contractor will need to carefully excavate to expose and protect these utilities and lines prior to installing Navaids, airfield lighting, manholes, handholes, and/or junction structures and the associated trenches for the proposed conduits, ducts, and raceway system.

Payment for locating and marking underground utilities and cables will not be paid for separately but shall be considered incidental to the respective duct installation.

110-3.9 Separation of high-voltage and low-voltage wiring. High-voltage circuit wiring (airfield lighting 5000 Volt series circuits and/or other circuits rated above 600 Volts) and low-voltage circuit wiring (rated 600 Volts and below) shall maintain separation from each other to comply with 2023 National Electrical Code 300.3(C)(2). This is also required by "Airport Lighting Engineering Regional Supplement" issued by Great Lakes Region. High-voltage wiring and low-voltage wiring shall not be installed in the same wireway, conduit, duct, raceway, handhole, or junction box.

METHOD OF MEASUREMENT

110-4.1 Add the following:

> "All restoration work associated with installation of ducts and conduits will be considered incidental to the respective item for which they are installed, and no additional measurement will be made. Removal and replacement of bituminous pavement or concrete pavement will be considered incidental to the respective pay item for which the duct is installed. All duct and conduit interface to manholes, handholes, junction structures, or pull boxes including coring of manholes, handholes, junction structures, or pull boxes will be considered incidental to the respective item for which they are installed, and no additional measurement will be made. Conduits, conduit nipples, conduit couplings, and other conduit fittings included with splice cans, junction structures, Navaid installations, base mounted airfield light fixtures, airfield signs, and/or taxi signs, will be considered incidental to the respective item for which they are installed, and no additional measurement will be made.
>
> All lockout/tagout procedures to ensure and maintain safety of personnel will be

considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed."

BASIS OF PAYMENT

110-5.1. Add the following:

Payment will be made under:

Item AR110202	2" PVC Duct, Direct Bury – per FOOT.
Item AT110202	2" PVC Duct, Direct Bury – per FOOT.

REFERENCES

Add the following:

American National Standards Institute (ANSI)

ANSI C80.1	Rigid Steel Conduit, Zinc Coated.
ANSI C80.4	Fittings Rigid Metal Conduit and EMT.

ASTM International (ASTM).

ASTM D3350	Specification of Polyethylene Plastics Pipe and Fittings Materials.
ASTM F2160	Standard Specification for Solid Wall, High-Density Polyethylene Conduit Based on Controlled Outside Diameter.

Federal Aviation Administration Standard (FAA STD)

FAA STD-019f	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

National Electrical Manufacturers Association (NEMA)

NEMA TC-2	Electrical Plastic Tubing and Conduit.
NEMA TC-3	Fittings Rigid PVC Conduit and Tubing.
NEMA TC-7	Smooth-Wall Coilable Polyethylene Electrical Plastic Conduit.

National Fire Protection Association

NFPA 70 National Electrical Code (NEC), most current issue in force.

NFPA 70E Standard for Electrical Safety in the Workplace.

NFPA 2638645-1 = National Fire Protection Association ID.

Occupational Safety and Health Administration

OSHA 29 CFR Part Number 1910; Occupational Safety and Health Standards, Standard Number 1910.147; The control of hazardous Energy (lockout/tagout).

Underwriters Laboratories (UL)

UL Standard 651B Standard for Continuous Length High-Density Polyethylene (HDPE) Conduit.

END OF ITEM 110

Item 115 Electrical Manholes and Junction Structures

EQUIPMENT AND MATERIALS

115-2.1 General. Add the following to paragraph d.

The Contractor shall furnish shop drawings for approval before ordering equipment and/or materials. Shop drawings are required for each type of electrical handhole/manhole and junction structure to be used on the project. **Shop drawings shall be clear and legible. Copies that are illegible will be rejected.** The preferred shop drawing submittal format shall be electronic (PDF) copies. Shop drawings shall include the following information:

(1) Certification of compliance with the AIP (Airport Improvement Program) Buy American Preferences for all materials and equipment. Do not submit ARRA (American Recovery and Reinvestment Act) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Do not submit NAFTA (North American Free Trade Agreement) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Shop drawings submitted without certification of compliance with the Airport Improvement Program Buy American Preferences or without certification of manufacture in the United States of America in accordance with the AIP Buy American Requirements will be rejected. See the FAA website at: http://www.faa.gov/airports/aip/buy_american/ for more information on the AIP Buy American Preferences requirements.

(2) In order to expedite the shop drawing review, inspection and/or testing of materials and equipment, the Contractor shall furnish complete statements to the Project Engineer as to the origin and manufacturer of all materials and equipment to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials and equipment.

(3) The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Engineer 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.

(4) Provide cut sheets with part number and specifications for each FAA L-867 junction structure/splice can.

(5) Provide cut sheets with part number and specifications for covers and frames for each respective handholes or manhole.

(6) Provide drawings and specifications for precast handholes and manholes.

115-2.4 Junction boxes. Add the following:

"Cans shall be the size and depth as detailed on the Plans. Lids for splice cans containing high voltage airfield lighting cables shall include minimum 1/2-inch-high lettering labeled "**DANGER HIGH VOLTAGE KEEP OUT**" to comply with 2020 NEC (National Electrical Code) 300.45 "Danger Signs", 2023 NEC 305.12 "Danger Signs", and 2020/2023 NEC 314.72 "Construction and Installation Requirements", (E) "Suitable Covers". This will need to be coordinated with the splice can manufacturer. Lids for splice cans containing low voltage cables (rated 600 Volts and below) will be acceptable to use blank covers."

CONSTRUCTION METHODS

Add the following:

115-3.15 Locating existing underground utilities and cables. The location, size, and type of material of existing underground and/or aboveground utilities indicated on the Plans are not represented as being accurate, sufficient, or complete. Neither the Owner nor the Engineer assumes any responsibility whatever in respect to the accuracy, completeness, or sufficiency of the information. There is no guarantee, either expressed or implied, that the locations, size, and type of material 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 service connections to underground utilities. Prior to construction, the Contractor shall notify the utility companies of his operational plans and shall obtain from the respective utility companies detailed information and assistance relative to the location of their facilities and the working schedule of the companies for removal or adjustment, where required. In the event an unexpected utility interference is encountered during construction, the Contractor shall immediately notify the utility company of jurisdiction. The Owner's Representative and/or the Resident Engineer shall also be immediately notified. Any damage to such mains and services shall be restored to service at once and paid for by the Contractor at no additional cost to the Contract.

All utility cables and lines shall be located by the respective utility. **Contact JULIE (Joint Utility Location Information for Excavators) for utility information, phone: 1-800-892-0123.** Contact the FAA (Federal Aviation Administration) for assistance in locating FAA cables and utilities. Location of FAA power, control, and communication cables shall be coordinated with and/or located by the FAA. Also contact Airport Director/Manager and Airport Personnel for assistance in locating underground Airport cables and/or utilities. Also coordinate work with all aboveground utilities.

Contractor shall locate and mark all existing cables within ten (10) feet of proposed excavating/trenching area. Any cables found interfering with proposed excavation or cable/trenching shall be hand dug and exposed. Any damaged cables shall be immediately repaired to the satisfaction of the Resident Engineer at the Contractor's expense. The Resident Engineer and Owner shall be notified immediately if any cables are damaged.

Due to the quantities of existing utilities and lines in the proposed areas of work, the Contractor will need to carefully excavate to expose and protect these utilities and lines prior to installing manholes, handholes, and/or junction structures and the associated trenches for the proposed conduits, ducts, and raceway system.

Contractor is responsible for the repairs of any utilities, lines, and/or cables damaged as a result of his operations.

Payment for locating and marking underground utilities and cables will not be paid for separately but shall be considered incidental to the respective duct installation.

115-3.16 Separation of high-voltage and low-voltage wiring. High-voltage circuit wiring (airfield lighting 5000 Volt series circuits and/or other circuits rated above 600 Volts) and low-voltage circuit wiring (rated 600 Volts and below) shall maintain separation from each other, to comply with 2023 National Electrical Code 300.3(C)(2). This is also required by "Airport Lighting Engineering Regional Supplement" issued by Great Lakes Region. High-voltage wiring, and low-voltage wiring shall not be installed in the same wireway, conduit, duct, raceway, handhole, or junction box.

115-3.17 Grounding for L-867 and/or L-868 Junction Cans and Splice Cans. Furnish and install a ground rod at each L-867 and/or L868 junction can and splice can. Grounding for junction can and splice cans shall be as detailed on the Plans and as specified herein. The purpose of the junction can/splice can ground is to provide a degree of protection for maintenance personnel from possible contact with an energized base can that may result from a shorted power cable. The ground shall be a #6 AWG bare copper conductor bonded to the ground lug on the respective L-867/L-868 junction can/splice can and a 3/4-inch diameter by 20-feet long (minimum), UL-listed, copper-clad ground rod. Ground rods at junction cans and splice cans shall be connected to the equal potential grounding system for the respective airfield lighting circuit. Connections to ground lugs on the L-867/L-868 can shall be with a UL-listed grounding connector. Connections to ground rods shall be made with exothermic-weld type connectors, Cadweld by nVent Erico Products, Inc., Thermoweld by Continental Industries, Inc., Ultraweld by Harger, or approved equal. Exothermic-weld connections shall be installed in conformance with the respective manufacturer's directions using molds, as required for each respective application. Bolted connections will not be permitted at ground rods. Top of ground rods shall be buried 12 in. minimum below grade, unless noted deeper on the Plans. For each base can, the Contractor shall test the made electrode ground system with an instrument specifically designed for testing ground systems. Test results shall be recorded for each junction can and splice can. Copies of ground system test results shall be furnished to the Resident Engineer and the Project Engineer of Record.

METHOD OF MEASUREMENT

115-4.1. Add the following:

> "All coring, interface and labor associated with conduit, duct, cable in unit duct, and/or cable entries; locating existing utilities, lines, and cables in the respective areas of work; and all coordination with the respective Airport staff, site personnel, and/or FAA personnel will be considered incidental to the respective item for which they are installed, and no additional compensation will be made. Conduits, conduit nipples, conduit couplings, and other conduit fittings included with handholes, junction structures, and/or splice cans, will be considered incidental to the respective item for which they are installed, and no additional compensation will be made. Ground rods, grounding electrode conductors, connections, and associated grounding work included with handholes, junction structures, and/or splice cans, will be considered incidental to the respective item for which they are installed, and no additional compensation will be

made. All removals, relocations, adjustments, and associated work to accommodate handhole, junction structure, and/or splice can relocations will be considered incidental to the respective item for which they are installed, and no additional compensation will be made.

New cover plates for existing L-867 light bases to remain in place and be used as a splice/junction can will be considered incidental to the Project and no additional compensation with be provided.

All lockout/tagout procedures to ensure and maintain safety of personnel will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed."

BASIS OF PAYMENT

115-5.1. Add the following:

"Payment will be made under:

Item AR125565 Splice Can - per EACH"

END OF ITEM 115

Item 119 Airport Obstruction Lights

EQUIPMENT AND MATERIALS

119-2.2 Obstruction Lights. Add the following:

"Obstruction lights for the beacon tower shall be FAA Type L-810(L) LED with infrared option, single unit, 120 VAC, steady burning, red obstruction light and shall comply with FAA AC 150/5345-43 (current issue in effect and shall be on the current list of FAA approved equipment noted in FAA AC 150/5345-53D, Appendix 3 Addendum latest revision. Obstruction lighting shall be manufactured in the United State of America to comply with the Airport improvement Program Buy American Preferences requirements of be on the Federal Aviation Administration list of equipment meeting Buy American Requirements of on the list of Nationwide Buy American Waivers issued by the FAA.

METHOD OF MEASUREMENT

119-4.1 Add the following:

"All lockout/tagout procedures to ensure and maintain safety of personnel will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

All conduits, wiring, and mounting hardware associated with the obstruction lights will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

Removal of existing obstruction lights scheduled for replacement will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

Testing the obstruction lighting systems will be considered incidental to the respective work item for which they are installed, and no additional compensation will be allowed.

All temporary wiring will be considered incidental to the associated work for which it is necessary, and no additional compensation will be allowed.

BASIS OF PAYMENT

119-5.1 Add the following:

Payment will be made under:

Item AS119511 Airport Obstruction Light-Single – per EACH"

END OF ITEM 119

Item 125 Installation of Airport Lighting Systems

DESCRIPTION

125-1.1. Add the following:

"This item of work shall also consist of furnishing and installing Runway End Identification Lights (REILS) at the locations shown on the Construction Plans. Each installation will be in accordance with the details on the Plans and these Special Provisions. Also included in this item will be the testing of the installation and all incidentals necessary to complete and place the lighting system into proper operation to the satisfaction of the Project Engineer.

Also included in this Item will be the testing of the installation and all incidentals necessary to place the lighting systems into operation, completed, and to the satisfaction of the Resident Engineer."

EQUIPMENT AND MATERIALS

125-2.1 General. Add the following to paragraph d.

The Contractor shall furnish shop drawings for approval before ordering equipment and/or materials. Shop drawings are required for each type of electrical handhole/manhole and junction structure to be used on the project. **Shop drawings shall be clear and legible. Copies that are illegible will be rejected.** The preferred shop drawing submittal format shall be electronic (PDF) copies. Shop drawings shall include the following information:

(1) Certification of compliance with the AIP (Airport Improvement Program) Buy American Preferences for all materials and equipment. Do not submit ARRA (American Recovery and Reinvestment Act) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Do not submit NAFTA (North American Free Trade Agreement) certification as a substitute for certification of compliance with the AIP Buy American Preferences. Shop drawings submitted without certification of compliance with the Airport Improvement Program Buy American Preferences or without certification of manufacture in the United States of America in accordance with the AIP Buy American Requirements will be rejected. See the FAA website at: http://www.faa.gov/airports/aip/buy_american/ for more information on the AIP Buy American Preferences requirements. FAA approved equipment that is on the FAA Buy American Conformance List or the list of Nationwide Buy American Waivers Issued by the FAA complies with the AIP Buy American Preferences and will not require additional waiver paperwork for AIP projects. See the FAA website at: http://www.faa.gov/airports/aip/buy_american/ for a list of Nationwide Buy American Waivers Issued by the FAA.

(2) In order to expedite the shop drawing review, inspection and/or testing of materials and equipment, the Contractor shall furnish complete statements to the Project Engineer of Record as to the origin and manufacturer of all materials and equipment to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials and equipment.

(3) Illinois Department of Transportation Division of Aeronautics requires the following: ***"Under the FAA Buy American Preference, the contractor is required to submit certification that assures only domestic steel, domestic materials and domestic manufactured products are used. The Buy American statement must come from the producer, not the supplier. Producer verification must state that the items are produced in the United States and are made from 100% domestic materials. Statements that solely refer to the "Buy American Act" or "ARRA" or any federal purchasing act other than Title 49 United States Code (USC), Section 50101 will be rejected. Producers may use the Illinois Department of Transportation Domestic Material Compliance Certification Form AER 25 to satisfy this requirement."***

(4) Cut sheets with part number and specifications each airfield light fixture. Include cut sheets with part numbers and dimensions for base cans, base plates, transformers, and associated components for each airfield light fixture.

(5) Provide cut sheets and specifications for the REILS.

(6) Concrete mix design.

(7) Provide cut sheets with manufacturer's name, catalog number, dimensions, material and UL listing for each type and size ground rod. Include certification of 100% domestic steel for ground rods. Include cut sheets for exothermic weld connections, ground lugs, and ground wire.

125-2.1 General. Add the following to paragraph f.

