

# HOLBROOK MUNICIPAL AIRPORT

Holbrook, Arizona

CONTRACT DOCUMENTS INCLUDING DETAILED SPECIFICATIONS

## **SCHEDULE I**

Reconstruct Apron

## **SCHEDULE II (NON-AIP)**

Reconstruct Apron Hangar Connections

AIP No. 3-04-0020-0xx-2024

ACI No. 22965

February 2024



**A LOCHNER COMPANY**

2345 South Alma School Road, Suite 208

Mesa, Arizona 85210

O: 602.803.7079

[www.armstrongconsultants.com](http://www.armstrongconsultants.com)



## HOLBROOK MUNICIPAL AIRPORT

HOLBROOK, ARIZONA

Contract Documents  
including  
Detailed Specifications

AIP No. 3-04-0020-0xx-2024

ACI No. 22965

### CERTIFICATION

I hereby certify that these plans and specifications for Holbrook Municipal Airport Improvements, AIP No. 3-04-0020-0xx-2024, were prepared under my direct supervision for the Owners thereof.

Designed by:



Engineer

3/6/24

Date

Reviewed by and prepared under my direct supervision:



**ARMSTRONG CONSULTANTS, INC.**

Airport Engineering, Planning & Environmental Studies

2345 South Alma School Road, Suite 208

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**INVITATION FOR BIDS**  
**FOR IMPROVEMENTS TO**  
**HOLBROOK MUNICIPAL AIRPORT**  
**PERIMETER FENCING**  
**HOLBROOK, ARIZONA**

AIP NO. 3-04-0020-0xx-2024

Online bids for improvements to the Holbrook Municipal Airport, AIP No. 3-04-0020-0xx-2024, will be received by the City of Holbrook via online bidding through Quest CDN at [www.armstrongconsultants.com](http://www.armstrongconsultants.com) until April 4, 2024 at 10:00 a.m., MST. Online bidding will begin on March 27, 2024.

The work involved includes the following:

SCHEDULE I  
RECONSTRUCT APRON

SCHEDULE II (NON-AIP)  
RECONSTRUCT APRON HANGAR CONNECTIONS

For a complete set of Plans, Specifications and Contract Documents all purchases must be made through our website at [www.armstrongconsultants.com](http://www.armstrongconsultants.com). A digital copy may be downloaded for \$60.00, this will include access to online bidding. There will be no refunds.

Each bid must be accompanied by a Bid Bond executed by a Surety Company in an amount not less than ten (10) percent of the total bid made payable to the City of Holbrook.

The Bidder must supply all the information required by the proposal forms and specifications and he/she must bid on all items of every schedule. The City of Holbrook reserves the right to waive any informality in, or to reject any or all portions of, the various bid items. No proposal may be withdrawn for a period of ninety (90) days from the opening thereof.

A non-mandatory pre-bid meeting will be held at the Holbrook Municipal Airport on March 14, 2024 at 11:00 a.m., MST. All bidders are advised to examine the site to become familiar with all site conditions.

The proposed contract is subject to: Buy American Preference (Title 49 USC § 50101, Executive Order 14005, Pub. L. No. 117-58, and BABA), Civil Rights Title VI Assurance (49 USC § 47123 and FAA Order 1400-11), the Davis Bacon Act (40 USC §§ 3141-3144, 3146, and 3147), as amended; Debarment and Suspension restrictions (2 CFR Part 180), the provisions of Department of Transportation Regulations 49 CFR Part 26 (Disadvantaged Business Enterprise Participation), Lobby Federal Employee restrictions (21 USC § 1352), and Procurement of Recovered Materials requirements (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) ; ).

Minimum wage rates as established by the Secretary of Labor are applicable to all schedules awarded for this project.

The proposed contract is under and subject to the following federal provision(s):

- Affirmative Action Requirement
- Buy American Preference
- Civil Rights – Title VI Assurance
- Debarment and Suspension
- Federal Fair Labor Standards Act (Federal Minimum Wage)
- Trade Restriction Certification
- Procurement of Recovered Materials

Any questions regarding this project are to be directed to the office of Armstrong Consultants, Inc., Mesa, Arizona, (602) 803-7079 for interpretation.

**HOLBROOK, ARIZONA**

The Tribune News  
Published: March 6, and 13, 2024



## **INSTRUCTIONS TO BIDDERS**

- 1. Defined Terms.** Terms used in these Instructions to Bidders, which are defined in the General Provisions of the Construction Contract, have the meanings assigned to them in the General Provisions. The term "Successful Bidder" means the lowest, qualified, responsible Bidder to whom the Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.
- 2. Copies of Bidding Documents**
  - 2.1** Complete sets of the Bidding Documents may be obtained from Engineer (unless another issuing office is designated in the Advertisement or Invitation to Bid) for the deposit sum stated in the Advertisement or Invitation to Bid. The deposit will not be refunded. Partial sets of Bidding Documents shall not be issued. Portions of the Contract Documents not produced by the Owner or Engineer will not be furnished.
  - 2.2** Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
  - 2.3** Owner and Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.
- 3. Qualifications of Bidders**
  - 3.1** Each bidder may be required to submit written evidence of its qualifications to perform the Work, including but not limited to; financial data, a narrative of previous experience and evidence of authority to conduct business in the jurisdiction where the Project is located. Each Bid must contain evidence of Bidder's qualification to do business in the State where the project is located, or covenant to obtain such qualification prior to award.
- 4. Examination of Contract Documents and Site**
  - 4.1** Before submitting a Bid, each Bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress or performance of the Work, (c) familiarize himself with federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, progress, or performance of the Work; and (d) study and carefully correlate Bidder's observations with the Contract Document.
  - 4.2** Where any soils investigation or report of subsurface and latent physical conditions at the site or otherwise affecting cost, progress, or performance of the Work which have been relied upon by Engineer in preparing the Drawings and Specifications, for the convenience of the Bidder, the Engineer will make copies of such reports available to any Bidder requesting them. These reports are not guaranteed as to accuracy or completeness, nor are they part of the Contract Documents. Before submitting his Bid, each Bidder will, at his own expense, make such additional investigations and tests as the Bidder may deem necessary to determine his Bid for performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

- 4.3** On request, Owner will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of his Bid.
- 4.4** The lands upon which the Work is to be performed, rights-of-way for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Special Provisions, General Provisions, or Drawings.
- 4.5** Drawings and Specifications were prepared on the basis of interpretation, judgment and discretion of Engineer. Accuracy of the Drawings and Specifications cannot be guaranteed. Questions about perceived inconsistencies, ambiguities or errors should be directed to the Engineer. By submitting its Bid, Bidder waives the right to assert that inconsistencies, ambiguities or errors impacted its Bid, Bidder assumes the risk attendance to successful performance of the work, waives all claims for additional compensation or time extensions on the grounds that the nature or amount of work to be done was not understood at the time of Bidding and waives all claims of any nature against the Owner and the Engineer arising out of or related to submission of its bid. The submission of a Bid will constitute an incontrovertible representation by the Bidder that he has complied with every requirement of this Article 4 and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.
- 4.6** The Bid Set of Drawings and Specifications may have been obtained through a plan room, either physically or through Internet access. Bidder acknowledges that the Engineer has no control over the operation of the plan room. Bidder acknowledges and accepts sole responsibility for obtaining all Bid information, including but not limited to, Addenda which may be issued subsequent to the Original Bid Set.
- 5. Interpretations.** All questions about Contract Documents including Detailed Specifications and/or Construction Plans shall be submitted to Engineer in writing. Questions will be accumulated and a reply will be issued by Addendum. Bidders identified on the planholders list will be notified by email that an Addendum is available by no later than eight (8) business days before the scheduled Bid Opening. Questions received less than nine (9) business days prior to the time and date for opening Bids will not be answered. Only questions answered by formal written Addenda will be binding and receipt of all addenda must be properly acknowledged on the appropriate proposal page. If acknowledgement for receiving any of the issued addenda is missing, then your bid will not be accepted. Oral and other interpretations or clarifications will be without legal effect.
- 6. Bid Security**
- 6.1** Bid Security shall be made payable to Owner, in an amount of ten (10) percent of the Bidder's total Bid price and in the form of a Bid Bond issued by a Surety as assurance that the Bidder will, upon acceptance of his Bid, execute such contractual documents as may be required within the time specified.
- 6.2** The Bid Security of the successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required Contract Security; whereupon, it will be returned; if the successful Bidder fails to execute and deliver the Agreement and furnish the required Contract Security within 15 days of the Notice of Award, Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid Security of any Bidder whom the Owner believes to have a reasonable chance of receiving the award may be

retained by the Owner until the earlier of the seventh day after the "effective date of the Agreement" or the ninety first day after the Bid opening. Bid Security of other Bidders will be returned within seven days of the Bid opening.

7. **Contract Time.** The number of days within which, or the date by which the Work is to be completed, (the Contract Time) is set forth in Article 31 of the Agreement.
8. **Liquidated Damages.** Provisions for liquidated damages, if any, are set forth in the Agreement.
9. **Substitute Material and Equipment.** The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the "effective date of the Agreement." The procedure for submittal of any such application by Contractor and consideration by Engineer is set forth in Section 60, paragraph 3 of the General Provisions that may be supplemented in the Special Provisions.

## 10. Subcontractors

- 10.1 Proposal requires that the identity of intended Subcontractors be submitted to Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, other person or organization, either may, before giving the Notice of Award, request the apparent Successful Bidder to submit an acceptable substitute without an increase in Bid price. If the apparent Successful Bidder declines to make any such substitution, the Contract shall not be awarded to such Bidder, but his declining to make any such substitution will not constitute grounds for sacrificing his Bid Security. Any Subcontractor, other person or organization so listed and to whom Owner or Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer.
- 10.2 In contracts where the Contract Price is on the Basis of Cost-of-the-Work Plus a Fee, the apparent Successful Bidder, prior to the Notice of Award, shall identify, in writing to Owner, those portions of the Work that such Bidder proposes to subcontract and after the Notice of Award may only subcontract other portions of the Work with Owner's written consent.
- 10.3 No Contractor shall be required to employ any Subcontractor, other person or organization against which he has reasonable objection.

## 11. Bid Proposal Form

- 11.1 The Bid Proposal Form is attached hereto and available for download at [www.ArmstrongConsultants.com](http://www.ArmstrongConsultants.com).
- 11.2 Bid proposal forms must be completed and uploaded to the online bidding platform. The bid prices of each item must be input into the online bidding platform. The bid tabulation for bid evaluation will be based on the bid price the bidder inputs.

- 11.3** Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
- 11.4** Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.
- 11.5** All names must be typed or printed below the signature.
- 11.6** Acknowledgement of receipt of Addenda is incorporated into the online bidding process. Bidders acknowledge receipt of Addenda by downloading the Addenda. Downloading of the Addenda is required prior to submitting an online bid.
- 11.7** The address to which communications regarding the Bid are to be directed must be shown.

## **12. Submission of Bids**

- 12.1** Bidders must submit proposals for all of the work entailed by all of the schedules. A bidder may not submit a proposal for some, but not all, of the schedules.
- 12.2** Bids shall be submitted online at the time indicated in the Advertisement or Invitation to Bid. Online bid submittal should be per the system requirements.
- 12.3** Each Bidder will submit the following in the online system as indicated in the Advertisement or Invitation to Bid:
  - A.** The Owner's copy of the Proposal and such other items as may be required to accompany the Proposal. The entire contract documents book is not required to be submitted.
  - B. Bid Security.** For online submittal, the Bid Security shall be uploaded as required in the system.

**13. Modification and Withdrawal of Bids.** Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

**14. Opening of Bids.** When Bids are opened publicly, they will be read aloud and an abstract of the amounts of the base Bids and major alternates (if any) will be made available within seven (7) days after the opening of Bids.

**15. Bids to Remain Open.** All Bids shall remain open for the period specified in General Provision 30-02, but Owner may, at his sole discretion, release any Bid and return the Bid Security prior to that date.

## **16. Award of Contract**

- 16.1** Owner reserves the right to reject any and all Bids, to waive any and all informalities and to negotiate contract terms with the Successful Bidder. The Owner further reserves the right to

disregard all nonconforming, nonresponsive, or conditional Bids. Discrepancies between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

- 16.2** In evaluating Bids, Owner shall consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements and alternates and unit prices, if requested in the Bid forms. It is Owner's intent to accept alternates (if any are accepted), but Owner may accept them in any order or combination.
- 16.3** Owner may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the Work as to which the identity of Subcontractors and other persons and organizations must be submitted as provided in the Proposal. Operating costs, maintenance considerations, performance data and guarantees of materials and equipment may also be considered by Owner. A Certification of Inclusion of Labor and EEO Requirements in Subcontracts shall be submitted to the Owner for each subcontract.
- 16.4** Owner may conduct such investigations as he deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of the Bidders, proposed Subcontractors and other persons and organizations to do the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.
- 16.5** Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.
- 16.6** The scope of the project may be revised prior to award depending on the availability of funds. If the Contract is to be awarded, it will be awarded based on the lowest responsive Bid total of the awarded items.
- 16.7** If the Contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within the period specified in General Provision 30-02.

**17. Performance and Other Bonds.** Article 34 of the Agreement sets forth Owner's requirements as to performance and other Bonds. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by the required Contract Security.

## **18. Agreement**

- 18.1** The successful Bidder shall, within 15 days after Notification of the Award:
  - A.** Enter into an Agreement, in writing, with Owner covering all matters detailed in these Specifications and his Proposal.
  - B.** Execute the necessary Bonds with Surety acceptable to the Owner as indicated in the Agreement.

- C. Show evidence of adequate insurance acceptable to the Owner as defined by the General Provisions and Special Provisions.
  - D. If requested by the Owner, provide a fully detailed financial statement.
- 18.2** The aforesaid Agreement and Bonds shall be subject to approval by the Owner's Attorney. All Bonds are to be furnished at the sole cost of the successful Bidder. Surety therein provided for shall be a Corporate Surety authorized to do business in the State of Arizona.
- 18.3** The Agreement, when executed, shall be deemed to include the entire Agreement between the parties hereto and the Contractor shall not claim any modification thereof resulting from any representation of the Owner or any other person.
- 19. State and Federal Regulations.** The successful Contractor must fully comply with all applicable Federal and State requirements pertaining to the work, employees used on the job and any special requirements pertaining to work procedures.
- 20. Disadvantaged Business Enterprises (DBE).** This project includes Disadvantaged Business Enterprises clauses. See Article 12 of the Agreement.
- 20.1** 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:
- A. The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
  - B. A description of the work that each DBE firm will perform;
  - C. The dollar amount of the participation of each DBE firm listed under (1);
  - D. 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,
  - E. 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
  - F. 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. 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.
- 20.2 Good Faith Efforts.** The following actions, by the Bidder, are generally considered a sign of good faith effort. This list is not exclusive or exhaustive but should be used as a guide in determining good faith effort.

- A. Attendance at Pre-bid meetings scheduled to inform DBE's of the Project.
  - B. Advertisement in general circulation, trade association and minority focus media concerning subcontracting opportunities.
  - C. Written notice to DBE's, allowing sufficient time for reply.
  - D. Follow-up of initial solicitation.
  - E. Section of portions of the work likely to be performed by DBE's.
  - F. Provide interested DBE's adequate information for bidding.
  - G. Negotiation with interested DBE's.
  - H. Assist interested DBE's with bonding; insurance; credit, or in obtaining equipment, supplies and materials.
  - I. Use of minority contractors' groups and minority business assistance offices.
- 20.3 Contract Goals.** The Bidder shall Subcontract 1.68 percent of the dollar value of the total amount of a D.O.T.-assisted Contract to qualified DBE Contractors. Based on the 9<sup>th</sup> Circuit Court Decision in Western States Paving Company v. Washington State Department of Transportation, The City of Holbrook has determined that it is appropriate to use a race/gender neutral goal. The City of Holbrook encourages all bidders to take active race gender/neutral steps to include DBE's in this and other airport contracts. Race/gender neutral steps include: unbundling large contract, subcontract work the prime contractor may self-perform, provide bonding or financing assistance, provide technical assistance, etc. This contract can be awarded without the lowest responsive bidder meeting the goal or demonstrating good faith effort to meet the goal.
- 20.4** The requirements of 49 CFR part 26 apply to this contract. It is the policy of the City of Holbrook 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.

**21. Affirmative Action** (41 CFR part 60-4 and Executive Order 11246)

This project includes Affirmation Action clauses. See Article 2 of the Agreement.

**22. Buy American Preference** (Title 49 USC § 50101, Executive Order 14005, Ensuring the Future is Made in All of America by All of America's Workers, Bipartisan Infrastructure Law (Pub. L. No. 117-58), Build America, Buy America (BABA))

This project includes Buy American Preference clauses. See Article 4 of the Agreement.

**23. Title VI Solicitation Notice (49 USC § 47123 and FAA Order 1400.11)**

The Holbrook Municipal Airport, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and no businesses will be discriminated against on the grounds of race, color, national origin (including limited English proficiency), creed, sex (including sexual orientation and gender identity), age, or disability in consideration for an award.

**24. Federal Fair Labor Standards Act (Federal Minimum Wage) (29 USC § 201, et seq, 2 CFR § 200.430)**

This project includes Federal Fair Labor Standards Act (Federal minimum Wage) clauses. See Article 16 of the Agreement.



**PROPOSAL**  
**FOR IMPROVEMENTS TO**  
**HOLBROOK MUNICIPAL AIRPORT**  
**RECONSTRUCT APRON**  
**HOLBROOK, ARIZONA**  
**AIP NO. 3-04-0020-0xx-2024**

TO: City of Holbrook  
465 1<sup>st</sup> Avenue  
P.O. Box 970  
Holbrook, Arizona 86025

The undersigned Bidder, having examined the Plans, Specifications and other Contract Documents as designated and all Addenda thereto; having investigated the location of and conditions affecting the Proposed Work; and being acquainted with and fully understanding the extent and character of the Work covered by this Proposal and all factors and conditions affecting or which may be affected by the Work;

HEREBY PROPOSES, pursuant to the Invitation for Bids published March 6, and 13, 2024, to furnish all required materials, tools, equipment and plant; to perform all necessary labor and superintendence; and to undertake and complete the Work required for Holbrook Municipal Airport, AIP No. 3-04-0020-0xx-2024, in Holbrook, Arizona, in full accordance with Plans, Specifications and Contract Documents hereto attached or by reference made a part thereof, at and for the following prices:

**BID SCHEDULE**

**SCHEDULE I - RECONSTRUCT APRON**

| Item No. | Spec. No. | Description                                                     | Est. Qty. | Unit | Unit Price in Figures and in Writing | Total Price |
|----------|-----------|-----------------------------------------------------------------|-----------|------|--------------------------------------|-------------|
| I-1      | C-100     | Contractor Quality Control Program (CQCP)                       | 1         | LS   | \$                                   | \$          |
| I-2      | C-105     | Mobilization                                                    | 1         | LS   | \$                                   | \$          |
| I-3      | P-101a    | Asphalt Pavement Removal                                        | 28,000    | SY   | \$                                   | \$          |
| I-4      | P-101b    | Removal of Cable and Conduit                                    | 2,200     | LF   | \$                                   | \$          |
| I-5      | P-101c    | Removal of Tie-Downs                                            | 1         | LS   | \$                                   | \$          |
| I-6      | P-101d    | Removal of Concrete Structure                                   | 1         | LS   | \$                                   | \$          |
| I-7      | P-101e    | Removal of Area Lights                                          | 5         | EA   | \$                                   | \$          |
| I-8      | P-101f    | Remove and Replace Electrical Duct Bank (Includes Junction Box) | 200       | LF   | \$                                   | \$          |
| I-9      | P-101g    | Remove Edge Light                                               | 9         | EA   | \$                                   | \$          |
| I-10     | P-101h    | Remove Sign                                                     | 2         | EA   | \$                                   | \$          |
| I-11     | P-101i    | Remove Culvert                                                  | 80        | LF   | \$                                   | \$          |
| I-12     | P-152a    | Unclassified Excavation                                         | 8,000     | CY   | \$                                   | \$          |
| I-13     | P-152b    | Muck Excavation                                                 | 1,200     | CY   | \$                                   | \$          |
| I-14     | P-156a    | Cement Treated Subgrade                                         | 22,850    | SY   | \$                                   | \$          |
| I-15     | P-156b    | Cement                                                          | 580       | TON  | \$                                   | \$          |
| I-16     | P-208     | Aggregate Base Course                                           | 4,200     | CY   | \$                                   | \$          |

**SCHEDULE I - RECONSTRUCT APRON (continued)**

| Item No.                             | Spec. No. | Description                                                                                              | Est. Qty. | Unit | Unit Price in Figures and in Writing | Total Price |
|--------------------------------------|-----------|----------------------------------------------------------------------------------------------------------|-----------|------|--------------------------------------|-------------|
| I-17                                 | P-401     | Asphalt Surface Course                                                                                   | 4,400     | TON  | \$                                   | \$          |
| I-18                                 | P-605     | Silicone Joint Sealant                                                                                   | 800       | LF   | \$                                   | \$          |
| I-19                                 | P-620a    | Temporary Marking                                                                                        | 5,600     | SF   | \$                                   | \$          |
| I-20                                 | P-620b    | Marking                                                                                                  | 5,600     | SF   | \$                                   | \$          |
| I-21                                 | S-10      | Aircraft Tie-Downs (Set of 3)                                                                            | 20        | EA   | \$                                   | \$          |
| I-22                                 | S-162     | Detection Loop                                                                                           | 1         | LS   | \$                                   | \$          |
| I-23                                 | D-701     | 8 Inch Corrugated Steel Culvert                                                                          | 80        | LF   | \$                                   | \$          |
| I-24                                 | S-701     | 8 Inch Galvanized Flared End Section                                                                     | 2         | EA   | \$                                   | \$          |
| I-25                                 | L-108a    | No. 8 AWG 5kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit                            | 2,100     | LF   | \$                                   | \$          |
| I-26                                 | L-108b    | No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed in Trench, Including Connections/Terminations | 1,300     | LF   | \$                                   | \$          |
| I-27                                 | L-110a    | Non-Encased 2-inch PVC Duct (Direct Earth Burial Including Trenching)                                    | 1,300     | LF   | \$                                   | \$          |
| I-28                                 | L-110b    | Concrete Encased 2-Way, 4-inch PVC Duct (Direct Earth Burial)                                            | 50        | LF   | \$                                   | \$          |
| I-29                                 | L-125a    | L-861T Taxiway Edge Light                                                                                | 14        | EA   | \$                                   | \$          |
| I-30                                 | L-125b    | L-858Y Guidance Sign (2-Module)                                                                          | 1         | EA   | \$                                   | \$          |
| <b>TOTAL BID AMOUNT – SCHEDULE I</b> |           |                                                                                                          |           |      | \$                                   |             |

| SCHEDULE II (NON-AIP)– RECONSTRUCT APRON HANGAR CONNECTIONS |           |                         |           |      |                                      |             |
|-------------------------------------------------------------|-----------|-------------------------|-----------|------|--------------------------------------|-------------|
| Item No.                                                    | Spec. No. | Description             | Est. Qty. | Unit | Unit Price in Figures and in Writing | Total Price |
| II-1                                                        | P-152     | Unclassified Excavation | 200       | CY   | \$                                   | \$          |
|                                                             |           |                         |           |      |                                      |             |
| II-2                                                        | P-156a    | Cement Treated Subgrade | 390       | SY   | \$                                   | \$          |
|                                                             |           |                         |           |      |                                      |             |
| II-3                                                        | P-156b    | Cement                  | 10        | TON  | \$                                   | \$          |
|                                                             |           |                         |           |      |                                      |             |
| II-4                                                        | P-208     | Aggregate Base Course   | 60        | CY   | \$                                   | \$          |
|                                                             |           |                         |           |      |                                      |             |
| II-5                                                        | P-401     | Asphalt Surface Course  | 60        | TON  | \$                                   | \$          |
|                                                             |           |                         |           |      |                                      |             |
| II-6                                                        | P-605     | Silicone Joint Sealant  | 200       | LF   | \$                                   | \$          |
|                                                             |           |                         |           |      |                                      |             |
| TOTAL BID AMOUNT – SCHEDULE II (NON-AIP)                    |           |                         |           |      | \$                                   |             |

| SUMMARY                            |           |
|------------------------------------|-----------|
| Bid Amount - Schedule I            | \$        |
| Bid Amount - Schedule II (Non-AIP) | \$        |
| <b>TOTAL OF ALL SCHEDULES</b>      | <b>\$</b> |

## EQUAL EMPLOYMENT OPPORTUNITY STATEMENT

A Bidder must have properly completed this form to be considered an eligible Bidder.

The Bidder shall complete the following statement by checking the appropriate boxes.

The Bidder    *has*    ☐                      *has not*    ☐  
participated in a previous contract subject to the equal opportunity clause prescribed by Executive Order 11246.

The Bidder    *has*    ☐                      *has not*    ☐  
submitted all compliance reports in connection with any such contract due under the applicable filing requirements; and that representations indicating submission of required compliance reports signed by Proposed Subcontractors will be obtained prior to Award of Subcontracts.

If the Bidder has participated in a previous Contract subject to the equal opportunity clause and has not submitted compliance reports due under applicable filing requirements, the Bidder shall submit a compliance report on Standard Form 100, 'Employee Information Report EEO-1' prior to the Award of Contract.

## DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION FORM

*The undersigned bidder/offeror has satisfied the requirements of the bid specification in the following manner:*

- ☐ Bidder/offeror has met the DBE contract goal.  
The bidder/offeror is committed to a minimum of \_\_\_\_\_% DBE utilization on this contract.
- ☐ Bidder/offeror has not met the DBE contract goal.  
The bidder/offeror is committed to a minimum of \_\_\_\_\_% DBE utilization on this contract and has submitted documentation demonstrating good faith efforts.

---

Legal name of bidder/offeror's firm

---

Bidder/Offeror Representative

---

Name & Title

---

Signature

---

Date

## LETTER OF INTENT FORM

*The authorized representative (AR) named below must be an individual vested with the authority to make contracting decisions on behalf of the firm.*

\_\_\_\_\_  
Name of Bidder/Offeror's Firm

\_\_\_\_\_  
Name & Title of Firm's AR

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Email

\_\_\_\_\_  
Name of DBE Firm

\_\_\_\_\_  
Name & Title of DBE Firm's AR

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Email

\_\_\_\_\_  
Address

\_\_\_\_\_  
City

\_\_\_\_\_  
State/ Zip

*Work to be performed by DBE firm:*

| <i>Description of Work</i> | <i>NAICS</i> | <i>Dollar Amount / % <sup>1</sup></i> | <i>Dealer/Manufacturer <sup>2</sup></i> |
|----------------------------|--------------|---------------------------------------|-----------------------------------------|
|                            |              |                                       |                                         |
|                            |              |                                       |                                         |
|                            |              |                                       |                                         |
|                            |              |                                       |                                         |
|                            |              |                                       |                                         |
|                            |              |                                       |                                         |
|                            |              |                                       |                                         |

<sup>1</sup>Percentage is to be used only in negotiated procurements, including design-build contracts.

<sup>2</sup>For material suppliers only, indicate whether the DBE is a manufacturer or a regular dealer as defined by §26.55.

*The undersigned bidder/offeror is committed to utilizing the above-named DBE firm for the work described above. The total expected dollar value of this work is \$ \_\_\_\_\_. The bidder/offeror understands that if it is awarded the contract/agreement resulting from this procurement, it must enter into a subcontract with the DBE*

*firm identified above that is representative of the type and amount of work listed. Bidder/offeror understands that upon submitting this form with its bid/offer, it may not substitute or terminate the DBE listed above without following the procedures of 49 CFR Part 26, §26.53.*

\_\_\_\_\_  
Signature of Bidder/Offeror's Authorized Representative

\_\_\_\_\_  
Date

*The undersigned DBE affirms that it is ready, willing, and able to perform the amount and type of work as described above, and is properly certified to be counted for DBE participation, therefore.*

\_\_\_\_\_  
Signature of DBE's Authorized Representative

\_\_\_\_\_  
Date

***If the bidder/offeror does not receive award of the prime contract, any and all representations in this Letter of Intent shall be null and void.***

***Submit this form for each DBE subcontractor.***



**BIDDER'S SUBCONTRACTOR'S LIST**  
(This form should include DBE and Non-DBE Subcontractor's)

Project Title: \_\_\_\_\_ Date: \_\_\_\_\_  
 Prime Contractor: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Address: \_\_\_\_\_

| Name of Firm | Address/ Phone # | Type of Work to be Performed on Contract | Dollar Amount of Contract | Certified DBE |    | Age of Firm                                                                                                                                                                                                  | Annual Gross Receipts                                                                                                                                                                                                               |
|--------------|------------------|------------------------------------------|---------------------------|---------------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |                                          |                           | YES           | NO |                                                                                                                                                                                                              |                                                                                                                                                                                                                                     |
|              |                  |                                          |                           |               |    | <input type="checkbox"/> Less than 1 year<br><input type="checkbox"/> 1- 3 years<br><input type="checkbox"/> 4-7 years<br><input type="checkbox"/> 8-10 years<br><input type="checkbox"/> More than 10 years | <input type="checkbox"/> Less than \$500K<br><input type="checkbox"/> \$500K - \$1 million<br><input type="checkbox"/> \$1-2 million<br><input type="checkbox"/> \$2-5 million<br><input type="checkbox"/> Greater than \$5 million |
|              |                  |                                          |                           |               |    | <input type="checkbox"/> Less than 1 year<br><input type="checkbox"/> 1- 3 years<br><input type="checkbox"/> 4-7 years<br><input type="checkbox"/> 8-10 years<br><input type="checkbox"/> More than 10 years | <input type="checkbox"/> Less than \$500K<br><input type="checkbox"/> \$500K - \$1 million<br><input type="checkbox"/> \$1-2 million<br><input type="checkbox"/> \$2-5 million<br><input type="checkbox"/> Greater than \$5 million |
|              |                  |                                          |                           |               |    | <input type="checkbox"/> Less than 1 year<br><input type="checkbox"/> 1- 3 years<br><input type="checkbox"/> 4-7 years<br><input type="checkbox"/> 8-10 years<br><input type="checkbox"/> More than 10 years | <input type="checkbox"/> Less than \$500K<br><input type="checkbox"/> \$500K - \$1 million<br><input type="checkbox"/> \$1-2 million<br><input type="checkbox"/> \$2-5 million<br><input type="checkbox"/> Greater than \$5 million |
|              |                  |                                          |                           |               |    | <input type="checkbox"/> Less than 1 year<br><input type="checkbox"/> 1- 3 years<br><input type="checkbox"/> 4-7 years<br><input type="checkbox"/> 8-10 years<br><input type="checkbox"/> More than 10 years | <input type="checkbox"/> Less than \$500K<br><input type="checkbox"/> \$500K - \$1 million<br><input type="checkbox"/> \$1-2 million<br><input type="checkbox"/> \$2-5 million<br><input type="checkbox"/> Greater than \$5 million |
|              |                  |                                          |                           |               |    | <input type="checkbox"/> Less than 1 year<br><input type="checkbox"/> 1- 3 years<br><input type="checkbox"/> 4-7 years<br><input type="checkbox"/> 8-10 years<br><input type="checkbox"/> More than 10 years | <input type="checkbox"/> Less than \$500K<br><input type="checkbox"/> \$500K - \$1 million<br><input type="checkbox"/> \$1-2 million<br><input type="checkbox"/> \$2-5 million<br><input type="checkbox"/> Greater than \$5 million |

## **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 USC § 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 USC § 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 Airport Sponsor or 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 USC § 50101(a) but may qualify for a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

- a) To submit to the Airport Sponsor or 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.

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Date

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Signature

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Company Name

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Title

## **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.

## **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 verify 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:

1. Checking the System for Award Management at website: <http://www.sam.gov>.
2. Collecting a certification statement similar to the Certificate of Offeror/Bidder Regarding Debarment, above.
3. 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.

## TRADE RESTRICTION CERTIFICATION

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

- a) 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);
- b) 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
- c) 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 Section 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:

- a) 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
- b) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list or
- c) 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.

BIDDER acknowledges receipt of the following ADDENDUM:

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The submission of a BID will constitute an incontrovertible representation by the BIDDER that he is familiar with conditions of the site as well as with the work required.