"All LED light fixtures (including PAPI's and REILS), must be warranted by the manufacturer for a minimum of 4 years after date of installation inclusive of all electronics."

125-2.3 Conduit and duct. Add the following to this section:

a. Rigid Steel Conduit and fittings shall be hot-dipped, galvanized, UL-listed, produced in accordance with UL Standard 6 – Rigid Metal Conduit and ANSI C80.1 – Rigid Steel Conduit, Zinc Coated. Couplings, connectors, and fittings for rigid steel conduit shall be threaded galvanized steel or galvanized malleable iron specifically designed and manufactured for the purpose. Fittings shall conform to ANSI C80.4 – Fittings Rigid Metal Conduit and EMT. Set screw type fittings are not acceptable. Galvanized rigid steel conduit shall be manufactured in the United States of America produced from 100 percent domestic steel.

b. Conduits for grounding electrode conductors shall be Schedule 80 (minimum) PVC, UL-listed, rated for 90°C cable-conforming to NEMA Standard TC-2 and UL 651, listed suitable for concrete encasement and direct burial in earth.

125-2.8 Runway and taxiway lights. Part a. Runway In-Pavement Lights, Item (3) L-850C Runway Edge of the class, mode, style and options as specified. Add the following:

The proposed high intensity in-pavement runway lights shall be an L-850C(L) LED in-pavement runway edge light with white/white color or white/yellow colors corresponding to the light fixture schedule. All of the above lights shall be manufactured in accordance with FAA Specification AC No. 150/5345-46E, (or respective edition in force as identified in AC 150/5345-53D, AIRPORT LIGHTING EQUIPMENT CERTIFICATION PROGRAM Appendix 3 Addendum), and shall be FAA approved, and in compliance with the Airport Improvement Program Buy American Preference Requirements. Light direction and colors shall be as detailed on the Plans. Runway Lights with LED (Light Emitting Diode) illumination shall conform to the applicable requirements of FAA Engineering Brief No. 67D Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures. **See 125-2.20 Spare Parts for spare part requirements.**

125-2.8 Runway and taxiway lights. Part c. Runway and Taxiway Elevated Lights, Item (6) L-862 Runway Edge of the options specified. (precision IFR runways) Add the following:

The proposed high intensity runway edge lights shall be Type L-862(L) High Intensity Runway Edge Light with LED (Light Emitting Diode) illumination. All lights shall have an overall height of 24 in. All of the above lights shall be manufactured in accordance with FAA Specification AC No. 150/5345-46E, (or respective edition in force as identified in AC 150/5345-53D, AIRPORT LIGHTING EQUIPMENT CERTIFICATION PROGRAM Appendix 3 Addendum), and shall be FAA approved, and in compliance with the Airport Improvement Program Buy American Preference Requirements. Light direction and colors shall be as detailed on the Plans. Runway Lights with LED (Light Emitting Diode) illumination shall conform to the applicable requirements of FAA Engineering Brief No. 67D Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures. **See 125-2.20 Spare Parts for spare part requirements.**

125-2.8 Runway and taxiway lights. Part c. Runway and Taxiway Elevated Lights, Item (7) L-862E Runway Threshold/End of the options specified. (precision IFR runways) Add the following:

The proposed high intensity threshold lights shall be Type L-862E(L) High Intensity Threshold Light with LED (Light Emitting Diode) illumination. All lights shall have an overall height of 24 in. All of the above lights shall be manufactured in accordance with FAA Specification AC No. 150/5345-46E, (or respective edition in force as identified in AC 150/5345-53D, AIRPORT LIGHTING EQUIPMENT CERTIFICATION PROGRAM Appendix 3 Addendum), and shall be FAA approved, and in compliance with the Airport Improvement Program Buy American Preference Requirements. Light direction and colors shall be as detailed on the Plans. Runway Lights with LED (Light Emitting Diode) illumination shall conform to the applicable requirements of FAA Engineering Brief No. 67D Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures. **See 125-2.20 Spare Parts for spare part requirements.**

125-2.10 Runway end identifier light (REIL). Add the following:

The REILS shall be Type L-849I(L) (powered by a constant current 6.6 Amp power supply with Light Emitting Diode type strobes), Style A (unidirectional, high intensity, one brightness step), base mounted, consisting of two lighting units (a primary unit with controller and a secondary unit), with transient suppression, and all accessories as per FAA AC 150/5345-51B (or latest edition in force), FAA approved, and in compliance with the Airport Improvement Program Buy American Preference Requirements. Include breakable couplings for mounting REILS to the respective base. REILS shall conform to the applicable requirements of FAA Engineering Brief No. 67D Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures.

Confirm part number with the respective REIL manufacturer. Include the following spare parts:

A. One (1) L-849(L) LED REIL Control “Current” Circuit Board Assembly.
B. Two (2) LED Flasher Power Supply Assemblies.
C. One (1) Power Supply Assembly.
D. Four (4) Lightning Arrestors-275VAC.
E. Two (2) frangible couplings (compatible with the respective REILS).

125-2.14 Isolation transformers. Add the following to this section:

“Series circuit isolation transformers for the runway or taxiway edge lights, airfield guidance signs, and/or other airfield Navaids or lighting devices shall be manufactured to FAA Specification AC 150/5345-47 (current edition in effect) and shall be FAA-approved (ETL-Certified). Series circuit transformer shall be properly sized for the respective runway or taxiway edge lights, airfield guidance signs and/or other airfield Navaids or lighting devices and shall be as recommended by the respective runway or taxiway edge lights manufacturer, respective airfield guidance sign manufacturer, respective Navaid manufacturer, and/or respective airfield lighting device manufacturer. Confirm proper transformer selection and sizing with the respective equipment manufacturer.”

Add the following:

125-2.16 Identification tags. Identification tags shall be attached to each airfield light fixture. Where shown on the Plans provide new identification tags for existing fixtures. The tag shall be of the type and with the lettering shown on the Plans. The cost of furnishing and installing these tags shall be included in the unit price for the fixtures and no additional compensation will be allowed.

125-2.17 Anti-seize compound. Prior to installing the proposed airfield lights, the Contractor will apply an oxide-inhibiting, anti-seizing compound to all screws, nuts, breakable coupling, and all places where metal comes into contact with metal.

125-2.18 Stainless steel bolts. All base plate-mounting bolts and stake-mounting bolts shall be stainless steel.

125-2.19 Ground rods. Ground rods shall be 3/4-inch diameter by 20-foot-long UL listed Copper clad with 10 mils (minimum) Copper coating, (two 3/4-inch diameter by 10-feet long UL listed Copper clad ground rods coupled together to form a ground rod that is 20 feet in length). Ground rods shall be manufactured in the United States of America from 100 percent domestic steel to comply with the requirements of the Airport Improvement Program Buy American Preferences requirements and the Steel Products Procurement Act.

125-2.20 Spare parts. Spare parts for airport visual aids are allowable in accordance with the requirements of FAA Order 5100.38D "Airport Improvement Program Handbook" and the guidelines in FAA AC No. 150/5340-26C "Maintenance of Airport Visual Aid Facilities". Provide the following spare parts for the airport visual aid/airfield lighting system:

a. 2 (two) spare L862(L) runway edge lights omni-directional white color corresponding to the respective fixtures furnished. Include mounting hardware and transformers for each spare light fixture.

b. 2 (two) spare L862(L) runway edge light bi-directional white-yellow color corresponding to the respective fixtures furnished. Include mounting hardware and transformers for each spare light fixture.

c. 2 (two) spare L862E(L) threshold lights bidirectional red-green color corresponding to the respective fixtures furnished. Include mounting hardware and transformers for each spare light fixture.

Spare parts for the airport visual aid/airfield lighting system will be considered incidental to the respective airfield lighting system pay items and no additional compensation will be allowed.

CONSTRUCTION METHODS

125-3.1 Installation. Add the following to this section:

"The Contractor shall furnish and install all equipment and electrical materials necessary for complete and operational installation of the airfield lighting systems as shown on the Plans and detailed herein. The complete installation and wiring shall be done in a neat, workmanlike manner. All electrical work shall comply with the requirements of the NFPA 70 - National Electrical Code (NEC) most current issue in force and the applicable Federal Aviation Administration standards, orders, and advisory circulars. Equipment and materials shall be installed in conformance with the respective manufacturer's directions and recommendations for the respective application. Any installations which void the UL listing, Intertek Testing Services verification/ETL listing, (or other third-party listing), and/or the manufacturer's warranty of a device will not be permitted.

a. Keep all work, power outages, and/or shut down of existing systems coordinated with the Airport Director/Manager and the Resident Engineer. Any shutdown of existing systems shall be scheduled with and approved by the Airport Director/Manager prior to shut down. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped

with lockout/tagout equipment, the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on the system.

b. Examine the site to determine the extent of the work. The Contractor shall field verify existing site conditions.

c. Verify respective circuits and power sources prior to removing, disconnecting, relocating, installing, connecting, or working on the respective airfield lighting, taxi sign, NAVAID, or other device. Identify each respective circuit prior to performing work on that circuit.

d. Install airfield lights, guidance signs and other airfield lighting devices in accordance with the details shown on the Construction Plans. Airfield light fixtures, light bases, guidance signs, isolation transformers, and accessories shall be installed as shown on the Plans or approved shop drawings and in accordance with the applicable FAA advisory circulars. Tolerances given in the FAA advisory circulars and on the Plans shall not be exceeded. Where no tolerance is given, no deviation is permitted. Items not installed in accordance with the FAA advisory circulars, and the plans shall be replaced by and at the cost of the Contractor.

e. New 1/C #8 AWG FAA L-824 5,000 Volt cable shall be furnished and installed in duct or conduit from each respective light, junction structure, and/or taxi sign to the proposed light in order to place the new light into the lighting circuit. The cable will be paid for under Item 108. Provide sufficient slack cable at each splice/transformer can to perform cable splices outside of the can.

f. Locate existing underground utilities, cables and lines. The location, size, and type of material of existing underground and/or aboveground utilities indicated on the Plans are not represented as being accurate, sufficient, or complete. Neither the Owner nor the Engineer assumes any responsibility whatsoever in respect to the accuracy, completeness, or sufficiency of the information. There is no guarantee, either expressed or implied, that the locations, size, and type of material 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 service connections to underground utilities. Prior to construction, the Contractor shall notify the utility companies of his operational plans, and shall obtain, from the respective utility companies, detailed information and assistance relative to the location of their facilities and the working schedule of the companies for removal or adjustment, where required. In the event an unexpected utility interference is encountered during construction, the Contractor shall immediately notify the utility company of jurisdiction. The Owner's Representative and/or the Resident Engineer shall also be immediately notified. Any damage to such mains and services shall be restored to service at once and paid for by the Contractor at no additional cost to the Contract. All utility cables and lines shall be located by the respective utility. Also coordinate work with all aboveground utilities.

g. Identify, secure, and place any above ground temporary wiring in conduit to prevent electrocution and fire ignition sources in conformance with the requirements of FAA AC 150/5370-2G, Part 2.18.3 “Lighting and Visual NAVAIDs”. All temporary installations shall comply with National Electrical Code Article 590 – “Temporary Installations.”

h. Grounding work and modifications shall not be performed during a thunderstorm or when a thunderstorm is predicted in the area. Grounding for airfield lights and taxi signs shall be as detailed on the Plans and as specified herein.

i. Homerun cables for a respective circuit that are installed in conduit or duct shall be run together in the same raceway or duct.

j. The respective personnel performing airfield lighting work, vault work, and/or tests shall be familiar with, and qualified to work on 5000-volt airfield lighting series circuits, constant current regulators and associated airport electrical vault equipment. Please understand that airfield lighting series circuits are dangerous and only qualified personnel should be permitted to work on them and safety procedures need to be followed. NFPA 70 - National Electrical Code defines a Qualified Person as “***One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.”*** NFPA 70E Standard for Electrical Safety in the Workplace defines a Qualified Person as “***One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk.”*** OSHA (Occupational Safety and Health Administration), Part Number 1910 Occupational Safety and Health Standards, Subpart S, Electrical, Standard Number 1910.399 defines Qualified person as follows: ***“Qualified person. One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved.”*** Safety of personnel is the top priority. Follow safety procedures for all work. Only qualified and experienced personnel should be permitted to work on airfield lighting series circuits.

k. FAA requires that every airfield lighting cable splicer shall be qualified in making cable splices and terminations on cables rated at and/or above 5000 Volts AC and shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable. Personnel performing cable connections shall be qualified in making cable splices and terminations on 5,000 Volt rated cable for use on runway and taxiway series circuits in accordance with the requirements of Item L-108.

l. Obey and comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

m. Other construction projects might be in progress on the Airport at the same time as this project. The Contractor will be required to cooperate with all other contractors and the Airport Director/Manager in the coordination of the work.

n. The Contractor shall comply with the requirements of FAA AC No. 150/5370-2 (current issue in effect) "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION".

o. In the event a conflict is determined with respect to manufacturer installation instructions, National Electrical Code, and/or the Contract Documents, contact the Project Engineer of Record for further directions.

p. See Safety Plan and notes for safety and construction coordination requirements.

q. Existing ducts and cables associated with airfield guidance sign removals shall be abandoned in place unless it conflicts with the installation of the airfield light, sign, duct, cable, handhole, manhole, site work, pavement or other work, then it shall be disconnected, removed, and disposed of off the site at no additional cost to the Contract. Contractor may remove abandoned cables at no additional cost to the Contract and shall have the salvage rights to abandoned cables.

r. Obtaining the required borrow material from an offsite borrow, placing the borrow material, grading, seeding, and mulching the disturbed areas will be considered as an Incidental Item to the proposed/relocated lights, splice cans, and/or removal/relocation work and no additional compensation will be allowed.

s. Requirements of FAA AC 150/5340-30J, Paragraph 1.6 it notes "*Do not use the high voltage series lighting circuit to power devices that are not certified per AC 150/5345-53, Airport Lighting Equipment Certification Program, listed in Appendix 3, Addendum. Using non-certified devices can result in a poor system power factor resulting in unexpected constant current regulator (CCR) shutdowns and lighting circuit start-up problems."*

t. When a respective runway is closed the runway lighting and Navaids for that runway shall be shut off. Keep respective Navaids active during times when respective runway is open. Navaids receiving maintenance shall be shut off until operating properly.

u. All changes to the airfield lighting system control wiring will be documented by the Contractor and provided to the Resident Engineer/Resident Technician.

v. Per the requirements of FAA AC 150/5340-26C, Chapter 3, Section 3.6.6 Use of Original Equipment Manufacturer (OEM) Part, it notes the following: *"The use of non-OEM parts or lamps in FAA approved equipment is strongly discouraged. The FAA has strict specifications for approval of all airport lighting equipment and use of non-OEM parts or lamps in such equipment or systems can render the equipment to be functionally non-FAA approved. This could possibly lead to serious liability consequences in case of an aircraft incident at an airport following these practices. In the case of runway and taxiway lighting fixtures, the use of a generic, non-approved lamp can render the photometric output of the fixture out of specification and adversely affect the safety of low visibility operations."*

w. A slack of three (3') feet, minimum, plus depth of base can (if applicable), shall be provided in the primary cable at each transformer/connector termination. At stake-

mounted lights, the slack shall be loosely coiled immediately below the isolation transformer. There shall be no additional payment for cable slack and therefore the quantity of proposed cable slack has not been included in the respective cable pay items.

x. Provisions shall be made for the temporary wiring of the affected circuits to ensure that the Airport will maintain all runway and taxiway lighting capabilities for active runways and taxiways. All temporary wiring will be considered incidental to the associated work for which it is necessary, and no additional compensation will be allowed."

Add the following:

125-3.5 Installation of REILS. The REILS shall be installed at the locations shown on the Plans. Installation of REILS systems shall conform to FAA AC No. 150/5345-51 (current issue in effect) titled "SPECIFICATION FOR DISCHARGE-TYPE FLASHING LIGHT EQUIPMENT", the respective manufacturer's instructions, as detailed on the Plans, and as specified herein. The Contractor shall install L-867 base/splice cans and construct concrete bases for the REIL units in accordance with the respective REIL manufacturer's recommendation. Because of the difference in manufacturers' installations, all required trenching, cable, and ducts between the primary and secondary units, associated hardware, mounting requirements, etc. shall be installed per the respective REIL manufacturer's recommendations and shall be considered part of the installation with no additional compensation. REILS shall be aimed as detailed on the Plans and in accordance with the respective manufacturer's instructions.

a. Cable Installation for REILS. Installation of cables shall conform to Item 108, the applicable sections of FAA AC 150/5345-51 (current issue in effect), per the respective equipment manufacturer's recommendations, as detailed on the Plans, and as specified herein. Where cable splices are required, they shall conform to Item 108 and the details on the Plans. Power and/or control cables shall be installed in galvanized rigid steel conduit between the REIL Primary unit and the REIL Secondary unit shall be installed as detailed on the Plans and in conformance with the respective REIL manufacturer's recommendations and instructions. Cables and conduits between the REIL units will be considered incidental to the REIL installation and no additional compensation will be allowed.

b. Conduit installation for REILS. Installation of conduit shall conform to Item 110, the respective REIL manufacturer's installation instructions and/or recommendations, as detailed on the Plans and as specified herein. Control cables between REIL units shall be installed in a separate dedicated conduit. Power cables between the REIL units shall be installed in a conduit separate from the control cables.

c. Grounding for REILS. Grounding for REILS shall conform to the respective REIL manufacturer's installation instructions, as detailed on the Plans, and as specified herein. Furnish and install two 3/4-inch diameter by 20-feet long Copper-clad ground rods spaced not less than one rod length apart (20 feet) at each REIL unit. Bond each REIL unit housing and the REIL base can to the respective ground rod in accordance with the manufacturer's instructions with a #6 AWG bare tinned solid or stranded (per REIL manufacturer requirements) Copper grounding electrode conductor. The grounding electrode conductor shall be continuous from the REIL metal housing frame to the ground rods. Connect the ground rod furthest from each REIL unit to the equal potential grounding system for the runway airfield lighting. Top of ground rods shall be buried 30 inches below grade. All

connections to ground rods shall be exothermic weld as manufactured by Cadweld, Thermoweld, Ultraweld, or approved equal. Connections to REIL unit frames shall be as recommended by the manufacturer or with a UL listed grounding connector. Provide multi-terminal ground bar or individual ground lugs to terminate each ground wire in each REIL unit. For each REIL unit, and junction/splice/transformer/base can, the Contractor shall test and record the earth ground resistance for the made electrode ground system with an instrument specifically designed for testing ground systems. Test results shall be recorded for each REIL unit and junction/splice/transformer/base can. **If there are difficulties encountered when installing the grounding electrode system, contact the Project Engineer of Record for further directions. If ground resistance exceeds 25 Ohms, first check to make sure the earth ground resistance tester is properly calibrated, the batteries are in good working order, and the tester is being properly used in accordance with the manufacturer's instructions. If ground resistance still exceeds 25 Ohms, then check to make sure connections are good and secure, and correct where applicable. If ground resistance still exceeds 25 Ohms, check to make sure the ground rod(s) are connected to the equal potential grounding system (ground ring). At least two ground rods are required for each REIL unit to comply with 2023 NEC 250.53(A)(2) "Supplemental Electrode Required". Contact the Project Engineer of Record for further directions, where applicable. Copies of ground system test results shall be furnished to the Resident Engineer and the Project Engineer of Record. Grounding is considered incidental to the respective item for which it is required.**

d. REIL Operation.

(1) In the automatic mode of operation the REILS shall be activated by L-854 radio receiver control with the runway lighting series circuit corresponding to the 100% brightness level of the respective runway lights as follows:

REIL Operation
3 clicks – Off
5 clicks – Off
7 clicks – 100% Brightness/On

(2) In the manual mode of operation the Type L-849I REILS shall be activated by the constant current regulator for the runway lighting series circuit corresponding to the 100% brightness level of the respective runway lights as follows:

REIL Operation
10% Brightness Level – Off
30% Brightness Level – Off
100% Brightness Level – On

(3) The Contractor shall test and demonstrate proper operation for the Resident Engineer/Resident Technician, the Project Engineer of Record, and the Airport Manager or respective maintenance staff.

e. Ground check. Prior to substantial completion and activation, each completed REIL system will require a Ground Check to be conducted and recorded by the Contractor and the Resident Engineer and/or the Project Engineer of Record. A REIL Ground Check will include recording the location, date and site conditions of the REIL installation, observing and recording condition of the REILS, verification of proper installation, cable insulation

resistance testing, checking proper ratings of power source, checking for proper location, verification that the REILS are FAA approved equipment, inspection of the cables and ducts, checking the voltage and current readings for the REILs, recording the cable size, type and voltage rating, recording the nameplate data for each REIL unit, testing the REILS and confirming proper operation, checking, measuring, and recording the grounding electrode system for each REIL unit, confirming operation and installation manuals have been provided, and completing the REIL Ground Check List forms. It shall be the Contractor's responsibility to have a representative present to make any necessary adjustments and/or corrections of the respective REIL system installation. The Contractor shall be responsible for providing REIL systems that are installed properly and operate properly.

f. Flight check. Prior to final acceptance and activation, each completed REIL system will be flight checked by Federal Aviation Administration, and it shall be the Contractor's responsibility to have a representative present to make any necessary adjustments in the aiming of the respective REIL units. The Contractor shall be responsible for providing REIL systems that pass the flight check by Federal Aviation Administration. **Note: the FAA will pay the costs for one flight check. In the event that additional flight checks are required due to Contractor installation, the costs associated with the additional flight checks will be the responsibility of and paid for by the Contractor. FAA has noted the estimated cost for an additional flight check for the REILS will be approximately $5,000.00.**

125-3.6 Maintenance of airfield lighting during construction. The Contractor shall maintain lighting of the runways and taxiways during the various phases of the work as shown on the sequence of construction or as directed by the Resident Engineer. The Contractor shall be responsible for all temporary connections in the field, or at the regulator, necessary for operation of the circuits during construction.

125-3.7 Identification tags. The Contractor will place updated light identification number tags on all of the proposed and/or relocated airfield lights as detailed on the Plans. Existing light identification number tags may be reused and/or relocated for relocated and existing airfield light fixtures. The correct light identification numbers are shown on the Construction Plans. The cost to provide and install the identification number tags will be considered as an incidental item to the new and/or relocated airfield lights and no additional compensation will be allowed.

125-3.8 Grounding for airfield lights and taxi guidance signs. Furnish and install a ground rod at each L-867/L-868 transformer base/light can and at each stake-mounted light fixture**.** Grounding for Runway Lights, Taxiway Lights, and Lighted Taxi Guidance Signs shall be as detailed on the Plans and as specified herein. A ground rod must be installed at each light fixture and taxi guidance sign. The purpose of the light base ground is to provide a degree of protection for maintenance personnel from possible contact with an energized light base or mounting stake that may result from a shorted power cable or isolation transformer. A light base ground shall be installed at each transformer base/light can associated with runway lights, taxiway lights, and lighted taxi guidance signs. A light base ground shall also be installed at each stake-mounted light fixture. A light base ground shall be installed and connected to the metal frame of each taxi guidance sign as detailed on the Plans and in accordance with the respective taxi guidance sign manufacturer recommendations. The light base ground shall be a #6 AWG bare copper conductor bonded to the ground lug on the respective L-867 transformer base/light can or mounting stake and a **3/4-inch diameter by 20-feet long (minimum),** UL-listed, copper-clad ground rod. Connections to ground lugs on the L-867 transformer base/light can or mounting stake shall be with a UL-listed grounding connector. Connections to ground

rods shall be made with exothermic-weld type connectors, Cadweld by nVent Erico Products, Inc., Thermoweld by Continental Industries, Inc., Ultraweld by Harger, or approved equal. Exothermic-weld connections shall be installed in conformance with the respective manufacturer's directions using molds, as required for each respective application. Bolted connections will not be permitted at ground rods. Top of ground rods shall be buried 12 in. minimum below grade, unless noted deeper on the Plans.

Per National Electrical Code Article 250.53 "Grounding Electrode System Installation" resistance from the ground rod/electrode must be 25 Ohms or less via measurement with a ground tester. This is a safety issue for protection of personnel. Based on observations and test data, Southern Illinois Airport has a poor soil resistance due to sandy soil and appears to have a deep-water table, which impairs the resistance to ground for individual ground rods. Therefore, the soil conditions will require additional grounding to comply with NEC Article 250.53 and for safety of personnel. The grounding system described below is similar to an equipotential method counterpoise system. A #6 AWG bare solid Copper ground wire shall be installed to bond together each ground rod at the respective airfield light fixtures, taxi guidance signs, lighted Navaids, and base/splice/junction cans to form a ground ring for the respective airfield lighting system. The #6 AWG bare solid copper ground shall be direct burial in trench approximately 10 inches below grade. The ground conductor may be installed above the #8 FAA L-824, 5,000-Volt cable in duct or in an adjacent trench. The #6 AWG ground shall be connected to each respective ground rod with an exothermic weld connection. The completed ground wire installation will provide a ground ring system for the respective airfield lighting circuit. The ground wire will not be installed with the homerun cables for the respective airfield lighting circuit. This is to help accomplish a ground resistance of 25 Ohms or less for the ground rod at each light fixture, taxi sign, and base/splice/junction can for safety of personnel. The #6 AWG bare solid Copper ground will be paid for under Item AR108756 1/C #6 Ground per FOOT."

If there are difficulties encountered when installing the grounding electrode system, contact the Project Engineer of Record for further directions. For each airfield light fixture, airfield sign, Navaid, and junction/splice/base can the Contractor shall test and record the earth ground resistance for the made electrode ground system with an instrument specifically designed for testing ground systems. Test results shall be recorded for each airfield light fixture, taxi guidance sign, runway sign, Navaid, and junction/splice/base(L-867/L-868) can. If ground resistance exceeds 25 Ohms, first check to make sure the earth ground resistance tester is properly calibrated, the batteries are in good working order, and the tester is being properly used in accordance with the manufacturer's instructions. If ground resistance still exceeds 25 Ohms, then check to make sure connections are good and secure, and correct where applicable. If ground resistance still exceeds 25 Ohms, check to make sure the ground rod(s) are connected to the equal potential grounding system (ground ring). Contact the Project Engineer of Record for further directions, where applicable. Copies of ground system test results shall be furnished to the Resident Engineer and the Project Engineer of Record. Grounding is considered incidental to the respective item for which it is required.

For base mounted light fixtures the light fixtures must be bonded to the light base internal ground lug via a #6 AWG stranded copper wire rated for 600 Volts with Green XHHW insulation or a braided ground strap of equivalent current rating. The ground wire length must be sufficient to allow the removal of the light fixture from the light base for routine maintenance. See the light fixture manufacturer's instructions for proper methods of a attaching a bonding wire.

Where a conflict is determined with respect to grounding requirements per manufacturer installation instructions, National Electrical Code, and/or the Contract Documents, or there are other questions or concerns about the grounding requirements contact the Project Engineer of Record: Kevin Lightfoot for further directions. Safety of personnel is the top priority.

125-3.9 Testing airfield lighting systems. Each airfield lighting system shall be tested to determine proper installation and operation. Contractor shall coordinate testing with the Resident Engineer. All equipment, tools, and labor required for testing and demonstrations shall be furnished by the Contractor.

a. Prior to beginning excavations, airfield lighting modifications, cable installation, and/or any other work that might possibly affect airfield lighting circuits, all existing series circuit cables shall be Megger tested with an insulation resistance tester and recorded at the respective vault. All existing series circuit cable loops shall have the resistance measured with an Ohmmeter and recorded for each circuit at the vault. Each constant current regulator shall be tested with results recorded. Contractor shall provide a True RMS Ammeter for current measurements. Copies of test results shall be provided to the Resident Engineer and the respective Project Engineer of Record within five business days of conducting the respective set of tests. See the testing forms included in Appendix B. These tests are required to protect the Owner and the Contractor and to identify existing conditions and any defective cables, circuits, and/or constant current regulators. Failure to comply with this requirement might result in the Contractor being responsible for defective cable and circuit conditions (where previously not identified) and the associated corrective work at no additional cost to the Contract.

b. After airfield lighting modifications, additions, and/or upgrades have been completed, series circuit cables shall be Megger tested with an insulation resistance tester and recorded at the vault. All series circuit cable loops shall have the resistance measured with an Ohmmeter and recorded for each circuit at the vault. Each constant current regulator shall be tested with results recorded. Provide a True RMS Ammeter for current measurements. Copies of test results shall be provided to the Resident Engineer and the respective Project Engineer of Record within 5 business days of conducting the tests. See the testing forms in Appendix A.

c. Insulation resistance testing equipment for use with 5,000 Volt series circuit cables shall use an insulation resistance tester capable of testing the cables at 5,000 Volts. New 5,000 Volt rated airfield lighting series circuit cables shall be tested at not less than 5,000 Volts. Existing older series circuit cables and/or cables in poor condition may require the test voltage to be performed at a voltage lower than 5,000 Volts to obtain an insulation resistance reading (Example 1,000 Volts, 500 Volts, or less than 500 Volts). Insulation resistance testing equipment often has the feature to adjust the test voltage corresponding to the condition of the cable. The respective test voltages shall be recorded for each cable insulation resistance test result. Measuring the cable insulation resistance of existing conductors/cables is important to document the condition of existing conductors/cables and help determine if there are existing hazards and/or unsafe conditions that will need to be addressed for protection of personnel.

d. Insulation resistance testing equipment for use with 600 Volt rated cables shall use a 500 Volt insulation resistance tester. The respective test voltage shall be recorded for each cable insulation resistance test result.

e. It is recommended to use the same insulation resistance test equipment throughout the project to ensure reliable comparative readings at the beginning of the project and at the completion of the project.

f. Demonstrate all features and functions of all systems and instruct the Owner's personnel in the proper and safe operation of the systems.

g. The Contractor is responsible to employ qualified personnel that are capable of properly conducting the required tests to the satisfaction of the Project Engineer of Record. Tests that provide unsatisfactory results shall be reviewed to determine the possible cause of unsatisfactory results, corrections shall be made, and the tests shall be conducted again.

h. See Appendix A – "Cable and Constant Current Regulator Testing Forms" for additional information on testing requirements for airfield lighting systems.