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for unit prices or lump sum as shown on the BID SCHEDULE. The Bidder further agrees that no Bid may either be changed or withdrawn without consent of the Owner for a period of ninety (90) days after the scheduled time for opening the Bids.

The undersigned Bidder hereby agrees to be ready and to appear at the office of the City Manager to execute the attached Agreement in conformity with this Bid and also to have ready and furnish the required Proofs of Insurance and Bonds, executed by a Surety Company acceptable to the Owner's Attorney at any time within fifteen (15) days from the date of a Notice of Award, mailed to the address hereinafter given.

Enclosed herewith is a Bid Security as defined in the attached Instructions to Bidders in the amount of \_\_\_\_\_, which Bid Security the undersigned Bidder agrees is to be paid to and become the property of the Owner as liquidated damages and not as a penalty, for the delay and extra work caused hereby, should the Bidder prevent an award as defined in the Instructions to Bidders, or should the Proposal be accepted and Contract awarded him and he fails to enter into Agreement in the form prescribed and to furnish the required proofs of insurance and bonds within fifteen (15) days as stipulated.

## SIGNATURE OF BIDDER

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_, 2024.

### IF AN INDIVIDUAL:

Name: \_\_\_\_\_

By: \_\_\_\_\_  
(Signature of Individual)

Doing Business as: \_\_\_\_\_

Business Address: \_\_\_\_\_

\_\_\_\_\_

Telephone Number: \_\_\_\_\_

### IF A CORPORATION:

Corporation Name: \_\_\_\_\_

By: \_\_\_\_\_  
(Authorized Signature)

Name and Title: \_\_\_\_\_

Business Address: \_\_\_\_\_ (CORPORATE SEAL)

\_\_\_\_\_

Telephone Number: \_\_\_\_\_

ATTEST:

By: \_\_\_\_\_  
(Authorized Signature)

Name and Title: \_\_\_\_\_



**IF A JOINT VENTURE:**

Joint Venture Name: \_\_\_\_\_

By: \_\_\_\_\_  
(Authorized Signature)

Name and Title: \_\_\_\_\_

Business Address: \_\_\_\_\_

\_\_\_\_\_

Telephone Number: \_\_\_\_\_

Joint Venture Name: \_\_\_\_\_

By: \_\_\_\_\_  
(Authorized Signature)

Name and Title: \_\_\_\_\_

Business Address: \_\_\_\_\_

\_\_\_\_\_

Telephone Number: \_\_\_\_\_

## NON-COLLUSION AFFIDAVIT

I certify that this bid is genuine and is not in any way collusive or sham; that the bid is not with the intent to restrict or prohibit competition; that this firm has not revealed the contents of the bid to, or in any way colluded with, any other firm which may compete for the contract; and that no other firm which may compete for the contract has revealed the contents of a bid to, or in any way colluded with, this firm.

Name of Firm Submitting Bid: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

\_\_\_\_\_  
Authorized Signature

This affidavit is required pursuant to Arizona Revised Statute 34-253 and 41-2549. Failure to submit this affidavit signed at the time of bid opening is grounds for disqualification of the bid.

**NOTICE OF AWARD**

**FOR IMPROVEMENTS TO  
HOLBROOK MUNICIPAL AIRPORT  
RECONSTRUCT APRON  
HOLBROOK, ARIZONA**

AIP NO. 3-04-0020-0XX-2024

TO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

The OWNER has considered the Bid submitted by you for the above described Work in response to its Invitation for Bids and Instructions to Bidders.

You are hereby notified that your Bid for Schedule I and Schedule II (Non-AIP) has been accepted in the amount of \_\_\_\_\_ Dollars (\$\_\_\_\_\_).

You are required by the Instructions to Bidders to execute the Agreement and furnish the required Contractor's Performance and Payment Bonds and Proofs of Insurance within fifteen (15) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said Bonds and Proofs of Insurance within fifteen (15) days from the date of this Notice, said Owner will be entitled to consider your Bid abandoned, to annul this Notice of Award and to declare your Bid Security forfeited.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the Owner.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 2024.

CITY OF HOLBROOK  
(OWNER)

By \_\_\_\_\_, City Manager  
P.O. Box 970  
Holbrook, Arizona 86025  
(928) 524-6225

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE OF AWARD is hereby acknowledged by:

\_\_\_\_\_, Contractor

By: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_ Telephone: \_\_\_\_\_

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## AGREEMENT

This Agreement is made and entered into this \_\_\_\_ day of \_\_\_\_\_, 2024 by and between the City of Holbrook, (hereinafter "Sponsor"), a body corporate and politic and constituting a political subdivision of the State of Arizona, and \_\_\_\_\_ (hereinafter "Contractor").

## WITNESSETH

**WHEREAS**, Sponsor received sealed proposals for the provision and furnishing of any and all labor, tools, supplies, equipment, and/or materials necessary and required for the reconstruction of the Apron, and which more fully defined and identified in AIP No. 3-04-0020-0xx-2024, or ACI No. 22965 (hereinafter "Project"); and

**WHEREAS**, Contractor submitted a sealed proposal to Sponsor for the Project; and

**WHEREAS**, the Project has been awarded to Contractor; and

**WHEREAS**, Contractor is willing and able to perform all of the work that is necessary and required to complete the Project; and

**THEREFORE**, for and in consideration of the fees, covenants, and agreements contained herein, and for other good and valuable consideration, it is agreed and understood between Sponsor and Contractor:

### ARTICLE 1

#### ACCESS TO RECORDS AND REPORTS

(2 CFR § 200.334, 2 CFR § 200.337, and FAA Order 5100.38)

The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the Sponsor, 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, excerpt 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.

### ARTICLE 2

#### AFFIRMATIVE ACTION REQUIREMENT

(41 CFR Part 60-4 and Executive Order 11246)

- A.** The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
- B.** The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables:

Goals for Minority participation for each trade 19.8%.

### Goals for Female participation for each trade 6.9%

These goals are applicable to all the Contractor's Construction work (whether or not it is Federal or Federally-assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a) and its efforts to meet the goals. The hours of minority and female employment and training shall be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the Contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

- C. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs (OFCCP) within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.
- D. As used in this notice and in the Contract resulting from this solicitation, the "covered area" is in Holbrook, Navajo County, Arizona.

### **ARTICLE 3 BREACH OF CONTRACT TERMS (2 CFR § 200 Appendix II(A))**

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.

Sponsor 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. Sponsor reserves the right to withhold payments to Contractor until such time the Contractor corrects the breach or the Sponsor elects to terminate the contract. The Sponsor's notice will identify a specific date by which the Contractor must correct the breach. Sponsor may proceed with termination of the contract if the Contractor fails to correct the breach by the deadline indicated in the Sponsor'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.

**ARTICLE 4**  
**BUY AMERICAN PREFERENCE**  
**(Title 49 USC § 50101, Executive Order 14005, Ensuring the Future is Made in All**  
**of America by All of America's Workers, Bipartisan Infrastructure Law**  
**(Pub. L. No. 117-58), Build America, Buy America (BABA))**

\*\*\*SEE INSTRUCTIONS TO BIDDERS - SECTION 22 AND PROPOSAL FOR SOLICITATION COMPLIANCE.\*\*\*

**Certification of Compliance with Buy American Preference Statement**

**FAA BUY AMERICAN PREFERENCE**

The Contractor certifies that its bid/offer is in compliance with 49 USC § 50101, BABA and other related Made in America Laws,<sup>1</sup> 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 Airport Sponsor/Owner 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.

<sup>1</sup> 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.

**ARTICLE 5**  
**CIVIL RIGHTS-GENERAL**  
**(49 USC § 47123)**

- 5.1 General Clause that is used for Contracts, Lease Agreements, and Transfer Agreements.** 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 (including limited English proficiency), creed, sex (including sexual orientation and gender identity), 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.

**5.2 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.

**5.3 Specific Clause that is used for Lease Agreements or Transfer Agreements.** If the Contractor transfers its obligation to another, the transferee is obligated in the same manner as the Contractor.

The above provision obligates the Contractor for the period during which the property is owned, used or possessed by the Contractor and the airport remains obligated to the Federal Aviation Administration.

**ARTICLE 6**  
**CIVIL RIGHTS - TITLE VI ASSURANCES**  
**(49 USC § 47123 and FAA Order 1400.11)**

*\*\*\*NOTE: SEE INSTRUCTIONS TO BIDDERS - SECTION 23 FOR SOLICITATION COMPLIANCE.\*\*\**

**6.1 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 USC § 2000d et seq., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination in Federally-Assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 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 USC § 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 USC § 6101 et seq.) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 USC § 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (PL 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 USC § 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;
- The Federal Aviation Administration's Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations);
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs [70 Fed. Reg. 74087 (2005)];
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC § 1681, et seq).

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

## **ARTICLE 7**

### **CLEAN AIR AND WATER POLLUTION CONTROL**

**(2 CFR Part 200, Appendix II(G), 42 USC § 7401, et seq, 33 USC § 1251, et seq)**

### **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 USC §§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 USC §§ 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.

## **ARTICLE 8**

### **CONTRACT WORK HOURS AND SAFETY STANDARDS ACT REQUIREMENTS**

**(2 CFR Part 200, Appendix II(E), 2 CFR § 5.5(b), 40 USC § 3702, 40 USC § 3704)**

### **CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS**

**8.1 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.

**8.2 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.

**8.3 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.

**8.4 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.

**ARTICLE 9**  
**COPELAND "ANTI-KICKBACK" ACT**  
**(2 CFR § 200, Appendix II (D) and 29 CFR parts 3 and 5)**

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 Sponsor, a weekly statement on the wages paid to each employee performing on covered work during the prior week. Sponsor must report any violations of the Act to the Federal Aviation Administration.

**ARTICLE 10**  
**DAVIS BACON REQUIREMENTS**  
**(2 CFR Part 200, Appendix II(D), 29 CFR Part 5, 49 USC § 47112(b),**  
**40 USC §§ 3141-3144, 3146, and 3147)**

**10.1 MINIMUM WAGES.**

- a. 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 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.

**b.**

- i.** 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:
  - (a)** The work to be performed by the classification requested is not performed by a classification in the wage determination;
  - (b)** The classification is utilized in the area by the construction industry; and
  - (c)** The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- ii.** 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.
- iii.** 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.

- iv. 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.
- v. 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.

**10.2 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.

### **10.3 Payrolls and Basic Records.**

- a. 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.

**b.**

- i.** 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).
- ii.** 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:

  - (a)** 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;
  - (b)** 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;
  - (c)** 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.



- (d) 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.
- (e) 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.

#### **10.4 Apprentices and Trainees.**

- a. 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.

- b. **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 not 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.
- c. **Equal Employment Opportunity.** The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

**10.5 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.

**10.6 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 the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR § 5.5.

**10.7 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.

**10.8 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.



**10.9 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.

**10.10 Certification of Eligibility.**

- a. 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).
- b. 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).
- c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 USC § 1001.

**ARTICLE 11**

**DEBARMENT AND SUSPENSION**

**(2 CFR Part 180 (Subpart B), 2 CFR Part 200, Appendix II(H), 2 CFR Part 1200,  
DOT Order 4200.5, Executive Orders 12549 and 12689)**

**\*\*\*NOTE: SEE PROPOSAL FOR SOLICITATION COMPLIANCE. \*\*\***

**CERTIFICATION OF OFFEROR/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.

**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:

1. Checking the System for Award Management at website: <http://www.sam.gov>.
2. Collecting a certification statement similar to the Certification of Offeror /Bidder Regarding Debarment, above.
3. 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.

**ARTICLE 12**  
**DISADVANTAGED BUSINESS ENTERPRISE**  
**(49 CFR part 26)**

**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 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:

- (a) Withholding monthly progress payments;
- (b) Assessing sanctions;
- (c) Liquidated damages; and/or
- (d) Disqualifying the Contractor from future bidding as non-responsible.

**Prompt Payment (49 CFR § 26.29)** – The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than seven (7) days from the receipt of each payment the prime contractor receives from the Sponsor. The prime contractor agrees further to return retainage payments to each subcontractor within seven (7) days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the Sponsor. This clause applies to both DBE and non-DBE subcontractors.

**Termination of DBE Subcontracts (49 CFR § 26.53(f))** – The prime contractor must not terminate a DBE subcontractor listed in response to the Instructions for Bidders, Section 20 (or an approved substitute DBE firm) without prior written consent of Sponsor. This includes, but is not limited to, instances in which the prime contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

The prime contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the contractor obtains written consent Sponsor. Unless Sponsor consent is provided, the prime contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE.

Sponsor may provide such written consent only if Sponsor agrees, for reasons stated in the concurrence document, that the prime contractor has good cause to terminate the DBE firm. For purposes of this paragraph, good cause includes the circumstances listed in 49 CFR §26.53.

Before transmitting to Sponsor its request to terminate and/or substitute a DBE subcontractor, the prime contractor must give notice in writing to the DBE subcontractor, with a copy to Sponsor, of its intent to request to terminate and/or substitute, and the reason for the request.

The prime contractor must give the DBE five days to respond to the prime contractor's notice and advise Sponsor and the contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the Sponsor should not approve the prime contractor's action. If required in a

particular case as a matter of public necessity (e.g., safety), Sponsor may provide a response period shorter than five days.

In addition to post-award terminations, the provisions of this section apply to preaward deletions of or substitutions for DBE firms put forward by offerors in negotiated procurements.

**ARTICLE 13**  
**DISTRACTED DRIVING**  
**(Executive Order 13513 and DOT Order 3902.10)**

**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 \$10,000 that involve driving a motor vehicle in performance of work activities associated with the project.

**ARTICLE 14**  
**PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND**  
**VIDEO SURVEILLANCE SERVICES OR EQUIPMENT**  
**(2 CFR § 200, Appendix II(K), 2 CFR § 200.216)**

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 (Public Law 115-232 § 889(f)(1)).

**ARTICLE 15**  
**EQUAL EMPLOYMENT OPPORTUNITY (EEO)**  
**(2 CFR 200, Appendix II(C), 41 CFR § 60-1.4, 41 CFR § 60-4.3, Executive Order 11246)**

**15.1 EQUAL OPPORTUNITY CLAUSE**

**15.1.1** During the performance of this contract, the Contractor agrees as follows:

- a. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff, or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in

conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

- b. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
- c. The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.
- d. The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer, advising the labor union or workers' representative of the Contractor's commitments under this section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- e. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- f. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- g. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any such rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- h. The Contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance: *Provided*, however, that in the event the contractor becomes involved in, or is threatened

with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

## **15.2 STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS**

### **15.2.1 As used in these specifications:**

- a.** "Covered area" means the geographical area described in the solicitation from which this contract resulted;
- b.** "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;
- c.** "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;
- d.** "Minority" includes:
  - (i)** Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
  - (ii)** Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
  - (iii)** Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
  - (iv)** American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

**15.2.2** Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

**15.2.3** If the Contractor is participating (pursuant to 41 CFR part 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

**15.2.4** The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

**15.2.5** Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

**15.2.6** In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

**15.2.7** The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

- a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
- b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
- c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

- d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
- f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's work force.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.



- l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
- m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
- n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
- o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
- p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

**15.2.8** Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

**15.2.9** A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

**15.2.10** The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.

**15.2.11** The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

**15.2.12** The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and



cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

**15.2.13** The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR part 60-4.8.

**15.2.14** The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

**15.2.15** Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

**ARTICLE 16**  
**FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)**  
**(29 USC § 201, et seq, 2 CFR § 200.430)**

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, 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.

**ARTICLE 17**  
**LOBBYING AND INFLUENCING FEDERAL EMPLOYEES**  
**(31 USC § 1352 – Byrd Anti-Lobbying Amendment, 2 CFR part 200, Appendix II(I),**  
**and 49 CFR part 20, Appendix A)**

**CERTIFICATION REGARDING LOBBYING**

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

- 17.1.1** 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.
- 17.1.2** 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.
- 17.1.3** 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 section 1352, title 31, U.S. Code. 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.

**ARTICLE 18**  
**PROHIBITION OF SEGREGATED FACILITIES**  
**(2 CFR Part 200, Appendix II(C), 41 CFR Part 60-1)**

- 18.1** The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Employment Opportunity clause in this contract.
- 18.2** "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.
- 18.3** The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Employment Opportunity clause of this contract.

**ARTICLE 19**  
**OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970**  
**(29 CFR part 1910)**

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.

**ARTICLE 20**  
**PROCUREMENT OF RECOVERED MATERIALS**  
**(2 CFR § 200.323, 2 CFR Part 200, Appendix II(J), 40 CFR Part 247,**  
**42 USC § 6901, et seq (Resource Conservation and Recovery Act (RCRA)))**

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 of 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](http://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.

**ARTICLE 21**  
**SEISMIC SAFETY**  
**(49 CFR Part 41)**

NOT APPLICABLE.

## ARTICLE 22

### TAX DELINQUENCY AND FELONY CONVICTIONS

(Section 8113 of the Consolidated Appropriations Act, 2022 (Public Law 117-103) and similar provisions in subsequent appropriations acts. DOT Order 4200.6 – Appropriations Act Requirements for Procurement and Non-Procurement Regarding Tax Delinquency and Felony Convictions)

#### CERTIFICATION OF OFFEROR/BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

The applicant must complete the following two certification statements. The applicant must indicate its current status as it relates to tax delinquency and felony conviction by inserting a checkmark (✓) in the space following the applicable response. The applicant agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts.

#### Certifications

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

**Note:** If an applicant responds in the affirmative to either of the above representations, 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 Sponsor about its tax liability or conviction to the Sponsor, 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.

#### 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 U.S.C. § 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.

## ARTICLE 23

### TERMINATION OF CONTRACT

(2 CFR Part 200, Appendix II(B), FAA Advisory Circular 150/5370-10, Section 80-09)

#### TERMINATION FOR CONVENIENCE (CONSTRUCTION & EQUIPMENT CONTRACTS)

The Sponsor 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

Sponsor. Upon receipt of a written notice of termination, except as explicitly directed by the Sponsor, the Contractor shall immediately proceed with the following obligations regardless of any delay in determining or adjusting amounts due under this clause:

- (a) Contractor must immediately discontinue work as specified in the written notice.
- (b) Terminate all subcontracts to the extent they relate to the work terminated under the notice.
- (c) Discontinue orders for materials and services except as directed by the written notice.
- (d) Deliver to the Sponsor 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.
- (e) Complete performance of the work not terminated by the notice.
- (f) Take action as directed by the Sponsor to protect and preserve property and work related to this contract that Sponsor will take possession.

Sponsor agrees to pay Contractor for:

- (a) completed and acceptable work executed in accordance with the contract documents prior to the effective date of termination;
- (b) 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;
- (c) reasonable and substantiated claims, costs, and damages incurred in settlement of terminated contracts with Subcontractors and Suppliers; and
- (d) reasonable and substantiated expenses to the Contractor directly attributable to Sponsor's termination action.

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

#### **TERMINATION FOR DEFAULT (CONSTRUCTION)**

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

#### **TERMINATION FOR DEFAULT (EQUIPMENT)**

The Sponsor may, by written notice of default to the Contractor, terminate all or part of this Contract if the Contractor:

- (a)** Fails to commence the Work under the Contract within the time specified in the Notice- to-Proceed;
- (b)** Fails to make adequate progress as to endanger performance of this Contract in accordance with its terms;
- (c)** Fails to make delivery of the equipment within the time specified in the Contract, including any Sponsor approved extensions;
- (d)** Fails to comply with material provisions of the Contract;
- (e)** Submits certifications made under the Contract and as part of their proposal that include false or fraudulent statements; or
- (f)** Becomes insolvent or declares bankruptcy.

If one or more of the stated events occur, the Sponsor will give notice in writing to the Contractor and Surety of its intent to terminate the contract for cause. At the Sponsor's discretion, the notice may allow the Contractor and Surety an opportunity to cure the breach or default.

If within 10 days of the receipt of notice, the Contractor or Surety fails to remedy the breach or default to the satisfaction of the Sponsor, the Sponsor has authority to acquire equipment by other procurement action. The Contractor will be liable to the Sponsor for any excess costs the Sponsor incurs for acquiring such similar equipment.

Payment for completed equipment delivered to and accepted by the Sponsor shall be at the Contract price. The Sponsor may withhold from amounts otherwise due the Contractor for such completed equipment, such sum as the Sponsor determines to be necessary to protect the Sponsor against loss because of Contractor default.

Sponsor will not terminate the Contractor's right to proceed with the Work under this clause if the delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such acceptable causes include: acts of God, acts of the Sponsor, acts of another Contractor in the performance of a contract with the Sponsor, and severe weather events that substantially exceed normal conditions for the location.

If, after termination of the Contractor's right to proceed, the Sponsor determines that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the Sponsor issued the termination for the convenience the Sponsor.

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

**ARTICLE 24**  
**TRADE RESTRICTION CLAUSE**  
**(49 USC § 50104, 49 CFR part 30)**

\*\*\*NOTE: SEE PROPOSAL FOR SOLICITATION COMPLIANCE. \*\*\*

**TRADE RESTRICTION CERTIFICATION**

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

- (a) 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);
- (b) 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
- (c) 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:

- (a) 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
- (b) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list; or
- (c) 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.

**ARTICLE 25**  
**VETERAN'S PREFERENCE**  
**(49 USC § 47112(c))**

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 Title 49 United States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 USC 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.

**ARTICLE 26**  
**DOMESTIC PREFERENCES FOR PROCUREMENTS**  
**(2 CFR § 200.322, 2 CFR Part 200, Appendix II(L))**

**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.

**ARTICLE 27**  
**CONTRACT DOCUMENTS**

The Contract Documents consist of the following:

|                          |                                     |                                      |
|--------------------------|-------------------------------------|--------------------------------------|
| Invitation for Bids      | Instructions to Bidders             | Change Orders                        |
| Notice of Award          | Agreement                           | Applications for Payment             |
| Performance Bond         | EEO Requirements in Subcontracts    | Addenda                              |
| Proposal                 | Payment Bond                        | Wage Rates                           |
| Notice to Proceed        | Certification of Inclusion of Labor | General Provisions                   |
| Technical Specifications | Special Provisions                  | Construction Safety and Phasing Plan |
| Plans and Drawings       | Construction Management Plan        |                                      |

These Contract Documents are incorporated herein and are a part of this Agreement.



## **ARTICLE 28**

### **SCOPE OF WORK**

Contractor is to complete the Project in accordance with the Contract Documents and in accordance with all codes and regulations governing the construction of the Project. Any work, materials, or equipment that may be reasonably inferred from the Contract Documents as being required to produce the intended result shall be supplied by Contractor whether or not specifically called for. Reference to standard specifications, manuals, or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code, or laws or regulations in effect at the time of opening of bids and Contractor shall comply therewith. Sponsor shall have no duties other than those duties and obligations expressly set forth within the Contract Documents.

## **ARTICLE 29**

### **CONTRACT TIME**

Contractor agrees to undertake the performance of the Project on the date stated in the Notice to Proceed as issued by the Sponsor and agrees to fully complete the Project within seventy (70) calendar days for all work unless an extension of time is granted by Sponsor in accordance with the provisions of Section 80, Paragraph 7, of the General Provisions.

## **ARTICLE 30**

### **DAMAGES**

- 30.1** It is acknowledged that Contractor's failure to complete the Project within the Contract Time will cause Sponsor to incur substantial economic damages and losses of the types and in the amounts which are significantly difficult to compute and ascertain with any certainty as a basis for the recovery by Sponsor of actual damages, and that liquidated damages represent a fair, reasonable, and appropriate estimate thereof. Accordingly, in lieu of actual damages for such delay, Contractor agrees that liquidated damages may be assessed and recovered by Sponsor as against Contractor and its Surety in the event of delayed completion and without Sponsor being required to present any evidence of the amount or character of actual damages sustained by reason thereof. Contractor shall be liable to Sponsor for payment of liquidated damages in the amount of One Thousand Seven Hundred Fifty and No/100ths Dollars (\$1,750) for each day that the Project is delayed beyond the Contract Time as adjusted for any time extension that may be provided for by the Contract Documents. Such liquidated damages are intended to represent estimated actual damages and are not intended as a penalty, and Contractor shall pay them to Sponsor without limiting Sponsor's right to terminate this Agreement for default as provided elsewhere herein. Additionally, Sponsor may hold all or part of any liquidated damages from payments that may be due to Contractor for the Project. The acceptance by Sponsor of such liquidated damages does not constitute a waiver by Sponsor of any other remedy available at law or in equity, and Sponsor expressly reserves its right to pursue any available remedy.
- 30.2** If Contractor fails to comply with any covenants or conditions of this Agreement, Sponsor may take such actions as Sponsor deems necessary to complete the Project using persons and entities selected by Sponsor. If Sponsor's costs of completing the Project exceed any unpaid amounts to Contractor for the Project, upon demand, Contractor shall reimburse Sponsor the difference between the actual cost of completion and the unpaid balance of any amounts that remain to be paid for the Project. Sponsor's rights and remedies under this section are not exclusive and are

cumulative with any other rights and remedies Sponsor may have under this Agreement or applicable law. Notwithstanding the foregoing, Sponsor shall have all available rights and remedies pursuant to Arizona's statutes related to the Construction Defect Action Reform Act as well as any and all other applicable federal, state, or local statutes, laws, rules, and/or regulations.

## **ARTICLE 31**

### **TERMS OF PAYMENT**

- 31.1** Sponsor agrees to pay Contractor in accordance with the price or prices set forth in Contractor's Proposal, for the total cost of the Project, or the "Contract Price," will be \_\_\_\_\_ Dollars (\$\_\_\_\_\_). Partial payments will be made for work completed on the Project during the previous month, as well as for materials (invoice cost only) delivered to the site of the Project and which are properly and suitably stored.
- 31.2** Application for partial payments for stored materials must be accompanied by certified invoices showing all pertinent data that may be required by Armstrong Consultants, Inc. ("Engineer"), to verify the accuracy of the invoices and their relation to the stored materials. Failure to provide certified invoices will disqualify the materials in question from consideration for partial payment. Partial payments for work completed on the Project during the previous month will be made based on the Contractor's Application for Payment and any Recommendation of Payment made by Engineer. Sponsor will retain, from any partial payments, ten percent (10%) of the total amount due to Contractor based on the Contractor's Application for Payment and any Recommendation of Payment made by Engineer. However, nothing herein shall be construed as relieving Contractor and his, her, or its Sureties on the Contractor's Bond from any claim or claims for work or labor done, or materials or supplies furnished, as part of this Agreement and the completion of the Project.
- 31.3** It is the intent of Sponsor to make any partial payments in the following manner:
- 31.3.1** The Contractor shall submit to Engineer his Application for Payment no later than the next to last Friday of the month.
- 31.3.2** Engineer will, within 7 days after receipt, submit the Application for Payment to Sponsor for payment along with its Recommendation of Payment, noting any changes. The Sponsor will then make payment to Contractor when funds are received from the FAA and/or State and are available to Sponsor for payment to Contractor.

## **ARTICLE 32**

### **BONDS & INSURANCE**

- 32.1** At the time of the execution of this Agreement, Contractor shall provide the bonds that are required by the Contract Documents. The Performance Bond will be in an amount not less than one hundred percent (100%) of the Contract Price and shall provide for the completion of the Project in accordance with the Contract Documents, without additional cost to Sponsor. The obligation period of the Performance Bond will provide for the correction or replacement of any portion of the Project that is considered by Sponsor and/or Engineer to be defective in materials and workmanship for a period of one year following final acceptance of the Project, and it shall fully cover any and all of the costs of removal, correction, reconstruction, and any and all other related expenses in repairing or correcting the defective portions of the Project, without additional cost to Sponsor. The Payment Bond will be in an amount not less than one hundred

percent (100%) of the Contract Price and it shall provide for the payment of all Project costs in accordance with the Contract Documents, without additional cost to Sponsor.

- 32.2** Contractor shall obtain, before beginning the Project, and maintain in full force at all times relevant to this Agreement, as well as assure that all persons or entities working on the Project obtain and maintain in full force at all times, insurance for the protection of claims under workers' compensation laws. Prior to commencing work on the Project, Contractor, at Sponsor's request, shall provide Sponsor with a certification of the maintenance of workers' compensation as required by this section. Contractor shall also maintain, in full force at all times relevant to this Agreement, public liability/commercial general liability insurance and property damage insurance for the Contractor and for his Subcontract operations with a limit of at least \$2,000,000. This insurance shall also include coverage for completed operations, contractual liability, and automotive liability and shall afford coverage for all claims for bodily injury, including death, and all claims for the destruction of, or damage to, property arising out of or in connection with any work completed on the Project in regard to this Agreement, whether such work was done by Contractor or anyone directly or indirectly employed by Contractor or by a subcontractor. At a minimum, Public Liability Insurance shall be in the amount of not less than \$2,000,000.00 for injuries, including accidental death, to any one person, nor less than \$2,000,000.00 on account of any one accident. Property Damage Insurance shall be carried in an amount not less than \$2,000,000.00. Additionally, Contractor shall name Sponsor and Engineer as additional named insureds on these insurance policies, with the exception of the Workers' Compensation Insurance. Contractor, at Sponsor's request, shall provide Sponsor with certificates of these insurance policies. Prior to the completion of the Project, the insurance required under this Agreement cannot be cancelled by Contractor. See Special Provisions for additional insurance information.

### **ARTICLE 33**

#### **BONDING CLAUSES**

- 33.1** Contractor agrees to furnish a performance bond for 100 percent of the Contract Price. This bond is to be executed in connection with this Agreement in order to secure fulfillment of all of Contractor's obligations under this Agreement.
- 33.2** Contractor agrees to furnish a payment bond for 100 percent of the Contract Price. This bond is to be executed in connection with this Agreement to ensure payment of all monies owed by Contractor under this Agreement and other Contract Documents.

### **ARTICLE 34**

#### **CHANGE ORDERS**

Changes in the scope of work for the Project or the performance of the work under this Agreement and any materials used may be accomplished after execution of the Agreement and without invalidating the Agreement. However, a change order shall be in writing and signed by Sponsor, Contractor, Engineer, and other Funding Agencies as required. Change orders shall include notice to the Sponsor of the increase or decrease in cost as a result thereof. Any revision to the Plans and Specifications that are approved by Sponsor, if any, shall be considered to be a change order that has been approved by Sponsor when delivered to Contractor, requiring no further approval by Sponsor.

**ARTICLE 35  
DEBRIS REMOVAL**

Contractor shall, at all times, keep the work site reasonably free from the accumulation of waste materials or rubbish caused by its operations during its work on the Project. All waste and debris, tools or equipment, and surplus materials or machinery shall be removed as a condition of the substantial completion of the Project.

**ARTICLE 36  
ATTORNEY'S FEES & PUNITIVE DAMAGES**

In the event of litigation or arbitration to resolve any claim made by either party to this Agreement, the prevailing party shall be entitled to its costs and attorney fees incurred as a result of such litigation or arbitration. Each party hereto also intentionally waives all rights to recover punitive or exemplary damages from the other.

**ARTICLE 37  
GOVERNING LAW**

This Agreement shall be interpreted and governed in accordance with the laws of the State of Arizona.

**ARTICLE 38  
MODIFICATION OF AGREEMENT**

No subsequent modification of the terms of this Agreement shall be valid, binding on the parties, or enforceable unless made in writing and signed by the parties.

**ARTICLE 39  
SEVERABILITY**

In the event any part of this Agreement is found to be void, illegal, invalid, or unenforceable under any present or future law, then the remaining provisions of this Agreement shall nevertheless be binding with the same effect as though such part was deleted.

**ARTICLE 40  
BINDING EFFECT**

This Agreement shall be binding upon and insure to the benefit of the parties hereto and their respective heirs, successors, and assigns.

**ARTICLE 41  
HOLD HARMLESS**

Contractor shall release Sponsor and Engineer, and all of their agents, representatives, officers, employees, boards, directors, committees, and commissions, of any liability for, and shall protect, defend, indemnify, and hold Sponsor and Engineer harmless from and against all claims, demands, and causes of action of every kind and character that are asserted or brought on account of bodily injury, death, or damage to property as a result of the actions, omissions, negligence, gross negligence, and/or recklessness of Contractor or Contractor's agents, employees, representatives, invitees, licensees, subcontractors, or subcontractor's subcontractors. Contractor's indemnification obligations under this section shall be

without regard to, and without any right to contribution from, any insurance maintained by Contractor. Additionally, Contractor's indemnity obligations under this section shall be supported by insurance, but this insurance requirement shall be a separate and distinct obligation from Contractor's indemnity obligations, and the insurance and indemnity obligations shall be separately and independently enforceable. Further, Contractor's indemnity obligations hereunder are not limited by any insurance coverage Contractor may have.