125-3.10 Safety practices with airfield lighting series circuits. Please understand that airfield lighting series circuits are dangerous and only qualified personnel should be permitted to work on them and safety procedures need to be followed. Safety of personnel is the top priority. Follow safety procedures for all work. Only qualified and experienced personnel should be permitted to work on airfield lighting series circuits. The following safety procedures shall be followed for the safety of personnel.

a. Contractor shall coordinate work and any power outages with the Airport Manager and the Resident Engineer/Resident Technician. Any shutdown of existing systems shall be scheduled with and approved by the Airport Manager prior to shutdown. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment the Contractor will be responsible to provide the appropriate lockout/tagout equipment for safety of personnel. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on this system.

b. The Contractor shall provide a copy of their electrical energy source Lockout/Tagout Procedures document to the Airport Director/Manager, Resident Engineer and the Project Engineer of Record. The Lockout/Tagout Procedures document shall include the contact information with 24-hour phone numbers for the Contractor and the Electrical Contractor Superintendent and/or the respective licensed Journeyman Electricians on the project site. Per 2024 NFPA 70E, Article 120 "Establishing an Electrically Safe Work Condition", Section 120.5 "Lockout/Tagout Procedures" it notes "***The employer shall maintain a copy of the procedures required by this section and shall make the procedures available to all employees."*** The lockout/tagout procedure must include a method to identify the transfer of responsibility when the job extends beyond multiple shifts as noted in 2024 NFPA-70E Article 120, Section 120.5 (B)(8) "Shift Change", which notes ***"A method shall be identified in the procedure to transfer responsibility for lockout/tagout to another person or to the person in charge when the job or task extends beyond one shift."***

c. Where existing electrical equipment does not have features for lockout/tagout the Contractor will be responsible for providing the appropriate lockout/tagout equipment and measures to ensure the safety of personnel.

d. Compliance with Lockout/Tagout Procedures and all other safety procedures and requirements are the responsibility of the Contractor, the respective maintenance personnel, and any other personnel working on the equipment or electrical system.

e. An airport vault is a building, room, or designated area that contains electrical power and airfield lighting equipment and controls. Note that an Airport Electrical Vault is a restricted access facility and should be limited to experienced and qualified personnel only. Each door to the Airport Electrical Vault is recommended to include a warning sign labeled "**DANGER HIGH VOLTAGE UNAUTHORZED PERSONS KEEP OUT**" to comply with the requirements of 2020/2023 National Electrical Code Article 110, Section 110.34 "Work Space and Guarding" Paragraph (C) "Locked Rooms or Enclosures".

f. FAA AC 150/5340-30J; Design and Installation Details for Airport Visual Aids, Chapter 1 "Introduction", Part 1.2 "Scope" notes the following: "***This AC provides installation methods and techniques for airport visual aids. The standards contained herein are standards the FAA requires in all applications involving airport development of this nature. These standards must be met where lighting systems are required for FAA-developed procedures. Installations should conform to the National Fire Protection Association (NFPA) National Electrical Code (NEC) and local codes where applicable. See referenced materials."***

g. All electrical work shall comply with the requirements of NFPA 70 - National Electrical Code (NEC) most current issue in force, and all other applicable local codes, laws, ordinances, and requirements in force. Electrical equipment shall be installed in conformance with the respective manufacturer's directions and recommendations for the respective application. Any installations which void the UL listing, Intertek Testing Services verification/ETL listing, Factory Mutual approval, (or other third-party listing) and/or the manufacturer's warranty of a device, will not be permitted. National Electrical Code Article 110 "Requirements for Electrical Installation", Part 110.3(B) "***Installation and Use" notes the following: "Equipment that is listed, labeled, or both shall be installed and used in accordance with any instructions included in the listing or labeling".***

h. Provide personnel protective equipment for all personnel working on or testing electrical systems suitable for the respective application. Provide protective equipment for personnel to keep them safe in the event of an arc flash or other electrical accident. Refer to 2024 NFPA 70E "Standard for Electrical Safety in the Workplace", Article 250 "Personal Safety and Protective Equipment" and "Informative Annex H Guidance on Selection of Protective Clothing and Other Personal Protective Equipment (PPE)" for additional information on personal protective equipment.

i. The respective personnel performing airfield lighting work, vault work, and/or tests are recommended to be familiar with, and **qualified** to work on 5000 Volt airfield lighting series circuits, constant current regulators, and associated airport electrical vault equipment. National Electrical Code Article 100 "Definitions" defines a Qualified Person as ***"One who has the skills and knowledge related to the construction and***

operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved."

j. FAA AC 150/5370-10H – Standard Specifications for Construction of Airports, Item L-108 Underground Power Cable for Airports Part 108-2.5 Splicer qualifications requires the following: ***"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."***

k. Contractor shall comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

l. Per 2024 NFPA 70E Standard for Electrical Safety in the Workplace it defines Electrically Safe Work Condition as "***A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested for the absence of voltage, and, if necessary, temporarily grounded for personnel protection."*** Prior to conducting tests or working on equipment, verify equipment enclosures and frames have a good and secure ground connection.

m. Personnel shall comply with the applicable requirements of FAA Advisory Circular Number 150/5340-26C "Maintenance of Airport Visual Aid Facilities". Obtain and review this document for your safety.

n. FAA Advisory Circular Number 150/5340-26C notes that there are three basic rules to remember when working on and around airport lighting circuits. These are noted as follows:

1. *ALWAYS assume that the circuit is energized until you have proven otherwise. ALWAYS check for current before disconnecting the series circuit connector, removing the S1 cutout, or opening the primary series circuit by any other means. Make it a required practice to check the circuit with an ammeter prior to breaking the connection – NO EXCEPTIONS. Never attempt to measure voltage in a series lighting circuit using ordinary volt meters. An inductive voltage measuring device (sometimes referred to as a "ticker") such as is described in Chapter 4 may be used to detect the presence of induced voltage on a series lighting cable after checking for the presence of current. Always use a true RMS clamp-on type ammeter to verify if the circuit is energized. ALWAYS check the operation of the test equipment on a known live circuit before and after measurements are taken.*

2. ***NEVER*** *under any circumstances open or break a live airfield series circuit. The voltage generated in the circuit can reach levels many times normal before the regulator's open circuit protection can shut it down. As long as a current flow can be maintained, even if it is through <u>you</u>, the regulator will continue to operate. This is one of the reasons that series circuits can be so hazardous to work around – there is no personnel protection provided such as might be found on parallel interior wiring.*

3. *NEVER enter a manhole with energized conductors and never handle cables or transformers in light bases while there is current present. Cables or connectors can have cracked insulation where it is not visible or may be deteriorated and fall apart, exposing you to live circuit conductors.*

o. Never enter a manhole, handhole, or other raceway junction structure with energized conductors. Often light bases, transformer cans, splice cans, junction cans, junction boxes, junction structures, handholes, manholes, and/or other raceways may contain multiple circuits. All circuits must be shut down, locked out and tagged out, not just the circuit being worked on.

p. Verify respective circuits and power sources prior to removing, disconnecting, relocating, installing, connecting, or working on the respective airfield lighting, taxi sign, NAVAID, or other device. Identify each respective circuit prior to performing work on that circuit. Disconnect the airfield lighting series circuit cables from the constant current regulator when performing work or tests on the respective circuit. Disconnect the power source for the respective lighting system, sign, Navaid or other device when performing work or tests on the respective circuit. Shut down and lockout the circuit to help avoid a dangerous hazard for personnel working on the system.

q. When performing work on an airfield lighting circuit the respective circuit is required to be shut down and locked out (locked in off position) in accordance with 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on this system. This includes, but is not limited to, light fixture, sign and/or Navaid removals, repairs, replacements, relocations, lamp replacements, transformer replacements, component replacements, and/or installations; cable work, removals, repairs, replacements, relocations, rerouting, splicing, connecting, testing, and/or installations; grounding work, repairs, replacements, corrections, testing, and/or installations; Airport Electrical Vault work, constant current regulator work, and/or other electrical work.

r. Make sure each constant current regulator has a good and secured frame ground connection from the regulator housing to the respective vault ground bus and grounding electrode system, prior to operation and testing of each regulator.

s. Avoid placing materials on top of constant current regulators. Maintain clearance about constant current regulators for air flow and cooling in accordance with the respective manufacturer's recommendations and requirements.

t. Make sure each airfield light fixture, sign, and Navaid has a good and secured frame ground connection from the respective device to the respective grounding electrode system, prior to operation, working on, and/or and testing of the device.

u. Per the requirements of FAA AC 150/5340-26C, Chapter 3, Section 3.6.6 Use of Original Equipment Manufacturer (OEM) Part, it notes the following: "***The use of non-OEM parts or lamps in FAA approved equipment is strongly discouraged. The FAA has strict specifications for approval of all airport lighting equipment and use of non-OEM parts or lamps in such equipment or systems can render the equipment to be***

functionally non-FAA approved. This could possibly lead to serious liability consequences in case of an aircraft incident at an airport following these practices. In the case of runway and taxiway lighting fixtures, the use of a generic, non-approved lamp can render the photometric output of the fixture out of specification and adversely affect the safety of low visibility operations."

v. Never come in contact with water surrounding an active airfield lighting series circuit. Do not put your hand in a junction structure, splice can, handhole, manhole or other raceway system containing live airfield lighting circuits with water. The water may conduct electricity and cause harm, electric shock, injury or death.

w. Series circuit disconnects are required for each constant current regulator in accordance with FAA AC 150/5340-30J "Design and Installation Details for Airport Visual Aids". The following practices are recommended and/or required for series circuit cutouts/disconnects and the associated airfield lighting series circuit wiring.

1. The Type S-1 Series Plug Cutout is a series circuit disconnecting device installed at the output side of a constant current regulator (CCR). With the handle plug assembly removed, the cutout isolates the CCR output from airfield lighting series circuit loop for maintenance and personnel safety. The S-1 cutout also shorts the series loop and shorts the regulator secondary for helping with servicing, maintenance, and troubleshooting.

2. Provide series plug cutouts for each constant current regulator as detailed on the Plans. Series plug cutouts shall be Type S-1, rated 5KV, 20-Amps, and shall comply with FAA AC 150/5340-30J. Cutouts shall be certified in writing by the manufacturer as suitable for the respective applications. Cutouts shall disconnect the input from the output, short the input terminals, and short the output terminals when the handle/plug is removed. Series circuit plug cutouts shall be installed and used in accordance with the respective manufacturers' instructions, recommendations and requirements.

3. Install the series plug cutouts in a NEMA 12 painted steel enclosure adequately sized to house the cutout(s), with a hinged cover and back panel to mount the cutouts. All enclosures shall be pad lockable. Where existing cutout enclosures are used provide pad lock kits for each existing enclosure. The installation of series circuit cutouts shall accommodate lockout/tagout for safety of personnel.

4. Never remove or insert a series circuit plug cutout/disconnect with the circuit energized. Removal of a series circuit plug cutout/disconnect on an energized circuit can result in an arc flash that may cause injury, burns, and harm to personnel. Always shutoff and lockout input power to the respective constant current regulator prior to pulling or inserting a series plug cutout.

5. Series circuit plug cutouts/disconnects shall only be used on airfield lighting series circuits in accordance with the respective manufacturer's instructions, recommendations and requirements. Verify ratings and applications with each respective series plug cutout manufacturer. Note, observe, and verify the differences in applications for the different manufacturer series plug cutouts. Confirm ratings and suitability for the respective application with each respective cutout manufacturer. Some manufacturers' Type S-1 series circuit cutouts might

not be suitable for applications that other manufacturer's Type S-1 series circuit cutouts are rated for.

6. Know the difference between Type S-1 series circuit plug cutouts and Type SCO series circuit plug cutouts. Type SCO cutouts do not operate the same as Type S-1 cutouts. Examples of Type S-1 cutouts include (but are not limited to) Crouse-Hinds, Type S-1, Model 2, Catalog Number 30775, Manairco Catalog Number MRS1, Hughey and Phillips Catalog Number MRS1, and Airport Lighting Company Catalog Number S1. Examples of Type SCO cutouts are ADB Safegate Part Number 1475.92.030 and Part Number 1475.92.030-1. Refer to the respective installation instructions for each type of cutout. This is important for the safety of personnel.

7. Series circuit wiring shall be installed in enclosed raceways. No exposed airfield lighting series circuit cables (L-824) will be permitted in the Airport Electrical Vault. In accordance with 2023 National Electrical Code Article 305, "*General Requirements for Wiring Methods and Materials for Systems Rated Over 1000 Volts ac, 1500 Volts, dc, Nominal*", Part 305.3 "*Other Articles*", Exception, it notes: "***Airfield lighting cable used in series circuits that are powered by regulators and installed in restricted airport lighting vault shall be permitted as exposed cable installations."*** An Airport Electrical Vault is a restricted access facility limited to access by qualified persons only. Often airport electrical vault buildings do not have provisions to limit access to only qualified personnel. Therefore, no exposed airfield lighting series circuit cables will be permitted in the Airport Electrical Vault.

8. Maintain separation of high-voltage airfield lighting 5000 Volt series circuits from low-voltage circuit wiring (120 VAC, 208 VAC, 240 VAC, 480 VAC or other wiring rated 600 Volts and below). High-voltage wiring and low-voltage wiring shall not be installed in the same wireway, conduit, duct, raceway, junction box, handhole, or manhole. High-voltage airfield lighting 5000 Volt series circuits wiring shall enter each respective regulator at the high-voltage/series circuit output section of the regulator. 208 VAC, 240 VAC, or 480 VAC input power wiring shall enter each respective regulator at the low-voltage/input power section of the regulator. Control wiring shall enter each respective regulator at the control section of the regulator.

x. The following are a list of incidents that have taken place on airfields that resulted in dangerous conditions, injuries, electric shock, and/or death. These are provided for informational purposes to help keep personnel safe.

1. Situation 1; In 2023 a taxiway circuit was tested to be in very poor and dangerous condition. The circuit was energized, and the Airport staff drove around to see if any lights were on. They observed one of the airfield lighting series circuit transformers was above grade and was on fire on a wet day. The Airport Maintenance Person got out of the truck to go look at the transformer that was on fire. The Hanson employee on site told the Airport Maintenance Personnel to get back in the truck immediately and explained that a 5,000 Volt series circuit on fire in wet conditions can cause electrocution to someone getting into the nearby wet grass and/or standing water. Injury was avoided on this day.

2. Situation 2; The taxiway circuit identified in Situation 1 was troubleshooted by qualified personnel. The circuit was energized, and the Electrical Contractor drove around to see if any lights were on. They observed one of the taxiway lights having steam coming out of the light base due to boiling water caused by a bad transformer and/or ground fault condition. The Contractor recorded this with a video and shortly after the taxiway light fixture blew up and caused an arc flash.

3. Situation 3; The Electrical Contractor was changing light bulbs on a live airfield lighting series circuit. The Contractor did not have the circuit shut off nor was it locked off and tagged off per OSHA requirements. The Contractor was wearing gloves to protect his hands from possible broken lamps. The Contractor had one hand on a lamp and grabbed the stem of the light fixture with his other hand and it blew off the thumb on his hand. The light fixture stem was shorted to the series circuit.

4. Situation 4; The Electrical Contractor was changing light bulbs on a live airfield lighting series circuit. The Contractor did not have the circuit shut off nor was it locked off and tagged off per OSHA requirements. The Contractor had one hand on a lamp and grabbed the stem of the light fixture with his other hand and it blew off the index finger on his hand. The light fixture stem was shorted to the series circuit.