**CAUTION: READ BEFORE SIGNING.**

IN WITNESS THEREOF, the parties have executed this Agreement on the date set forth next to their signatures.

\_\_\_\_\_  
CONTRACTOR

By: \_\_\_\_\_  
Authorized Representative

Date: \_\_\_\_\_

City of Holbrook  
SPONSOR

By: \_\_\_\_\_  
City Manager

Date: \_\_\_\_\_

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## CONSTRUCTION PERFORMANCE BOND

**Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.**

CONTRACTOR (Name and Address):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SURETY (Name and Principal Place of Business)

OWNER (Name and Address):

City of Holbrook  
P.O. Box 970  
Holbrook, Arizona 86025

### CONSTRUCTION CONTRACT

Date: \_\_\_\_\_

Amount: \$

Description (Name and Location):

Holbrook Municipal Airport  
Holbrook, Arizona  
AIP No. 3-04-0020-0xx-2024

### BOND

Date (Not earlier than Construction Contract Date): \_\_\_\_\_

Amount: \$

Modifications to this Bond Form:

CONTRACTOR AS PRINCIPAL

Company:  
(Corp. Seal)

SURETY

Company: \_\_\_\_\_  
(Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title: \_\_\_\_\_

Signature: \_\_\_\_\_  
Name and Title: \_\_\_\_\_

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, including all related Construction Documents and modifications thereto, which is incorporated herein by reference.
2. If the Contractor completes the Contract and corrects all defects that appear within one year after final acceptance of all the work required under the Contract Documents, the Surety and the Contractor shall have no obligation under this bond, except to participate in conferences as provided in Subparagraph 3.1.
3. The Surety's obligations under this Bond shall arise after:
  - 3.1 The Owner has notified the Contractor and the Surety at its address described in Paragraph 10 below, that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Contract, or for correcting defects in workmanship or material that have appeared within one year after final acceptance of the work. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Contract, or to correct said defects in workmanship or material, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and
  - 3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the Contract or to correct said defects. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and
  - 3.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Contract or to a contractor selected to perform the Contract, or to correct said defects in accordance with the terms of the Contract with the Owner.
4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
  - 4.1 Arrange for the Contractor, with consent of the Owner to perform and complete the Contract, or to correct said defects in workmanship or material; or
  - 4.2 Undertake to perform and complete the Contract, or to correct said defects in workmanship or material itself, through its agents or through independent contractors; or
  - 4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract to (a) perform and complete the Contract or correct said defects in workmanship or materials; (b) arrange for a Contract to be prepared for execution by the Owner and the Contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract and (c) pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or
  - 4.4 Waive its right to perform and complete, arrange for completion or obtain a new contractor and with reasonable promptness under the circumstances:
    1. After investigation, determine the amount for which it may be liable to the Owner and as soon as practicable after the amount is determined, tender payment therefore to the Owner; or
    2. Deny liability in whole or in part and notify the Owner citing reasons therefore.
5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond and the Owner shall be entitled to enforce any remedy available to the Owner if the Surety proceeds as provided in Subparagraph 4.4 and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
6. After the Owner has terminated the Contractor's right to complete the Contract, or to correct said defects in workmanship or materials and if the Surety elects to act under Subparagraphs 4.1, 4.2 or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Contract and related Construction Documents and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Contract and Construction Documents. To the limit of the amount of this Bond, but subject to commitment by the Owner to pay the Balance of the Contract Price to mitigation of costs and damages of the Contract, the Surety is obligated without duplication for:
  - 6.1 The responsibilities of the Contractor for completion of the Contract and correction of any defects that appear within one year following final acceptance of all the work required under the Construction Contract and related Documents;
  - 6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, or resulting from the actions or failure to act of the Surety under Paragraph 4; and
  - 6.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or nonperformance of the Contractor.
7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Contract and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.
8. The Surety hereby waives notice of any change, including changes of time and changes in the work required under the Contract or related subcontracts, purchase orders and other obligations.
9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Owner became aware, or reasonably should have become aware of Contractor Default or within two years after the Surety refuses or fails to perform its obligations under this Bond; whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period for limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
10. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.
11. When this bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted hereon and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common-law bond.
12. Definitions:
  - 12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Contract after all proper adjustments have been made, including allowance to the Contractor of any amount received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.
  - 12.2 Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
  - 12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
  - 12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.



## CONSTRUCTION PAYMENT BOND

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SURETY (Name and Principal Place of Business)

OWNER (Name and Address):

City of Holbrook  
P.O. Box 970  
Holbrook, Arizona 86025

CONSTRUCTION CONTRACT

Date: \_\_\_\_\_

Amount: \$

Description (Name and Location):

Holbrook Municipal Airport  
Holbrook, Arizona  
AIP No. 3-04-0020-0xx-2024

BOND

Date (Not earlier than Construction Contract Date): \_\_\_\_\_

Amount: \$

Modifications to this Bond Form:

CONTRACTOR AS PRINCIPAL

Company:  
(Corp. Seal)

SURETY

Company: \_\_\_\_\_  
(Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title: \_\_\_\_\_

Signature: \_\_\_\_\_  
Name and Title: \_\_\_\_\_

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.
2. With respect to the Owner, this obligation shall be null and void if the Contractor:
  - 2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants and
  - 2.2. Defends, indemnifies and holds harmless the Owner from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address as described in Paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety and provided there is no Owner Default.
3. With respect to Claimant's this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
4. The Surety shall have no obligation to Claimants under this Bond until:
  - 4.1. Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
  - 4.2. Claimants who do not have a direct contract with the Contractor:
    1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and
    2. Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and
    3. Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.
5. If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.
6. When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
  - 6.1. Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
  - 6.2. Pay or arrange for payment any undisputed amounts.
7. The Surety's total obligation shall not exceed the amount of this Bond and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
8. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
9. The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.
11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Subparagraph 4.1 or Clause 4.2 (3) , or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
12. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be accomplished shall be sufficient compliance as of the date received at the address shown on the signature page.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or legal requirement shall be deemed incorporated herein. The intent is, that this Bond shall be construed as a statutory bond and not as a common law bond.
14. Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.
15. DEFINITIONS
  - 15.1. Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.
  - 15.2. Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes hereto.
  - 15.3. Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

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**CERTIFICATION OF INCLUSION OF LABOR & EEO REQUIREMENTS IN SUBCONTRACTS**

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**AIP No.:** 3-04-0020-0xx-2024**AIRPORT:** Holbrook Municipal Airport

The Prime Contractor whose signature appears below certifies that a Subcontract was awarded on \_\_\_\_\_, 2024 to \_\_\_\_\_ to perform the following Work:

\_\_\_\_\_  
\_\_\_\_\_

in the amount of \$\_\_\_\_\_.

All of the required clauses and certifications are incorporated into the Subcontract for this Work.

BY: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Name and Title)

\_\_\_\_\_  
(Date)

---

**APPLICABLE TO SUBCONTRACTS OVER \$2,000 AND AS NOTED:**

The Subcontractor whose signature appears below certifies that all the federal provisions identified in the Prime Contractor's agreement with the Sponsor for the above AIP project are incorporated into and made a part of its Subcontract.

The Subcontract should also contain Certificate of Non-segregated Facilities as a part of said Subcontract.

The Subcontractor whose signature appears below also acknowledges his responsibility under the Subcontract for including these clauses in any Lower Tier Subcontract.

BY: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Name and Title)

\_\_\_\_\_  
(Date)

SOURCES OF LABOR RECEIVING STANDARD FORM 36  
"NOTICE OF NON-DISCRIMINATION IN EMPLOYMENT"

\_\_\_\_\_

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**NOTICE TO PROCEED**

**FOR IMPROVEMENTS TO  
HOLBROOK MUNICIPAL AIRPORT  
RECONSTRUCT APRON  
HOLBROOK, ARIZONA**

AIP NO. 3-04-0020-0xx-2024

TO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DATE: \_\_\_\_\_

You are notified that the Contract Time under the above Contract will commence to run on \_\_\_\_\_. By that date, you are to start performing your obligations under the Contract Documents and you are to complete the Work within seventy (70) consecutive calendar days thereafter. The date of completion of all Work is therefore \_\_\_\_\_, 2024.

CITY OF HOLBROOK

By \_\_\_\_\_, City Manager  
P.O. Box 970  
Holbrook, Arizona 86025

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by:

\_\_\_\_\_, Contractor

this the \_\_\_\_\_ day of \_\_\_\_\_, 2024

By: \_\_\_\_\_  
(Title)

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**CONTRACT CHANGE ORDER NO. \_\_\_\_\_**  
**or**  
**SUPPLEMENTAL AGREEMENT NO. \_\_\_\_\_**

**AIRPORT:** Holbrook Municipal Airport

**DATE:**

**LOCATION:** Holbrook, Arizona

**AIP NO.:** 3-04-0020-0xx-2024

**CONTRACTOR:**

You are requested to perform the following described Work upon receipt of an approved copy of this document or as directed by the Engineer:

| ITEM NO.                       | DESCRIPTION | UNIT | UNIT PRICE | QUANTITY | AMOUNT |
|--------------------------------|-------------|------|------------|----------|--------|
|                                |             |      |            |          |        |
|                                |             |      |            |          |        |
|                                |             |      |            |          |        |
|                                |             |      |            |          |        |
| This Change Order Total        |             |      | \$         |          |        |
| Previous Change Order(s) Total |             |      | \$         |          |        |
| Original Contract Price        |             |      | \$         |          |        |
| Revised Contract Total         |             |      | \$         |          |        |

The time provided for completion in the Contract is (unchanged) (decreased) (increased) by \_\_\_\_\_ calendar days. This document shall become an Amendment to the Contract and all provisions of the Contract will apply. Changes are shown on the attached Quantities Tabulation.

Recommended by: \_\_\_\_\_  
Engineer Date

Approved by: \_\_\_\_\_  
Owner Date

Accepted by: \_\_\_\_\_  
Contractor Date

Approved by: \_\_\_\_\_  
State Aviation Date

Approved by: See Page CO-2 \_\_\_\_\_  
Federal Aviation Administration Date

NOTE: Change Orders and Supplemental Agreements require FAA approval prior to construction. Otherwise, no Federal participation can be granted. State Aviation concurrence is required when State participation is anticipated.

**AIP NO.:** 3-04-0020-0xx-2024

**CHANGE ORDER NO.:** \_\_\_\_\_

**AIRPORT:** Holbrook Municipal Airport

**LOCATION:** Holbrook, Arizona

**FAA Approval:**

- ☐ This approval is subject to the availability of Federal funds and limitations of the Grant Agreement.
- ☐ This approval is subject to the availability of Federal funds and limitations of the Grant Agreement and comments in our letter dated \_\_\_\_\_.
- ☐ This approval is for record purposes only, with no Federal participation.

By: \_\_\_\_\_  
Program Manager, PHX-ADO

\_\_\_\_\_ Date

NOTE: Change Orders and Supplemental Agreements require FAA approval prior to construction. Otherwise, no Federal participation can be granted.

ADOT / MDP Aeronautics Group concurrence is required when State participation is anticipated.



**AIP NO.:** 3-04-0020-0xx-2024

**CHANGE ORDER NO.**

**AIRPORT:** Holbrook Municipal Airport

**LOCATION:** Holbrook, Arizona

**JUSTIFICATION FOR CHANGE**

1. Brief description of the proposed Contract change(s) and location(s).
2. Reason(s) for the change(s). (Continue on reverse if necessary.)
3. Justifications for Unit Prices or Total Cost.
4. The Sponsor's share of this cost is available from:
5. If this is Supplemental Agreement involving more than \$2,000, is the Cost Estimate based on the latest wage rate decision? Yes ☐ No ☐ Not Applicable ☐
6. Has Consent of Surety been obtained? Yes ☐ No ☐ Not Applicable ☐
7. Will this change affect the insurance coverage? Yes ☐ No ☐
8. If yes, will the policies be extended? Yes ☐ No ☐
9. Has this Change Order been discussed with FAA officials?  
Yes ☐ No ☐ When \_\_\_\_\_ With Whom \_\_\_\_\_

Comment \_\_\_\_\_

Submit four executed copies to the FAA.

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**APPLICATION FOR PAYMENT NO. \_\_\_\_**

To City of Holbrook (OWNER). Contract for Holbrook Municipal Airport Improvements dated \_\_\_\_\_. OWNER'S AIP No. 3-04-0020-0xx-2024 and ACI No. 22965 for Work accomplished through the date of \_\_\_\_\_.

**ATTACH ITEMIZED LIST**

|                             |                             |          |
|-----------------------------|-----------------------------|----------|
| Accompanying Documentation: | GROSS AMOUNT DUE            | \$ _____ |
| _____                       | LESS ____ % RETAINAGE       | \$ _____ |
| _____                       | AMOUNT DUE TO DATE          | \$ _____ |
| _____                       | LESS PREVIOUS PAYMENTS      | \$ _____ |
| _____                       | AMOUNT DUE THIS APPLICATION | \$ _____ |

**CONTRACTOR'S Certification:**

The undersigned CONTRACTOR certifies that (1) all previous Progress Payments received from OWNER on account of Work done under the Contract referred to above have been applied to discharge in full all obligations of CONTRACTOR incurred in connection with Work covered by prior Applications for Payment numbered 1 through \_\_\_\_ inclusive; and (2) title to all materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of final acceptance of Project free and clear of all liens, claims, security interests and encumbrances.

Dated \_\_\_\_\_

\_\_\_\_\_  
CONTRACTOR

By \_\_\_\_\_

**ENGINEER'S Recommendation:**

This Application (with accompanying documentation) meets the requirements of the Contract Documents and payment of the above AMOUNT DUE THIS APPLICATION is recommended.

Dated \_\_\_\_\_

Armstrong Consultants, Inc.  
ENGINEER

By \_\_\_\_\_

**OWNER'S Approval:**

This Application is approved.

Dated \_\_\_\_\_

City of Holbrook  
SPONSOR

By \_\_\_\_\_

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**CONTRACTOR'S AFFIDAVIT REGARDING  
SETTLEMENT OF CLAIMS**

**Project:** Holbrook Municipal Airport | Reconstruct Apron

**AIP No.:** 3-04-0020-0xx-2024

**To:** City of Holbrook  
PO Box 970  
Holbrook, Arizona 86025

This is to certify that all lawful claims for materials, rental of equipment and labor used in connection with the construction of the above project, whether by subcontractor or claimant in person, have been duly discharged.

The undersigned, for the consideration of \$\_\_\_\_\_ as set out in the final pay estimate, as full and complete payment under the terms of the contract, hereby waives and relinquishes any and all further claims or right of lien under, in connection with, or as a result of the above described project. The undersigned further agrees to indemnify and save harmless the City of Holbrook and Armstrong Consultants, Inc., against any and all liens, claims of liens, suits, actions, damages, charges and expenses whatsoever, which said Owner and Engineer may suffer arising out of the failure to the undersigned to pay for all labor performances and materials furnished for the performance of said installation.

Signed and dated at \_\_\_\_\_, this \_\_\_\_\_ day of \_\_\_\_\_, 2024.

Contractor: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

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General Decision Number: AZ20240009 01/19/2024

Superseded General Decision Number: AZ20230009

State: Arizona

Construction Type: Highway

Counties: Apache, Cochise, Gila, Graham, Greenlee, La Paz, Navajo and Santa Cruz Counties in Arizona.

#### HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

|                                                                                                                                                                   |                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022: | Executive Order 14026 generally applies to the contract.<br>The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.  |
| If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:         | Executive Order 13658 generally applies to the contract.<br>The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024. |

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number    Publication Date

0            01/05/2024

1            01/19/2024

CARP0408-007 07/01/2023

APACHE, COCHISE & SANTA CRUZ COUNTIES

Rates            Fringes

CARPENTER (Including Cement Form Work).....\$ 34.50            14.17

-----  
ENGI0428-004 06/01/2023

Rates            Fringes

POWER EQUIPMENT OPERATOR Oiler Driver.....\$ 34.96            13.52

-----  
\* IRON0075-006 10/01/2023

Apache, Cochise, Gila, Graham, Greenlee, La Paz, Navajo Counties

Rates            Fringes

Ironworker, Rebar.....\$ 32.00            18.91

Zone 1: 0 to 50 miles from City Hall in Phoenix or Tucson

Zone 2: 050 to 100 miles - Add \$4.00

Zone 3: 100 to 150 miles - Add \$5.00

Zone 4: 150 miles & over - Add \$6.50

-----  
\* SUAZ2009-002 04/23/2009

Rates            Fringes

CARPENTER

Gila, Graham, Greenlee, La Paz & Navajo.....\$ 21.71            3.82

CEMENT MASON.....\$ 17.74            3.59

ELECTRICIAN.....\$ 24.43            5.38

IRONWORKER, Rebar

Santa Cruz county.....\$ 21.75            13.59



## LABORER

|                           |             |      |
|---------------------------|-------------|------|
| Asphalt Raker.....        | \$ 14.97 ** | 5.88 |
| Concrete Worker.....      | \$ 13.38 ** | 4.50 |
| Fence Builder.....        | \$ 12.20 ** | 3.84 |
| Flagger.....              | \$ 12.31 ** | 3.96 |
| General/Cleanup.....      | \$ 12.78 ** | 2.50 |
| Guard Rail Installer..... | \$ 12.20 ** | 3.84 |
| Landscape Laborer.....    | \$ 11.02 ** |      |
| Water Blaster.....        | \$ 14.90 ** | 2.90 |

## OPERATOR: Power Equipment

|                                                                            |          |      |      |
|----------------------------------------------------------------------------|----------|------|------|
| Backhoe < 1 cu yd.....                                                     | \$ 17.76 | 3.89 |      |
| Compactor Self Propelled (with blade-grade operation).....                 | \$ 22.53 | 6.57 |      |
| Compactor Small Self Propelled (with blade-backfill, ditch operation)..... | \$ 22.29 |      | 6.31 |
| Concrete Pump.....                                                         | \$ 20.31 | 6.48 |      |
| Crane (under 15 tons).....                                                 | \$ 22.98 | 4.26 |      |
| Drilling Machine (including wells).....                                    | \$ 21.79 | 4.10 |      |
| Grade Checker.....                                                         | \$ 23.41 | 6.54 |      |
| Hydrographic Seeder.....                                                   | \$ 19.73 | 5.40 |      |
| Mass Excavator.....                                                        | \$ 23.33 | 6.98 |      |
| Milling Machine/Rotomill.....                                              | \$ 21.87 | 6.84 |      |
| Power Sweeper.....                                                         | \$ 19.33 | 4.85 |      |
| Roller (all types asphalt).....                                            | \$ 17.46 | 5.58 |      |
| Roller (excluding asphalt).....                                            | \$ 19.23 | 5.09 |      |
| Scraper (pneumatic tire).....                                              | \$ 22.41 | 6.90 |      |
| Screed.....                                                                | \$ 20.90 | 6.72 |      |
| Skip Loader (all types 3 < 6 cu yd).....                                   | \$ 20.91 | 7.35 |      |
| Skip Loader (all types 6 < 10 cu yd).....                                  | \$ 22.24 | 6.83 |      |
| Skip Loader < 3 cu yd.....                                                 | \$ 17.97 | 6.60 |      |
| Tractor (dozer, pusher-all).....                                           | \$ 22.53 | 6.47 |      |
| Tractor (wheel type).....                                                  | \$ 24.62 | 7.57 |      |

PAINTER.....\$ 13.94 \*\* 2.56

## TRUCK DRIVER

|                                   |             |      |
|-----------------------------------|-------------|------|
| 2 or 3 axle Dump or Flatrack..... | \$ 16.17 ** | 4.24 |
| Oil Tanker Bootman.....           | \$ 21.94    |      |
| Pickup.....                       | \$ 12.88 ** | 1.73 |
| Water Truck < 2500 gal.....       | \$ 19.59    | 5.90 |
| Water Truck > 3900 gal.....       | \$ 18.70    | 4.79 |
| Water Truck 2500 < 3900 gal.....  | \$ 17.13 ** |      |

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

=====

**\*\* Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.20) or 13658 (\$12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.**

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and

are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

## WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

**GENERAL CONTRACT PROVISIONS****SECTION 10  
DEFINITION OF TERMS**

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

| <b>Paragraph Number</b> | <b>Term</b>                              | <b>Definition</b>                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>10-01</b>            | <b>AASHTO</b>                            | The American Association of State Highway and Transportation Officials.                                                                                                                                                                                                                                                                                                 |
| <b>10-02</b>            | <b>Access Road</b>                       | The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public roadway.                                                                                                                                                                                                                                                      |
| <b>10-03</b>            | <b>Advertisement</b>                     | A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.                                                                                                                                                                                                                                                  |
| <b>10-04</b>            | <b>Airport</b>                           | Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; airport buildings and facilities located in any of these areas, and a heliport.                                                |
| <b>10-05</b>            | <b>Airport Improvement Program (AIP)</b> | A grant-in-aid program, administered by the Federal Aviation Administration (FAA).                                                                                                                                                                                                                                                                                      |
| <b>10-06</b>            | <b>Air Operations Area (AOA)</b>         | The term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron. |
| <b>10-07</b>            | <b>Apron</b>                             | Area where aircraft are parked, unloaded or loaded, fueled and/or serviced.                                                                                                                                                                                                                                                                                             |
| <b>10-08</b>            | <b>ASTM International (ASTM)</b>         | Formerly known as the American Society for Testing and Materials (ASTM).                                                                                                                                                                                                                                                                                                |
| <b>10-09</b>            | <b>Award</b>                             | The Owner's notice to the successful bidder of the acceptance of the submitted bid.                                                                                                                                                                                                                                                                                     |
| <b>10-10</b>            | <b>Bidder</b>                            | Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.                                                                                                                                                                                                       |
| <b>10-11</b>            | <b>Building Area</b>                     | An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.                                                                                                                                                            |
| <b>10-12</b>            | <b>Calendar Day</b>                      | Every day shown on the calendar.                                                                                                                                                                                                                                                                                                                                        |

| Paragraph Number | Term                                               | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10-13            | <b>Certificate of Analysis (COA)</b>               | The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications.                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 10-14            | <b>Certificate of Compliance (COC)</b>             | The manufacturer's certification stating that materials or assemblies furnished fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer's authorized representative.                                                                                                                                                                                                                                                                                                                                       |
| 10-15            | <b>Change Order</b>                                | A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for work within the scope of the contract and necessary to complete the project.                                                                                                                                                                                                                                                                                       |
| 10-16            | <b>Contract</b>                                    | <p>A written agreement between the Owner and the Contractor that establishes the obligations of the parties including but not limited to performance of work, furnishing of labor, equipment and materials and the basis of payment.</p> <p>The awarded contract includes but may not be limited to: Advertisement, Contract form, Proposal, Performance bond, payment bond, General provisions, certifications and representations, Technical Specifications, Plans, Supplemental Provisions, standards incorporated by reference and issued addenda.</p> |
| 10-17            | <b>Contract Item (Pay Item)</b>                    | A specific unit of work for which a price is provided in the contract.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 10-18            | <b>Contract Time</b>                               | The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.                                                                                                                                                                                                                                              |
| 10-19            | <b>Contractor</b>                                  | The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.                                                                                                                                                                                                                                                                              |
| 10-20            | <b>Contractors Quality Control (QC) Facilities</b> | The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 10-21            | <b>Contractor Quality Control Program (CQCP)</b>   | Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors.                                                                                                                                                                                                                                                     |

| Paragraph Number | Term                                               | Definition                                                                                                                                                                                                                                                                                                                                                                            |
|------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10-22            | <b>Control Strip</b>                               | A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.                                                                                                                                                                                                                       |
| 10-23            | <b>Construction Safety and Phasing Plan (CSPP)</b> | The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.                                                                                                |
| 10-24            | <b>Drainage System</b>                             | The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.                                                                                                                                                                                                                                                 |
| 10-25            | <b>Engineer</b>                                    | The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the contract work and acting directly or through an authorized representative.                                                                                                                                                    |
| 10-26            | <b>Equipment</b>                                   | All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work.                                                                                                                                                                                              |
| 10-27            | <b>Extra Work</b>                                  | An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or Resident Project Representative (RPR) to be necessary to complete the work within the intended scope of the contract as previously modified.                                                                 |
| 10-28            | <b>FAA</b>                                         | The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.                                                                                                                                                                                                                                       |
| 10-29            | <b>Federal Specifications</b>                      | The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.                                                                                                                                                                                                          |
| 10-30            | <b>Force Account</b>                               | <p><b>a.</b> Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis.</p> <p><b>b.</b> Owner Force Account - Work performed for the project by the Owner's employees.</p>                                                                                                                                     |
| 10-31            | <b>Intention of Terms</b>                          | Whenever, in these specifications or on the plans, the words "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words |

| Paragraph Number | Term                                   | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                                        | <p>“approved,” “acceptable,” “satisfactory,” or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner.</p> <p>Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.</p> |
| <b>10-32</b>     | <b>Lighting</b>                        | A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.                                                                                                                                                                |
| <b>10-33</b>     | <b>Major and Minor Contract Items</b>  | A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor contract items.                                                                                                                                                                                                                                                                                            |
| <b>10-34</b>     | <b>Materials</b>                       | Any substance specified for use in the construction of the contract work.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>10-35</b>     | <b>Modification of Standards (MOS)</b> | Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1.                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>10-36</b>     | <b>Notice to Proceed (NTP)</b>         | A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.                                                                                                                                                                                                                                                                                                                               |
| <b>10-37</b>     | <b>Owner</b>                           | The term “Owner” shall mean the party of the first part or the contracting agency signatory to the contract. Where the term “Owner” is capitalized in this document, it shall mean airport Sponsor only. The Owner for this project is <b>City of Holbrook.</b>                                                                                                                                                                                                                                                                 |
| <b>10-38</b>     | <b>Passenger Facility Charge (PFC)</b> | Per 14 Code of Federal Regulations (CFR) Part 158 and 49 United States Code (USC) § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls.                                                                                                                                                                                                                                                                                                                     |
| <b>10-39</b>     | <b>Pavement Structure</b>              | The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit.                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>10-40</b>     | <b>Payment bond</b>                    | The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.                                                                                                                                                                                                                                                                                                          |



| Paragraph Number | Term                                  | Definition                                                                                                                                                                                                                                                                                                                                                            |
|------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10-41            | Performance bond                      | The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.                                                                                                                                                                                 |
| 10-42            | Plans                                 | The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications. Plans may also be referred to as 'contract drawings.'                                                                   |
| 10-43            | Project                               | The agreed scope of work for accomplishing specific airport development with respect to a particular airport.                                                                                                                                                                                                                                                         |
| 10-44            | Proposal                              | The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.                                                                                                                                                |
| 10-45            | Proposal guaranty                     | The security furnished with a proposal to guarantee that the bidder will enter into a contract if their own proposal is accepted by the Owner.                                                                                                                                                                                                                        |
| 10-46            | Quality Assurance (QA)                | Owner's responsibility to assure that construction work completed complies with specifications for payment.                                                                                                                                                                                                                                                           |
| 10-47            | Quality Control (QC)                  | Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.                                                                                                                                                                                                                     |
| 10-48            | Quality Assurance (QA) Inspector      | An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.                                                                  |
| 10-49            | Quality Assurance (QA) Laboratory     | The official quality assurance testing laboratories of the Owner or such other laboratories as may be designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory.                                                                                                                                                            |
| 10-50            | Resident Project Representative (RPR) | The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative. |
| 10-51            | Runway                                | The area on the airport prepared for the landing and takeoff of aircraft.                                                                                                                                                                                                                                                                                             |
| 10-52            | Runway Safety Area (RSA)              | A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the                                                                                                                                                                                                                                                    |

| Paragraph Number | Term                                          | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                                               | Construction Safety and Phasing Plan (CSPP) for limits of the RSA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 10-53            | <b>Safety Plan Compliance Document (SPCD)</b> | Details how the Contractor will comply with the CSPP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 10-54            | <b>Specifications</b>                         | A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.                                                                                                                                                                                                                                                                        |
| 10-55            | <b>Sponsor</b>                                | A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.                                                                                                                                                                                                                                                                                                                                                  |
| 10-56            | <b>Structures</b>                             | Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.                                                                                                                                                                         |
| 10-57            | <b>Subgrade</b>                               | The soil that forms the pavement foundation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 10-58            | <b>Superintendent</b>                         | The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction.                                                                                                                                                                                                                                                                                                                                                                      |
| 10-59            | <b>Supplemental Agreement</b>                 | A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%; (2) in scope work would increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item. |
| 10-60            | <b>Surety</b>                                 | The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.                                                                                                                                                                                                                                                                                                                                                                                                            |
| 10-61            | <b>Taxilane</b>                               | A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 10-62            | <b>Taxiway</b>                                | The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.                                                                                                                                                                                                                                                                                                                                                         |

| Paragraph Number | Term                                      | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10-63            | <b>Taxiway/Taxilane Safety Area (TSA)</b> | A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See the construction safety and phasing plan (CSPP) for limits of the TSA.                                                                                                                                                                                                                                                                                 |
| 10-64            | <b>Work</b>                               | The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.                                                                                                                                                                                                                                                     |
| 10-65            | <b>Working day</b>                        | A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days. |
| 10-66            | <b>Owner Defined terms</b>                | <b>None.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

**END OF SECTION 10**

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## SECTION 20 PROPOSAL REQUIREMENTS AND CONDITIONS

**20-01 ADVERTISEMENT (NOTICE TO BIDDERS).** This project has been advertised on March 6, and 13, 2024.

**20-02 QUALIFICATION OF BIDDERS.** Each bidder shall submit evidence of competency and evidence of financial responsibility to perform the work to the Owner at the time of bid opening.

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

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

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

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

Mobilization is limited to 10 percent of the total project cost per schedule, as bid, with mobilization included into the total.

A non-mandatory prebid conference will be held for this project to discuss as a minimum, the following items: material requirements; submittals; Quality Control/Quality Assurance requirements; the construction safety and phasing plan including airport access and staging areas; and unique airfield paving construction requirements.

**20-04 ISSUANCE OF PROPOSAL FORMS.** The Owner reserves the right to refuse to issue a proposal form to a prospective bidder if the bidder is in default for any of the following reasons:

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

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

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

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

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

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

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

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

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

**20-08 RESPONSIVE AND RESPONSIBLE BIDDER.** A responsive bid conforms to all significant terms and conditions contained in the Owner's invitation for bid. It is the Owner's responsibility to decide if the

exceptions taken by a bidder to the solicitation are material or not and the extent of deviation it is willing to accept.

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

**20-09 IRREGULAR PROPOSALS.** Proposals shall be considered irregular for the following reasons:

- a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered, or if any part of the proposal form is detached.
- b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.
- c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.
- d. If the proposal contains unit prices that are obviously unbalanced.
- e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.
- f. If the applicable Disadvantaged Business Enterprise information is incomplete.

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

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

**20-11 DELIVERY OF PROPOSAL.** Each proposal submitted shall be submitted online per system requirements. No proposal will be considered unless received as specified in the advertisement or as modified by Addendum before the time specified for opening all bids. Proposals received after the bid opening will not be accepted.

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

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

**20-14 DISQUALIFICATION OF BIDDERS.** A bidder shall be considered disqualified for any of the following reasons:

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

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

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

**20-15 DISCREPANCIES AND OMISSIONS.** A Bidder who discovers discrepancies or omissions with the project bid documents shall immediately notify the Owner's Engineer of the matter. A bidder that has doubt as to the true meaning of a project requirement may submit to the Owner's Engineer a written request for interpretation no later than nine (9) days prior to bid opening.

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

#### END OF SECTION 20



## SECTION 30 AWARD AND EXECUTION OF CONTRACT

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

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

- a. If the proposal is irregular as specified in Section 20, paragraph 20-09, *Irregular Proposals*.
- b. If the bidder is disqualified for any of the reasons specified Section 20, paragraph 20-14, *Disqualification of Bidders*.

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

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

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

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

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

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

**30-06 EXECUTION OF CONTRACT.** The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return the signed contract to the Owner, along with the fully executed surety bond or bonds specified in paragraph 30-05, *Requirements of Contract Bonds*, of this section, within 15 calendar days from the date mailed or otherwise delivered to the successful bidder.

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

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

**END OF SECTION 30**

## SECTION 40 SCOPE OF WORK

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

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

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

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

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

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

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

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

When determined by the RPR to be in the Owner's best interest, the RPR may order the Contractor to proceed with extra work as provided in Section 90, paragraph 90-05, *Payment for Extra Work*. Extra work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a supplemental agreement as defined in Section 10, paragraph 10-59, *Supplemental Agreement*.

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

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

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

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

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

c. When the contract requires the maintenance of an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep the road, street, or highway open to all traffic and shall provide maintenance as may be required to accommodate traffic. The Contractor, at their expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (<http://mutcd.fhwa.dot.gov/>), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways.

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

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

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

**40-07 RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK.** Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be embankment, the Contractor may at their own option either:

- a. Use such material in another contract item, providing such use is approved by the RPR and is in conformance with the contract specifications applicable to such use; or,
- b. Remove such material from the site, upon written approval of the RPR; or
- c. Use such material for the Contractor's own temporary construction on site; or,
- d. Use such material as intended by the terms of the contract.

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

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

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

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

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

**40-08 FINAL CLEANUP.** Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition.

Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of the property Owner.

**END OF SECTION 40**

## SECTION 50 CONTROL OF WORK

**50-01 AUTHORITY OF THE RESIDENT PROJECT REPRESENTATIVE (RPR).** The RPR has final authority regarding the interpretation of project specification requirements. The RPR shall determine acceptability of the quality of materials furnished, method of performance of work performed, and the manner and rate of performance of the work. The RPR does not have the authority to accept work that does not conform to specification requirements.

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

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

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

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

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

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

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

advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

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

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

**50-04 LIST OF SPECIAL PROVISIONS.** See Special Provisions section of these Contract Documents.

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

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

**50-06 COOPERATION BETWEEN CONTRACTORS.** The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

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

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



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

Prior to performing the initial control survey, submit a methodology statement to the Engineer for their review, complete with survey equipment to be utilized and with information as to the accuracy of the equipment.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points necessary for the proper execution and control of the work on this project will be provided to the RPR. The Contractor is responsible to establish all layout required for the construction of the project.

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

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

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

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

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

**50-09 INSPECTION OF THE WORK.** All materials and each part or detail of the work shall be subject to inspection. The RPR shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

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

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

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

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

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of Section 70, paragraph 70-14, *Contractor's Responsibility for Work*.

No removal work made under provision of this paragraph shall be done without lines and grades having been established by the RPR. Work done contrary to the instructions of the RPR, work done beyond the lines shown on the plans or as established by the RPR, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the RPR made under the provisions of this subsection, the RPR will have authority to cause unacceptable work to be remedied or removed and replaced; and unauthorized work to be removed and recover the resulting costs as a liquidated damage against the Contractor.

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

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

**50-12 MAINTENANCE DURING CONSTRUCTION.** The Contractor shall maintain the work during construction and until the work is accepted. Maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

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

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

**50-13 FAILURE TO MAINTAIN THE WORK.** Should the Contractor at any time fail to maintain the work as provided in paragraph 50-12, *Maintenance during Construction*, the RPR shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the RPR's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be recovered as a liquidated damage against the Contractor.

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

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

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the RPR will notify the Contractor and the Contractor shall correct the unsatisfactory work. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the RPR will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

**50-16 CLAIMS FOR ADJUSTMENT AND DISPUTES.** If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the RPR in writing of their intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the RPR is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim

for such additional compensation. Such notice by the Contractor and the fact that the RPR has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the RPR who will present it to the Owner for consideration in accordance with local laws or ordinances.

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

**END OF SECTION 50**

## SECTION 60 CONTROL OF MATERIALS

**60-01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS.** The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

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

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

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

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

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

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

A copy of all Contractor QC test data shall be provided to the RPR daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the RPR showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests. A legible, handwritten copy of all test data shall be given to the Engineer **DAILY**, along with electronic reports on forms provided by the Engineer in spreadsheet format (.xls or approved equal), on a weekly basis.

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

**60-03 CERTIFICATION OF COMPLIANCE/ANALYSIS (COC/COA).** The RPR may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's COC stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified. The COA is the manufacturer's COC and includes all applicable test results.

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

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

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

- a. Conformance to the specified performance, testing, quality or dimensional requirements; and,
- b. Suitability of the material or assembly for the use intended in the contract work.

The RPR shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

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

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

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

- a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.
- b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.
- c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

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

**60-05 ENGINEER/RESIDENT PROJECT REPRESENTATIVE (RPR) FIELD OFFICE.** An Engineer/RPR field office is not required.

**60-06 STORAGE OF MATERIALS.** Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the RPR. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans and/or CSPP, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as indicated by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner's permission.

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

**60-07 UNACCEPTABLE MATERIALS.** Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the RPR.

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

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

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

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

## END OF SECTION 60

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**SECTION 70**  
**LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC**

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

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

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

**70-04 RESTORATION OF SURFACES DISTURBED BY OTHERS.** The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) must be shown on the plans and is indicated as follows: None.

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

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

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

**70-06 SANITARY, HEALTH, AND SAFETY PROVISIONS.** The Contractor's worksite and facilities shall comply with applicable federal, state, and local requirements for health, safety and sanitary provisions.

Representatives of the Owner or the Engineer are not responsible during site visits or as a result of observations or inspections of the Contractor's work in progress for any safety precautions or programs incident to the Work of the Contractor or for any failure of the Contractor to comply with laws, rules, regulations, ordinances, codes or orders applicable to safety precautions or programs.

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

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

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

**70-08 CONSTRUCTION SAFETY AND PHASING PLAN (CSPP).** The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP plan sheet(s) can be found in the project plans. The CSPP report can be found in the Special Provisions of these contract documents.

**70-09 USE OF EXPLOSIVES.** The use of explosives is not permitted on this project.

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

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

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of

the non-execution thereof by the Contractor, the Contractor shall restore, at their expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

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

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

**70-13 OPENING SECTIONS OF THE WORK TO TRAFFIC.** If it is necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such "phasing" of the work must be specified below and indicated on the approved Construction Safety and Phasing Plan (CSPP) and the project plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified.

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

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

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

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

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

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

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

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

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and/or in the contract documents and the Owners are indicated as follows: a one-call utility location phone number is indicated on the Plans (where one is known to exist).

Please see Special Provisions for contact information.

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

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the Owners of all utility services or other facilities of their plan of operations. Such notification shall be in

writing addressed to "The Person to Contact" as provided in this paragraph and paragraph 70-04, *Restoration of Surfaces Disturbed By Others*. A copy of each notification shall be given to the RPR.

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

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

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

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

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

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

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

**70-17 PERSONAL LIABILITY OF PUBLIC OFFICIALS.** In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the Engineer, RPR, their authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

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

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

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

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

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

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract change order or supplemental agreement as provided in Section 40, paragraph 40-04, *Extra Work*, and Section 90, paragraph 90-05, *Payment for Extra Work*. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with Section 80, paragraph 80-07, *Determination and Extension of Contract Time*.

**70-21 INSURANCE REQUIREMENTS.** See insurance requirements in Agreement.

## END OF SECTION 70

## SECTION 80 EXECUTION AND PROGRESS

**80-01 SUBLETTING OF CONTRACT.** The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Resident Project Representative (RPR).

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

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

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

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

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

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

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the RPR's request, submit a revised schedule for completion of the work within the contract time and modify their operations to provide such additional materials, equipment, and labor necessary to meet the revised



schedule. Should the execution of the work be discontinued for any reason, the Contractor shall notify the RPR at least 24 hours in advance of resuming operations.

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

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

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

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

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

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

Portions of the AOA will be closed to aircraft operation intermittently as described in the Special Provisions.

See the Construction Safety and Phasing Plan for AOA closures.

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

**80-04.1 OPERATIONAL SAFETY ON AIRPORT DURING CONSTRUCTION.** All Contractors' operations shall be conducted in accordance with the approved project Construction Safety and Phasing Plan (CSPP) and the Safety Plan Compliance Document (SPCD) and the provisions set forth within the current version of AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction



activities. The Contractor shall prepare and submit a SPCD that details how it proposes to comply with the requirements presented within the CSPP.

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

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

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

**80-05 CHARACTER OF WORKERS, METHODS, AND EQUIPMENT.** The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

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

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

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

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

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless otherwise authorized by the RPR. If the Contractor desires to use a method or type of equipment other than specified in the contract, the Contractor may request authority from the RPR to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the RPR determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the

substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the RPR may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this paragraph.

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

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the written order to suspend work to the effective date of the written order to resume the work. Claims for such compensation shall be filed with the RPR within the time period stated in the RPR's order to resume work. The Contractor shall submit with their own claim information substantiating the amount shown on the claim. The RPR will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather or for any other delay provided for in the contract, plans, or specifications.

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

**80-07 DETERMINATION AND EXTENSION OF CONTRACT TIME.** The number of calendar days shall be stated in the proposal and contract and shall be known as the Contract Time.

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

**80-07.1 CONTRACT TIME BASED ON CALENDAR DAYS.** Contract Time based on calendar days shall consist of the number of calendar days stated in the contract counting from the effective date of the Notice to Proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

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

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

| Project           | Liquidated Damages Cost  | Allowed Construction Time |
|-------------------|--------------------------|---------------------------|
| Reconstruct Apron | \$1,750 Per Calendar Day | 70 Calendar Days          |

The maximum construction time allowed for the project will be not more than seventy (70) days. Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the Owner of any of its rights under the contract.

**80-09 DEFAULT AND TERMINATION OF CONTRACT.** The Contractor shall be considered in default of their contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons, if the Contractor:

- a. Fails to begin the work under the contract within the time specified in the Notice to Proceed, or
- b. Fails to perform the work or fails to provide sufficient workers, equipment and/or materials to assure completion of work in accordance with the terms of the contract, or
- c. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or
- d. Discontinues the execution of the work, or
- e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or
- f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or
- g. Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or
- h. Makes an assignment for the benefit of creditors, or
- i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Owner consider the Contractor in default of the contract for any reason above, the Owner shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the RPR of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. The Owner

may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the RPR will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

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

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

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

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the RPR.

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

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

## END OF SECTION 80

## SECTION 90 MEASUREMENT AND PAYMENT

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

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

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

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

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

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

### Measurement and Payment Terms

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

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

| Term                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | <p>payment to the Contractor will be allowed for materials previously weighed and recorded.</p> <p>Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them.</p> <p>Scale installations shall have available ten standard 50-pound weights for testing the weighing equipment or suitable weights and devices for other approved equipment.</p> <p>All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.</p> |
| <b>Rental Equipment</b> | <p>Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered in connection with extra work will be measured as agreed in the change order or supplemental agreement authorizing such work as provided in paragraph 90-05 <i>Payment for Extra Work</i>.</p>                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Pay Quantities</b>   | <p>When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the RPR. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.</p>                                                                                                                                                                                                                                            |

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

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

**90-03 COMPENSATION FOR ALTERED QUANTITIES.** When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in Section 40, paragraph 40-02, *Alteration of Work and Quantities*, will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from their own unbalanced allocation of overhead and profit among the contract items, or from any other cause.



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

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

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

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

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

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

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

(1) Contractor may request release of retainage on work that has been partially accepted by the Owner in accordance with Section 50-14. Contractor must provide a certified invoice to the RPR that supports the value of retainage held by the Owner for partially accepted work.

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

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



portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

c. When at least 95% of the work has been completed to the satisfaction of the RPR, the RPR shall, at the Owner's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done. The Owner may retain an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.

It is understood and agreed 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 or supplemental agreements, except when such excess quantities have been determined by the RPR to be a part of the final quantity for the item of work in question.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

After the Contractor has approved, or approved under protest, the RPR's final estimate, and after the RPR's receipt of the project closeout documentation required in paragraph 90-11, *Contractor Final Project Documentation*, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of Section 50, paragraph 50-16, *Claims for Adjustments and Disputes*, or under the provisions of this paragraph, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

**90-10 CONSTRUCTION WARRANTY.**

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work, except as noted. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of the Contractor's failure to conform to contract requirements; or any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within seven (7) days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within 14 days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Owner, as directed by the Owner, and (3) Enforce all warranties for the benefit of the Owner.

h. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

**90-11 CONTRACTOR FINAL PROJECT DOCUMENTATION.** Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the RPR approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturer's warranties specified for materials, equipment, and installations.

b. Provide weekly payroll records (not previously received) from the General Contractor and all subcontractors.

c. Complete final cleanup in accordance with Section 40, paragraph 40-08, *Final Cleanup*.

d. Complete all punch list items identified during the Final Inspection.

- e. Provide complete release of all claims for labor and material arising out of the Contract.
- f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid, monthly and final, to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.
- g. When applicable per state requirements, return copies of sales tax completion forms.
- h. Manufacturer's certifications for all items incorporated in the work.
- i. All required record drawings, as-built drawings or as-constructed drawings.
- j. Project Operation and Maintenance (O&M) Manual(s).
- k. Security for Construction Warranty.
- l. Equipment commissioning documentation submitted, if required.

**END OF SECTION 90**

## **GENERAL CONSTRUCTION ITEMS**



**ITEM C-100**  
**CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)**

**100-1 GENERAL.** Quality is more than test results. Quality is the combination of proper materials, testing, workmanship, equipment, inspection, and documentation of the project. Establishing and maintaining a culture of quality is key to achieving a quality project. The Contractor shall establish, provide, and maintain an effective Contractor Quality Control Program (CQCP) that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The Contractor shall establish a CQCP that will:

- a. Provide qualified personnel to develop and implement the CQCP.
- b. Provide for the production of acceptable quality materials.
- c. Provide sufficient information to assure that the specification requirements can be met.
- d. Document the CQCP process.

The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQCP has been reviewed and approved by the Resident Project Representative (RPR). No partial payment will be made for materials subject to specific quality control (QC) requirements until the CQCP has been reviewed and approved.

The QC requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the quality assurance (QA) testing requirements. QA testing requirements are the responsibility of the RPR or Contractor as specified in the specifications.

A Quality Control (QC)/Quality Assurance (QA) workshop with the Engineer, RPR, Contractor, subcontractors, testing laboratories, and Owner's representative must be held prior to start of construction. The QC/QA workshop will be facilitated by the Contractor. The Contractor shall coordinate with the Airport and the RPR on time and location of the QC/QA workshop. Items to be addressed, at a minimum, will include:

- a. Review of the CQCP including submittals, QC Testing, Action & Suspension Limits for Production, Corrective Action Plans, Distribution of QC reports, and Control Charts.
- b. Discussion of the QA program.
- c. Discussion of the QC and QA Organization and authority including coordination and information exchange between QC and QA.
- d. Establish regular meetings to discuss control of materials, methods and testing.
- e. Establishment of the overall QC culture.

**100-2 DESCRIPTION OF PROGRAM.**

**a. General description.** The Contractor shall establish a CQCP to perform QC inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. The CQCP shall ensure conformance to applicable specifications and plans with respect to materials, off-site fabrication, workmanship, construction, finish, and functional performance. The CQCP shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of QC.

**b. Contractor Quality Control Program (CQCP).** The Contractor shall describe the CQCP in a written document that shall be reviewed and approved by the RPR prior to the start of any production, construction, or off-site fabrication. The written CQCP shall be submitted to the RPR for review and approval at least 10 calendar days before the CQCP Workshop. The Contractor's CQCP and QC testing laboratory must be approved in writing by the RPR prior to the Notice to Proceed (NTP).

The CQCP shall be organized to address, as a minimum, the following:

1. QC organization and resumes of key staff
2. Project progress schedule
3. Submittals schedule
4. Inspection requirements
5. QC testing plan
6. Documentation of QC activities and distribution of QC reports
7. Requirements for corrective action when QC and/or QA acceptance criteria are not met

8. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

The Contractor must add any additional elements to the CQCP that is necessary to adequately control all production and/or construction processes required by this contract.

**100-3 CQCP ORGANIZATION.** The CQCP shall be implemented by the establishment of a QC organization. An organizational chart shall be developed to show all QC personnel, their authority, and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all QC staff by name and function, and shall indicate the total staff required to implement all elements of the CQCP, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of



all or part of the CQCP, the personnel assigned shall be subject to the qualification requirements of paragraphs 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The QC organization shall, as a minimum, consist of the following personnel:

**a. Program Administrator.** The Contractor Quality Control Program Administrator (CQCPA) must be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The CQCPA must have a minimum of five (5) years of experience in QC pavement construction with prior QC experience on a project of comparable size and scope as the contract.

Included in the five (5) years of paving/QC experience, the CQCPA must meet at least one of the following requirements:

- (1) Professional Engineer with one (1) year of airport paving experience.
- (2) Engineer-in-training with two (2) years of airport paving experience.
- (3) National Institute for Certification in Engineering Technologies (NICET) Civil Engineering Technology Level IV with three (3) years of airport paving experience.
- (4) An individual with four (4) years of airport paving experience, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

The CQCPA must have full authority to institute any and all actions necessary for the successful implementation of the CQCP to ensure compliance with the contract plans and technical specifications. The CQCPA authority must include the ability to immediately stop production until materials and/or processes are in compliance with contract specifications. The CQCPA must report directly to a principal officer of the construction firm. The CQCPA may supervise the Quality Control Program on more than one project provided that person can be at the job site within two (2) hours after being notified of a problem.

**b. QC technicians.** A sufficient number of QC technicians necessary to adequately implement the CQCP must be provided. These personnel must be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II in Civil Engineering Technology or higher, and shall have a minimum of two (2) years of experience in their area of expertise.

The QC technicians must report directly to the CQCPA and shall perform the following functions:

- (1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by paragraph 100-6.
- (2) Performance of all QC tests as required by the technical specifications and paragraph 100-8.
- (3) Performance of tests for the RPR when required by the technical specifications.

Certification at an equivalent level of qualification and experience by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

**c. Staffing levels.** The Contractor shall provide sufficient qualified QC personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The CQCP shall state where different technicians will be required for different work elements.

**100-4 PROJECT PROGRESS SCHEDULE.** Critical QC activities must be shown on the project schedule as required by Section 80, paragraph 80-03, *Execution and Progress*.

**100-5 SUBMITTALS SCHEDULE.** The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include as a minimum:

- a. Specification item number
- b. Item description
- c. Description of submittal
- d. Specification paragraph requiring submittal
- e. Scheduled date of submittal

**100-6 INSPECTION REQUIREMENTS.** QC inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by paragraph 100-9.

Inspections shall be performed as needed to ensure continuing compliance with contract requirements until completion of the particular feature of work. Inspections shall include the following minimum requirements:

**a.** During plant operation for material production, QC test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The CQCP shall detail how these and other QC functions will be accomplished and used.

**b.** During field operations, QC test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The CQCP shall document how these and other QC functions will be accomplished and used.

**100-7 CONTRACTOR QC TESTING FACILITY.**

**a.** For projects that include Item P-401, Item P-403, and Item P-404, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that

meet requirements in the following paragraphs of ASTM D3666, *Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials*:

- 8.1.3 Equipment Calibration and Checks;
- 8.1.9 Equipment Calibration, Standardization, and Check Records;
- 8.1.12 Test Methods and Procedures

**b.** For projects that include P-501, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM C1077, *Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation*:

- 7 Test Methods and Procedures
- 8 Facilities, Equipment, and Supplemental Procedures

**100-8 QC TESTING PLAN.** As a part of the overall CQCP, the Contractor shall implement a QC testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional QC tests that the Contractor deems necessary to adequately control production and/or construction processes.

The QC testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

- a.** Specification item number (e.g., P-401)
- b.** Item description (e.g., Hot Mix Asphalt Pavements)
- c.** Test type (e.g., gradation, grade, asphalt content)
- d.** Test standard (e.g., ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)
- e.** Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)
- f.** Responsibility (e.g., plant technician)
- g.** Control requirements (e.g., target, permissible deviations)

The QC testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The RPR shall be provided the opportunity to witness QC sampling and testing.

All QC test results shall be documented by the Contractor as required by paragraph 100-9.

**100-9 DOCUMENTATION.** The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required QC inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the RPR daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the CQCPA.

Contractor QC records required for the contract shall include, but are not necessarily limited to, the following records:

**a. Daily inspection reports.** Each Contractor QC technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous QC inspections have been performed and shall, as a minimum, include the following:

- (1) Technical specification item number and description
- (2) Compliance with approved submittals
- (3) Proper storage of materials and equipment
- (4) Proper operation of all equipment
- (5) Adherence to plans and technical specifications
- (6) Summary of any necessary corrective actions
- (7) Safety inspection.
- (8) Photographs and/or video

The daily inspection reports shall identify all QC inspections and QC tests conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible QC technician and the CQCPA. The RPR shall be provided at least one copy of each daily inspection report on the work day following the day of record. When QC inspection and test results are recorded and transmitted electronically, the results must be archived.

**b. Daily test reports.** The Contractor shall be responsible for establishing a system that will record all QC test results. Daily test reports shall document the following information:

- (1) Technical specification item number and description

- (2) Test designation
- (3) Location
- (4) Date of test
- (5) Control requirements
- (6) Test results
- (7) Causes for rejection
- (8) Recommended remedial actions
- (9) Retests

Test results from each day's work period shall be submitted to the RPR prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical QC charts. When QC daily test results are recorded and transmitted electronically, the results must be archived.

**100-10 CORRECTIVE ACTION REQUIREMENTS.** The CQCP shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the CQCP as a whole, and for individual items of work contained in the technical specifications.

The CQCP shall detail how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

**100-11 INSPECTION AND/OR OBSERVATIONS BY THE RPR.** All items of material and equipment are subject to inspection and/or observation by the RPR at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate QC system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to inspection and/or observation by the RPR at the site for the same purpose.

Inspection and/or observations by the RPR does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor's or subcontractor's work.

After the out-of-tolerance process is identified, the RPR may require a specific, timely, and detailed corrective action written narrative that is beyond the corrective actions described in the initial project CQCP. For example, specific equipment, stockpiles, bins, and personnel may need to be identified in a corrective action that adequately addresses the specific process in question.

**100-12 NONCOMPLIANCE.**

a. The RPR will provide written notice to the Contractor of any noncompliance with their CQCP. After receipt of such notice, the Contractor must take corrective action.

b. When QC activities do not comply with either the CQCP or the contract provisions or when the Contractor fails to properly operate and maintain an effective CQCP, and no effective corrective actions have been taken after notification of non-compliance, the RPR will recommend the Owner take the following actions:

(1) Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors and/or

(2) Order the Contractor to stop operations, with no additional cost to the Owner or contract days granted, until appropriate corrective actions are taken.

**METHOD OF MEASUREMENT**

**100-13 BASIS OF MEASUREMENT AND PAYMENT.** Contractor Quality Control Program (CQCP) is for the personnel, tests, facilities and documentation required to implement the CQCP. The CQCP will be paid as a lump sum with the following schedule of partial payments:

a. With first pay request, 25% with approval of CQCP and completion of the Quality Control (QC)/Quality Assurance (QA) workshop.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 20%.

d. When 75% or more of the original contract is earned, an additional 20%

e. After final inspection and acceptance of project, the final 10%.

**BASIS OF PAYMENT**

**100-14** Payment will be made under:

Item C-100 Contractor Quality Control Program (CQCP) – per lump sum

**REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

National Institute for Certification in Engineering Technologies (NICET)

ASTM International (ASTM)

ASTM C1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

ASTM D3665 Standard Practice for Random Sampling of Construction Materials

ASTM D3666 Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

**END OF ITEM C-100**

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### ITEM C-105 MOBILIZATION

**105-1 DESCRIPTION.** This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

**105-2 MOBILIZATION LIMIT.** Mobilization shall be limited to 10 percent of the total project cost, per schedule, as bid, with mobilization included into the total.

**105-3 POSTED NOTICES.** Prior to commencement of construction activities, the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL "Notice to All Employees" Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

**105-4 ENGINEER/RPR FIELD OFFICE.** An Engineer/RPR field office is not required.

### METHOD OF MEASUREMENT

**105-5 BASIS OF MEASUREMENT AND PAYMENT.** Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as follows:

- a. With first pay request, 25%.
- b. When 25% or more of the original contract is earned, an additional 25%.
- c. When 50% or more of the original contract is earned, an additional 40%.
- d. After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials as required by Section 90, paragraph 90-11, *Contractor Final Project Documentation*, the final 10%.

### BASIS OF PAYMENT

**105-6** Payment will be made under:

Item C-105      Mobilization – per lump sum

### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Office of Federal Contract Compliance Programs (OFCCP)

Executive Order 11246, as amended

EEOC-P/E-1 – Equal Employment Opportunity is the Law Poster

United States Department of Labor, Wage and Hour Division (WHD)

WH 1321 – Employee Rights under the Davis-Bacon Act Poster

**END OF ITEM C-105**

**ITEM C-110**  
**METHOD OF ESTIMATING PERCENTAGE OF MATERIAL**  
**WITHIN SPECIFICATION LIMITS (PWL)**

**110-1 GENERAL.** When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average ( $\bar{X}$ ) and sample standard deviation ( $S_n$ ) of the specified number ( $n$ ) of sublots for the lot and the specification tolerance limits,  $L$  for lower and  $U$  for upper, for the particular acceptance parameter. From these values, the respective Quality index,  $Q_L$  for Lower Quality Index and/or  $Q_U$  for Upper Quality Index, is computed and the PWL for the lot for the specified  $n$  is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the Contractor that, in order to consistently offset the Contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the Contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

**110-2 METHOD FOR COMPUTING PWL.** The computational sequence for computing PWL is as follows:

- a. Divide the lot into  $n$  sublots in accordance with the acceptance requirements of the specification.
- b. Locate the random sampling position within the subplot in accordance with the requirements of the specification.
- c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.
- d. Find the sample average ( $\bar{X}$ ) for all subplot test values within the lot by using the following formula:

$$\bar{X} = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

Where:  $\bar{X}$  = Sample average of all subplot test values within a lot

$x_1, x_2, \dots, x_n$  = Individual subplot test values

$n$  = Number of subplot test values

e. Find the sample standard deviation ( $S_n$ ) by use of the following formula:

$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \dots + d_n^2)/(n-1)]^{1/2}$$

Where:  $S_n$  = Sample standard deviation of the number of subplot test values in the set

$d_1, d_2, \dots, d_n$  = Deviations of the individual subplot test values  $x_1, x_2, \dots$  from the average value  $X$

that is:  $d_1 = (x_1 - X), d_2 = (x_2 - X) \dots d_n = (x_n - X)$

$n$  = Number of subplot test values

f. For single sided specification limits (i.e., L only), compute the Lower Quality Index  $Q_L$  by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with  $Q_L$ , using the column appropriate to the total number ( $n$ ) of measurements. If the value of  $Q_L$  falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (i.e., L and U), compute the Quality Indexes  $Q_L$  and  $Q_U$  by use of the following formulas:

$$Q_L = (X - L) / S_n$$

and

$$Q_U = (U - X) / S_n$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with  $Q_L$  and  $Q_U$ , using the column appropriate to the total number ( $n$ ) of measurements, and determining the percent of material above  $P_L$  and percent of material below  $P_U$  for each tolerance limit. If the values of  $Q_L$  fall between values shown on the table, use the next higher value of  $P_L$  or  $P_U$ . Determine the PWL by use of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where:  $P_L$  = percent within lower specification limit

$P_U$  = percent within upper specification limit

**EXAMPLE OF PWL CALCULATION**

**Project:** Example Project

**Test Item:** Item P-401, Lot A.

**A. PWL Determination for Mat Density.**

1. Density of four random cores taken from Lot A.

$$A-1 = 96.60$$

$$A-2 = 97.55$$

$$A-3 = 99.30$$

$$A-4 = 98.35$$

$$n = 4$$

2. Calculate average density for the lot.

$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

$$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$$

$$X = 97.95\% \text{ density}$$

3. Calculate the standard deviation for the lot.

$$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$$

$$S_n = 1.15$$

4. Calculate the Lower Quality Index  $Q_L$  for the lot. ( $L=96.3$ )

$$Q_L = (X - L) / S_n$$

$$Q_L = (97.95 - 96.30) / 1.15$$

$$Q_L = 1.4348$$

5. Determine PWL by entering Table 1 with  $Q_L = 1.44$  and  $n = 4$ .

$$PWL = 98$$

**B. PWL Determination for Air Voids.**

1. Air Voids of four random samples taken from Lot A.

$$A-1 = 5.00$$

$$A-2 = 3.74$$

$$A-3 = 2.30$$

$$A-4 = 3.25$$

2. Calculate the average air voids for the lot.

$$X = (x_1 + x_2 + x_3 \dots n) / n$$

$$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$$

$$X = 3.57\%$$

3. Calculate the standard deviation  $S_n$  for the lot.

$$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$$

$$S_n = 1.12$$

4. Calculate the Lower Quality Index  $Q_L$  for the lot. ( $L = 2.0$ )

$$Q_L = (X - L) / S_n$$

$$Q_L = (3.57 - 2.00) / 1.12$$

$$Q_L = 1.3992$$

5. Determine  $P_L$  by entering Table 1 with  $Q_L = 1.41$  and  $n = 4$ .

$$P_L = 97$$

6. Calculate the Upper Quality Index  $Q_U$  for the lot. ( $U = 5.0$ )

$$Q_U = (U - X) / S_n$$

$$Q_U = (5.00 - 3.57) / 1.12$$

$$Q_U = 1.2702$$

7. Determine  $P_U$  by entering Table 1 with  $Q_U = 1.29$  and  $n = 4$ .

$$P_U = 93$$

8. Calculate Air Voids PWL

$$PWL = (P_L + P_U) - 100$$

$$PWL = (97 + 93) - 100 = 90$$

**EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E178)**

**Project:** Example Project

**Test Item:** Item P-401, Lot A.

**A. Outlier Determination for Mat Density.**

1. Density of four random cores taken from Lot A arranged in descending order.

A-3 = 99.30

A-4 = 98.35

A-2 = 97.55

A-1 = 96.60

2. From ASTM E178, Table 1, for  $n=4$  an upper 5% significance level, the critical value for test criterion = 1.463.

3. Use average density, standard deviation, and test criterion value to evaluate density measurements.

- a. For measurements greater than the average:

If  $(\text{measurement} - \text{average})/(\text{standard deviation})$  is less than test criterion, then the measurement is not considered an outlier.

For A-3, check if  $(99.30 - 97.95) / 1.15$  is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

- b. For measurements less than the average:

If  $(\text{average} - \text{measurement})/(\text{standard deviation})$  is less than test criterion, then the measurement is not considered an outlier.

For A-1, check if  $(97.95 - 96.60) / 1.15$  is greater than 1.463.

Since 1.435 is less than 1.463, the value is not an outlier.

**Note:** In this example, a measurement would be considered an outlier if the density were:

Greater than  $(97.95 + 1.463 \times 1.15) = 99.63\%$

OR

less than  $(97.95 - 1.463 \times 1.15) = 96.27\%$ .