5. Situation 5; An Electrical Contractor was working on a base mounted airfield light fixture on a live airfield lighting series circuit. The Contractor did not have the circuit shut off nor was it locked off and tagged off per OSHA requirements. The contractor was removing the bolts for the light base cover. He had 5 of the six bolts removed. When he removed the sixth bolt the cover blew off and hit him in the face due to a ground fault condition and losing the ground path when the last bolt was removed. It is important to have light base covers connected to ground with a bonding jumper or ground strap to maintain safety of personnel. FAA AC 150/5340-30j requires the following light fixture bonding for safety of personnel: *Bond the light fixture to the light base internal ground lug via a No. 6 AWG stranded copper wire rated for 600 volts with green XHHW, THWN-2, or other suitable insulation, bare stranded conductor or a braided ground strap of equivalent current rating. The bonding conductor length must be sufficient to allow the removal of the light fixture from the light base for routine maintenance.*

6. Situation 6; During an electrical survey at an Airport, it was observed that the electric utility transformer for the Airport Electrical Vault Building had been changed from a 25 KVA unit to a 100 KVA unit to accommodate additional temporary electric services for the annual festival that took place at the Airport. The electric service to the Airport Electrical Vault is 120/240 VAC, single phase, 3 wire. The previous 25 KVA utility transformer had a maximum calculated fault current that was less than 10,000 Amps, and the service disconnect and distribution panelboard were adequately rated for fault current not exceeding 10,000 Amps at 120/240 VAC. The replacement 100 KVA transformer had an impedance of 1.73 percent and a maximum calculated fault current of 17,705 Amps. The existing Service Disconnect had 200 Amp, Bussmann NON-200 One-Time General Purpose Fuses that had 10,000 Amp Interrupting Rating which were no longer suitable for the available fault current. The Distribution

panelboard had a 200 Amp, 2 pole main breaker with 22,000 AIC at 240 VAC and branch breakers that were rated 10,000 AIC at 120/240 VAC. To address the higher available fault current of 17,705 Amps the following corrective action was taken. The existing 200 Amp, Bussmann NON-200 One-Time General-Purpose Fuses in the service disconnect were replaced with 200 Amp, Type RK5 fuses that had 100,000 Amp Interrupting Rating. To make the distribution panel fully rated for 22,000 AIC at 120/240 all of the branch and feeder circuit breakers were replaced with new breakers that were rated 22,000 AIC at 120/240 VAC. The point to this is that situations can change that affect existing electrical equipment ratings. When the vault service and distribution equipment was originally installed it was properly rated and suitable for the application where it was served by a 25 KVA transformer that had a fault current of less than 10,000 Amps. The change to the larger 100 KVA transformer was not coordinated with the vault electric service and distribution equipment. This was discovered after the transformer had been replaced with a larger unit. Upon its discovery, corrective action was taken to address this unsafe situation. Please be aware when doing work on electric service and distribution systems it is important to verify the maximum available fault current at the equipment and verify that the respective equipment is properly rated for the fault current. Sometimes changes will be necessary to ensure the equipment is properly rated to safely trip the circuit breakers or blow the fuse in the event of a fault. Where equipment is not adequately rated for the fault current it might be subject to damage and unsafe conditions for personnel in the event of a fault. Such conditions need to be addressed, and corrective action needs to be taken.

7. Situation 7; Several years ago, a client contacted us and noted they had lightning damage on their runway lighting circuit. Approximately 16 runway light fixtures and transformers were damaged and in some cases the transformers were blown out of the circuit (and disconnected). The client explained that the constant current regulator for the runway lighting system would operate providing 6.6 Amps but 0 (zero) volts output indicating a shorted output. They noted when they switched over to the backup regulator it would not run and provided an open circuit loop alarm. It was explained the client to be very cautious about the regulator that was providing 6.6 Amps output at zero volts output. It sounded like the output lightning arrestors on the regulator had blown and shorted to ground (the frame of the regulator). This condition had the output current running through the metal frame/housing of the regulator and is a concern of electric shock or electrocution. A qualified electrician investigated and determined that both output lightning arrestors had blown and shorted to the frame of the regulator. The regulator was shut down and repairs were made. Based on the above please note the following safety concerns.

    - It is required and important that each constant current regulator always has a good and secure ground connection from its frame to a good grounding electrode system. When operating a constant current regulator confirm it has a good and secure ground connection to its frame prior to operation. This is important for the protection of personnel. In the above situation, if the regulator did not have a good ground to its frame, a condition would have existed that increased the possibility of electric shock or electrocution. Please be aware that grounding does not guarantee you will not receive a shock, be injured, or killed from damaged

or defective equipment and/or materials. Proper grounding will however significantly reduce the possibility of shock, injury, or death. Please always focus on safety of personnel.

- It is recommended to include an output voltage meter on constant current regulators for testing, maintenance, and troubleshooting purposes. This is an optional feature, not a standard feature, and therefore needs to be included with the specification for the respective regulator. Having an output voltage meter on the regulator identified above helped us to determine the failure and unsafe condition.

- An airport electrical vault is a restricted access electrical facility for qualified and authorized personnel only. Anytime you enter an airport electrical vault you need to be accompanied by someone that is authorized and qualified to ensure your safety. Also note that just because someone is “authorized and qualified”, does not mean that they will also take responsibility for your safety. If you are not comfortable entering an airport electrical vault, please stay out. Your safety is always important and needs to be the priority.

8. Situation 8; In July 2009 we were working at an airport and observing the installation of a new airport electrical vault building and airfield lighting equipment. An airport vault is a building that contains electrical power and airfield lighting equipment and controls. The electrical contractor staff performing the installation had left the site to go work at another location and brought in a different two-man crew (journeyman and apprentice) that was not completely familiar with the status of the work completed to date. We had worked for several days addressing problems and were at the point of testing the new vault equipment. Tests were conducted in the morning and the airfield lighting was observed to be in working order. In the afternoon the apprentice began demolition of the old vault. The electric service had been disconnected and removed from the old vault a number of days earlier. Tests were conducted again in the afternoon for demonstration to the Airport Manager and it was discovered that one of the runway circuits no longer worked. Investigation found that there was an old homerun circuit to the old vault that had not been disconnected from the airfield lighting. The apprentice had removed the old series circuit disconnecting means (cutout) and it resulted in an open circuit condition for the runway lighting series circuit, which caused the lights to no longer work. Remember this old vault had no electric service power, but it still had a live circuit running to it that originated from the new vault. This was an extremely dangerous condition. The issue was corrected, and no one was hurt. The point of this is to be aware of the possible dangers that might occur when a different crew is brought in to complete the work of others. And never assume a circuit is dead unless it has been checked and verified as disconnected at the power source AND disconnected at the respective system it is powering (disconnected at both locations). Please always take measures to ensure your safety and the safety of those you are working with.

9. Situation 9; In April 2011 we were testing a new taxiway lighting system on an old constant current regulator. The cover of the constant current regulator was off for testing and startup purposes. The Resident Technician was looking at the

regulator and was told not to look at the regulator during a startup. The Resident Technician was not a qualified electrical person and left the site for safety purposes. The regulator was turned on and tested with no load. The regulator was observed to operate properly. The regulator was shut off and the taxiway lighting circuit was connected to it. The regulator was again turned on and one of the capacitors exploded and caught fire. This is an example of why you should not look at electrical equipment during start up until considered safe and you have appropriate personal protection equipment. It is also an example of the need for personnel protective equipment, clothing, face protection and other protection during start up, testing and operation of electrical equipment.

10. Situation 10; A laborer was performing an airfield lighting series circuit splice connection. He had not practiced lockout/tagout for the respective circuit. An airport maintenance person decided to check the respective airfield lighting for burnt out lamps and turned on the circuit while the laborer was performing a splice. The laborer received electric shock and had to be taken to a hospital for medical attention. The laborer was reported to have spent two days in the hospital and did recover. The point to this is that only qualified and experienced cable splicers are permitted to perform airfield lighting series circuit connections and lockout/tagout procedures must be followed for safety of personnel.

11. Situation 11; An electrical contractor crew was working on an airfield lighting system. The electrical contractor pulled the airfield lighting series circuit cutouts/disconnects in the Airport Electrical Vault. The Electrical contractor thought they had all airfield lighting series circuits disconnected but actually had one circuit that was not disconnected and was a live circuit. An apprentice electrician went to work on the one circuit that was not disconnected and was electrocuted and died on the site. This is an example of why it is important to verify all power sources, shut off and disconnect power to each respective constant current regulator AND disconnect each respective airfield lighting series circuit/cutout and lockout/tagout the respective circuits.

12. Situation 12; An airport maintenance electrician was working on a taxi guidance sign during daylight hours. The maintenance electrician did not verify the respective series lighting circuit and did not practice lockout/tagout. The maintenance staff thought the respective circuit was off but mistakenly identified the wrong circuit. The maintenance electrician went to work on the taxi sign and received electric shock and required medical attention. The maintenance electrician did survive this incident. This is another example of why it is important to verify all power sources, shut off and disconnect power to each respective constant current regulator AND disconnect each respective airfield lighting series circuit/cutout and lockout/tagout the respective circuits. During the daylight all of the series circuits could have been shut down and not affected airfield operations. The safety of personnel is the most important issue.

13. Situation 13; An airfield maintenance staff person was troubleshooting an airfield lighting series circuit. They were in communication with the Air Traff Control Tower (ATCT) staff and having them turn the circuit off. They were not practicing lockout/tagout of the circuit and were relying on the Air Traffic Control Tower staff to tell them when the circuit was off. They requested the ATCT to turn off the circuit and the ATCT person reported back the circuit was off. The circuit had not

been turned off as reported and the maintenance person died due to electrocution while working of the circuit. The point to this is, never trust someone else to shut off and lockout a circuit. You need to shut off and lockout circuits for your protection and safety.

14. Situation 14; In May 2019, it was observed during a vault survey that all of the Type SCO series circuit cutouts were wired incorrectly. This was reported to the head maintenance electrician at the Airport. The head maintenance electrician took a serious interest in this situation and requested directions for correction. The head maintenance electrician informed us that the reason he became the head maintenance electrician was because his previous supervisor had been electrocuted and died while working on an airfield lighting series circuit.

15. Situation 15; it was a very hot day in July 2011. The heat index was reported to be 122 degrees F. The actual temperature was observed on a local thermometer as 113 degrees F. An electrical contractor was working on an airfield lighting series circuit. People on site including engineering staff and contractor staff were getting overheated and it was affecting their judgement. One of the electricians received a phone call about a friend of his that was also an electrician and that was working on another nearby job site. This electrician had been electrocuted and died on the job site. The point is that weather conditions can create unsafe working conditions, and this always needs to be considered for the safety of personnel.

16. Situation 16; Please note when electrical/mechanical equipment and/or materials are energized after installation, repairs, relocation, maintenance, servicing, or other applications there is a danger of arc flash, fire, or other unsafe conditions that might take place. When in the field observing work, stand clear of and do not look at electrical/mechanical equipment/materials when being turned on until it is confirmed to be safe and operating properly. Often during startups equipment can cause an arc flash, fire, or come apart due to defective components, incorrect wiring, failing or weakened components, incorrect application, or other factors that might affect the installation. This is a dangerous situation that can cause injury, fire, or death. Please make sure to always consider your safety and the safety of others. Many of these installations are restricted to qualified and authorized personnel only. Regardless of your qualifications you need to make sure your safety is always addressed.

17. Situation 17; When using a voltmeter to check if a circuit is live always check the meter first on a known live source to confirm the voltage meter is working properly. Many years ago, we (my supervisor at the time and myself) were working at a project site and were checking an electric service for the voltage and got no voltage reading on the voltmeter. We were pretty sure the service was active, so we checked again with a second voltmeter and got no voltage reading on the meter. We were not convinced this service was off and therefore checked it again with a third voltmeter and got no voltage reading on the meter. An electrician was on site, and we asked him about the service and he used his voltmeter and confirmed the service was active. We had three different voltage meters that all had bad batteries and were giving false readings. Never assume an electrical system is off unless you have confirmation the system is shut off and have checked it with a known working voltage meter. Additionally, if you are

not comfortable or qualified to use a voltage meter, leave that task to those that are qualified. Regardless of your qualifications you need to make sure your safety is always addressed.

18. Situation 18; During an airport electrical vault survey, we observed a Type S-1 series circuit plug cutout wired to a 120 VAC Circuit for use as a primary disconnect to a 120 VAC to 480 VAC step-up transformer. This is an unacceptable and dangerous practice. The Airport maintenance staff noted that each time they try to shut off the transformer it blows up. When the cutout plug is removed it causes a line to neutral fault (short circuit between phase conductor and neutral) and an arc flash. This puts the personnel at risk of injury, burns, and harm. The series circuit cutout in this application needs to be disconnected, removed, and replaced with a heavy duty 30 Amp, 240 VAC, 2 pole, safety switch suitable for the 120 VAC power application. Series circuit plug cutouts shall only be used on airfield lighting series circuits in accordance with the respective manufacturer's instructions.

19. Situation 19; An Airport Manager contacted us and noted the circuit breaker had tripped for their main runway lighting constant current regulator. This was during the summer on a day when the ambient temperature was 103 degrees Fahrenheit. It was suggested that they check the Airport Vault building fan to make sure it was operating properly. The Airport Manager confirmed the fan was operating. A few minutes later the Airport Manager called and noted that he discovered they had a filter on the intake air louver, and it was completely clogged with dirt. The Airport Manager noted they were not aware that this intake air louver included a filter and that it might not have been changed since the original installation of the Airport Vault building. Note it is important that constant current regulators have adequate air flow and cooling to accommodate proper operation. Confirm ventilation and cooling systems are in proper working order.

20. Situation 20; Two electricians were troubleshooting an airfield lighting series circuit. Both were experienced electricians with more than 30 years of experience each but had little knowledge and experience with constant current regulators. They put a 600 Volt rated voltmeter across the output terminals of the constant current regulator and blew up the meter. The electricians were not aware that the maximum output voltage for the 7.5 KW constant current regulator was over 1100 Volts. Neither electrician was harmed, but the voltage meter was destroyed. It is recommended to include an output voltage meter on constant current regulators for testing, maintenance, and troubleshooting purposes. This is an optional feature, not a standard feature, and therefore needs to be included with the specification for the respective regulator. Having an output voltage meter on the regulator identified would have helped avoid the unsafe condition that occurred.

21. Situation 21: An individual was surveying existing taxi guidance signs to help confirm the sign legends and existing electrical loads. As the individual approached the respective sign his boot lace got caught on an exposed ground rod and grounding electrode conductor. This caused the individual to trip and fall into a nearby ditch with rip rap. The individual injured his elbow and had to go to

the Emergency room of a nearby hospital for treatment. The point to this is that the grounding for taxi guidance signs need to have a schedule 80 plastic conduit coordinated in the pad, located under the sign to accommodate the grounding electrode conductor and the ground rod needs to be buried below grade to help avoid tripping hazards and help avoid damage to the grounding system for the respective sign.

22. Situation 22: A General Contractor and engineering staff were called out to a pump station site due to the pump motor starters tripping off. The Electric Utility was at the project site along with the Electrical Contractor. The service to the pump station was a 240/120 VAC, 3 phase, 4 wire delta with a high leg. The weather was cold and had been below freezing for several days and was below 0 degrees F at night for a few of the previous days. The Contractor thought that the motor starters had gone bad and prepared a change order to replace each motor starter. The voltage was measured as follows: Phase A to Ground: just over 500 Volts, Phase B (high leg) to ground: just over 800 Volts, and Phase C to ground: just over 500 Volts. The electric utility was unsure of what was causing the problems and the unusually high voltage readings for a 240/120 VAC, 3 phase, 4 wire service. It was observed that the ground rod for the electric service had been excavated and was reinstalled at an approximate 30-degree angle with about two-thirds of the ground rod exposed above grade. It did not appear that the ground rod extended below the frost line. The Engineer requested that the ground rod be installed properly such that the ground rod was driven vertically for the full ten feet of length and extended below the frost line. Upon correction of the ground rod installation the pump motor starters worked properly, and the voltage measurements were recorded again as follows: Phase A to Ground: approximately 125 Volts, Phase B (high leg) to ground: approximately 217 Volts, and Phase C to ground: approximately 125 Volts. This is a good example to justify the requirement that a grounding electrode system needs to be installed below the frost line to help establish a ground resistance that meets the requirements of the National Electrical Code.