**TABLE 1**  
**TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)**

| Percent<br>Within Limits<br>(P <sub>L</sub> and P <sub>U</sub> ) | Positive Values of Q (Q <sub>L</sub> and Q <sub>U</sub> ) |        |        |        |        |        |        |        |
|------------------------------------------------------------------|-----------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|
|                                                                  | n=3                                                       | n=4    | n=5    | n=6    | n=7    | n=8    | n=9    | n=10   |
| 99                                                               | 1.1541                                                    | 1.4700 | 1.6714 | 1.8008 | 1.8888 | 1.9520 | 1.9994 | 2.0362 |
| 98                                                               | 1.1524                                                    | 1.4400 | 1.6016 | 1.6982 | 1.7612 | 1.8053 | 1.8379 | 1.8630 |
| 97                                                               | 1.1496                                                    | 1.4100 | 1.5427 | 1.6181 | 1.6661 | 1.6993 | 1.7235 | 1.7420 |
| 96                                                               | 1.1456                                                    | 1.3800 | 1.4897 | 1.5497 | 1.5871 | 1.6127 | 1.6313 | 1.6454 |
| 95                                                               | 1.1405                                                    | 1.3500 | 1.4407 | 1.4887 | 1.5181 | 1.5381 | 1.5525 | 1.5635 |
| 94                                                               | 1.1342                                                    | 1.3200 | 1.3946 | 1.4329 | 1.4561 | 1.4717 | 1.4829 | 1.4914 |
| 93                                                               | 1.1269                                                    | 1.2900 | 1.3508 | 1.3810 | 1.3991 | 1.4112 | 1.4199 | 1.4265 |
| 92                                                               | 1.1184                                                    | 1.2600 | 1.3088 | 1.3323 | 1.3461 | 1.3554 | 1.3620 | 1.3670 |
| 91                                                               | 1.1089                                                    | 1.2300 | 1.2683 | 1.2860 | 1.2964 | 1.3032 | 1.3081 | 1.3118 |
| 90                                                               | 1.0982                                                    | 1.2000 | 1.2290 | 1.2419 | 1.2492 | 1.2541 | 1.2576 | 1.2602 |
| 89                                                               | 1.0864                                                    | 1.1700 | 1.1909 | 1.1995 | 1.2043 | 1.2075 | 1.2098 | 1.2115 |
| 88                                                               | 1.0736                                                    | 1.1400 | 1.1537 | 1.1587 | 1.1613 | 1.1630 | 1.1643 | 1.1653 |
| 87                                                               | 1.0597                                                    | 1.1100 | 1.1173 | 1.1192 | 1.1199 | 1.1204 | 1.1208 | 1.1212 |
| 86                                                               | 1.0448                                                    | 1.0800 | 1.0817 | 1.0808 | 1.0800 | 1.0794 | 1.0791 | 1.0789 |
| 85                                                               | 1.0288                                                    | 1.0500 | 1.0467 | 1.0435 | 1.0413 | 1.0399 | 1.0389 | 1.0382 |
| 84                                                               | 1.0119                                                    | 1.0200 | 1.0124 | 1.0071 | 1.0037 | 1.0015 | 1.0000 | 0.9990 |
| 83                                                               | 0.9939                                                    | 0.9900 | 0.9785 | 0.9715 | 0.9671 | 0.9643 | 0.9624 | 0.9610 |
| 82                                                               | 0.9749                                                    | 0.9600 | 0.9452 | 0.9367 | 0.9315 | 0.9281 | 0.9258 | 0.9241 |
| 81                                                               | 0.9550                                                    | 0.9300 | 0.9123 | 0.9025 | 0.8966 | 0.8928 | 0.8901 | 0.8882 |
| 80                                                               | 0.9342                                                    | 0.9000 | 0.8799 | 0.8690 | 0.8625 | 0.8583 | 0.8554 | 0.8533 |
| 79                                                               | 0.9124                                                    | 0.8700 | 0.8478 | 0.8360 | 0.8291 | 0.8245 | 0.8214 | 0.8192 |
| 78                                                               | 0.8897                                                    | 0.8400 | 0.8160 | 0.8036 | 0.7962 | 0.7915 | 0.7882 | 0.7858 |
| 77                                                               | 0.8662                                                    | 0.8100 | 0.7846 | 0.7716 | 0.7640 | 0.7590 | 0.7556 | 0.7531 |
| 76                                                               | 0.8417                                                    | 0.7800 | 0.7535 | 0.7401 | 0.7322 | 0.7271 | 0.7236 | 0.7211 |
| 75                                                               | 0.8165                                                    | 0.7500 | 0.7226 | 0.7089 | 0.7009 | 0.6958 | 0.6922 | 0.6896 |
| 74                                                               | 0.7904                                                    | 0.7200 | 0.6921 | 0.6781 | 0.6701 | 0.6649 | 0.6613 | 0.6587 |
| 73                                                               | 0.7636                                                    | 0.6900 | 0.6617 | 0.6477 | 0.6396 | 0.6344 | 0.6308 | 0.6282 |
| 72                                                               | 0.7360                                                    | 0.6600 | 0.6316 | 0.6176 | 0.6095 | 0.6044 | 0.6008 | 0.5982 |
| 71                                                               | 0.7077                                                    | 0.6300 | 0.6016 | 0.5878 | 0.5798 | 0.5747 | 0.5712 | 0.5686 |
| 70                                                               | 0.6787                                                    | 0.6000 | 0.5719 | 0.5582 | 0.5504 | 0.5454 | 0.5419 | 0.5394 |
| 69                                                               | 0.6490                                                    | 0.5700 | 0.5423 | 0.5290 | 0.5213 | 0.5164 | 0.5130 | 0.5105 |
| 68                                                               | 0.6187                                                    | 0.5400 | 0.5129 | 0.4999 | 0.4924 | 0.4877 | 0.4844 | 0.4820 |
| 67                                                               | 0.5878                                                    | 0.5100 | 0.4836 | 0.4710 | 0.4638 | 0.4592 | 0.4560 | 0.4537 |
| 66                                                               | 0.5563                                                    | 0.4800 | 0.4545 | 0.4424 | 0.4355 | 0.4310 | 0.4280 | 0.4257 |
| 65                                                               | 0.5242                                                    | 0.4500 | 0.4255 | 0.4139 | 0.4073 | 0.4030 | 0.4001 | 0.3980 |
| 64                                                               | 0.4916                                                    | 0.4200 | 0.3967 | 0.3856 | 0.3793 | 0.3753 | 0.3725 | 0.3705 |
| 63                                                               | 0.4586                                                    | 0.3900 | 0.3679 | 0.3575 | 0.3515 | 0.3477 | 0.3451 | 0.3432 |
| 62                                                               | 0.4251                                                    | 0.3600 | 0.3392 | 0.3295 | 0.3239 | 0.3203 | 0.3179 | 0.3161 |
| 61                                                               | 0.3911                                                    | 0.3300 | 0.3107 | 0.3016 | 0.2964 | 0.2931 | 0.2908 | 0.2892 |
| 60                                                               | 0.3568                                                    | 0.3000 | 0.2822 | 0.2738 | 0.2691 | 0.2660 | 0.2639 | 0.2624 |



| Percent<br>Within Limits<br>(P <sub>L</sub> and P <sub>U</sub> ) | Positive Values of Q (Q <sub>L</sub> and Q <sub>U</sub> ) |         |         |         |         |         |         |         |
|------------------------------------------------------------------|-----------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|
|                                                                  | n=3                                                       | n=4     | n=5     | n=6     | n=7     | n=8     | n=9     | n=10    |
| 59                                                               | 0.3222                                                    | 0.2700  | 0.2537  | 0.2461  | 0.2418  | 0.2391  | 0.2372  | 0.2358  |
| 58                                                               | 0.2872                                                    | 0.2400  | 0.2254  | 0.2186  | 0.2147  | 0.2122  | 0.2105  | 0.2093  |
| 57                                                               | 0.2519                                                    | 0.2100  | 0.1971  | 0.1911  | 0.1877  | 0.1855  | 0.1840  | 0.1829  |
| 56                                                               | 0.2164                                                    | 0.1800  | 0.1688  | 0.1636  | 0.1607  | 0.1588  | 0.1575  | 0.1566  |
| 55                                                               | 0.1806                                                    | 0.1500  | 0.1406  | 0.1363  | 0.1338  | 0.1322  | 0.1312  | 0.1304  |
| 54                                                               | 0.1447                                                    | 0.1200  | 0.1125  | 0.1090  | 0.1070  | 0.1057  | 0.1049  | 0.1042  |
| 53                                                               | 0.1087                                                    | 0.0900  | 0.0843  | 0.0817  | 0.0802  | 0.0793  | 0.0786  | 0.0781  |
| 52                                                               | 0.0725                                                    | 0.0600  | 0.0562  | 0.0544  | 0.0534  | 0.0528  | 0.0524  | 0.0521  |
| 51                                                               | 0.0363                                                    | 0.0300  | 0.0281  | 0.0272  | 0.0267  | 0.0264  | 0.0262  | 0.0260  |
| 50                                                               | 0.0000                                                    | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  | 0.0000  |
| 49                                                               | -0.0363                                                   | -0.0300 | -0.0281 | -0.0272 | -0.0267 | -0.0264 | -0.0262 | -0.0260 |
| 48                                                               | -0.0725                                                   | -0.0600 | -0.0562 | -0.0544 | -0.0534 | -0.0528 | -0.0524 | -0.0521 |
| 47                                                               | -0.1087                                                   | -0.0900 | -0.0843 | -0.0817 | -0.0802 | -0.0793 | -0.0786 | -0.0781 |
| 46                                                               | -0.1447                                                   | -0.1200 | -0.1125 | -0.1090 | -0.1070 | -0.1057 | -0.1049 | -0.1042 |
| 45                                                               | -0.1806                                                   | -0.1500 | -0.1406 | -0.1363 | -0.1338 | -0.1322 | -0.1312 | -0.1304 |
| 44                                                               | -0.2164                                                   | -0.1800 | -0.1688 | -0.1636 | -0.1607 | -0.1588 | -0.1575 | -0.1566 |
| 43                                                               | -0.2519                                                   | -0.2100 | -0.1971 | -0.1911 | -0.1877 | -0.1855 | -0.1840 | -0.1829 |
| 42                                                               | -0.2872                                                   | -0.2400 | -0.2254 | -0.2186 | -0.2147 | -0.2122 | -0.2105 | -0.2093 |
| 41                                                               | -0.3222                                                   | -0.2700 | -0.2537 | -0.2461 | -0.2418 | -0.2391 | -0.2372 | -0.2358 |
| 40                                                               | -0.3568                                                   | -0.3000 | -0.2822 | -0.2738 | -0.2691 | -0.2660 | -0.2639 | -0.2624 |
| 39                                                               | -0.3911                                                   | -0.3300 | -0.3107 | -0.3016 | -0.2964 | -0.2931 | -0.2908 | -0.2892 |
| 38                                                               | -0.4251                                                   | -0.3600 | -0.3392 | -0.3295 | -0.3239 | -0.3203 | -0.3179 | -0.3161 |
| 37                                                               | -0.4586                                                   | -0.3900 | -0.3679 | -0.3575 | -0.3515 | -0.3477 | -0.3451 | -0.3432 |
| 36                                                               | -0.4916                                                   | -0.4200 | -0.3967 | -0.3856 | -0.3793 | -0.3753 | -0.3725 | -0.3705 |
| 35                                                               | -0.5242                                                   | -0.4500 | -0.4255 | -0.4139 | -0.4073 | -0.4030 | -0.4001 | -0.3980 |
| 34                                                               | -0.5563                                                   | -0.4800 | -0.4545 | -0.4424 | -0.4355 | -0.4310 | -0.4280 | -0.4257 |
| 33                                                               | -0.5878                                                   | -0.5100 | -0.4836 | -0.4710 | -0.4638 | -0.4592 | -0.4560 | -0.4537 |
| 32                                                               | -0.6187                                                   | -0.5400 | -0.5129 | -0.4999 | -0.4924 | -0.4877 | -0.4844 | -0.4820 |
| 31                                                               | -0.6490                                                   | -0.5700 | -0.5423 | -0.5290 | -0.5213 | -0.5164 | -0.5130 | -0.5105 |
| 30                                                               | -0.6787                                                   | -0.6000 | -0.5719 | -0.5582 | -0.5504 | -0.5454 | -0.5419 | -0.5394 |
| 29                                                               | -0.7077                                                   | -0.6300 | -0.6016 | -0.5878 | -0.5798 | -0.5747 | -0.5712 | -0.5686 |
| 28                                                               | -0.7360                                                   | -0.6600 | -0.6316 | -0.6176 | -0.6095 | -0.6044 | -0.6008 | -0.5982 |
| 27                                                               | -0.7636                                                   | -0.6900 | -0.6617 | -0.6477 | -0.6396 | -0.6344 | -0.6308 | -0.6282 |
| 26                                                               | -0.7904                                                   | -0.7200 | -0.6921 | -0.6781 | -0.6701 | -0.6649 | -0.6613 | -0.6587 |
| 25                                                               | -0.8165                                                   | -0.7500 | -0.7226 | -0.7089 | -0.7009 | -0.6958 | -0.6922 | -0.6896 |
| 24                                                               | -0.8417                                                   | -0.7800 | -0.7535 | -0.7401 | -0.7322 | -0.7271 | -0.7236 | -0.7211 |
| 23                                                               | -0.8662                                                   | -0.8100 | -0.7846 | -0.7716 | -0.7640 | -0.7590 | -0.7556 | -0.7531 |
| 22                                                               | -0.8897                                                   | -0.8400 | -0.8160 | -0.8036 | -0.7962 | -0.7915 | -0.7882 | -0.7858 |
| 21                                                               | -0.9124                                                   | -0.8700 | -0.8478 | -0.8360 | -0.8291 | -0.8245 | -0.8214 | -0.8192 |
| 20                                                               | -0.9342                                                   | -0.9000 | -0.8799 | -0.8690 | -0.8625 | -0.8583 | -0.8554 | -0.8533 |
| 19                                                               | -0.9550                                                   | -0.9300 | -0.9123 | -0.9025 | -0.8966 | -0.8928 | -0.8901 | -0.8882 |
| 18                                                               | -0.9749                                                   | -0.9600 | -0.9452 | -0.9367 | -0.9315 | -0.9281 | -0.9258 | -0.9241 |

| Percent<br>Within Limits<br>( $P_L$ and $P_U$ ) | Positive Values of Q ( $Q_L$ and $Q_U$ ) |         |         |         |         |         |         |         |
|-------------------------------------------------|------------------------------------------|---------|---------|---------|---------|---------|---------|---------|
|                                                 | n=3                                      | n=4     | n=5     | n=6     | n=7     | n=8     | n=9     | n=10    |
| 17                                              | -0.9939                                  | -0.9900 | -0.9785 | -0.9715 | -0.9671 | -0.9643 | -0.9624 | -0.9610 |
| 16                                              | -1.0119                                  | -1.0200 | -1.0124 | -1.0071 | -1.0037 | -1.0015 | -1.0000 | -0.9990 |
| 15                                              | -1.0288                                  | -1.0500 | -1.0467 | -1.0435 | -1.0413 | -1.0399 | -1.0389 | -1.0382 |
| 14                                              | -1.0448                                  | -1.0800 | -1.0817 | -1.0808 | -1.0800 | -1.0794 | -1.0791 | -1.0789 |
| 13                                              | -1.0597                                  | -1.1100 | -1.1173 | -1.1192 | -1.1199 | -1.1204 | -1.1208 | -1.1212 |
| 12                                              | -1.0736                                  | -1.1400 | -1.1537 | -1.1587 | -1.1613 | -1.1630 | -1.1643 | -1.1653 |
| 11                                              | -1.0864                                  | -1.1700 | -1.1909 | -1.1995 | -1.2043 | -1.2075 | -1.2098 | -1.2115 |
| 10                                              | -1.0982                                  | -1.2000 | -1.2290 | -1.2419 | -1.2492 | -1.2541 | -1.2576 | -1.2602 |
| 9                                               | -1.1089                                  | -1.2300 | -1.2683 | -1.2860 | -1.2964 | -1.3032 | -1.3081 | -1.3118 |
| 8                                               | -1.1184                                  | -1.2600 | -1.3088 | -1.3323 | -1.3461 | -1.3554 | -1.3620 | -1.3670 |
| 7                                               | -1.1269                                  | -1.2900 | -1.3508 | -1.3810 | -1.3991 | -1.4112 | -1.4199 | -1.4265 |
| 6                                               | -1.1342                                  | -1.3200 | -1.3946 | -1.4329 | -1.4561 | -1.4717 | -1.4829 | -1.4914 |
| 5                                               | -1.1405                                  | -1.3500 | -1.4407 | -1.4887 | -1.5181 | -1.5381 | -1.5525 | -1.5635 |
| 4                                               | -1.1456                                  | -1.3800 | -1.4897 | -1.5497 | -1.5871 | -1.6127 | -1.6313 | -1.6454 |
| 3                                               | -1.1496                                  | -1.4100 | -1.5427 | -1.6181 | -1.6661 | -1.6993 | -1.7235 | -1.7420 |
| 2                                               | -1.1524                                  | -1.4400 | -1.6016 | -1.6982 | -1.7612 | -1.8053 | -1.8379 | -1.8630 |
| 1                                               | -1.1541                                  | -1.4700 | -1.6714 | -1.8008 | -1.8888 | -1.9520 | -1.9994 | -2.0362 |

### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM E178      Standard Practice for Dealing with Outlying Observations

**END OF ITEM C-110**

**ITEM S-6  
WATERING****DESCRIPTION**

**S-6-1.1** This item shall consist of furnishing and applying water required in the compaction of embankments, subgrades, subbases, base courses, for dust control, and for other purposes in accordance with the requirements of these Specifications or as directed by the Engineer.

**CONSTRUCTION METHODS**

**S-6-2.1** Water, when required, shall be applied at the locations, in the amounts, and during the hours, including nights, as directed by the Engineer. An adequate water supply shall be provided by the Contractor. The equipment used for watering shall be of ample capacity and of such design as to assure uniform application of water in the amounts directed by the Engineer.

**METHOD OF MEASUREMENT**

**S-6-3.1** No measurement will be made of water on any part of the Work. If any material is prewetted prior to weighing, the weight of the water shall be deducted from the scale weight.

**BASIS OF PAYMENT**

**S-6-4.1** No payment will be made separately or directly for water on any part of the Work. Water will be considered a necessary and incidental part of the Work and the Contractor shall include its cost in the Contract Unit Price for the pay items of Work involved.

**END OF ITEM S-6**

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## SITEWORK



**ITEM P-101**  
**PREPARATION/REMOVAL OF EXISTING PAVEMENTS**

**DESCRIPTION**

**101-1** This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable plans.

**EQUIPMENT AND MATERIALS**

**101-2** All equipment and materials shall be specified here and in the following paragraphs or approved by the Resident Project Representative (RPR). The equipment shall not cause damage to the pavement to remain in place.

**CONSTRUCTION**

**101-3.1 REMOVAL OF EXISTING PAVEMENT.**

The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

**a. Asphalt pavement removal.** Asphalt pavement to be removed shall be saw cut to the full depth of the asphalt pavement around the perimeter of the area to be removed. The asphalt and aggregate material is to be removed and stockpiled in areas identified on the plans or pulverized rolled and graded to drain in areas that are not being reconstructed. The pulverized material shall be broken to a maximum size of 2 Inches.

**101-3.2 MAINTENANCE.** The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the RPR. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor's expense.

**101-3.3 SAW CUTTING.**

**a.** All saw cuts shall be made at the locations and to the depths shown on the Drawings or otherwise specified. The saw cut shall be made to produce a neat vertical face joint between the pavement areas to be removed and the adjacent existing surface.

**b.** The equipment used to perform the saw cutting shall be approved by the RPR prior to commencement of the Work.

**101-3.4 REMOVAL OF PIPE AND OTHER BURIED STRUCTURES.**

**a. Removal of Cables and Conduit.** Where indicated on the plans, conduits and electrical cables shall be removed. The material shall be legally disposed of off-site in a timely manner following removal.

Trenches shall be backfilled with material equal to or better in quality than adjacent embankment. Trenches under paved areas must be compacted to 95% of ASTM D698.

**b. Remove Aircraft Tie-Downs.** Where indicated on the plans, aircraft tie-downs and concrete bases shall be removed. The tie-downs and concrete bases shall be legally disposed of off-site in a timely manner following removal.

**c. Remove Concrete Structures.** Where indicated on the plans, concrete structures shall be removed. The concrete structures shall be legally disposed of off-site in a timely manner following removal.

**d. Remove Area Lights.** Where indicated on the plans, area lights, concrete foundations and associated wiring shall be removed. Area lights, concrete foundations and associated wiring shall be legally disposed of off-site in a timely manner following removal.

**e. Remove and Replace Electrical Duct Bank.** Where indicated on the plans, electrical service wiring and electrical duct shall be removed. New conduit, cable and junction boxes (if needed) shall be installed so that the top of new conduit is at least 18 inches below finished grades per the project plans. If existing conduit and cable are found to be at least 18 inches below finished grades, then the electrical service and duct may be kept in place or replaced at the same elevation. New electrical lines and conduits shall meet the requirements of L-108 and L-110.

**f. Remove Edge Light.** Where indicated on the plans, edge lights and associated light bases, and concrete shall be removed. The edge lights and associated light bases and concrete shall be legally disposed of off-site in a timely manner following removal. The holes remaining after the removal process shall be backfilled with material equal to or better in quality than material removed.

**g. Remove Sign.** Where indicated on the plans, guidance signs and associated splice bases and concrete foundations shall be removed. Guidance signs and associated splice bases and concrete foundations shall be legally disposed of off-site in a timely manner following removal. The holes remaining after the removal process shall be backfilled with material equal to or better in quality than material removed.

**h. Removal of Existing Culverts.** Remove culverts as indicated on the plans. The culvert material shall be legally disposed of off-site in a timely manner following removal. Trenches shall be backfilled with material equal to or better in quality than adjacent embankment or as indicated on the plans.

## METHOD OF MEASUREMENT

**101-4.1 ASPHALT PAVEMENT REMOVAL.** The unit of measurement for pavement removal shall be the number of square yards of asphalt surface course pulverized, removed and stockpiled by the Contractor. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for saw cutting. Saw cutting shall be incidental to pavement removal.

**101-4.2 REMOVAL OF CABLES AND CONDUIT.** The unit of measurement for removal of cable and conduit shall be the number of linear feet of conduit removed by the contractor in accordance to



paragraph 101-3.4 shall be incidental. The cable quantity, regardless of the number of strands in the conduit, will not be a measured separately for payment.

**101-4.3 REMOVAL OF AREA LIGHTS, EDGE LIGHTS AND SIGNS.** The unit of measurement for removal of area lights, edge lights and signs shall be the number of each unit removed in accordance to paragraph 101-3.4.

**101-4.4 REMOVAL OF TIE-DOWNS AND CONCRETE STRUCTURES.** Tie-downs and concrete structures shall not be measured for payment. Removal of tie-downs and concrete structures will be paid as lump sum and in accordance with paragraph 101-3.4.

**101-4.5 REMOVAL AND REPLACEMENT OF ELECTRICAL DUCT BANK.** The unit of measurement for the removal and replacement of electrical duct bank shall be the number of linear feet removed and replace by the contractor in accordance with paragraph 101-3.4.

**101-4.6 REMOVAL OF CULVERT.** The unit of measurement for removal of culverts shall be the number of linear feet removed by the contractor in accordance with paragraph 101-3.4.

#### **BASIS OF PAYMENT**

**101-5.1 PAYMENT.** Payment shall be made at contract unit price for the unit of measurement as specified above. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

|             |                                                                                  |
|-------------|----------------------------------------------------------------------------------|
| Item P 101a | Asphalt Pavement Removal - per square yard                                       |
| Item P-101b | Removal of Cable and Conduit – per linear foot                                   |
| Item P-101c | Removal of Tie-Downs – per lump sum                                              |
| Item P-101d | Removal of Concrete Structures – per lump sum                                    |
| Item P-101e | Removal of Area Lights – per each                                                |
| Item P-101f | Remove and Replace Electrical Duct Bank (Includes Junction Box)– per linear foot |
| Item P-101g | Remove Edge Lights – per each                                                    |
| Item P-101h | Remove Sign – per each                                                           |
| Item P-101i | Remove Culvert – per linear foot                                                 |

#### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

##### Advisory Circulars (AC)

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

##### ASTM International (ASTM)

ASTM D6690      Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

#### **END OF ITEM P-101**

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**ITEM P-152**  
**EXCAVATION, SUBGRADE, AND EMBANKMENT**

**DESCRIPTION**

**152-1.1** This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

**152-1.2 CLASSIFICATION.** All material excavated shall be classified as defined below:

- a. Unclassified excavation.** Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature.
- b. Muck excavation.** Muck excavation shall consist of the removal and disposal of deposits or mixtures of soils and organic matter not suitable for foundation material. Muck shall include materials that will decay or produce subsidence in the embankment. It may consist of decaying stumps, roots, logs, humus, or other material not satisfactory for incorporation in the embankment.

**152-1.3 UNSUITABLE EXCAVATION.** Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

**CONSTRUCTION METHODS**

**152-2.1 GENERAL.** Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans or as identified by RPR. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches, to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches in their greatest dimension will not be permitted in the top 6 inches of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the

Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

**a. Blasting.** Blasting shall not be allowed.

**152-2.2 EXCAVATION.** No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

Digital terrain model (DTM) files of the existing surfaces, finished surfaces and other various surfaces were used to develop the design plans.

Existing grades on the design cross sections or DTM's, where they do not match the locations of actual spot elevations shown on the topographic map, were developed by computer interpolation from those spot elevations. Prior to disturbing original grade, Contractor shall verify the accuracy of the existing ground surface by verifying spot elevations at the same locations where original field survey data was obtained as indicated on the topographic map. Contractor shall recognize that, due to the interpolation process, the actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. Contractor's verification of original ground surface, however, shall be limited to verification of spot elevations as indicated herein, and no adjustments will be made to the original ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot of the stated elevations for ground surfaces, or within 0.04 foot for hard surfaces (pavements, buildings, foundations, structures, etc.) shall be considered "no change". Only deviations in excess of these will be considered for adjustment of the original ground surface. If Contractor's verification identifies discrepancies in the topographic map, Contractor shall notify the RPR in writing at least two weeks before disturbance of existing grade to allow sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's. Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes as shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as advised by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

**a. Selective grading.** When selective grading is indicated on the plans, the more suitable material designated by the RPR shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and

compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

**b. Undercutting.** Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed of at locations shown on the plans. This excavated material shall be paid for at the contract unit price per cubic yard for unclassified excavation. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as unclassified excavation.

**c. Over-break.** Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as identified by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as "Unclassified Excavation."

**d. Removal of utilities.** The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as identified by the RPR. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

**152-2.3 BORROW EXCAVATION.** Borrow areas are not required.

**152-2.4 DRAINAGE EXCAVATION.** Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as identified by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

**152-2.5 PREPARATION OF CUT AREAS OR AREAS WHERE EXISTING PAVEMENT HAS BEEN REMOVED.** In those areas on which a subbase or base course is to be placed, the top 12 inches of subgrade shall be compacted to not less than 100 % of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D698. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

**152-2.6 PREPARATION OF EMBANKMENT AREA.** No placement of embankment material shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor the survey notes of the elevations and measurements of the existing ground surface. The Contractor and RPR shall agree that the original ground lines shown on original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

**152-2.7 CONTROL STRIP.** The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

**152-2.8 FORMATION OF EMBANKMENTS.** The material shall be constructed in lifts as established in the control strip, but not less than 6 inches nor more than 12 inches of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as advised by the RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within  $\pm 2\%$  of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The RPR and Contractor will take samples of excavated materials which will be used in embankment for testing to develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D698. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the RPR and Contractor for every 1,000 square yards of compacted embankment for the top lift and one test (minimum) per 1,000 cubic yards of lower lifts, or other appropriate frequencies as determined by the RPR.

If the material has greater than 30% retained on the 3/4-inch sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted to not less than 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D698. Under all areas to be paved, the embankments shall be compacted to a depth of 12-Inches and to a density of not less than 100 percent of the maximum density as determined by ASTM D698. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

The in-place field density shall be determined in accordance with ASTM 6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. The Contractor's laboratory shall perform all density tests in the RPR's presence and provide test results upon completion to the RPR for acceptance. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches in their greatest dimensions will not be allowed in the top 12 inches of the subgrade. Rockfill shall be brought up in lifts as specified or as identified by the RPR and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the RPR.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet in



thickness. Each lift shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The lift shall not be constructed above an elevation 4 feet below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

**152-2.9 PROOF ROLLING.** The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. Before start of embankment, and after compaction is completed, the subgrade area shall be proof rolled with a 20 ton Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 100 psi in the presence of the RPR. Apply a minimum of three (3) coverage, or as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch or show permanent deformation greater than 1 inch shall be removed and replaced with suitable material or reworked to conform to the moisture content and in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

**152-2.10 COMPACTION REQUIREMENTS.** The subgrade under areas to be paved shall be compacted to a depth of 12 inches and to a density of not less than 100 percent of the maximum dry density as determined by ASTM D698. The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of 12 inches and to a density of not less than 95 percent of the maximum density as determined by ASTM D698.

The material to be compacted shall be within  $\pm 2\%$  of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the  $\frac{3}{4}$  inch sieve, follow the methods in ASTM D698. Tests for moisture content and compaction will be taken at a minimum of 1,000 S.Y. of subgrade. All quality assurance testing shall be done by the Contractor's laboratory in the presence of the RPR, and the density test results shall be furnished upon completion to the RPR for acceptance testing.

The in-place field density shall be determined in accordance with ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as identified by the RPR and the finished subgrade shall be maintained.

**152-2.11 FINISHING AND PROTECTION OF SUBGRADE.** Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the



lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

**152-2.12 HAUL.** All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

**152-2.13 SURFACE TOLERANCES.** In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

**a. Smoothness.** The finished surface shall not vary more than  $\pm \frac{1}{2}$  inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

A 12 foot straight edge shall be provided by the Contractor and made available to the RPR at all times for testing of surface smoothness tolerances.

**b. Grade.** The grade and crown shall be measured on a 50-foot grid and shall be within  $\pm 0.05$  feet of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to be placed, grade shall not vary more than 0.10 feet from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

**152-2.14 TOPSOIL.** When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will

require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905. No direct payment will be made for topsoil under Item P-152.

### **METHOD OF MEASUREMENT**

**152-3.1** Measurement for payment specified by the cubic yard shall be computed by the the comparison of digital terrain model (DTM) surfaces for computation of neat line design quantities. The end area is that bound by the original ground line established by field measurements and the final theoretical pay line established by cross-sections shown on the plans, subject to verification by the RPR.

No measurement of the plan excavation or embankment quantity shall be made. Plan quantities include all ditches, "grading to drain" areas and adjustments for stripping of vegetation areas and adjustments for pavement templates. Plan quantities do not include rehandling and processing/compaction of designated minimum thickness of subgrade under areas to be paved. Payment will be based on plan quantities.

If plan width of excavations are changed by more than  $\pm 1.0$  foot; and/or plan elevations of excavations are changed by more than  $\pm 0.5$  foot, the volume of the changes will be measured and the awarded quantity of excavations will be adjusted to coincide with the changes.

Measurement of changes shall not include the quantity of material placed or removed without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.

### **BASIS OF PAYMENT**

**152-4.1** Embankment and Muck excavation payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

No direct payment shall be made for embankment or for processing and compaction of subgrade under proposed pavements.

There will be no separate payment for haul of any excavation or embankment materials or for placement and compaction of any material. All costs incidental to clearing and grubbing, hauling, embankments construction, processing and compaction of subgrade under areas to be paved, disposal of unsuitable materials and other necessary operations for construction of excavations or embankments shall be included in the Contract Unit Prices for "Unclassified Excavation."

Payment will be made under:

- Item P-152a      Unclassified Excavation - per cubic yard
- Item P-152b      Muck Excavation - per cubic yard

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T-180 Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

ASTM International (ASTM)

ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>)

ASTM D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>)

ASTM D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Advisory Circulars (AC)

AC 150/5370-2 Operational Safety on Airports During Construction Software

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

FAA RD-76-66 Design and Construction of Airport Pavements on Expansive Soils

**END OF ITEM P-152**

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**ITEM P-153**  
**CONTROLLED LOW-STRENGTH MATERIAL (CLSM)**

**DESCRIPTION**

**153-1.1** This item shall consist of furnishing, transporting, and placing a controlled low-strength material (CLSM) as flowable backfill in trenches or at other locations shown on the plans or as identified by the Resident Project Representative (RPR).