23. Situation 23: While observing constant current regulator tests it was noticed that some of the taxiway constant current regulators had outputs currents at the B100 step (100 percent brightness step) that were considerably lower than the specified tolerance of 6.5 to 6.7 Amps. Some of the taxiway regulators had output currents of approximately 5.7 to 6.0 Amps at the B100 setting which corresponded to brightness levels of 40 to 60 percent. It was discovered that each of these constant current regulators were rated for 240 VAC input voltage, but the electric service to the Vault was 208/120 VAC. The lower input voltage of 208 VAC instead of 240 VAC had reduced the output on each constant current regulator to unacceptable brightness levels. The regulators each had input voltage tap settings and were corrected to 208 VAC input. After each CCR was reconnected for 208 VAC input power, the lighting output of each CCR at step B100 was increased to provide an output current closer to the nominal specified current of 6.6 Amps. It is important to have airfield lighting systems operating at the proper brightness levels to meet FAA requirements. Where runway and taxiway lighting fixtures are operating below acceptable tolerances it will affect

the photometric output of the fixtures and adversely affect the safety of low visibility operations.

24. Situation 24: A new runway lighting system was being installed. Many of the days were considered unworkable due to rain, standing water and muddy site conditions at the project site. The Contractor performing the work had a good reputation and was known to be willing to work in site conditions that others would consider unworkable. The site conditions were muddy and unreasonable to work in. They were working on a conduit trench for a PAPI (Precision Approach Path Indicator), and the cable trencher sank and got stuck in the mud. During the process of trying to remove the cable trencher it nearly overturned. Often Contractors are pressured to get work done to meet Contract schedules and sometimes it results in working in conditions that are considered unworkable or unsafe. It rained on approximately 22 of the 42 construction calendar days for the duration of this project. Regardless of a project schedule the safety of the personnel needs to be the priority on a project.

25. Situation 25: During a site visit at an Airport Vault, it was observed that the main runway high intensity regulator output current at step B5 was only 4.5 Amps corresponding to about 8 percent brightness instead of 100 percent brightness. It was during the summer and the Airport staff was going home before dark and was not aware of the reduced brightness level. It was reported to the Airport, and they commented that the runway lighting system was being checked each day and was working fine, and that they had received no complaints from pilots about the lighting. The Maintenance staff also noted the lighting system was working fine and offered to demonstrate their testing procedures using radio control. The Maintenance Manager and the Engineer went out on the Airfield to the MALSR (Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights) and clicked up the lighting system to the 100 percent brightness level. The Engineer commented that the MALSR appears to be working properly but the runway edge lighting was too dim. The Maintenance Manager commented that he was not aware that the MASLR and the runway edge lighting were two different systems. He noted that he usually just checked the MALSR and if it was good he thought the runway edge lighting was also good. The Engineer helped the Maintenance Manager troubleshoot the Runway lighting system and discovered that a circuit board had gone bad in the constant current regulator. The Airport had a spare circuit board on site and replaced the circuit board in the regulator. After repairs the CCR was then operating better and closer to the respective correct brightness levels for all five steps. It is important to understand the proper operation of airfield lighting systems, their power sources, and their control systems. Visual observations of airfield lighting systems need to accompany verification of proper operation of each respective constant current regulator and/or power source. Where runway and taxiway lighting fixtures are operating below acceptable tolerances it will affect the photometric output of the fixtures and adversely affect the safety of low visibility operations.

SAFETY OF PERSONNEL IS THE PRIORITY ON THE JOB. PLEASE ALWAYS PRACTICE SAFETY PROCEDURES FOR THE PROTECTION OF PERSONNEL.

METHOD OF MEASUREMENT

125-4.1 Add the following:

"All lockout/tagout procedures to ensure and maintain safety of personnel will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

The transformer base can and series isolation transformer, associated with the light fixture, sign, or other airfield lighting device, and slack cable to perform cable connections outside of the base can, will be considered incidental to the respective item for which it is required and no additional compensation will be allowed.

The transformer base cans associated with the respective PAPI, REIL or other airfield lighting device, and slack cable to perform cable connections outside of the base can, will be considered incidental to the respective PAPI, REIL and no additional compensation will be allowed.

The series isolation transformer associated with the light fixture, taxi guidance sign, wind cone, REIL, Navaid, or other airfield lighting device, will be considered incidental to the respective device and no additional compensation will be allowed.

Ground resistance tests for the made electrode ground system at each airfield light fixture and/or airfield sign will be considered incidental to the respective airfield light fixture and/or airfield sign and no additional compensation will be allowed.

Labeling, identification tags, nameplates, power source legends plates, and other identification for each airfield light fixture and/or airfield sign will be considered incidental to the respective airfield light fixture and/or airfield sign and no additional compensation will be allowed.

Testing the airfield lighting systems and the associated constant current regulator tests and cable tests will be considered incidental to the respective work item for which they are installed, and no additional compensation will be allowed.

Spare parts for the airport visual aid/airfield lighting system will be considered incidental to the respective airfield lighting system pay items and no additional compensation will be allowed.

Conduits, conduit nipples, conduit couplings, and other conduit fittings included with splice cans, junction structures, Navaid installations, base mounted airfield light fixtures, airfield signs, and/or other airfield fixtures, will be considered incidental to the respective item for which they are installed, and no additional compensation will be made.

Ground rods, grounding electrode conductors, connections, and associated grounding work included with airfield lights and/or airfield guidance signs will be considered incidental to the respective item for which they are installed, and no additional compensation will be made.

All temporary wiring will be considered incidental to the associated work for which it is necessary, and no additional compensation will be allowed.

All cable and duct removals associated with airfield lighting removals, relocations, and /or cable or duct replacements will be considered incidental to the associated work and no additional compensation will be allowed.

New cover plates for existing L-867 light bases to remain in place and be used as a splice/junction can will be considered incidental to the Project and no additional compensation with be provided.

For Item AR125400 Replace Isolation Transformer the quantity to be paid for under this item shall be on a per EACH basis, installed as completed units in place, ready for operation, and accepted by the Resident Engineer. The replacement series isolation transformers will vary in size due to the application. The Contractor is encouraged to bid this item that will take into account that some replacement transformers will be larger than others. For example, the replacement transformers for the existing ADB Siemens wind cones will require FAA L-830-6, 200-Watt transformers. Some of the existing Lumacurve signs will require FAA L-830-4, 100-Watt transformers and the existing Lumacurve distance remaining signs might need FAA L-830-6, 200-Watt isolation transformers. Existing transformers designated for replacement shall be field verified to determine the proper size for each application. Replacement and/or additional ground rods associated with the light bases for existing items requiring a replacement series isolation transformer will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed. Interface and connections to new and/or existing light bases, junction/splice/transformer cans, signs, Navaids, or other devices associated with the equal potential grounding system will be considered incidental to the respective item of work for which it applies, and no additional compensation will be allowed.

For Item AR125922 Replace Base Mounted Light the quantity to be paid for under this item shall be on a per EACH basis, installed as completed units in place, ready for operation, and accepted by the Resident Engineer. This will apply to the threshold light fixtures on Runway 18L-36R. The existing threshold light fixtures, bases plates, and transformers shall be replaced with new L-862E(L) fixtures and installed on the existing L-867 light bases."

BASIS OF PAYMENT

125-5.1 Add the following:

"Payment will be made under:

Item AR125400	Replace Isolation Transformer – per EACH.
Item AR125515	HIRL, Base Mounted – per EACH.
Item AR125525	HIRL, Inpavement – per EACH.
Item AR125610	REILS – per PAIR
Item AR125922	Replace Base Mounted Light – per EACH.

REFERENCES

Add the following:

American National Standards Institute (ANSI)

ANSI C80.1	Rigid Steel Conduit, Zinc Coated.
ANSI C80.4	Fittings Rigid Metal Conduit and EMT.

Federal Aviation Administration Advisory Circulars (AC). Note: where FAA Advisory circulars are referenced that shall be the current issue or issues in effect.

AC 150/5370-2	OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION.

Federal Aviation Administration Standard (FAA STD)

FAA STD-019f	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code (most current issue in force).
NFPA 70E	Standard for Electrical Safety in the Workplace.
NFPA 2638645-1 =	National Fire Protection Association IDN.

Occupational Safety and Health Administration

OSHA 29 CFR Part Number 1910; Occupational Safety and Health Standards, Standard Number 1910.147; The control of hazardous energy (lockout/tagout).

Underwriters Laboratories (UL)

UL Standard 6	Rigid Metal Conduit.
UL Standard 514B	Conduit, Tubing and Cable Fittings.

END OF ITEM 125

ITEM AR800476 REMOVE AIRFIELD LIGHTING

DESCRIPTION

800476-1.1 This Item of work shall consist of the removal of base-and stake-mounted airfield lighting, removal of airfield guidance signs, removal of splice/transformer cans, and the removal of other airfield lighting units in accordance with the details in the Construction Plans and in accordance with these Special Provisions.

800476-1.2 References. Note: where FAA Advisory Circulars are referenced they shall be the current issue or issues in effect.

a. FAA AC No. 150/5370-2G "Operational Safety on Airports During Construction" (current issue in effect).

b. NFPA 70E – Standard for Electrical Safety in the Workplace

c. OSHA 29 CFR Part Number 1910; Occupational Safety and Health Standards, Standard Number 1910.147; The control of hazardous energy (lockout/tagout).

CONSTRUCTION METHODS

800476-2.1 General

a. The respective personnel performing airfield lighting demolition and removal work, shall be familiar with, and qualified to work on the respective airfield lighting systems, 5000-volt airfield lighting series circuits, constant current regulators and associated airport electrical vault equipment. Please understand that airfield lighting series circuits are dangerous and only qualified personnel should be permitted to work on them and safety procedures need to be followed. NFPA 70 - National Electrical Code defines a Qualified Person as "***One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved."*** NFPA 70E Standard for Electrical Safety in the Workplace defines a Qualified Person as "***One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk."*** OSHA (Occupational Safety and Health Administration), Part Number 1910 Occupational Safety and Health Standards, Subpart S, Electrical, Standard Number 1910.399 defines Qualified person as follows: "***Qualified person. One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved."*** Safety of personnel is the top priority. Follow safety procedures for all work. Only qualified and experienced personnel should be permitted to work on airfield lighting series circuits.

b. Contractor shall examine the site to determine the extent of the work. Contractor shall field verify existing site conditions. Contractor shall field verify the respective circuits and power sources prior to removing, disconnecting, relocating, working on, or connecting the respective airfield lighting, taxi sign, NAVAID, circuit, Vault equipment, or other device.

c. Contractor shall coordinate work and any power outages with the Airport Manager, the respective Airport personnel, and the Resident Engineer/Resident Technician. Any shutdown of existing systems shall be scheduled with and approved by the Airport Manager prior to shutdown. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures, including, but not limited to, 29 CFR Section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on the respective system.

d. Contractor shall comply with the requirements of FAA AC No. 150/5370-2G "Operational Safety on Airports During Construction" (current issue in effect).

e. Contractor shall comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

f. Power for each respective airfield lighting system and/or electrical junction structure shall be disconnected at the respective power source prior to removal. Contractor shall field verify to confirm the respective power source for each respective airfield lighting system or other device. The airfield lighting appears to have power from multiple sources.

g. Where detailed herein and/or to accommodate maintaining operation of the airfield lighting system, the Contractor shall furnish jumper cables and connector kits as required to place the airfield lighting back into operation. All temporary installations shall comply with National Electrical Code Article 590 – "Temporary Installations." The Contractor shall secure, identify, and place temporary exposed wiring in conduit, duct, or unit duct to prevent electrocution and fire ignition sources in conformance with the requirements of FAA AC 150/5370-2G "Operational Safety on Airports During Construction", Part 2.18.3 "Lighting and Visual NAVAIDs".

h. Existing airfield lighting cables associated with airfield lighting to be removed shall be abandoned in place unless it conflicts with new work and then it shall be removed at no additional cost to the Contact. If the Contractor elects to salvage the cable within the circuit to be removed, shown in the Construction Plans as cable to be abandoned, any cost associated with removal of the cable shall be considered incidental to the Contract and no additional compensation will be allowed.

i. Every airfield lighting cable splicer shall be qualified in making cable splices and terminations on cables rated at and/or above 5,000 Volts AC. The Contractor shall submit to the Project Engineer of Record proof of the qualifications of each proposed cable splicer for the 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.

800476-2.2 Removal of airfield lights and signs. The existing airfield lights, airfield guidance signs, and/or splice cans designated for removal shall be removed in their entirety unless detailed otherwise herein. The existing L-867 light bases for the threshold lights on Runway 18L-36R at Southern Illinois Airport shall remain and be reused with the replacement threshold

lights. Some of the existing L-867 light bases will be reused for junction/splice cans where designated on the Plans. The Contractor shall remove the existing lights and/or signs including mounting stakes, concrete bases, base/transformer cans, foundations, and transformers. The electrical wire will be disconnected from each light and placed underground at a minimum depth of 18-in. If the Contractor elects to salvage the cable within the circuit of the lights to be removed, shown in the Construction Plans as cable to be abandoned, any cost associated with removal of the cable shall be considered incidental to the Contract and no additional compensation will be allowed. The existing lights and transformers shall be turned over to the Airport Director/Manager. The existing mounting stakes and light bases shall be removed and disposed of off the Airport site in a legal manner. Any materials not salvaged by the Airport, shall be disposed of off the airport site, in a legal manner, at the Contractor's own expense. The stake mounted lights, concrete base mounted lights, and/or splice cans shall be removed, and earth material will be placed in the hole made from the base and/or foundation removal. The disturbed area shall be seeded and mulched to establish a stand of grass. The seeding and mulching will be considered as an incidental item to the sign removal and/or light removal and no additional compensation will be allowed.

Obtaining the required borrow material from an offsite borrow, placing the borrow material, grading, seeding, and mulching the disturbed areas will be considered as an Incidental Item to the removal work and no additional compensation will be allowed.

800476-2.3 Removal of airfield lighting cable. The existing airfield lighting series circuit cables associated with the respective lighting systems to be removed shall be disconnected, removed where accessible, and abandoned in place elsewhere. The electrical wire will be disconnected from each light, sign, or other device and placed underground at a minimum depth of 18-in. If the Contractor elects to salvage the cable within the circuit of the lighting system to be removed, shown in the Construction Plans as cable to be abandoned, any cost associated with removal of the cable shall be considered incidental to the Contract and no additional compensation will be allowed.

800476-2.4 Removal of airfield conduits. The existing airfield lighting series circuit conduits associated with the respective lighting systems designated to be removed shall be removed where in conflict with new work and abandoned in place elsewhere. Note some of the conduits associated with the airfield lighting replacement are designated to remain and be reused with the new lighting circuit(s).

800476-2.5 Removal of electrical junction structures. Removal of electrical junction structures shall include L-867 base cans, splice cans, handholes, and manholes. The existing electrical junction structures designated for removal shall be removed in their entirety. Any materials not salvaged by the Airport, shall be disposed of off the airport site, in a legal manner, at the Contractor's own expense. The existing junction structures, bases, foundations, handholes, manholes, and associated materials designated for removal shall be disposed of off the airport site, in a legal manner, at the Contractor's own expense. Earth material will be placed in the hole made from respective removal. The disturbed area shall be restored.