**MATERIALS**

**153-2.1 MATERIALS.**

**a. Cement.** Cement shall conform to the requirements of ASTM C150 Type I, II, or V.

**b. Fly ash.** Fly ash shall conform to ASTM C618, Class C or F.

**c. Fine aggregate (sand).** Fine aggregate shall conform to the requirements of ASTM C33 except for aggregate gradation. Any aggregate gradation which produces the specified performance characteristics of the CLSM and meets the following requirements, will be accepted.

| Sieve Size | Percent Passing by weight |
|------------|---------------------------|
| 3/4 inch   | 100                       |
| No. 200    | 0 - 12                    |

**d. Water.** Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

**MIX DESIGN**

**153-3.1 PROPORTIONS.** The Contractor shall submit, to the RPR, a mix design including the proportions and source of aggregate, fly ash, cement, water, and approved admixtures. No CLSM mixture shall be produced for payment until the RPR has given written approval of the proportions. The proportions shall be prepared by a laboratory and shall remain in effect for the duration of the project. The proportions shall establish a single percentage or weight for aggregate, fly ash, cement, water, and any admixtures proposed. Laboratory costs are incidental to this item.

**a. Compressive strength.** CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi when tested in accordance with ASTM D4832, with no significant strength gain after 28 days.

**b. Consistency.** Design CLSM to achieve a consistency that will produce an approximate 8-inch diameter circular-type spread without segregation. CLSM consistency shall be determined per ASTM D6103.

## CONSTRUCTION METHODS

### 153-4.1 PLACEMENT.

**a. Placement.** CLSM may be placed by any reasonable means from the mixing unit into the space to be filled. Agitation is required during transportation and waiting time. Placement shall be performed so structures or pipes are not displaced from their final position and intrusion of CLSM into unwanted areas is avoided. The material shall be brought up uniformly to the fill line shown on the plans or as identified by the RPR. Each placement of CLSM shall be as continuous an operation as possible. If CLSM is placed in more than one lift, the base lift shall be free of surface water and loose foreign material prior to placement of the next lift.

**b. Contractor Quality Control.** The Contractor shall collect all batch tickets to verify the CLSM delivered to the project conforms to the mix design. The Contractor shall verify daily that the CLSM is consistent with 153-3.1a and 153-3.1b. Adjustments shall be made as necessary to the proportions and materials as needed. The Contractor shall provide all batch tickets to the RPR.

**c. Limitations of placement.** CLSM shall not be placed on frozen ground. Mixing and placing may begin when the air or ground temperature is at least 35°F and rising. Mixing and placement shall stop when the air temperature is 40°F and falling or when the anticipated air or ground temperature will be 35°F or less in the 24-hour period following proposed placement. At the time of placement, CLSM shall have a temperature of at least 40°F.

### 153-4.2 CURING AND PROTECTION

**a. Curing.** The air in contact with the CLSM shall be maintained at temperatures above freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32°F the material may be rejected by the RPR if damage to the material is observed.

**b. Protection.** The CLSM shall not be subject to loads and shall remain undisturbed by construction activities for a period of 48 hours or until a compressive strength of 15 psi is obtained. The Contractor shall be responsible for providing evidence to the RPR that the material has reached the desired strength. Acceptable evidence shall be based upon compressive tests made in accordance with paragraph 153-3.1a.

**153-4.3 QUALITY ASSURANCE (QA) ACCEPTANCE.** CLSM QA acceptance shall be based upon batch tickets provided by the Contractor to the RPR to confirm that the delivered material conforms to the mix design.

## METHOD OF MEASUREMENT

**153-5.1 MEASUREMENT.** No separate measurement for payment shall be made for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

## BASIS OF PAYMENT

**153-6.1 PAYMENT.** No payment will be made separately or directly for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### ASTM International (ASTM)

|            |                                                                                                            |
|------------|------------------------------------------------------------------------------------------------------------|
| ASTM C33   | Standard Specification for Concrete Aggregates                                                             |
| ASTM C150  | Standard Specification for Portland Cement                                                                 |
| ASTM C618  | Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete           |
| ASTM C595  | Standard Specification for Blended Hydraulic Cements                                                       |
| ASTM C1602 | Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete                |
| ASTM D4832 | Standard Test Method for Preparation and Testing of Controlled Low-Strength Material (CLSM) Test Cylinders |
| ASTM D6103 | Flow Consistency of Controlled Low Strength Material (CLSM)                                                |

**END OF ITEM P-153**

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**ITEM P-156  
CEMENT TREATED SUBGRADE**

**DESCRIPTION**

**156-1.1** This item shall consist of constructing one or more courses of a mixture of soil, stabilizer, and water in accordance with this specification, and in conformity with the lines, grades, thickness, and typical cross-sections shown on the plans.

**MATERIALS**

**156-2.1 CEMENT.** Cement shall conform to the requirements of ASTM C150, Type I, IA, II, or IIA or ASTM C595, Type IS, IL, IP, or IS(A).

**156-2.2 WATER.** Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

**156-2.3 SOIL.** The soil for this work shall consist of on-site materials free of roots, sod, weeds, and stones larger than 2-1/2 inches and have a sulfate content of less than 0.3%.

**COMPOSITION**

**156-3.1 SOIL-CEMENT MIXTURE.** Before the start of subgrade construction, tests shall be made on the soil to be stabilized by the Contractor to determine the quantity of cement required for the mix design.

Test specimens containing various amounts of cement shall be compacted per ASTM D558, and the optimum moisture determined for each specimen. Samples at the optimum moisture shall be subjected to the wet-dry and freeze-thaw tests in accordance with ASTM D559 and ASTM D560, respectively.

Cement shall be added until the minimum California Bearing Ratio (CBR) of 100 or a 7-day compressive strength of 300 to 800 psi per ASTM C133 is achieved. The application rate of 5-7 percent of dry unit weight is anticipated.

**156-3.2 TOLERANCES.** At final compaction, the cement and water content for each course of subgrade treatment shall conform to the following tolerances:

**TOLERANCES**

| Material/Properties | Target      | Tolerance | Specifications        |
|---------------------|-------------|-----------|-----------------------|
| Cement              | ___%        | 0 to +1%  | % Total Dry Materials |
| Moisture Content    | Optimum +2% | 0 to +1%  | ASTM D1557            |

**WEATHER LIMITATIONS**

**156-4.1 WEATHER LIMITATION.** Do not construct subgrade when weather conditions detrimentally affect the quality of the materials. Do not apply cement unless the air temperature is at least 40°F and rising. Do not apply cement to soils that are frozen or contain frost. Do not apply cement when conditions are too windy to allow even distribution of the cement to the subgrade. If the air temperature falls below 35°F, protect completed treated areas against freezing. Remove and replace any damaged portion of the completed treated area with new material in accordance with this specification.

## EQUIPMENT

**156-5.1 EQUIPMENT.** All equipment necessary to grade, scarify, spread, mix and compact the material shall be provided. The Resident Project Representative (RPR) must approve the Contractor's proposed equipment prior to the start of the treatment.

## CONSTRUCTION METHODS

**156-6.1 GENERAL.** This specification is to construct a subgrade consisting of a uniform cement mixture which shall be free from loose or segregated areas. The subgrade shall be of uniform density and moisture content, well mixed for its full depth and have a smooth surface suitable for placing subsequent courses. The Contractor shall be responsible for meeting the above requirements.

Prior to any treatment, the subgrade shall be constructed as specified in Item P-152, Excavation, Subgrade and Embankment, and shaped to conform to the typical sections, lines, and grades as shown on the plans.

The mixing machine must give visible indication at all times that it is cutting, pulverizing and mixing the material uniformly to the proper depth over the full width of the cut.

**156-6.2 APPLICATION.** Cement shall be uniformly spread only over an area where the initial mixing operations and compaction can be completed during the same workday. The cement shall not be applied when wind conditions are detrimental to proper application. A motor grader shall not be used to spread the lime. Adequate moisture shall be added to the cement/soil mixture to maintain the proper moisture content. Materials shall be handled, stored, and applied in accordance with all federal, state, and local requirements.

**156-6.3 MIXING PROCEDURE.** The full depth of the treated subgrade shall be mixed with equipment as approved by the RPR. Cement shall not be left exposed for more than one (1) hour after distribution. Mixing and pulverization shall continue until the soil cement mixture contains no clods greater than 1-1/2 inches in size. Final moisture content of the mix shall be determined by the Contractor immediately prior to compaction in accordance with ASTM D2216 or ASTM D4959.

**156-6.4 CONTROL STRIP.** The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. Upon acceptance of the control strip by the RPR, the Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

**156-6.5 TREATMENT APPLICATION AND DEPTH CHECKS.** The amount of cement applied shall be monitored by the Contractor to assure that no less than the amount of cement required by the mix design is applied. The depth of stabilization shall be measured by the Contractor no less than 2 tests per day of material placed; test shall be witnessed by the RPR. Measurements shall be made in test holes excavated to show the full depth of mixing.

**156-6.6 COMPACTION.** The moisture content shall be within the tolerance as specified in paragraph 156-3.2. The field density of the compacted mixture shall be at least 95% of the maximum density as specified in paragraph 156-6.10. Compaction of the soil/cement mixture shall begin within 30 minutes after mixing the cement into the subgrade. All compaction operations shall be completed within 2 hours from the start of mixing.

Perform in-place density test immediately after completion of compaction to determine degree of compaction. If the material fails to meet the density requirements, compaction shall continue or the material shall be removed and replaced. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**156-6.7 FINISHING AND CURING.** After the final lift or course of treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. Finished portions of treated subgrade shall be protected to prevent equipment from marring, permanently deforming, or damaging completed work.

Not later than 24 hours after completion of final finishing, the surface shall be cured by application of an emulsified asphalt or application of a curing compound or other moisture retention methods as approved by the RPR.

Sufficient protection from freezing shall be provided for at least 7 days after its construction or as approved by the RPR.

**156-6.8 MAINTENANCE.** The Contractor shall maintain the entire treated subgrade in good condition from the start of work until all the work has been completed, cured, and accepted by the RPR. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meets all specification requirements. The cost shall be incidental to this item.

**156-6.9 SURFACE TOLERANCE.** In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

**a. Smoothness.** The finished surface shall not vary more than  $\pm \frac{1}{2}$  inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

**b. Grade.** The grade and crown shall be measured on a 50-foot grid and shall be within  $\pm 0.05$  feet of the specified grade.

**156-6.10 ACCEPTANCE SAMPLING AND TESTING.** Aggregate base course shall be accepted for density and thickness on an area basis. Testing frequency shall be a minimum of one (1) compaction and thickness test per 1000 square yards of stabilized subgrade, but not less than four (4) tests per day of production. Sampling locations will be determined on a random basis per ASTM D3665.

- a. Density.** All testing shall be done by the Contractor's laboratory in the presence of the RPR and density test results shall be furnished upon completion to the RPR for acceptance determination.

The field density of the compacted mixture shall be at least 95% of the maximum density as determined by ASTM D558. The in-place field density shall be determined in accordance with ASTM D6938, Procedure A, direct transmission method. The in-place moisture content shall be determined in accordance with ASTM D2216. If the material fails to meet the density requirements, compaction shall continue or the material shall be removed and replaced. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**b. Thickness.** The thickness of the base course shall be within  $\pm 0$  and  $\pm 1/2$  inch of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each subplot. Where the thickness is deficient by more than  $1/2$ -inch, the material shall be removed to full depth and replaced, at Contractor's expense.

#### METHOD OF MEASUREMENT

**156-7.1** The amount of cement treated subgrade shall be based on the number of square yards complete and accepted.

**156-7.2** The amount of cement used is based upon an application rate as specified in paragraph 156-3.1. The amount of cement shall be paid by the number of tons of cement used in the completed and accepted work.

#### BASIS OF PAYMENT

**156-8.1** Payment for placement shall be made at the contract unit price per square yard for the cement treated subgrade for the thickness specified. The price shall be full compensation for all preparation, delivering, placing and mixing these materials, and all labor, equipment, tools and incidentals necessary to complete this item.

**156-8.2** Payment for cement shall be made at the contract unit price per ton for the cement. The price shall be full compensation for all preparation, delivering, placing and mixing these materials, and all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

|             |                                           |
|-------------|-------------------------------------------|
| Item P 156a | Cement treated subgrade - per square yard |
| Item P-156b | Cement - per ton                          |

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### ASTM International (ASTM)

|            |                                                                                                                                                            |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ASTM C150  | Standard Specification for Portland Cement                                                                                                                 |
| ASTM C595  | Standard Specification for Blended Hydraulic Cements                                                                                                       |
| ASTM C1602 | Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete                                                                |
| ASTM D558  | Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures                                                                 |
| ASTM D1556 | Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method                                                                  |
| ASTM D1557 | Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2,700 kN-m/m <sup>3</sup> )) |
| ASTM D1663 | Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders                                                                             |
| ASTM D2216 | Test Methods for Laboratory Determination of Water (Moisture) Soil and Rock by Mass                                                                        |
| ASTM D2487 | Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)                                                |
| ASTM D4318 | Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils                                                                        |
| ASTM D4959 | Standard Test Method for Determination of Water Content of Soil by Direct Heating                                                                          |
| ASTM D6938 | Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)                                 |

**END OF ITEM P-156**

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## BASE COURSES





**ITEM P-208**  
**AGGREGATE BASE COURSE**

**DESCRIPTION**

**208-1.1** This item shall consist of a base course composed of course aggregate bonded with fine aggregate base. It shall be constructed on a prepared subgrade or subbase course per these specifications and shall conform to the dimensions and typical cross-section shown on the plans.

**MATERIALS**

**208-2.1 AGGREGATE BASE.** The aggregate base material shall consist of both fine and coarse aggregate. Material shall be clean, sound, durable particles and fragments of stone or gravel, crushed stone, or crushed gravel mixed or blended with sand, screenings, or other materials. Materials shall be handled and stored in accordance with all federal, state, and local requirements. The aggregate shall be free from clay lumps, organic matter, or other deleterious materials or coatings. The method used to produce the crushed gravel shall result in the fractured particles in the finished product as nearly constant and uniform as practicable. The fine aggregate portion, defined as the portion passing the No. 4 sieve produced in crushing operations, shall be incorporated in the base material to the extent permitted by the gradation requirements. Aggregate base material requirements are listed in the following table.

**AGGREGATE BASE MATERIAL REQUIREMENTS**

| Material Test                                                         | Requirement                                                                                                                | Standard   |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|------------|
| <b>Coarse Aggregate</b>                                               |                                                                                                                            |            |
| Resistance to Degradation                                             | Loss: 50% maximum                                                                                                          | ASTM C131  |
| Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate | Loss after 5 cycles:<br>12% maximum using Sodium sulfate - or -<br>18% maximum using magnesium sulfate                     | ASTM C88   |
| Percentage of Fractured Particles                                     | Minimum 60% by weight of particles with at least two fractured faces and 75% with at least one fractured face <sup>1</sup> | ASTM D5821 |
| Flat Particles, Elongated Particles, or Flat and Elongated Particles  | 10% maximum, by weight, of flat, elongated, or flat and elongated particles <sup>2</sup>                                   | ASTM D4791 |
| <b>Fine Aggregate</b>                                                 |                                                                                                                            |            |
| Liquid limit                                                          | Less than or equal to 25                                                                                                   | ASTM D4318 |
| Plasticity Index                                                      | Not more than five (5)                                                                                                     | ASTM D4318 |

<sup>1</sup>The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

<sup>2</sup>A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

**208-2.2 GRADATION REQUIREMENTS.** The gradation of the aggregate base material shall meet the requirements of the gradation given in the following table when tested per ASTM C117 and ASTM C136. The gradation shall be well graded from coarse to fine and shall not vary from the lower limit on one sieve to the high limit on an adjacent sieve or vice versa.

**GRADATION OF AGGREGATE BASE**

| Sieve Size | Design Range Percentage by Weight passing | Contractor's Final Gradation | Job Control Grading Band Tolerances for Contractor's Final Gradation <sup>1</sup> Percent |
|------------|-------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------|
| 2 inch     | --                                        |                              | ±0                                                                                        |
| 1-1/2 inch | --                                        |                              | ±5                                                                                        |
| 1 inch     | 100                                       |                              | ±8                                                                                        |
| 3/4 inch   | 70-100                                    |                              | ±8                                                                                        |
| No. 4      | 35-65                                     |                              | ±8                                                                                        |
| No. 40     | 10-25                                     |                              | ±5                                                                                        |
| No. 200    | 0-5                                       |                              | ±3                                                                                        |

<sup>1</sup>The "Job Control Grading Band Tolerances for Contractor's Final Gradation" in the table shall be applied to "Contractor's Final Gradation" to establish a job control grading band. The full tolerance still applies if application of the tolerances results in a job control grading band outside the design range.

**208-2.3 SAMPLING AND TESTING.**

**a. Aggregate base materials.** The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraphs 208-2.1 and 208-2.2. This sampling and testing will be the basis for approval of the aggregate base quality requirements. RPR may require additional iterations of materials sampling and testing during extended breaks in aggregate production or if differing materials become apparent.

**b. Gradation requirements.** The Contractor shall take at least two aggregate base samples per day in the presence of the Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet all the requirements in paragraph 208-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

**208-2.4 SEPARATION GEOTEXTILE.** Not used.**CONSTRUCTION METHODS**

**208-3.1 CONTROL STRIP.** The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.

**208-3.2 PREPARING UNDERLYING SUBGRADE AND/OR SUBBASE.** The underlying subgrade and/or subbase shall be checked and accepted by the RPR before base course placing and spreading operations begin. Re-proof rolling of the subgrade or proof rolling of the subbase in accordance with Item P-152, at

the Contractor's expense, may be required by the RPR if the Contractor fails to ensure proper drainage or protect the subgrade and/or subbase. Any ruts or soft, yielding areas due to improper drainage conditions, hauling, or any other cause, shall be corrected before the base course is placed. To ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

**208-3.3 PRODUCTION.** The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 208-3.5, the approved material may be transported directly to the placement.

**208-3.4 PLACEMENT.** The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The base course layer shall be constructed in lifts as established in the control strip, but not less than 4 inches nor more than 12 inches of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

**208-3.5 COMPACTION.** Immediately upon completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least 100% of the maximum density of laboratory specimens prepared from samples of the base material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with ASTM D698. The moisture content of the material during placing operations shall be within  $\pm 2$  percentage points of the optimum moisture content as determined by ASTM D6938. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**208-3.6 WEATHER LIMITATIONS.** Material shall not be placed unless the ambient air temperature is at least 40 °F and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

**208-3.7 MAINTENANCE.** The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at their expense.

**208-3.8 SURFACE TOLERANCES.** After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and recompact to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

A 12-foot straight edge shall be provided by the Contractor and made available to the RPR at all times for testing of surface smoothness tolerance.

**a. Smoothness.** The finished surface shall not vary more than 3/8-inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

**b. Grade.** The grade and crown shall be measured on a 50-foot grid and shall be within +0 and -1/2 inch of the specified grade.

**208-3.9 ACCEPTANCE SAMPLING AND TESTING.** Aggregate base course shall be accepted for density and thickness on an area basis. Two tests will be made for density and thickness for each 1200 square yards. Sampling locations will be determined on a random basis per ASTM D3665.

**a. Density.** The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance.

Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM D698. The in-place field density shall be determined per ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the area represented by the failed test must be reworked and/or recompact and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**b. Thickness.** Depth tests shall be made by test holes at least 3 inches in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2 inch, the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches, adding new material of proper gradation, and the material shall be blended and recompact to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

If approved by the RPR, lift thickness testing may also be performed via survey at no cost to the Sponsor. If survey is to be used, Contractor shall provide the RPR with electronic survey of both the final accepted underlying surface prior to placing of base course material and after the placement of base course. Thickness checks will use this survey as the basis for determining base course thickness. Format of electronic survey shall be approved by RPR.

c. The Contractor shall remove all survey and grade hubs from base courses prior to placing any surface course.

### METHOD OF MEASUREMENT

**208-4.1** The quantity of aggregate base course shall be measured by the number of cubic yards of material actually constructed and accepted by the RPR as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities.

### BASIS OF PAYMENT

**208-5.1** Payment shall be made at the contract unit price per cubic yard for aggregate base course. This price shall be full compensation for furnishing all materials and for all operations, hauling, placing, and compacting of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-208      Aggregate Base Course - per cubic yard

### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

|            |                                                                                                                                     |
|------------|-------------------------------------------------------------------------------------------------------------------------------------|
| ASTM C29   | Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate                                                        |
| ASTM C88   | Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate                                      |
| ASTM C117  | Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing                          |
| ASTM C131  | Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine |
| ASTM C136  | Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates                                                     |
| ASTM C142  | Standard Test Method for Clay Lumps and Friable Particles in Aggregates                                                             |
| ASTM D75   | Standard Practice for Sampling Aggregates                                                                                           |
| ASTM D698  | Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> )      |
| ASTM D1556 | Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method                                           |

|            |                                                                                                                                     |
|------------|-------------------------------------------------------------------------------------------------------------------------------------|
| ASTM D1557 | Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> )      |
| ASTM D2167 | Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method                                      |
| ASTM D2487 | Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)                         |
| ASTM D3665 | Standard Practice for Random Sampling of Construction Materials                                                                     |
| ASTM D4318 | Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils                                                |
| ASTM D4491 | Standard Test Methods for Water Permeability of Geotextiles by Permittivity                                                         |
| ASTM D4643 | Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating                                  |
| ASTM D4751 | Standard Test Methods for Determining Apparent Opening Size of a Geotextile                                                         |
| ASTM D4791 | Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate                   |
| ASTM D5821 | Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate                                      |
| ASTM D6938 | Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)           |
| ASTM D7928 | Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis |

American Association of State Highway and Transportation Officials (AASHTO)

|      |                                                                                |
|------|--------------------------------------------------------------------------------|
| M288 | Standard Specification for Geosynthetic Specification for Highway Applications |
|------|--------------------------------------------------------------------------------|

**END OF ITEM P-208**

## **FLEXIBLE PAVEMENTS**





**ITEM P-401  
ASPHALT MIX PAVEMENT**

**DESCRIPTION**

**401-1.1** This item shall consist of pavement courses composed of mineral aggregate and asphalt binder mixed in a central mixing plant and placed on a prepared base or stabilized course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

**MATERIALS**

**401-2.1 AGGREGATE.** Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand, and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. Coarse aggregate is the material retained on the No. 4 sieve. Fine aggregate is the material passing the No. 4 sieve.

**a. Coarse aggregate.** Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Coarse aggregate material requirements are given in the table below.

**COARSE AGGREGATE MATERIAL REQUIREMENTS**

| Material Test                                                                | Requirement                                                                                                                                                                                                                                                                                                                                                                                                               | Standard   |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Resistance to Degradation                                                    | Loss: 40% maximum                                                                                                                                                                                                                                                                                                                                                                                                         | ASTM C131  |
| Soundness of Aggregates by Use of Sodium Sulfate <b>or</b> Magnesium Sulfate | Loss after 5 cycles:<br>12% maximum using Sodium sulfate - or -<br>18% maximum using magnesium sulfate                                                                                                                                                                                                                                                                                                                    | ASTM C88   |
| Clay lumps and friable particles                                             | 1.0% maximum                                                                                                                                                                                                                                                                                                                                                                                                              | ASTM C142  |
| Percentage of Fractured Particles                                            | For pavements designed for aircraft gross weights of 60,000 pounds or more:<br>Minimum 75% by weight of particles with at least two fractured faces and 85% with at least one fractured face <sup>1</sup><br><br>For pavements designed for aircraft gross weights less than 60,000 pounds:<br>Minimum 50% by weight of particles with at least two fractured faces and 65% with at least one fractured face <sup>1</sup> | ASTM D5821 |
| Flat, Elongated, or Flat and Elongated Particles                             | 8% maximum, by weight, of flat, elongated, or flat and elongated particles at 5:1 <sup>2</sup>                                                                                                                                                                                                                                                                                                                            | ASTM D4791 |
| Bulk density of slag <sup>3</sup>                                            | Weigh not less than 70 pounds per cubic foot                                                                                                                                                                                                                                                                                                                                                                              | ASTM C29.  |

<sup>1</sup>The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

<sup>2</sup>A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

<sup>3</sup>Only required if slag is specified.

**b. Fine aggregate.** Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, slag, or gravel and shall be free from coatings of clay, silt, or other objectionable matter. Natural (non-manufactured) sand may be used to obtain the gradation of the fine aggregate blend or to improve the workability of the mix. Fine aggregate material requirements are listed in the table below.

**FINE AGGREGATE MATERIAL REQUIREMENTS**

| Material Test                                                         | Requirement                                                                                            | Standard   |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------|
| Liquid limit                                                          | 25 maximum                                                                                             | ASTM D4318 |
| Plasticity Index                                                      | 4 maximum                                                                                              | ASTM D4318 |
| Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate | Loss after 5 cycles:<br>10% maximum using Sodium sulfate - or -<br>15% maximum using magnesium sulfate | ASTM C88   |
| Clay lumps and friable particles                                      | 1.0% maximum                                                                                           | ASTM C142  |
| Sand equivalent                                                       | 45 minimum                                                                                             | ASTM D2419 |

**c. Sampling.** ASTM D75 shall be used in sampling coarse and fine aggregate.

**401-2.2 MINERAL FILLER.** Mineral filler (baghouse fines) may be added in addition to material naturally present in the aggregate. Mineral filler shall meet the requirements of ASTM D242.

**MINERAL FILLER REQUIREMENTS**

| Material Test    | Requirement | Standard   |
|------------------|-------------|------------|
| Plasticity Index | 4 maximum   | ASTM D4318 |

**401-2.3 ASPHALT BINDER.** Asphalt binder shall conform to ASTM D6373 Performance Grade (PG) 64-28.

**401-2.4 ANTI-STRIPPING AGENT.** Any anti-stripping agent or additive (anti-strip) shall be heat stable and shall not change the asphalt binder grade beyond specifications. Anti-strip shall be an approved material of the Department of Transportation of the State in which the project is located.

## COMPOSITION

**401-3.1 COMPOSITION OF MIXTURE(S).** The asphalt mix shall be composed of a mixture of aggregates, filler and anti-strip agent if required, and asphalt binder. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

**401-3.2 JOB MIX FORMULA (JMF) LABORATORY.** The laboratory used to develop the JMF shall possess a current certificate of accreditation, listing D3666 from a national accrediting authority and all test methods required for developing the JMF; and be listed on the accrediting authority's website. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Resident Project Representative (RPR) prior to start of construction.

**401-3.3 JOB MIX FORMULA (JMF).** No asphalt mixture shall be placed until an acceptable mix design has been submitted to the RPR for review and accepted in writing. The RPR's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

When the project requires asphalt mixtures of differing aggregate gradations and/or binders, a separate JMF shall be submitted for each mix. Add anti-stripping agent to meet tensile strength requirements.

The JMF shall be prepared by an accredited laboratory that meets the requirements of paragraph 401-3.2. The asphalt mixture shall be designed using procedures contained in Asphalt Institute MS-2 Mix Design Manual, 7th Edition. Samples shall be prepared and compacted using a Marshall compactor in accordance with ASTM D6926.

Should a change in sources of materials be made, a new JMF must be submitted to the RPR for review and accepted in writing before the new material is used. After the initial production JMF has been approved by the RPR and a new or modified JMF is required for whatever reason, the subsequent cost of the new or modified JMF, including a new control strip when required by the RPR, will be borne by the Contractor.

The RPR may request samples at any time for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

The JMF shall be submitted in writing by the Contractor at least 30 days prior to the start of paving operations. The JMF shall be developed within the same construction season using aggregates proposed for project use.

The JMF shall be dated, and stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

- Manufacturer's Certificate of Analysis (COA) for the asphalt binder used in the JMF in accordance with paragraph 401-2.3. Certificate of asphalt performance grade is with modifier already added, if used and must indicate compliance with ASTM D6373. For plant modified asphalt binder, certified test report indicating grade certification of modified asphalt binder.
- Manufacturer's Certificate of Analysis (COA) for the anti-stripping agent if used in the JMF in accordance with paragraph 401-2.4.
- Certified material test reports for the course and fine aggregate and mineral filler in accordance with paragraphs 401-2.1.
- Percent passing each sieve size for individual gradation of each aggregate cold feed and/or hot bin; percent by weight of each cold feed and/or hot bin used; and the total combined gradation in the JMF.
- Specific Gravity and absorption of each coarse and fine aggregate.
- Percent natural sand.
- Percent fractured faces.
- Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).
- Percent of asphalt.
- Number of blows or gyrations
- Laboratory mixing and compaction temperatures.
- Supplier-recommended field mixing and compaction temperatures.
- Plot of the combined gradation on a 0.45 power gradation curve.

- Graphical plots of air voids, voids in the mineral aggregate (VMA), and unit weight versus asphalt content. To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.
- Tensile Strength Ratio (TSR).
- Type and amount of Anti-strip agent when used.
- Asphalt Pavement Analyzer (APA) results.
- Date the JMF was developed. Mix designs that are not dated or which are from a prior construction season shall not be accepted.

**TABLE 1**  
**ASPHALT DESIGN CRITERIA**

| Test Property                                     | Value                                      | Test Method |
|---------------------------------------------------|--------------------------------------------|-------------|
| Number of blows or gyrations                      | 50                                         |             |
| Air voids (%)                                     | 3.5                                        | ASTM D3203  |
| Percent voids in mineral aggregate (VMA), minimum | See Table 2                                | ASTM D6995  |
| Tensile Strength Ratio (TSR) <sup>1</sup>         | not less than 80 at a saturation of 70-80% | ASTM D4867  |

<sup>1</sup>Test specimens for TSR shall be compacted at  $7 \pm 1.0$  % air voids. In areas subject to freeze-thaw, use freeze-thaw conditioning in lieu of moisture conditioning per ASTM D4867.

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation or gradations specified in Table 2 when tested in accordance with ASTM C136 and ASTM C117.

The gradations in Table 2 represent the limits that shall determine the suitability of aggregate for use from the sources of supply; be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa.

**TABLE 2**  
**AGGREGATE - ASPHALT PAVEMENTS**

| Sieve Size                                                  | Percentage by Weight Passing Sieve |
|-------------------------------------------------------------|------------------------------------|
| 1 inch                                                      | --                                 |
| 3/4 inch                                                    | 100                                |
| 1/2 inch                                                    | 90-100                             |
| 3/8 inch                                                    | 72-88                              |
| No. 4                                                       | 53-73                              |
| No. 8                                                       | 38-60                              |
| No. 16                                                      | 26-48                              |
| No. 30                                                      | 18-38                              |
| No. 50                                                      | 11-27                              |
| No. 100                                                     | 6-18                               |
| No. 200                                                     | 3-6                                |
| <b>Minimum Voids in Mineral Aggregate (VMA)<sup>1</sup></b> | 15.0                               |
| <b>Asphalt Percent:</b>                                     |                                    |
| Stone or gravel                                             | 5.0-7.5                            |
| Slag                                                        | 6.5-9.5                            |
| <b>Recommended Minimum Construction Lift Thickness</b>      | 2-Inch                             |

<sup>1</sup>To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition.

**401-3.4 RECLAIMED ASPHALT PAVEMENT (RAP).** RAP shall not be used.

**401-3.5 CONTROL STRIP.** Full production shall not begin until an acceptable control strip has been constructed and accepted in writing by the RPR. The Contractor shall prepare and place a quantity of asphalt according to the JMF. The underlying grade or pavement structure upon which the control strip is to be constructed shall be the same as the remainder of the course represented by the control strip.

The Contractor will not be allowed to place the control strip until the Contractor quality control program (CQCP), showing conformance with the requirements of paragraph 401-5.1, has been accepted, in writing, by the RPR.

The control strip will consist of at least 250 tons or 1/2 subplot, whichever is greater. The control strip shall be placed in two lanes of the same width and depth to be used in production with a longitudinal cold joint. The cold joint must be cut back in accordance with paragraph 401-4.14 using the same procedure that will be used during production. The cold joint for the control strip will be an exposed construction joint at least four (4) hours old or when the mat has cooled to less than 160°F. The equipment used in construction of the control strip shall be the same type, configuration and weight to be used on the project.

The control strip will be considered acceptable by the RPR if the gradation, asphalt content, and VMA are within the action limits specified in paragraph 401-5.5a; and Mat Density greater than or equal to 94.5%, air voids  $3.5\% \pm 1\%$ , and joint density greater than or equal to 92.5% .

If the control strip is unacceptable, necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made and another control strip shall be placed. Unacceptable control strips shall be removed at the Contractor's expense.

The control strip will be considered one lot for payment based upon the average minimum of 3 samples (no sublots required for control strip. Payment will only be made for an acceptable control strip in accordance with paragraph 401-8.1 using a lot pay factor equal to 100.