800476-2.6 Removal of REILS. Power for each respective REIL system shall be disconnected at the respective power source prior to removing the respective REIL system. Power for the existing REILS located on the Runways are understood to be powered from the respective runway lighting series circuit. Contractor shall field verify to confirm the respective power source for each REIL system.

The Contractor shall remove the REIL units when the runway is closed. The Contractor shall remove the REIL units and turn them over to the Airport. In the event the Airport does not want the REIL units the Contractor shall dispose of the REILS off the Airport site in a legal manner. The Contractor shall coordinate with and notify the Airport Manager and the Resident Engineer/Resident Technician and provide a schedule for REIL removals and the new REIL installations. The Contractor shall remove the existing REIL bases and dispose of them off the airport site in a legal manner. The existing electrical cables shall be disconnected and abandoned in place or removed to accommodate new construction. The holes left from the removal of the concrete bases will be filled with earth material. The earth material will be compacted to prevent any future settlement. The earth material will be obtained from off the Airport site. The disturbed area will be restored, graded, and seeded to the satisfaction of the Engineer, and will be considered as an incidental item to the removal of the REIL units.

Remove existing ground rods associated with the REIL systems to be removed.

800476-2.7 Restoration. All turf areas disturbed by the removal of airfield lighting, taxi signs, Navaids, junction structures, handholes, manholes, splice cans and associated work shall be restored, graded, and seeded in accordance with Item 901 Seeding and Item 908. All areas disturbed by work shall be restored to its original condition. The hole left from the removal of each base/foundation shall be filled with earth material. The earth material shall be compacted to prevent any future settlement. The earth material shall be obtained from off the Airport site. The restoration shall include any necessary topsoiling, fertilizing, liming, seeding, or mulching, as shown on the plans. All such work shall be performed to establish a stand of grass. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. Restoration shall be considered incidental to the pay item of which it is a component part.

BASIS OF PAYMENT

800476-3.1 This item of work will be paid for at the contract unit price bid price per lump sum for removal of the existing airfield lighting. This price and payment shall constitute full compensation for field verification of existing site conditions and power sources, disconnecting the respective power sources, removing the base-and stake-mounted airfield lights, airfield guidance signs, removal of splice cans, removal of junction structures, junction boxes, handholes, manholes, and/or other electrical equipment enclosures, and removal of associated mounting stakes, bases, foundations, cables, ducts, conduits, splice cans, transformer cans, and transformers; for all excavating and backfilling; for furnishing all earth material; for all restoration work; and for furnishing all coordination, labor, tools, equipment, and incidentals necessary to complete this item of work. Salvageable materials shall be turned over to the Airport. Any materials not salvaged by the Airport shall be legally disposed of off the Airport site by the Contractor at no additional cost to the Contract.

Payment will be made under:

Item AR800476 Remove Airfield Lighting - per L. SUM.

END OF ITEM 800476

END OF SPECIAL PROVISIONS

APPENDIX A

Southern Illinois Airport (MDH)
Carbondale/
Murphysboro, Illinois

Reconstruct Runway Lights on 18L/36R
Illinois Project No. MDH-5177
SBG Proj. No. 3-17-SBGP-TBD

Cable and Constant Current Regulator
Testing Forms

Engineering Firm	Hanson Professional Services Inc.
Airport Name	Southern Illinois Airport (MDH)
Project	Reconstruct Runway Lights on 18L/36R
IL Project No.	MDH-5177
Hanson Project	24A0093.00
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TESTING FORMS

Prior to beginning excavations, airfield lighting demolition, airfield lighting modifications, duct installation, cable installation, and/or any other work that might possibly affect airfield lighting circuits, all existing series circuit lighting cables in the areas of work shall be Megger tested with an insulation resistance tester and recorded at the respective airport electrical vault. The respective series circuit cable loops shall have the resistance measured with an Ohmmeter and recorded for each circuit at the vault. Each constant current regulator shall be tested with results recorded. The Contractor is responsible to employ the services of personnel qualified, familiar with, and trained to perform the respective tests, and qualified to work on 5000 Volt airfield lighting series circuits, constant current regulators, and associated airport electrical vault equipment. Please understand that airfield lighting series circuits are dangerous and only qualified personnel should be permitted to work on them and safety procedures need to be followed. NFPA 70 - National Electrical Code defines a Qualified Person as "***One who has the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved."*** NFPA 70E - Standard for Electrical Safety in the Workplace defines a Qualified Person as "***One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk."*** OSHA (Occupational Safety and Health Administration), Part Number 1910 Occupational Safety and Health Standards, Subpart S, Electrical, Standard Number 1910.399 defines Qualified person as follows: "***Qualified person. One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved."*** Safety of personnel is the top priority. Follow safety procedures for all work. Only qualified and experienced personnel are permitted to work on airfield lighting series circuits.

Personnel shall coordinate work and any power outages with the Owner's Designated Representative(s). Any shutdown of existing systems should be scheduled with and approved by the Owner's Designated Representative(s) prior to shut down. Once shut down, the circuits shall be labeled as such to prevent accidental energizing of the respective circuits. All personnel shall follow U.S. Department of Labor Occupational Safety & Health Administration (OSHA) 29 CFR Part 1910 Occupational Safety and Health Standards for electrical safety and lockout/tagout procedures including, but not limited to, 29 CFR section 1910.147 The Control of Hazardous Energy (lockout/tagout). Where the facility is not equipped with lockout/tagout equipment the respective personnel will be responsible for providing the appropriate lockout/tagout equipment. Failure to shut down and lockout the circuit presents a dangerous hazard for personnel working on this system.

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Personnel are recommended to comply with the applicable requirements of NFPA 70E – Standard for Electrical Safety in the Workplace.

Provide personnel protective equipment for all personnel working on or testing electrical systems suitable for the respective application. Provide protective equipment for personnel to keep them safe in the event of an arc flash or other electrical accident. Refer to NFPA 70E "Standard for Electrical Safety in the Workplace", Article 250 "Personal Safety and Protective Equipment" and "Informative Annex H Guidance on Selection of Protective Clothing and Other Personal Protective Equipment (PPE)" for additional information on personal protective equipment.

Insulation resistance testing equipment for use with 5,000 Volt series circuit cables shall use an insulation resistance tester capable of testing the cables at 5,000 Volts. New 5,000 Volt rated airfield lighting series circuit cables shall be tested at not less than 5,000 Volts. Existing older series circuit cables and/or cables in poor condition may require the test voltage to be performed at a voltage lower than 5,000 Volts to obtain an insulation resistance reading (Example 1,000 Volts, 500 Volts, or less than 500 Volts). Insulation resistance testing equipment often has the feature to adjust the test voltage corresponding to the condition of the cable. The respective test voltages shall be recorded for each cable insulation resistance test result. Measuring the cable insulation resistance of existing conductors/cables is important to document the condition of existing conductors/cables and help determine if there are existing hazards and/or unsafe conditions that will need to be addressed for protection of personnel.

Insulation resistance testing equipment for use with 600 Volt rated cables shall use a 500 Volt insulation resistance tester. The respective test voltage shall be recorded for each cable insulation resistance test result.

It is recommended to use the same insulation resistance test equipment throughout the project to ensure reliable comparative readings at the beginning of the project and at the completion of the project.

Disconnect the airfield lighting series circuit cables from the constant current regulator when performing cable insulation resistance tests (Megger Tests). Test the cables that go to the airfield for the respective airfield lighting series circuit. Connect the cable insulation resistance tester to one of the airfield lighting series circuit cables and to a good ground in the airport electrical vault such as the airport vault ground bus. Conduct the cable insulation resistance test on each respective cable for not less than 90 seconds. Record the test results at the end of the time duration for the test.

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TESTING FORMS

FAA Advisory Circular 150/5340-26C Maintenance of Airport Visual Aid Facilities provides guidance on Insulation Resistance Tests. Also refer to the user manual for the respective cable insulation resistance tester. Reasonably new series circuit cables and transformers with good connections should read 500 Mega-Ohms to 1,000 Mega-Ohms or higher. The readings should decrease with age. The resistance value declines over the service life of the circuit; a 10-20 percent decline per year may be considered normal. A yearly decline of 50 percent (4 percent monthly) or greater indicates the existence of a problem, such as a high resistance ground, serious deterioration of the circuit insulation, lightning damage, bad connections, bad splices, cable insulation damage, or other failure. FAA Advisory Circular 150/5340-26C notes "***Generally speaking, any circuit that measures less than 1 megohm is certainly destined for rapid failure."*** Airfield lighting series circuits with cable insulation readings of less than 1 megohm are not uncommon for older circuits that are 20 years or more of age.

Based on information in FAA AC No. 150/5340-26C Maintenance of Airport Visual Aid Facilities, the cable insulation resistance value inevitably declines of the service life of the circuit; a 10-20 percent decline per year may be considered normal. In the event that the cable insulation resistance readings have declined more than 2 percent per month it might indicate cable damage due to lightning or damage as a result of Contractor operations. Where the cable insulation resistance readings have declined more than 2 percent per month over the project construction duration as a result of Contractor operations, Contractor will need to investigate, address, and repair the respective cable circuits.

Please beware, where the respective series circuit cable insulation resistance test voltage is less than the operating voltage of the circuit, the cable needs to be replaced and is considered very poor to dangerous condition. For example, if a 30 KW, 6.6 Amp circuit cable insulation resistance tests less than 1 Mega-ohm at 500 volts, this cable is considered very poor to dangerous condition. A 30 KW, 6.6 Amp constant current regulator may output 4500 Volts where it is loaded near capacity. A cable that tests less than the operating voltage is considered dangerous and in need of replacement. Where the cable insulation resistance test voltage is less than the cable insulation rating it is unacceptable for continued use. A 5,000 Volt rated series circuit conductor that needs to be suitable to operate at 5,000 Volts, also needs to be capable of being tested at 5,000 Volts. Anything less indicates the cable insulation is starting to fail and/or is in dangerous condition. Dangerous condition indicates lighting failures, ground faults, transformer failures, bad connections, unsafe conditions, risk of electric shock, injury and/or death, and other failure conditions can be expected or presently exist. Personnel are at risk of electric shock, injury, and death when on the airfield areas that contain the lighting systems, when the lighting systems are in operation. The airfield lighting series circuit cables are unsafe, and that being near them with standing water on the ground or

in wet conditions, could be life-threatening. Caution needs to be exercised when working on or around these circuits. The airfield lighting series circuits are considered to be in such bad condition that they are a safety hazard to personnel working on the airfield, and safety measures need to be performed when working around these circuits. These circuits need immediate replacement. The respective lighting system can be expected to fail at any time.

SAFETY OF PERSONNEL MUST BE AND IS THE PRIORITY. When the airfield lighting circuits become dangerous, they need to be replaced immediately to help protect the pilots, airport staff, maintenance personnel, contractors, the public, and others that use or visit the airport.

All existing series circuit cable loops shall also have the resistance measured with an Ohmmeter and recorded for each circuit at the vault. The resistance of the series circuit loop with connections using #8 AWG copper conductor should be approximately 0.8 to 1 Ohm per thousand feet of cable length. The resistance of the series circuit loop with connections using #6 AWG copper conductor should be approximately 0.5 to 0.7 Ohm per thousand feet of cable length. The number of series circuit transformers and connections will affect the overall resistance of the series circuit loop and therefore the measurements might be slightly higher than the calculated resistance for the respective length of cable.

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TESTING FORMS

__Record the date for the respective tests.

__ Record the manufacture and model number of the insulation resistance tester used for the Megger tests. Note: it is recommended to use the same insulation resistance tester again after airfield lighting modifications, additions, and/or upgrades have been completed.

__ Record the manufacture and model number of the Ohmmeter used to measure resistance of each series circuit cable loop. Note: it is recommended to use the same Ohmmeter again after airfield lighting modifications, additions, and/or upgrades have been completed.

__ Record the manufacture and model number of the Ammeter used to measure current. Note: it is recommended to use the same Ammeter again after airfield lighting modifications, additions, and/or upgrades have been completed.

__Record personnel conducting tests.

__Record personnel observing tests.

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__ For each respective series circuit and/or feeder circuit in the areas of work, conduct cable insulation resistance test (Megger test) at the vault and record test results. Time duration of test should not be less than 90 seconds.

Cable Under Test	Cable Insulation Resistance	Test Voltage	Time Duration
Runway 18L-36R High Intensity Ltg series circuit cable			
Runway 18R-36L- Medium Intensity Ltg series circuit cable			
Taxiway A-North Lighting series circuit cable			
Taxiway A-South, G, H, and J Lighting series circuit cable			
Taxiway B-East, and F Lighting series circuit cable			
Taxiway B-West, B1 and D Lighting series circuit cable			
Taxiway C, C1, E Lighting series circuit cable			
Runway 6-24 Medium Intensity Ltg series circuit cable			

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__ Each respective lighting series circuit cable loop shall have the resistance tested and recorded at the vault. Use an Ohmmeter and measure the resistance of the series circuit loop at the Vault.

Cable Under Test	**Series Circuit Loop Resistance in Ohms**
Runway 18L-36R High Intensity Ltg series circuit cable	
Runway 18R-36L- Medium Intensity Ltg series circuit cable	
Taxiway A-North Lighting series circuit cable	
Taxiway A-South, G, H, and J Lighting series circuit cable	
Taxiway B-East, and F Lighting series circuit cable	
Taxiway B-West, B1 and D Lighting series circuit cable	
Taxiway C, C1, E Lighting series circuit cable	
Runway 6-24 Medium Intensity Ltg series circuit cable	

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Tests for constant current regulators shall include the following.

1. The respective personnel performing airfield lighting work, vault work, and/or tests shall be familiar with and qualified to work on 5000 Volt airfield lighting series circuits, constant current regulators, and associated airport electrical vault equipment.

2. Prior to conducting tests confirm each constant current regulator has a good and secure frame ground connection to the vault grounding electrode system (vault ground bus bar). The constant current regulator frame ground shall be a minimum #6 AWG copper conductor and UL listed grounding connectors with secure and tight connections. Correct where missing. Failure to properly ground this equipment presents a dangerous hazard for personnel working on this system. **PLEASE BE AWARE THAT GROUNDING DOES NOT GUARANTEE YOU WILL NOT RECEIVE A SHOCK, BE INJURED, OR KILLED FROM DEFECTIVE EQUIPMENT OR MATERIALS. PROPER GROUNDING WILL HOWEVER SIGNIFICANTLY REDUCE THE POSSIBILITY OF SHOCK, INJURY, OR DEATH. PLEASE FOCUS ON SAFETY OF PERSONNEL AT ALL TIMES.**

3. Prior to conducting tests confirm each series circuit cutout enclosure is grounded properly. Each cutout enclosure shall have a #6 AWG (minimum) copper equipment ground wire with the 6.6 Amp output series circuit conductors from the respective constant current regulator to the respective cutout enclosure. Each cutout enclosure shall have a #6 AWG (minimum) copper equipment ground wire with the 20 Amp output series circuit conductors from the respective constant current regulator to the respective cutout enclosure. Bond the equipment ground wire to the constant current regulator frame and the cutout enclosure frame. Cutout enclosures are required to be grounded and bonded per 2023 National Electrical Code Article 250.4 *"General Requirements for Grounding and Bonding*". Failure to properly ground this equipment presents a dangerous hazard for personnel working on this system. Correct where missing.

4. The respective personnel performing tests shall be familiar with the respective test equipment and the use and operation of the test equipment. The Contractor is responsible to employ the services of personnel qualified to perform the respective tests and qualified to work on 5000 Volt airfield lighting series circuits, constant current regulators, and associated airport electrical vault equipment.