Full production shall not begin until an acceptable test section has been constructed and accepted in writing by the Engineer.

## CONSTRUCTION METHODS

**401-4.1 WEATHER LIMITATIONS.** The asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the RPR, if requested; however, all other requirements including compaction shall be met.

**TABLE 4**  
**SURFACE TEMPERATURE LIMITATIONS OF UNDERLYING COURSE**

| Mat Thickness                                | Base Temperature (Minimum) |    |
|----------------------------------------------|----------------------------|----|
|                                              | °F                         | °C |
| 3 inches or greater                          | 40                         | 4  |
| Greater than 2 inches but less than 3 inches | 45                         | 7  |

**401-4.2 ASPHALT PLANT.** Plants used for the preparation of asphalt shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 including the following items.

**a. Inspection of plant.** The RPR, or RPR's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

**b. Storage bins and surge bins.** The asphalt mixture stored in storage and/or surge bins shall meet the same requirements as asphalt mixture loaded directly into trucks. Asphalt mixture shall not be stored in storage and/or surge bins for a period greater than twelve (12) hours. If the RPR determines there is an excessive heat loss, segregation, or oxidation of the asphalt mixture due to temporary storage, temporary storage shall not be allowed.

**401-4.3 AGGREGATE STOCKPILE MANAGEMENT.** Aggregate stockpiles shall be constructed in a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the asphalt batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used.

A continuous supply of materials shall be provided to the work to ensure continuous placement.

**401-4.4 HAULING EQUIPMENT.** Trucks used for hauling asphalt shall have tight, clean, and smooth metal beds. To prevent the asphalt from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the RPR. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

**401-4.4.1 MATERIAL TRANSFER VEHICLE (MTV).** Material transfer vehicles are not required.

**401-4.5 ASPHALT PAVERS.** Asphalt pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of asphalt that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface. The asphalt paver shall be equipped with a control system capable of automatically maintaining the specified screed grade and elevation.

If the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued.

The paver shall be capable of paving to a minimum width specified in paragraph 401-4.12.

**401-4.6 ROLLERS.** The number, type, and weight of rollers shall be sufficient to compact the asphalt to the required density while it is still in a workable condition without crushing of the aggregate, depressions or other damage to the pavement surface. Rollers shall be in good condition, clean, and capable of operating at slow speeds to avoid displacement of the asphalt. All rollers shall be specifically designed and suitable for compacting asphalt concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used.

**401-4.7 DENSITY DEVICE.** The Contractor shall have on site a density gauge during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall supply a qualified technician during all paving operations to calibrate the gauge and obtain accurate density readings for all new asphalt. These densities shall be supplied to the RPR upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

**401-4.8 PREPARATION OF ASPHALT BINDER.** The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt binder to the mixer at a uniform temperature. The temperature of unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F when added to the aggregate.

**401-4.9 PREPARATION OF MINERAL AGGREGATE.** The aggregate for the asphalt shall be heated and dried. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete



coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

**401-4.10 PREPARATION OF ASPHALT MIXTURE.** The aggregates and the asphalt binder shall be weighed or metered and mixed in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all asphalt upon discharge shall not exceed 0.5%.

**401-4.11 APPLICATION OF PRIME AND TACK COAT.** Immediately before placing the asphalt mixture, the underlying course shall be cleaned of all dust and debris.

A tack coat shall be applied in accordance with Item P-603 to all vertical and horizontal asphalt and concrete surfaces prior to placement of the first and each subsequent lift of asphalt mixture.

**401-4.12 LAYDOWN PLAN, TRANSPORTING, PLACING, AND FINISHING.** Prior to the placement of the asphalt, the Contractor shall prepare a laydown plan with the sequence of paving lanes and width to minimize the number of cold joints; the location of any temporary ramps; laydown temperature; and estimated time of completion for each portion of the work (milling, paving, rolling, cooling, etc.). The laydown plan and any modifications shall be approved by the RPR.

Deliveries shall be scheduled so that placing and compacting of asphalt is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to approximately ambient temperature. The Contractor, at their expense, shall be responsible for repair of any damage to the pavement caused by hauling operations.

Contractor shall survey each lift of asphalt surface course and certify to RPR that every lot of each lift meets the grade tolerances of paragraph 401-6.2d before the next lift can be placed.

Edges of existing asphalt pavement abutting the new work shall be saw cut and the cut off material and laitance removed. Apply a tack coat in accordance with P-603 before new asphalt material is placed against it.

The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Placement of the asphalt mix shall begin along the centerline of a crowned section or on the high side of areas with a one way slope unless shown otherwise on the laydown plan as accepted by the RPR. The asphalt mix shall be placed in consecutive adjacent lanes having a minimum width of 10 feet except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least one foot; however, the joint in the surface top course shall be at the centerline of crowned



pavements. Transverse joint-s in one course shall be offset by at least 10 feet from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt mixture. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet long.

**401-4.13 COMPACTION OF ASPHALT MIXTURE.** After placing, the asphalt mixture shall be thoroughly and uniformly compacted by self-propelled rollers. The surface shall be compacted as soon as possible when the asphalt has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any surface defects and/or displacement occurring as a result of the roller, or from any other cause, shall be corrected at the Contractor's expense.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross-section, and the required field density is obtained. To prevent adhesion of the asphalt to the roller, the wheels shall be equipped with a scraper and kept moistened with water as necessary.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power tampers.

Any asphalt that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

**401-4.14 JOINTS.** The formation of all joints shall be made to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid asphalt except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be coated with an asphalt tack coat before placing any fresh asphalt against the joint.

Longitudinal joints which have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F; or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches, horizontally, to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. Asphalt tack coat in accordance with P-603 shall be applied to the clean, dry joint prior to placing any additional fresh asphalt against the joint. The cost of this work shall be considered incidental to the cost of the asphalt.

Cut back of cold joints is required as specified above. The Contractor may provide additional joint density QC by use of joint heaters at the Contractor's expense. Electrically powered infrared heating equipment should consist of one or more low-level radiant energy heaters to uniformly heat and soften the pavement joints. The heaters should be configured to uniformly heat an area up to 18 inches in width and 3 inches in depth. Infrared equipment shall be thermostatically controlled to provide a uniform, consistent temperature increase throughout the layer being heated up to a maximum temperature range of 200 to 300°F.

Propane powered infrared heating equipment shall be attached to the paving machine and the output of infrared energy shall be in the one to six-micron range. Converters shall be arranged end to end directly over the joint to be heated in sufficient numbers to continuously produce, when in operation, a minimum of 240,000 BTU per hour. The joint heater shall be positioned not more than one inch above the pavement to be heated and in front of the paver screed and shall be fully adjustable. Heaters will be required to be in operation at all times.

The heaters shall be operated so they do not produce excessive heat when the units pass over new or previously paved material.

**401-4.15 SAW-CUT GROOVING.** Saw-cut grooving is not required.

**401-4.16 DIAMOND GRINDING.** Diamond grinding shall be completed prior to pavement grooving. Diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive.

Diamond grinding shall be performed with a machine designed specifically for diamond grinding capable of cutting a path at least 3 feet wide. The saw blades shall be 1/8-inch wide with a sufficient number of blades to create grooves between 0.090 and 0.130 inches wide; and peaks and ridges approximately 1/32 inch higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that cause ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted. Contractor shall demonstrate to the RPR that the grinding equipment will produce satisfactory results prior to making corrections to surfaces. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. The Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

**401-4.17 NIGHTTIME PAVING REQUIREMENTS.** The Contractor shall provide adequate lighting during any nighttime construction. A lighting plan shall be submitted by the Contractor and approved by the RPR prior to the start of any nighttime work. All work shall be in accordance with the approved CSPP and lighting plan.

### CONTRACTOR QUALITY CONTROL (CQC)

**401-5.1 GENERAL.** The Contractor shall develop a Contractor Quality Control Program (CQCP) in accordance with Item C-100. No partial payment will be made for materials without an approved CQCP.

**401-5.2 CONTRACTOR QUALITY CONTROL (QC) FACILITIES.** The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The RPR shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

**401-5.3 CONTRACTOR QC TESTING.** The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved CQCP. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A QC Testing Plan shall be developed as part of the CQCP.

**a. Asphalt content.** A minimum of two tests shall be performed per day in accordance with ASTM D6307 or ASTM D2172 for determination of asphalt content. When using ASTM D6307, the correction factor shall be determined as part of the first test performed at the beginning of plant production; and as part of every tenth test performed thereafter. The asphalt content for the day will be determined by averaging the test results.

**b. Gradation.** Aggregate gradations shall be determined a minimum of twice per day from mechanical analysis of extracted aggregate in accordance with ASTM D5444, ASTM C136, and ASTM C117.

**c. Moisture content of aggregate.** The moisture content of aggregate used for production shall be determined a minimum of once per day in accordance with ASTM C566.

**d. Moisture content of asphalt.** The moisture content shall be determined once per day in accordance with AASHTO T329 or ASTM D1461.

**e. Temperatures.** Temperatures shall be checked, at least four times per day, at necessary locations to determine the temperatures of the dryer, the asphalt binder in the storage tank, the asphalt at the plant, and the asphalt at the job site.

**f. In-place density monitoring.** The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D2950.

**g. Smoothness for Contractor Quality Control.**

In the presence of the RPR, the Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than ¼ inch in 12 feet, identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues.

The Contractor may use a 12-foot straightedge, a rolling inclinometer meeting the requirements of ASTM E2133, or rolling external reference device that can simulate a 12-foot straightedge approved by the RPR. Straightedge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling inclinometer or external reference device is used, the data may be evaluated using the FAA profile program, ProFAA or FHWA ProVal, using the 12-foot straightedge simulation function.

Smoothness readings shall not be made across grade changes or cross slope transitions. The transition between new and existing pavement shall be evaluated separately for conformance with the plans.

**(1) Transverse measurements.** Transverse measurements shall be taken for each day's production placed. Transverse measurements shall be taken perpendicular to the pavement centerline each 50 feet or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues.

**(2) Longitudinal measurements.** Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests shall be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet; and at the third points of paving lanes when widths of paving lanes are 20 ft or greater. When placement abuts previously placed material, the first measurement shall start with one half the length of the straight edge on the previously placed material.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 401-6.1d(3). Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

**h. Grade.** Grade shall be evaluated daily to allow adjustments to paving operations when grade measurements do not meet specifications. As a minimum, grade shall be evaluated prior to and after the placement of the first lift and after placement of the surface lift.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch vertically and 0.1 feet laterally. The documentation will be provided by the Contractor to the RPR by the end of the following working day.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 401-4.16.

The Contractor shall repair low areas or areas that cannot be corrected by grinding by removal of deficient areas to the depth of the final course plus 1/2 inch and replacing with new material. Skin patching is not allowed.

**401-5.4 SAMPLING.** When identified by the RPR, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

**401-5.5 CONTROL CHARTS.** The Contractor shall maintain linear control charts for both individual measurements and range (i.e. difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each day will be calculated and monitored by the QC laboratory.

Control charts shall be posted in a location satisfactory to the RPR and kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the RPR may suspend production or acceptance of the material.

**a. Individual measurements.** Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation, asphalt content, and VMA. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

**CONTROL CHART LIMITS FOR INDIVIDUAL MEASUREMENTS**

| Sieve                  | Action Limit | Suspension Limit |
|------------------------|--------------|------------------|
| 3/4 inch               | ±6%          | ±9%              |
| 1/2 inch               | ±6%          | ±9%              |
| 3/8 inch               | ±6%          | ±9%              |
| No. 4                  | ±6%          | ±9%              |
| No. 16                 | ±5%          | ±7.5%            |
| No. 50                 | ±3%          | ±4.5%            |
| No. 200                | ±2%          | ±3%              |
| <b>Asphalt Content</b> | ±0.45%       | ±0.70%           |
| <b>Minimum VMA</b>     | -0.5%        | -1.0%            |

**b. Range.** Control charts shall be established to control gradation process variability. The range shall be plotted as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of  $n = 2$ . Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for  $n = 3$  and by 1.27 for  $n = 4$ .

**CONTROL CHART LIMITS BASED ON RANGE**

| <b>Sieve</b>           | <b>Suspension Limit</b> |
|------------------------|-------------------------|
| 1/2 inch               | 11%                     |
| 3/8 inch               | 11%                     |
| No. 4                  | 11%                     |
| No. 16                 | 9%                      |
| No. 50                 | 6%                      |
| No. 200                | 3.5%                    |
| <b>Asphalt Content</b> | 0.8%                    |

**c. Corrective Action.** The CQCP shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

- (1) One point falls outside the Suspension Limit line for individual measurements or range; or
- (2) Two points in a row fall outside the Action Limit line for individual measurements.

**401-5.6 QC REPORTS.** The Contractor shall maintain records and shall submit reports of QC activities daily, in accordance with Item C-100.

### **MATERIAL ACCEPTANCE**

**401-6.1 ACCEPTANCE SAMPLING AND TESTING.** Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the RPR at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor.

**a. Quality assurance (QA) testing laboratory.** The QA testing laboratory performing these acceptance tests will be accredited in accordance with ASTM D3666. The QA laboratory accreditation will be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing will be listed on the lab accreditation.

**b. Lot size.** A standard lot will be equal to one day's production divided into approximately equal sublots of between 400 to 600 tons. When only one or two sublots are produced in a day's production, the sublots will be combined with the production lot from the previous or next day.

Where more than one plant is simultaneously producing asphalt for the job, the lot sizes will apply separately for each plant.

**c. Asphalt air voids.** Plant-produced asphalt will be tested for air voids on a subplot basis.

**(1) Sampling.** Material from each subplot shall be sampled in accordance with ASTM D3665. Samples shall be taken from material deposited into trucks at the plant or at the job site in accordance with ASTM D979. The sample of asphalt may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to maintain the material at or above the compaction temperature as specified in the JMF.



**(2) Testing.** Air voids will be determined for each subplot in accordance with ASTM D3203 for a set of three compacted specimens prepared in accordance with ASTM D6926.

**d. In-place asphalt mat and joint density.** Each subplot will be tested for in-place mat and joint density as a percentage of the theoretical maximum density (TMD).

**(1) Sampling.** The Contractor will cut minimum 5 inch diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

**(2) Bond.** Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as identified by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as identified by the RPR.

**(3) Thickness.** Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each subplot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or subplot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the RPR to circumscribe the deficient area. Lots that are consistently thicker than indicated thickness may be limited to plan quantity for payment.

**(4) Mat density.** One core shall be taken from each subplot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each subplot sample by the TMD for that subplot.

**(5) Joint density.** One core centered over the longitudinal joint shall be taken for each subplot that has a longitudinal joint. Core locations will be determined by the RPR in accordance with ASTM D3665. The bulk specific gravity of each core sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each joint density sample by the average TMD for the lot. The TMD used to determine the joint density at joints formed between lots will be the lower of the average TMD values from the adjacent lots.

#### **401-6.2 ACCEPTANCE CRITERIA.**

**a. General.** Acceptance will be based on the implementation of the Contractor Quality Control Program (CQCP) and the following characteristics of the asphalt and completed pavements: air voids, mat density, joint density, grade.

**b. Air Voids and Mat density.** Acceptance of each lot of plant produced material for mat density and air voids will be based on the percentage of material within specification limits (PWL). If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment will be determined in accordance with paragraph 401-8.1.

**c. Joint density.** Acceptance of each lot of plant produced asphalt for joint density will be based on the PWL. If the PWL of the lot is equal to or exceeds 90%, the lot will be considered acceptable. If the PWL is less than 90%, the Contractor shall evaluate the reason and act accordingly. If the PWL is less than 80%, the Contractor shall cease operations and until the reason for poor compaction has been determined. If the PWL is less than 71%, the pay factor for the lot used to complete the joint will be reduced by five (5) percentage points. This lot pay factor reduction will be incorporated and evaluated in accordance with paragraph 401-8.1.

**d. Grade.** The final finished surface of the pavement shall be surveyed to verify that the grade elevations and cross-sections shown on the plans do not deviate more than 1/2 inch vertically. Grade measurements shall correspond to surface lots.

Cross-sections of the pavement shall be taken at a minimum 50-foot longitudinal spacing, at all longitudinal grade breaks, and at start and end of each lane placed. Minimum cross-section grade points shall include grade at centerline, and edge of taxiway pavement.

The survey and documentation shall be stamped and signed by a licensed surveyor. Payment for sublots that do not meet grade for over 25% of the sublot shall not be more than 95%. Lots that are consistently thicker than indicated thickness may be limited to plan quantity for payment.

**e. Profilograph roughness for QA Acceptance.** Not used.

**401-6.3 PERCENTAGE OF MATERIAL WITHIN SPECIFICATION LIMITS (PWL).** The PWL will be determined in accordance with procedures specified in Item C-110. The specification tolerance limits (L) for lower and (U) for upper are contained in Table 5.

**TABLE 5**  
**ACCEPTANCE LIMITS FOR AIR VOIDS AND DENSITY**

| Test Property                  | Pavements Specification Tolerance Limits |     |
|--------------------------------|------------------------------------------|-----|
|                                | L                                        | U   |
| Air Voids Total Mix (%)        | 2.0                                      | 5.0 |
| Surface Course Mat Density (%) | 92.8                                     | -   |
| Base Course Mat Density (%)    | 92.0                                     | -   |
| Joint density (%)              | 90.5                                     | --  |

**a. Outliers.** All individual tests for mat density and air voids will be checked for outliers (test criterion) in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded, and the PWL will be determined using the remaining test values. The criteria in Table 5 is based on production processes which have a variability with the following standard deviations: Surface Course Mat Density (%), 1.30; Base Course Mat Density (%), 1.55; Joint Density (%), 1.55.

The Contractor should note that (1) 90 PWL is achieved when consistently producing a surface course with an average mat density of at least 94.5% with 1.30% or less variability, (2) 90 PWL is achieved when consistently producing a base course with an average mat density of at least 94.0% with 1.55% or less variability, and (3) 90 PWL is achieved when consistently producing joints with an average joint density of at least 92.5% with 1.55% or less variability.



**401-6.4 RESAMPLING PAVEMENT FOR MAT DENSITY.**

**a. General.** Resampling of a lot of pavement will only be allowed for mat density, and then, only if the Contractor requests same, in writing, within 48 hours after receiving the written test results from the RPR. A retest will consist of all the sampling and testing procedures contained in paragraphs 401-6.1d and 401-6.2b. Only one resampling per lot will be permitted.

**(1)** A redefined PWL will be calculated for the resampled lot. The number of tests used to calculate the redefined PWL will include the initial tests made for that lot plus the retests.

**(2)** The cost for resampling and retesting shall be borne by the Contractor.

**b. Payment for resampled lots.** The redefined PWL for a resampled lot will be used to calculate the payment for that lot in accordance with Table 6.

**c. Outliers.** Check for outliers in accordance with ASTM E178, at a significance level of 5%.

**METHOD OF MEASUREMENT**

**401-7.1 MEASUREMENT.** Asphalt shall be measured by the number of tons of asphalt used in the accepted work. Batch weights or truck scale weights will be used to determine the basis for the tonnage.

**BASIS OF PAYMENT**

**401-8.1 PAYMENT.** Payment for a lot of asphalt meeting all acceptance criteria as specified in paragraph 401-6.2 shall be made based on results of tests for mat density and air voids. Payment for acceptable lots shall be adjusted according to paragraph 401-8.1c for mat density and air voids; and paragraph 401-6.2c for joint density, subject to the limitation that:

**a.** The total project payment for plant mix asphalt pavement shall not exceed 100 percent of the product of the contract unit price and the total number of tons of asphalt used in the accepted work.

**b.** The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

**c. Basis of adjusted payment.** The pay factor for each individual lot shall be calculated in accordance with Table 6. A pay factor shall be calculated for both mat density and air voids. The lot pay factor shall be the higher of the two values when calculations for both mat density and air voids are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either mat density or air voids is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both mat density and air voids are less than 100%. If PWL for joint density is less than 71% then the lot pay factor shall be reduced by 5% but be no higher than 95%.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 401-8.1a. Payment in excess of 100% for accepted lots of asphalt shall be used to offset payment for accepted lots of asphalt pavement that achieve a lot pay factor less than 100%.

Payment for sublots which do not meet grade in accordance with paragraph 401-6.2d after correction for over 25% of the subplot shall be reduced by 5%.

**TABLE 6.**  
**PRICE ADJUSTMENT SCHEDULE<sup>1</sup>**

| <b>Percentage of material within specification limits (PWL)</b> | <b>Lot pay factor (percent of contract unit price)</b> |
|-----------------------------------------------------------------|--------------------------------------------------------|
| 96 – 100                                                        | 106                                                    |
| 90 – 95                                                         | PWL + 10                                               |
| 75 – 89                                                         | 0.5 PWL + 55                                           |
| 55 – 74                                                         | 1.4 PWL – 12                                           |
| Below 55                                                        | Reject <sup>2</sup>                                    |

<sup>1</sup>Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment above 100% shall be subject to the total project payment limitation specified in paragraph 401-8.1a.

<sup>2</sup>The lot shall be removed and replaced. However, the RPR may decide to allow the rejected lot to remain. In that case, if the RPR and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50% of the contract unit price and the total project payment shall be reduced by the amount withheld for the rejected lot.

**d. Profilograph Roughness.** Not used.

See Special Provisions for modifications to this section.

**401-8.1 PAYMENT.**

Payment will be made under:

Item P-401      Asphalt Surface Course - per ton

**REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

|           |                                                                                                                                     |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------|
| ASTM C29  | Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate                                                        |
| ASTM C88  | Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate                                      |
| ASTM C117 | Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing                                |
| ASTM C127 | Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate                            |
| ASTM C131 | Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine |
| ASTM C136 | Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates                                                     |

|            |                                                                                                                  |
|------------|------------------------------------------------------------------------------------------------------------------|
| ASTM C142  | Standard Test Method for Clay Lumps and Friable Particles in Aggregates                                          |
| ASTM C566  | Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying                                |
| ASTM D75   | Standard Practice for Sampling Aggregates                                                                        |
| ASTM D242  | Standard Specification for Mineral Filler for Bituminous Paving Mixtures                                         |
| ASTM D946  | Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction                    |
| ASTM D979  | Standard Practice for Sampling Asphalt Paving Mixtures                                                           |
| ASTM D1073 | Standard Specification for Fine Aggregate for Asphalt Paving Mixtures                                            |
| ASTM D1188 | Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples |
| ASTM D2172 | Standard Test Method for Quantitative Extraction of Bitumen from Asphalt Paving Mixtures                         |
| ASTM D1461 | Standard Test Method for Moisture or Volatile Distillates in Asphalt Paving Mixtures                             |
| ASTM D2041 | Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures          |
| ASTM D2419 | Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate                                       |
| ASTM D2489 | Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures                     |
| ASTM D2726 | Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures       |
| ASTM D2950 | Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods                              |
| ASTM D3203 | Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures                |
| ASTM D3381 | Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction                      |
| ASTM D3665 | Standard Practice for Random Sampling of Construction Materials                                                  |
| ASTM D3666 | Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials    |
| ASTM D4318 | Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils                             |

|            |                                                                                                                                                                 |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ASTM D4552 | Standard Practice for Classifying Hot-Mix Recycling Agents                                                                                                      |
| ASTM D4791 | Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate                                               |
| ASTM D4867 | Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures                                                                                 |
| ASTM D5361 | Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing                                                                                |
| ASTM D5444 | Standard Test Method for Mechanical Size Analysis of Extracted Aggregate                                                                                        |
| ASTM D5821 | Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate                                                                  |
| ASTM D6084 | Standard Test Method for Elastic Recovery of Bituminous Materials by Ductilometer                                                                               |
| ASTM D6307 | Standard Test Method for Asphalt Content of Hot Mix Asphalt by Ignition Method                                                                                  |
| ASTM D6373 | Standard Specification for Performance Graded Asphalt Binder                                                                                                    |
| ASTM D6752 | Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method                               |
| ASTM D6925 | Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor. |
| ASTM D6926 | Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus                                                                              |
| ASTM D6927 | Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures                                                                                     |
| ASTM D6995 | Standard Test Method for Determining Field VMA based on the Maximum Specific Gravity of the Mix (Gmm)                                                           |
| ASTM E11   | Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves                                                                                          |
| ASTM E178  | Standard Practice for Dealing with Outlying Observations                                                                                                        |
| ASTM E1274 | Standard Test Method for Measuring Pavement Roughness Using a Profilograph                                                                                      |
| ASTM E950  | Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference                 |
| ASTM E2133 | Standard Test Method for Using a Rolling Inclinator to Measure Longitudinal and Transverse Profiles of a Traveled Surface                                       |

American Association of State Highway and Transportation Officials (AASHTO)

|             |                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------|
| AASHTO M156 | Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures. |
|-------------|---------------------------------------------------------------------------------------------------------------|

|              |                                                                                                                                       |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------|
| AASHTO T329  | Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method                                                  |
| AASHTO T324  | Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures                                                 |
| AASHTO T 340 | Standard Method of Test for Determining the Rutting Susceptibility of Hot Mix Asphalt (APA) Using the Asphalt Pavement Analyzer (APA) |

## Asphalt Institute (AI)

Asphalt Institute Handbook MS-26, Asphalt Binder

Asphalt Institute MS-2      Mix Design Manual, 7th Edition

AI State Binder Specification Database

## Federal Highway Administration (FHWA)

Long Term Pavement Performance Binder Program

## Advisory Circulars (AC)

AC 150/5320-6      Airport Pavement Design and Evaluation

## FAA Orders

5300.1      Modifications to Agency Airport Design, Construction, and Equipment Standards

## Software

FAARFIELD

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## MISCELLANEOUS





**ITEM P-603**  
**EMULSIFIED ASPHALT TACK COAT**

**DESCRIPTION**

**603-1.1** This item shall consist of preparing and treating an asphalt or concrete surface with asphalt material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

**MATERIALS**

**603-2.1 ASPHALT MATERIALS.** The asphalt material shall be an emulsified asphalt as specified in ASTM D3628 as an asphalt application for tack coat appropriate to local conditions. The emulsified asphalt shall not be diluted. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the asphalt material to the Resident Project Representative (RPR) before the asphalt material is applied for review and acceptance. The furnishing of COA for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

**603-2.1 BITUMINOUS MATERIALS.** The bituminous material shall be an emulsified asphalt indicated in ASTM D3628 as a bituminous application for tack coat appropriate to local conditions or as designated by the Engineer.

**CONSTRUCTION METHODS**

**603-3.1 WEATHER LIMITATIONS.** The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is 50°F or above; the temperature has not been below 35°F for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

**603-3.2 EQUIPMENT.** The Contractor shall provide equipment for heating and applying the emulsified asphalt material. The emulsion shall be applied with a manufacturer-approved computer rate-controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spray bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the emulsion. Any type of tip or pressure source is suitable that will maintain predetermined flow rates and constant pressure during the application process with application speeds under eight (8) miles per hour or seven hundred (700) feet per minute.

The equipment will be tested under pressure for leaks and to ensure proper set-up before use to verify truck set-up (via a test-shot area), including but not limited to, nozzle tip size appropriate for application, spray-bar height and pressure and pump speed, evidence of triple-overlap spray pattern, lack of leaks, and any other factors relevant to ensure the truck is in good working order before use.

The distributor truck shall be equipped with a minimum 12-foot spreader spray bar with individual nozzle control with computer-controlled application rates. The distributor truck shall have an easily accessible thermometer that constantly monitors the temperature of the emulsion, and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.

The distributor truck shall be equipped to effectively heat and mix the material to the required temperature prior to application as required. Heating and mixing shall be done in accordance with the manufacturer's recommendations. Do not overheat or over mix the material.

The distributor shall be equipped with a hand sprayer.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

A power broom and/or power blower suitable for cleaning the surfaces to which the asphalt tack coat is to be applied shall be provided.

**603-3.3 APPLICATION OF EMULSIFIED ASPHALT MATERIAL.** The emulsified asphalt shall not be diluted. Immediately before applying the emulsified asphalt tack coat, the full width of surface to be treated shall be swept with a power broom and/or power blower to remove all loose dirt and other objectionable material.

The emulsified asphalt material shall be uniformly applied with an asphalt distributor at the rates appropriate for the conditions and surface specified in the table below. The type of asphalt material and application rate shall be approved by the RPR prior to application.

**EMULSIFIED ASPHALT**

| Surface Type     | Residual Rate, gal/SY | Emulsion Application Bar Rate, gal/SY |
|------------------|-----------------------|---------------------------------------|
| New asphalt      | 0.02-0.05             | 0.03-0.07                             |
| Existing asphalt | 0.04-0.07             | 0.06-0.11                             |
| Milled Surface   | 0.04-0.08             | .06-0.12                              |
| Concrete         | 0.03-0.05             | 0.05-0.08                             |

After application of the tack coat, the surface shall be allowed to cure without being disturbed for the period of time necessary to permit drying and setting of the tack coat. This period shall be determined by the RPR. The Contractor shall protect the tack coat and maintain the surface until the next course has been placed. When the tack coat has been disturbed by the Contractor, tack coat shall be reapplied at the Contractor's expense.

**603-3.4 BITUMINOUS MATERIAL CONTRACTOR'S RESPONSIBILITY.** The Contractor shall provide a statement of source and character of the proposed bituminous material which must be submitted and approved by the Engineer before any shipment of bituminous materials to the project.

The Contractor shall furnish the vendor's certified test reports for each carload, or equivalent, of bituminous material shipped to the project. The tests reports shall be provided to and approved by the Engineer before the bituminous material is applied. If the bituminous material does not meet the specifications, it shall be replaced at the Contractor's expense. Furnishing the vendor's certified test report for the bituminous material shall not be interpreted as a basis for final acceptance.

**603-3.4 FREIGHT AND WAYBILLS.** The Contractor shall submit waybills and delivery tickets, during progress of the work. Before the final statement is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement

covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

#### **METHOD OF MEASUREMENT**

**603-4.1** The bituminous material for tack coat shall not be measured.

#### **BASIS OF PAYMENT**

**603.5-1** No payment shall be made for bituminous tack coat material. The price for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item shall be incidental to P-401.

#### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

|            |                                                                                                            |
|------------|------------------------------------------------------------------------------------------------------------|
| ASTM D1250 | Standard Guide for Use of the Petroleum Measurement Tables                                                 |
| ASTM D2995 | Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors |
| ASTM D3628 | Standard Practice for Selection and Use of Emulsified Asphalts                                             |

#### **END ITEM P-603**

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**ITEM P-605  
JOINT SEALANTS FOR PAVEMENTS**

**DESCRIPTION**

**605-1.1** This item shall consist of providing and installing a resilient and adhesive joint sealing material capable of effectively sealing joints in pavement; joints between different types of pavements; and cracks in existing pavement.

**MATERIALS**

**605-2.1 JOINT SEALANTS.** Joint sealant materials shall meet the requirements of ASTM D5893 Standard Specifications for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

Each lot or batch of sealant shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, the safe heating temperature, and shall be accompanied by the manufacturer's certification stating that the sealant meets the requirements of this specification.

**605-2.2 BACKER ROD.** The use of a backer rod in the joint to be filled is required to control the depth of the sealant, to achieve the desired shape factor, and to support the sealant against indentation and sag. The material furnished shall be a compressible, non-shrinking, non-staining, non-absorbing material that is non-reactive with the joint sealant in accordance with ASTM D5249. The backer-rod material shall be  $25\% \pm 5\%$  larger in diameter than the nominal width of the joint and should recover to maintain contact with the joint faces when the joint is open.

Jute, paper, or other moisture absorbing material shall not be used for the backing material. The backing material shall be rubber, butyl rubber, or other approved material that will not react with the joint sealer and will not form a gas when the hot joint sealer is applied.

**605-2.3 BOND BREAKING TAPES.** Provide a bond breaking tape or separating material that is a flexible, non-shrinkable, non-absorbing, non-staining, and non-reacting adhesive-backed tape. The material shall have a melting point at least 5°F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. The bond breaker tape shall be approximately 1/8 inch wider than the nominal width of the joint and shall not bond to the joint sealant.

**CONSTRUCTION METHODS**

**605-3.1 TIME OF APPLICATION.** Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be 50°F and rising at the time of application of the poured joint sealing material. Do not apply sealant if moisture is observed in the joint.