5. Test each brightness step and measure and record the input current on Phase A, Phase B and/or Phase C for the 208 VAC branch circuit to each CCR. Note: Provide a True RMS Ammeter for current measurements.

6. Test each brightness step and record the CCR output current to the series circuit lighting. Each CCR should be equipped with an output current meter. In the event the output current meter is not working properly or is out of calibration use a True RMS Ammeter for output current measurements and measure the current in the output series circuit conductor.

7. Test each brightness step and record the CCR output voltage for the series circuit lighting. Each CCR should be equipped with an output voltage meter. Where the CCR does not include an output voltage meter, the output voltage measurements are not required. Do not use a 0 to 600 Volt voltmeter to measure voltage across the CCR output terminals due to safety concerns and high voltages at the CCR output.

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Note: Provide a True RMS Ammeter for current measurements. Note Output voltage measurements are not required for constant current regulators that do not include an output voltage meter.

__ Test Primary CCR for Runway 18L-36R by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B1	Phase A:	
	Phase C:	
B2	Phase A:	
	Phase C:	
B3	Phase A:	
	Phase C:	
B4	Phase A:	
	Phase C:	
B5	Phase A:	
	Phase C:	

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__ Test Primary CCR for Runway 18L-36R in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B1	Phase A:	
	Phase C:	
B2	Phase A:	
	Phase C:	
B3	Phase A:	
	Phase C:	
B4	Phase A:	
	Phase C:	
B5	Phase A:	
	Phase C:	

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TESTING FORMS

__ Test Backup CCR for Runway 18L-36R by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B1	Phase A:	
	Phase C:	
B2	Phase A:	
	Phase C:	
B3	Phase A:	
	Phase C:	
B4	Phase A:	
	Phase C:	
B5	Phase A:	
	Phase C:	

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__ Test Backup CCR for Runway 18L-36R in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B1	Phase A:	
	Phase C:	
B2	Phase A:	
	Phase C:	
B3	Phase A:	
	Phase C:	
B4	Phase A:	
	Phase C:	
B5	Phase A:	
	Phase C:	

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Note: Provide a True RMS Ammeter for current measurements. Note Output voltage measurements are not required for constant current regulators that do not include an output voltage meter.

__ Test Runway 18R-36L CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

__ Test Runway 18R-36L CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

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Note: Provide a True RMS Ammeter for current measurements. Note Output voltage measurements are not required for constant current regulators that do not include an output voltage meter.

__ Test Taxiway A-North CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

__ Test Taxiway A-North CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

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TESTING FORMS

Note: Provide a True RMS Ammeter for current measurements. Note Output voltage measurements are not required for constant current regulators that do not include an output voltage meter.

__ Test Taxiway A-South, G, H, and J CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

__ Test Taxiway A-South, G, H, and J CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

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Note: Provide a True RMS Ammeter for current measurements. Note Output voltage measurements are not required for constant current regulators that do not include an output voltage meter.

__ Test Taxiway B-East and F CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase b:	
	Phase C:	
B100	Phase B:	
	Phase C:	

__ Test Taxiway B-East and F CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

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Note: Provide a True RMS Ammeter for current measurements. Note Output voltage measurements are not required for constant current regulators that do not include an output voltage meter.

__ Test Taxiway B-West, B1, and D CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

__ Test Taxiway B-West, B1, and D CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

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Note: Provide a True RMS Ammeter for current measurements. Note Output voltage measurements are not required for constant current regulators that do not include an output voltage meter.

__ Test Taxiway C, C1 and E CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

__ Test Taxiway C, C1 and E CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

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TESTING FORMS

Note: Provide a True RMS Ammeter for current measurements. Note Output voltage measurements are not required for constant current regulators that do not include an output voltage meter.

__ Test Runway 6-24 CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

__Test runway 6-24 CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

Engineering Firm	Hanson Professional Services Inc.
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TESTING FORMS

END OF TESTS TO BE CONDUCTED PRIOR TO BEGINNING EXCAVATIONS, AIRFIELD LIGHTING DEMOLITION, AIRFIELD LIGHTING MODIFICATIONS, DUCT INSTALLATION, CABLE INSTALLATION, AND/OR ANY OTHER WORK THAT MIGHT POSSIBLY AFFECT AIRFIELD LIGHTING CIRCUITS

Engineering Firm	Hanson Professional Services Inc.	**TESTING FORMS**
Airport Name	Southern Illinois Airport (MDH)	
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After airfield lighting modifications, additions, and/or upgrades have been completed, series circuit cables shall be Megger tested with an insulation resistance tester and recorded at the vault. All series circuit cable loops shall have the resistance measured with an Ohmmeter and recorded for each circuit at the vault. Each constant current regulator shall be tested with results recorded. Record the date for the respective tests.

__ Record the manufacture and model number of the insulation resistance tester used for the Megger tests.

__ Record the manufacture and model number of the Ohmmeter used to measure resistance of each series circuit cable loop.

__ Record the manufacture and model number of the Ammeter used to measure current. Note: it is recommended to use the same Ammeter again after airfield lighting modifications, additions, and/or upgrades have been completed.

__Record personnel conducting tests.

__Record personnel observing tests.

Engineering Firm Hanson Professional Services Inc.
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__ After airfield lighting modifications, additions, and/or upgrades have been completed, conduct cable insulation resistance test (Megger test) at the vault and record test results for each respective series circuit and feeder circuit in the areas of work. Time duration of test should not be less than 90 seconds.

Cable Under Test	Cable Insulation Resistance	Test Voltage	Time Duration
Runway 18L-36R High Intensity Ltg series circuit cable			
Runway 18R-36L-Medium Intensity Ltg series circuit cable			
Taxiway A-North Lighting series circuit cable			
Taxiway A-South, G, H, and J Lighting series circuit cable			
Taxiway B-East, and F Lighting series circuit cable			
Taxiway B-West, B1 and D Lighting series circuit cable			
Taxiway C, C1, E Lighting series circuit cable			
Runway 6-24 Medium Intensity Ltg series circuit cable			

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__ After airfield lighting modifications, additions, and/or upgrades have been completed, each respective lighting series circuit cable loop shall have the resistance tested and recorded at the vault. Use an Ohmmeter and measure the resistance of the series circuit loop at the Vault.

Cable Under Test	**Series Circuit Loop Resistance in Ohms**
Runway 18L-36R High Intensity Ltg series circuit cable	
Runway 18R-36L- Medium Intensity Ltg series circuit cable	
Taxiway A-North Lighting series circuit cable	
Taxiway A-South, G, H, and J Lighting series circuit cable	
Taxiway B-East, and F Lighting series circuit cable	
Taxiway B-West, B1 and D Lighting series circuit cable	
Taxiway C, C1, E Lighting series circuit cable	
Runway 6-24 Medium Intensity Ltg series circuit cable	

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TESTING FORMS

Tests for constant current regulators shall include the following.

1. The respective personnel performing airfield lighting work, vault work, and/or tests shall be familiar with and qualified to work on 5000 Volt airfield lighting series circuits, constant current regulators, and associated airport electrical vault equipment.

2. Prior to conducting tests confirm each constant current regulator has a good and secure frame ground connection to the vault grounding electrode system. The constant current regulator frame ground shall be a minimum #6 AWG copper conductor and UL listed grounding connectors with secure and tight connections. Correct where missing. Failure to properly ground this equipment presents a dangerous hazard for personnel working on this system.

3. Prior to conducting tests confirm each series circuit cutout enclosure is grounded properly. Each cutout enclosure shall have a #6 AWG (minimum) equipment ground wire with the 6.6 Amp output series circuit conductors from the respective constant current regulator to the respective cutout enclosure. Each cutout enclosure shall have a #6 AWG (minimum) equipment ground wire with the 20 Amp output series circuit conductors from the respective constant current regulator to the respective cutout enclosure. Bond the equipment ground wire to the constant current regulator frame and the cutout enclosure frame. Cutout enclosures are required to be grounded and bonded per 2023 National Electrical Code Article 250.4 *"General Requirements for Grounding and Bonding"*. Failure to properly ground this equipment presents a dangerous hazard for personnel working on this system. Correct where missing.

4. The respective personnel performing tests shall be familiar with the respective test equipment and the use and operation of the test equipment. The Contractor is responsible to employ the services of personnel qualified to perform the respective tests and qualified to work on 5000 Volt airfield lighting series circuits, constant current regulators, and associated airport electrical vault equipment.

5. Test each brightness step and measure and record the input current on Phase A, Phase B and/or Phase C for the 208 VAC branch circuit to each CCR. Note: Provide a True RMS Ammeter for current measurements.

6. Test each brightness step and record the CCR output current to the series circuit lighting circuit. Each CCR should be equipped with an output current meter. In the event the output current meter is not working properly or is out of calibration use a True RMS Ammeter for output current measurements and measure the current in the output series circuit conductor.

7. Test each brightness step and record the CCR output voltage for the series circuit lighting circuit. Each CCR should be equipped with an output voltage meter. Where the CCR does not include an output voltage meter, the output voltage measurements are not required. Do not use a 0 to 600 Volt voltmeter to measure voltage across the CCR output terminals due to safety concerns and high voltages at the CCR output.

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TESTING FORMS

Note: Provide a True RMS Ammeter for current measurements. Note Output voltage measurements are not required for constant current regulators that do not include an output voltage meter.

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Primary CCR for Runway 18L-36R by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT	OUTPUT VOLTS
B1	Phase A:		
	Phase C:		
B2	Phase A:		
	Phase C:		
B3	Phase A:		
	Phase C:		
B4	Phase A:		
	Phase C:		
B5	Phase A:		
	Phase C:		

Engineering Firm	Hanson Professional Services Inc.
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TESTING FORMS

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Primary CCR for Runway 18L-36R in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT	OUTPUT VOLTS
B1	Phase A:		
	Phase C:		
B2	Phase A:		
	Phase C:		
B3	Phase A:		
	Phase C:		
B4	Phase A:		
	Phase C:		
B5	Phase A:		
	Phase C:		

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__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Backup CCR for Runway 18L-36R by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT	OUTPUT VOLTS
B1	Phase A:		
	Phase C:		
B2	Phase A:		
	Phase C:		
B3	Phase A:		
	Phase C:		
B4	Phase A:		
	Phase C:		
B5	Phase A:		
	Phase C:		

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TESTING FORMS

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Backup CCR for Runway 18L-36R in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT	OUTPUT VOLTS
B1	Phase A:		
	Phase C:		
B2	Phase A:		
	Phase C:		
B3	Phase A:		
	Phase C:		
B4	Phase A:		
	Phase C:		
B5	Phase A:		
	Phase C:		

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TESTING FORMS

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Runway 18R-36L CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Runway 18R-36L CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

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TESTING FORMS

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway A-North CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway A-North CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

Engineering Firm	Hanson Professional Services Inc.
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TESTING FORMS

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway A-South, G, H, and J CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway A-South, G, H, and J CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

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TESTING FORMS

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway B-East and F CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase b:	
	Phase C:	
B100	Phase B:	
	Phase C:	

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway B-East and F CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

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TESTING FORMS

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway B-West, B1, and D CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway B-West, B1, and D CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

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TESTING FORMS

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway C, C1 and E CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Taxiway C, C1 and E CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase A:	
	Phase B:	
B30	Phase A:	
	Phase B:	
B100	Phase A:	
	Phase B:	

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TESTING FORMS

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test Runway 6-24 CCR by Manual Control and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

__ After airfield lighting modifications, additions, and/or upgrades have been completed, Test runway 6-24 CCR in remote mode by airfield lighting control system and record input current and output current at each step.

STEP	INPUT CURRENT	OUTPUT CURRENT
B10	Phase B:	
	Phase C:	
B30	Phase B:	
	Phase C:	
B100	Phase B:	
	Phase C:	

Engineering Firm	Hanson Professional Services Inc.
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TESTING FORMS

END OF TESTS TO BE CONDUCTED AFTER AIRFIELD LIGHTING MODIFICATIONS, ADDITIONS, AND/OR UPGRADES HAVE BEEN COMPLETED

APPENDIX B

Southern Illinois Airport (MDH)
Carbondale/
Murphysboro, Illinois

Reconstruct Runway Lights on 18L/36R
Illinois Project No. MDH-5177
SBG Proj. No. 3-17-SBGP-TBD

REIL
GROUND CHECK LIST

Airport Identifier:	**MDH**
Airport Name:	**Southern Illinois Airport**
Location:	**Southern Illinois Airport (MDH)** **Carbondale/** **Murphysboro, Illinois**
SBG No.:	**3-17-SBGP-TBD**
IDA No.:	**MDH-5177**
Hanson Project No.:	**24A0093.00**
Date:	
Site Conditions:	

a. Inspect REIL to determine that it is installed correctly, at the proper height, at the correct location, level, and properly oriented.

b. Check all fixture securing screws or bolts to ensure that they have been tightened per manufacturer recommendations. Use an anti-seize compound on bolts made of stainless steel.

c. Check REIL to determine that the lenses are clean and unscratched.

d. Test REIL feeder circuits/series circuits for continuity and insulation resistance to ground. Observe and record megger test (cable insulation resistance test) for REIL feeder circuit/series circuit conductors.

Cable Under Test	Cable Insulation Resistance	Test Voltage	Time Duration
Respective Runway Lighting Series Circuit Conductor			
Phase A Conductor (For Voltage Powered REIL)			
Phase B Conductor (For Voltage Powered REIL)			

e. Check fuses and circuit breakers to determine if they are of the proper rating.

f. Check REIL to determine that it is properly oriented with respect to the runway longitudinal sides and the threshold. Check REIL for proper location.

g. Check equipment covered by FAA specifications to determine if the manufacturers have supplied certified equipment. Also check the equipment for general conformance with the requirements of the Plans, Specifications, and Special Provisions.

h. Inspect all cables, wiring, and splices to obtain assurance that the installation is per the Standard Specifications for Construction of Airports, the Special Provision Specifications, the Plans, the National Electrical Code, and local codes. Inspect and test insulation resistance of underground cables before backfilling.

i. Check all ducts and duct markers to determine that the installation is per the Standard Specifications for Construction of Airports, the Special Provision Specifications, and the Plans. Inspect underground ducts before backfilling is made.

j. Check the input voltage at the power and control circuits to determine that the voltage is within limits required for proper equipment operation. Select the proper voltage tap on equipment where taps are provided. Circuitry should also be checked per the manufacturer's requirements.

k. Check base plates for damage during installation and refinish according to manufacturer's instructions and as acceptable to the Engineer.

l. Check the size and type of feeder conductor from the vault or power source to the REILS.

m. Record nameplate data for REILS.

n. Test REIL by respective control system and confirm proper operation. Check to see if Runway REIL's activate at Step 1 (Off), Step 2 (Off) and Step 3 (100% brightness) of L-854 Radio Receiver Output.

o. Check to see if the Primary REIL unit has a ground wire connection from its frame to the ground rod.

p. Check to see if the Secondary REIL unit has a ground wire connection from its frame to the ground rod.

q. Make sure each REIL has good ground. Test and record earth ground resistance of ground rod installation at each REIL Unit. Earth ground resistance of each REIL unit shall not exceed 25 Ohms.

REIL LIGHT HOUSING UNIT	**Measured Ground Resistance in Ohms**
REIL Primary Light Unit	
REIL Secondary Light Unit	

r. Confirm Operation and Maintenance Manuals are provided for REILS.

s. Ground Check test results submitted by:

Name:	
Company:	
Date:	