**605-3.2 EQUIPMENT.** Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and maintained in satisfactory condition at all times. Submit a list of proposed equipment to be used in performance of construction work including descriptive data, 10 days prior to use on the project.

**a. Tractor-mounted routing tool.** Provide a routing tool, used for removing old sealant from the joints, of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks.

**b. Concrete saw.** Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified.

**c. Sandblasting equipment.** Sandblasting is not allowed.

**d. Waterblasting equipment.** The Contractor must demonstrate waterblasting equipment including the pumps, hose, guide and nozzle size, under job conditions, before approval in accordance with paragraph 605-3.3. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

**e. Hand tools.** Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces. Hand tools should be carefully evaluated for potential spalling effects prior to approval for use.

**f. Hot-poured sealing equipment.** The unit applicators used for heating and installing ASTM D6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

**g. Cold-applied, single-component sealing equipment.** The equipment for installing ASTM D5893 single component joint sealants shall consist of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. The dimension of the nozzle shall be such that the tip of the nozzle will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Small hand-held air-powered equipment (i.e., caulking guns) may be used for small applications.

**605-3.3 PREPARATION OF JOINTS.** Pavement joints for application of material in this specification must be dry, clean of all scale, dirt, dust, curing compound, and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

**a. Sawing.** All joints shall be sawed in accordance with specifications and plan details. Immediately after sawing the joint, the resulting slurry shall be completely removed from joint and adjacent area by flushing with a jet of water, and by use of other tools as necessary.

**b. Sealing.** Immediately before sealing, the joints shall be thoroughly cleaned of all remaining laitance, curing compound, filler, protrusions of hardened concrete, old sealant and other foreign material from the sides and upper edges of the joint space to be sealed. Cleaning shall be accomplished by tractor-mounted routing equipment, concrete saw or waterblaster as specified in paragraph 605-3.2. The newly exposed concrete joint faces and the pavement surface extending a minimum of 1/2 inch from the joint

edge shall be sandblasted clean. Sandblasting shall be accomplished in a minimum of two passes. One pass per joint face with the nozzle held at an angle directly toward the joint face and not more than 3 inches from it. After final cleaning and immediately prior to sealing, blow out the joints with compressed air and leave them completely free of debris and water. The joint faces shall be surface dry when the seal is applied.

**c. Backer Rod.** When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a backer rod in accordance with paragraph 605-2.2 to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backer rod is placed at the specified depth and is not stretched or twisted during installation.

**d. Bond-breaking tape.** Where inserts or filler materials contain bitumen, or the depth of the joint opening does not allow for the use of a backup material, insert a bond-separating tape breaker in accordance with paragraph 605-2.3 to prevent incompatibility with the filler materials and three-sided adhesion of the sealant. Securely bond the tape to the bottom of the joint opening so it will not float up into the new sealant.

**605-3.4 INSTALLATION OF SEALANTS.** Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the RPR before sealing is allowed. Sealants shall be installed in accordance with the following requirements:

Immediately preceding, but not more than 50 feet ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/8 to 1/4 inch  $\pm$  1/16 inch below the top of pavement surface; or bottom of groove for grooved pavement. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the RPR. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

**605-3.5 INSPECTION.** The Contractor shall inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified at no additional cost to the airport.

**605-3.6 CLEAN-UP.** Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

## METHOD OF MEASUREMENT

**605-4.1** Joint sealing material shall be measured by the linear foot of sealant in place, completed, and accepted.

## BASIS OF PAYMENT

**605-5.1** Payment for joint sealing material shall be made at the contract unit price per linear foot. The price shall be full compensation for furnishing all materials, for all preparation, delivering, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-605            Silicone Joint Sealant - per linear foot

### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### **ASTM International (ASTM)**

|            |                                                                                                                                             |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| ASTM D789  | Standard Test Method for Determination of Relative Viscosity of Polyamide (PA)                                                              |
| ASTM D5249 | Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints |
| ASTM D6690 | Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt                                                  |
| ASTM D7116 | Standard Specification for Joint Sealants, Hot Applied, Jet Fuel Resistant Types for Portland Cement Concrete Pavements                     |

#### **Advisory Circulars (AC)**

|                |                                                         |
|----------------|---------------------------------------------------------|
| AC 150/5340-30 | Design and Installation Details for Airport Visual Aids |
|----------------|---------------------------------------------------------|

**END ITEM P-605**



**ITEM P-620**  
**RUNWAY AND TAXIWAY MARKING**

**DESCRIPTION**

**620-1.1** This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as identified by the Resident Project Representative (RPR). The terms “paint” and “marking material” as well as “painting” and “application of markings” are interchangeable throughout this specification.

**MATERIALS**

**620-2.1 MATERIALS ACCEPTANCE.** The Contractor shall furnish manufacturer’s certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer’s surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

**620-2.2 MARKING MATERIALS.**

**TABLE 1**  
**MARKING MATERIALS**

| <b>Paint<sup>1</sup></b>               |                  |                       |                          | <b>Glass Beads<sup>2</sup></b> |                          |
|----------------------------------------|------------------|-----------------------|--------------------------|--------------------------------|--------------------------|
| Type                                   | Color            | Fed Std. 595 Number   | Application Rate Maximum | Type                           | Application Rate Minimum |
| Temporary Marking, Waterborne, Type II | Yellow and Black | 33538 or 33655, 37038 | 230 ft <sup>2</sup> /gal | N/A                            | --                       |
| Waterborne, Type II                    | Yellow and Black | 33538 or 33655, 37038 | 115 ft <sup>2</sup> /gal | Type I, Gradation A            | 7 lb/gal                 |

<sup>1</sup> See paragraph 620-2.2a

<sup>2</sup> See paragraph 620-2.2b

**a. Paint.** Paint shall be waterborne in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595.

**Waterborne.** Paint shall meet the requirements of Federal Specification TT-P-1952F, Type II. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

**b. Reflective media.** Glass beads for white and yellow paint shall meet the requirements for Federal Specification TT-B-1325D Type I, Gradation A.

Glass beads for red and pink paint shall meet the requirements for Type I, Gradation A.

Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Glass beads shall not be used in black and green paint.

Type III glass beads shall not be used in red and pink paint.

## CONSTRUCTION METHODS

**620-3.1 WEATHER LIMITATIONS.** Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer's recommendations. Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

**620-3.2 EQUIPMENT.** Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. The marking equipment for both paint and beads shall be calibrated daily.

**620-3.3 PREPARATION OF SURFACES.** Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminants that would reduce the bond between the paint and the pavement. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the RPR. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

**a. Preparation of new pavement surfaces.** The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the RPR to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

**b. Preparation of pavement to remove existing markings.** Existing pavement markings shall be removed by rotary grinding, water blasting, or by other methods approved by the RPR minimizing damage to the pavement surface. The removal area may need to be larger than the area of the markings to eliminate ghost markings. After removal of markings on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings.

**c. Preparation of pavement markings prior to remarking.** Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the RPR. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufacturers application and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

**620-3.4 LAYOUT OF MARKINGS.** The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

**620-3.5 APPLICATION.** A period of 30 days shall elapse between placement of surface course or seal coat and application of the final permanent paint markings. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet, and marking dimensions and spacing shall be within the following tolerances:

**MARKING DIMENSIONS AND SPACING TOLERANCE**

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

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted. A period of one (1) day shall elapse between placement of a bituminous surface course or seal coat and application of temporary paint. Temporary paint may be applied sooner if the seal coat has broken and is no longer tacky. However, if discoloration is evident, painting shall be discontinued and additional cure time of the seal coat will be required. All discolored paint shall be replaced at the Contractor's expense.

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

**620-3.6 APPLICATION--PREFORMED THERMOPLASTIC AIRPORT PAVEMENT MARKINGS.** Preformed thermoplastic pavement markings not used.

**620-3.7 CONTROL STRIP.** Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the RPR. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads (per Table 1) that are properly embedded and

evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

**620-3.8 RETRO-REFLECTANCE.** [Reflectance shall be measured with a portable retro-reflectometer meeting ASTM E1710 (or equivalent). A total of 6 reading shall be taken over a 6 square foot area with three (3) readings taken from each direction. The average shall be equal to or above the minimum levels of all readings which are within 30% of each other.

**MINIMUM RETRO-REFLECTANCE VALUES**

| Material                                          | Retro-reflectance mcd/m <sup>2</sup> /lux |        |     |
|---------------------------------------------------|-------------------------------------------|--------|-----|
|                                                   | White                                     | Yellow | Red |
| Initial Type I                                    | 300                                       | 175    | 35  |
| Initial Type III                                  | 600                                       | 300    | 35  |
| Initial Thermoplastic                             | 225                                       | 100    | 35  |
| All materials, remark when less than <sup>1</sup> | 100                                       | 75     | 10  |

<sup>1</sup> Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance

**620-3.9 PROTECTION AND CLEANUP.** After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

#### **METHOD OF MEASUREMENT**

**620-4.1** The quantity of markings to be paid for shall be measured by the number of square feet of painting.

**620-4.1a** The quantity of temporary markings to be paid for shall be the number of square feet of painting performed in accordance with the specifications and accepted by the RPR.

#### **BASIS OF PAYMENT**

**620-5.1** This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item complete in place and accepted by the RPR in accordance with these specifications.

**620-5.1a** Payment for markings shall be made at the contract price by the number of square feet of painting Reflective Media shall be considered incidental.

**620-5.1b** Payment for temporary markings shall be made at the contract price for the number of square feet of painting. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

- Item P-620a Temporary Marking - per square foot
- Item P-620b Marking - per square foot

### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### ASTM International (ASTM)

- ASTM D476 Standard Classification for Dry Pigmentary Titanium Dioxide Products
- ASTM D968 Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
- ASTM D1652 Standard Test Method for Epoxy Content of Epoxy Resins
- ASTM D2074 Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
- ASTM D2240 Standard Test Method for Rubber Property - Durometer Hardness
- ASTM D7585 Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
- ASTM E303 Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
- ASTM E1710 Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
- ASTM E2302 Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
- ASTM G154 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

#### Code of Federal Regulations (CFR)

- 40 CFR Part 60, Appendix A-7, Method 24  
Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings
- 29 CFR Part 1910.1200 Hazard Communication

#### Federal Specifications (FED SPEC)

- FED SPEC TT-B-1325D Beads (Glass Spheres) Retro-Reflective

FED SPEC TT-P-1952F      Paint, Traffic and Airfield Marking, Waterborne

FED STD 595      Colors used in Government Procurement

Commercial Item Description

A-A-2886B      Paint, Traffic, Solvent Based

Advisory Circulars (AC)

AC 150/5340-1      Standards for Airport Markings

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

**END OF ITEM P-620**

**ITEM S-10  
AIRCRAFT TIEDOWNS**

**DESCRIPTION**

**S-10-1.1** This Work shall consist of the installation of new aircraft tiedowns in accordance with this Specification at the locations and in accordance with the dimensions, designs and details shown on the Plans. This item shall include all excavation, backfilling and restoration of paved areas to the satisfaction of the Engineer.

**MATERIALS**

**S-10-2.1 GENERAL.** All materials shall be subject to acceptance by the Engineer.

**S-10-2.2 CONCRETE.** Concrete shall conform to ADOT Class S, 4,000 psi requirements.

**S-10-2.3 REINFORCING BARS.** Reinforcing Bars shall be 5/8" diameter, Grade 60, billet steel, conforming to the requirements of ASTM A 615.

**METHOD OF MEASUREMENT**

**S-10-3.1** An aircraft tiedown shall consist of 3 separate anchors - 2 wing anchors and 1 tail anchor. The quantity of aircraft tiedowns to be paid for shall be the number of 3 anchor units installed, and accepted.

**BASIS OF PAYMENT**

**S-10-4.1** Payment will be made at the Contract Unit Price for each 3 anchor tiedown unit completed and accepted. This price shall be full compensation for furnishing all materials and for all preparation, assembly and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item. Aircraft tiedowns which are removed or paved over shall be incidental to and included in Contract Unit Prices for the various pavement items.

Payment will be made under:

|           |                                         |
|-----------|-----------------------------------------|
| Item S-10 | Aircraft Tiedowns (Set of 3) - per each |
|-----------|-----------------------------------------|

**REFERENCES**

ASTM A 615    Concrete Rebar

**END OF ITEM S-10**

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## FENCING



**ITEM S - 162  
DETECTION LOOP**

**DESCRIPTION**

**162-1.1 GENERAL.** This item shall consist of furnishing and install a detection loop for a pre-existing gate operator in accordance with these Specifications and the details shown on the Plans and in conformity with the lines and grades shown on the Plans or established by the Engineer.

**162-1.2 SHOP DRAWINGS.** Shop Drawings shall include complete details of the detection loop material and connector equipment. Actual samples and certificates of compliance may be requested.

**MATERIALS**

**162-2.1 VEHICULAR LOOP DETECTOR.** The gate shall be activated to open as a vehicle is leaving airport property by traveling over a loop detector in the pavement. The loop detector shall be installed as per manufacturer's requirements and be compatible with the existing gate operator (HY-Security SlideDriver 10, Model 222 SS-ST, 3-Phase). The loop detector shall be connected to the gate operator per manufacturer's requirements.

For vehicular safety, the gate shall not be allowed to close until after a vehicle has passed over and beyond a double safety loop detector installed in the pavement.

**CONSTRUCTION METHODS**

**162-3.1 GENERAL.** The gate loop detector system shall be constructed in accordance with details on the Plans and as specified herein, and all Work shall be performed in a workmanlike manner satisfactory to the Engineer. Prior to the beginning of Work, the Contractor shall locate the position of the Work by establishing and marking the line. The gate operator systems and gate locks must operate per Manufacturer's recommendations.

**METHOD OF MEASUREMENT**

**162-4.1** Detection loops will be measured as completed and accepted units in place and connected to existing gate operators.

**BASIS OF PAYMENT**

**162-5.1** Payment for detection loops will be made at the Contract Lump Sum Price for each loop.

The price shall be full compensation for furnishing all materials, and for all preparation and installation of these materials, and for all labor equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

|            |                               |
|------------|-------------------------------|
| Item S-162 | Detection Loop - per lump sum |
|------------|-------------------------------|

**END OF ITEM S-162**

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## **DRAINAGE**



**ITEM D-701**  
**PIPE FOR STORM DRAINS AND CULVERTS**

**DESCRIPTION**

**701-1.1** This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

**MATERIALS**

**701-2.1** Materials shall meet the requirements shown on the plans and specified below. Underground piping and components used in drainage systems for terminal and aircraft fueling ramp drainage shall be noncombustible and inert to fuel in accordance with National Fire Protection Association (NFPA) 415.

**701-2.2 PIPE.** The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements:

American Association of State Highway and Transportation Officials (AASHTO) M167  
Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for  
Field-Bolted Pipe, Pipe-Arches, and Arches

**701-2.3 CONCRETE.** Not used.

**701-2.4 RUBBER GASKETS.** Rubber gaskets for zinc coated steel pipe and precoated galvanized pipe shall conform to the requirements of ASTM D1056, for the "RE" closed cell grades.

**701-2.5 JOINT MORTAR.** Not used.

**701-2.6 JOINT FILLERS.** Not used.

**701-2.7 PLASTIC GASKETS.** Not used.

**701-2.8. CONTROLLED LOW-STRENGTH MATERIAL (CLSM).** Controlled low-strength material shall conform to the requirements of Item P-153. When CLSM is used, all joints shall have gaskets.

**701-2.9 PRECAST BOX CULVERTS.** Manufactured in accordance with and conforming to ASTM C1433.

**701-2.10 PRECAST CONCRETE PIPE.** Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or American Concrete Pipe Association QCast Plant Certification Program.

**CONSTRUCTION METHODS**

**701-3.1 EXCAVATION.** The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus 12 inches on each side. The trench walls shall be approximately vertical.

The Contractor shall comply with all current federal, state and local rules and regulations governing the safety of men and materials during the excavation, installation and backfilling operations. Specifically, the Contractor shall observe that all requirements of the Occupational Safety and Health Administration (OSHA) relating to excavations, trenching and shoring are strictly adhered to. The width of the trench shall be sufficient to permit satisfactorily jointing of the pipe and thorough compaction of the bedding material under the pipe and backfill material around the pipe, but it shall not be greater than the widths shown on the plans trench detail.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 8 inch or 1/2 inch for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe. The excavation below grade should be filled with granular material to form a uniform foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The RPR shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

The excavation for pipes placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

**701-3.2 BEDDING.** The bedding surface for the pipe shall provide a foundation of uniform density to support the pipe throughout its entire length.

**a. Rigid pipe.** The pipe bedding shall be constructed uniformly for the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 in when the bedding thickness is less than 6 inches, and 1-1/2 in when the bedding thickness is greater than 6 inches. Bedding shall be loosely placed uncompacted material under the middle third of the pipe prior to placement of the pipe.

**b. Flexible pipe.** For flexible pipe, the bed shall be roughly shaped to fit the pipe, and a bedding blanket of sand or fine granular material shall be provided as follows:

**FLEXIBLE PIPE BEDDING**

| Pipe Corrugation Depth |    | Minimum Bedding Depth |    |
|------------------------|----|-----------------------|----|
| inch                   | mm | inch                  | mm |
| 1/2                    | 12 | 1                     | 25 |
| 1                      | 25 | 2                     | 50 |
| 2                      | 50 | 3                     | 75 |
| 2-1/2                  | 60 | 3-1/2                 | 90 |



**c. Other pipe materials.** For PVC, polyethylene, polypropylene, or fiberglass pipe, the bedding material shall consist of coarse sands and gravels with a maximum particle size of 3/4 inches. For pipes installed under paved areas, no more than 12% of the material shall pass the No. 200 sieve. For all other areas, no more than 50% of the material shall pass the No. 200 sieve. The bedding shall have a thickness of at least 6 inches below the bottom of the pipe and extend up around the pipe for a depth of not less than 50% of the pipe's vertical outside diameter.

**701-3.3 LAYING PIPE.** The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

Elliptical and elliptically reinforced concrete pipes shall be placed with the manufacturer's reference lines designating the top of the pipe within five degrees of a vertical plane through the longitudinal axis of the pipe.

**701-3.4 JOINING PIPE.** Joints shall be made with (1) cement mortar, (2) cement grout, (3) rubber gaskets, (4) plastic gaskets, (5) coupling bands.

Mortar joints shall be made with an excess of mortar to form a continuous bead around the outside of the pipe and shall be finished smooth on the inside. Molds or runners shall be used for grouted joints to retain the poured grout. Rubber ring gaskets shall be installed to form a flexible watertight seal.

**a. Concrete pipe.** Concrete pipe may be either bell and spigot or tongue and groove. Pipe sections at joints shall be fully seated and the inner surfaces flush and even.

**b. Metal pipe.** Metal pipe shall be firmly joined by form-fitting bands conforming to the requirements of ASTM A760 for steel pipe and AASHTO M196 for aluminum pipe.

**c. PVC, Polyethylene, or Polypropylene pipe.** Joints for PVC, Polyethylene, or Polypropylene pipe shall conform to the requirements of ASTM D3212 when leak resistant joints are required. Joints for PVC and Polyethylene pipe shall conform to the requirements of AASHTO M304 when soil tight joints are required. Fittings for polyethylene pipe shall conform to the requirements of AASHTO M252 or ASTM M294. Fittings for polypropylene pipe shall conform to ASTM F2881, ASTM F2736, or ASTM F2764.

**d. Fiberglass pipe.** Joints and fittings shall be as detailed on the plans and in accordance with the manufacturer's recommendations.

**701-3.5 EMBEDMENT AND OVERFILL.** Pipes shall be inspected before any fill material is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and re-laid or replaced at the Contractor's expense.

#### **701-3.5-1 EMBEDMENT MATERIAL REQUIREMENTS**

**a. Concrete Pipe.** Embedment material and compaction requirements shall be in accordance with the applicable Type of Standard Installation (Types 1, 2, 3, or 4) per ASTM C1479. If a concrete cradle or CLSM embedment material is used, it shall conform to the plan details.

**b. Plastic and fiberglass Pipe.** Embedment material shall meet the requirements of ASTM D3282, A-1, A-2-4, A-2-5, or A-3. Embedment material shall be free of organic material, stones larger than 1.5 inches in the greatest dimension, or frozen lumps. Embedment material shall extend to 12 inches above the top of the pipe.

**c. Metal Pipe.** Embedment material shall be granular as specified in the contract document and specifications, and shall be free of organic material, rock fragments larger than 1.5 inches in the greatest dimension and frozen lumps. As a minimum, backfill materials shall meet the requirements of ASTM D3282, A-1, A-2, or A-3. Embedment material shall extend to 12 inches above the top of the pipe.

**701-3.5-2 PLACEMENT OF EMBEDMENT MATERIAL.** The embedment material shall be compacted in layers not exceeding 6 inches on each side of the pipe and shall be brought up one foot above the top of the pipe or to natural ground level, whichever is greater. Thoroughly compact the embedment material under the haunches of the pipe without displacing the pipe. Material shall be brought up evenly on each side of the pipe for the full length of the pipe.

When the top of the pipe is above the top of the trench, the embedment material shall be compacted in layers not exceeding 6 inches and shall be brought up evenly on each side of the pipe to one foot above the top of the pipe. All embedment material shall be compacted to a density required under Item P-152.

Concrete cradles and flowable fills, such as controlled low strength material (CLSM) or controlled density fill (CDF), may be used for embedment provided adequate flotation resistance can be achieved by restraints, weighing, or placement technique.

It shall be the Contractor's responsibility to protect installed pipes and culverts from damage due to construction equipment operations. The Contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.

**701-3.6 OVERFILL.** Pipes shall be inspected before any overfill is in place. Any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense. Evaluation of any damage to RCP shall be evaluated based on AASHTO R73.

Overfill material shall be placed and compacted in layers as required to achieve compaction to at least 95 percent standard proctor per ASTM D698. The soil shall contain no debris, organic matter, frozen material, or stones with a diameter greater than one half the thickness of the compacted layers being placed.

**701-3.7 INSPECTION REQUIREMENTS.** An initial post installation inspection shall be performed by the Contractor in the presence of the RPR no sooner than 30 days after completion of installation and final backfill. Clean or flush all lines prior to inspection.

Use a camera with lighting suitable to allow a clear picture of the entire periphery of the pipe interior. Center the camera in the pipe both vertically and horizontally and be able to pan and tilt to a 90 degree angle with the axis of the pipe rotating 360 degrees. Use equipment to move the camera through the pipe that will not obstruct the camera's view or interfere with proper documentation of the pipe's condition. The video image shall be clear, focused, and relatively free from roll, static, or other image distortion qualities that would prevent the reviewer from evaluating the condition of the pipe.

Incorporate specific inspection requirements for the various types of pipes beneath the general inspection requirements.

Flexible pipes shall be inspected for rips, tears, joint separations, soil migration, cracks, localized buckling, settlement, alignment, and deflection. Determine whether the allowable deflection has been exceeded by use of a laser profiler for internal pipe diameters of 48 inches or less, or direct measurement for internal pipe diameters greater than 48 inches. Laser profile equipment shall utilize low barrel distortion video equipment. Deflection of installed pipe shall not exceed the limits provided in the table below, as a percentage of the average inside diameter of the pipe.

#### MAXIMUM ALLOWABLE PIPE DEFLECTION

| Type of Pipe          | Maximum Allowable Deflection (%) |
|-----------------------|----------------------------------|
| Corrugated Metal Pipe | 5                                |
| Concrete Lined CMP    | 3                                |
| Thermoplastic Pipe    | 5                                |
| Fiberglass            | 5                                |

If deflection readings in excess of the allowable deflection are obtained, remove the pipe with excessive deflection and replace with new pipe. Isolated areas may exceed allowable by 2.5% with concurrence of RPR. Repair or replace any pipe with cracks exhibiting displacement across the crack, bulges, creases, tears, spalls, or delaminations. The report for flexible pipe shall include as a minimum, the deflection results and final post installation inspection report. The inspection report shall include: a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design line and grade, and inspector's notes.

#### METHOD OF MEASUREMENT

**701-4.1** The length of pipe shall be measured in linear feet of pipe in place, completed, and accepted, inclusive of all pipe bedding, pipe cradles, and required backfill. It shall be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

#### BASIS OF PAYMENT

**701-5.1** These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

**701-5.2** Payment will be made at the contract unit price per linear foot for Corrugated Steel Culvert.

Payment will be made under:

Item D-701      8 Inch Corrugated Steel Culvert - per linear foot

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### American Association of State Highway and Transportation Officials (AASHTO)

|             |                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------|
| AASHTO M167 | Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches       |
| AASHTO M190 | Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches                                      |
| AASHTO M196 | Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains                                                       |
| AASHTO M219 | Standard Specification for Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches            |
| AASHTO M243 | Standard Specification for Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches         |
| AASHTO M252 | Standard Specification for Corrugated Polyethylene Drainage Pipe                                                                |
| AASHTO M294 | Standard Specification for Corrugated Polyethylene Pipe (12- to 60-in.) Diameter                                                |
| AASHTO M304 | Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter |
| AASHTO MP20 | Standard Specification for Steel Reinforced Polyethylene (PE) Ribbed Pipe, 12- to 36-in. Diameter                               |

### ASTM International (ASTM)

|           |                                                                                                                           |
|-----------|---------------------------------------------------------------------------------------------------------------------------|
| ASTM A760 | Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains                                   |
| ASTM A761 | Standard Specification for Corrugated Steel Structural Plate, Zinc Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches |
| ASTM A762 | Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains                                 |
| ASTM A849 | Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe       |
| ASTM B745 | Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains                                                 |
| ASTM C14  | Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe                                    |

|            |                                                                                                                                   |
|------------|-----------------------------------------------------------------------------------------------------------------------------------|
| ASTM C76   | Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe                                               |
| ASTM C94   | Standard Specification for Ready Mixed Concrete                                                                                   |
| ASTM C144  | Standard Specification for Aggregate for Masonry Mortar                                                                           |
| ASTM C150  | Standard Specification for Portland Cement                                                                                        |
| ASTM C443  | Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets                                            |
| ASTM C506  | Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe                                          |
| ASTM C507  | Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe                                     |
| ASTM C655  | Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe                                         |
| ASTM C990  | Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants   |
| ASTM C1433 | Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers             |
| ASTM D1056 | Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber                                                  |
| ASTM D3034 | Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings                                           |
| ASTM D3212 | Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals                              |
| ASTM D3262 | Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe                                   |
| ASTM D3282 | Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes                       |
| ASTM D4161 | Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals |
| ASTM D6690 | Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements                              |
| ASTM F477  | Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe                                                   |

|            |                                                                                                                                       |
|------------|---------------------------------------------------------------------------------------------------------------------------------------|
| ASTM F667  | Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings                                                 |
| ASTM F714  | Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter                                           |
| ASTM F794  | Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter      |
| ASTM F894  | Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe                                         |
| ASTM F949  | Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings                      |
| ASTM F2435 | Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe                                                         |
| ASTM F2562 | Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage                      |
| ASTM F2736 | Standard Specification for 6 to 30 in. Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe                            |
| ASTM F2764 | Standard Specification for 30 to 60 in. Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications |
| ASTM F2881 | Standard Specification for 12 to 60 in. Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications      |

National Fire Protection Association (NFPA)

|          |                                                                                     |
|----------|-------------------------------------------------------------------------------------|
| NFPA 415 | Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways |
|----------|-------------------------------------------------------------------------------------|

**END ITEM D-701**

**ITEM S - 701  
FLARED END SECTIONS**

**DESCRIPTION**

**S-701-1.1** This item shall consist of construction of pipe culvert and/or storm drain flared end sections of the sizes and types shown on the Plans in accordance with these Specifications and in reasonably close conformity with the lines and grades show on the Plans.

**MATERIALS**

**S-701-2.1** Materials and sizes for the types of flared end sections show on the Plans shall meet the requirements shown on the Plans and specified below.

**S-701-2.2** The flared end sections shall be of galvanized steel-type and shall conform to the applicable material requirements of AASHTO M218 and ASTM A 929

**INSTALLATION METHODS**

**S-701-3.1** This shall include excavating and cutting the pipe to install the end section to maintain drainage flow in the area.

1. A strap or rod shall be securely tightened around the pipe.
2. The toe wall shall be placed in narrow trench.
3. The invert of the end section shall be supported evenly by the bedding.
4. The alignment of the end section shall match that of the pipe.
5. Backfilling shall conform to Section D-701-3.5.

**METHOD OF MEASUREMENT**

**S-701-4.1** The work associated with this specification shall be measured for payment per each unit completed and accepted.

**BASIS OF PAYMENT**

**S-701-5.1** Payment shall be made at the Contract Unit Price per each unit completed and accepted.

These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, and incidentals including all else necessary to complete the items.

Payment will be made under:

S-701                      8 Inch Galvanized Steel Flared End Section - per each

**END OF ITEM S-701**

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## **LIGHTING INSTALLATION**



**ITEM L-108**  
**UNDERGROUND POWER CABLE FOR AIRPORTS**

**DESCRIPTION**

**108-1.1** This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

**EQUIPMENT AND MATERIALS**

**108-2.1 GENERAL.**

**a.** Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

**b.** All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

**c.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when identified by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

**d.** All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

**e.** The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format. The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

**f.** All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's

discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

**108-2.2 CABLE.** Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824, Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

**108-2.3 BARE COPPER WIRE (COUNTERPOISE, BARE COPPER WIRE GROUND AND GROUND RODS).** Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper or copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 8 feet long and 5/8 inch in diameter.

**108-2.4 CABLE CONNECTIONS.** In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

**a. The cast splice.** A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M™ Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

**b. The field-attached plug-in splice.** Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

**c. The factory-molded plug-in splice.** Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

**d. The taped or heat-shrink splice.** Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

**108-2.5 SPLICER QUALIFICATIONS.** Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the RPR proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

**108-2.6 CONCRETE.** Concrete shall conform to ADOT Class S requirements with a minimum allowable compressive strength of 4,000 psi.

**108-2.7 FLOWABLE BACKFILL.** Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**108-2.8 CABLE IDENTIFICATION TAGS.** Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

**108-2.9 TAPE.** Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

**108-2.10 ELECTRICAL COATING.** Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

**108-2.11 EXISTING CIRCUITS.** Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

**108-2.12 DETECTABLE WARNING TAPE.** Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

## CONSTRUCTION METHODS

**108-3.1 GENERAL.** The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot vertically above the top of the access structure. This requirement also applies where

primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch in size. The cable circuit identification shall match the circuits noted on the construction plans.

**108-3.2 INSTALLATION IN DUCT BANKS OR CONDUITS.** This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

**108-3.3 INSTALLATION OF DIRECT-BURIED CABLE IN TRENCHES.** Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

**a. Trenching.** Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches. Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:



(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

**b. Backfilling.** After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables; be 3 inches deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. This layer shall not be compacted. The second layer shall be 5 inches deep, loose measurement, and shall contain no particles that would be retained on a one inch sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557.

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the direct-buried cable or the counterpoise wire if present. A 3-6 inch wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches minimum below finished grade.

**c. Restoration.** Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557. Restoration shall be considered incidental to the pay item of which it is a component part.

**108-3.4 CABLE MARKERS FOR DIRECT-BURIED CABLE.** The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet square and 4-6 inch thick, extending approximately one inch above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet along the cable run, with an additional marker at each change of direction

of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches high and 3 inches wide, with width of stroke 1/2 inch and 1/4 inch deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPLICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as identified by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR. Furnishing and installation of cable markers is incidental to the respective cable pay item.

**108-3.5 SPLICING.** Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

**a. Cast splices.** These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the RPR.

**b. Field-attached plug-in splices.** These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

**c. Factory-molded plug-in splices.** These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

**d. Taped or heat-shrink splices.** A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer's instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminants prior to application.

**e. Assembly.** Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer's recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

**108-3.6 BARE COUNTERPOISE WIRE INSTALLATION FOR LIGHTNING PROTECTION AND GROUNDING.** If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

**a. Equipotential.** –Not Used

**b. Isolation** – Counterpoise size is as shown on the plans. The isolation method is an alternate method for use only with edge lights installed in turf and stabilized soils and raceways installed parallel to and adjacent to the edge of the pavement. NFPA 780 uses 15 feet to define "adjacent to".

The counterpoise conductor shall be installed halfway between the pavement edge and the light base, mounting stake, raceway, or cable being protected.

The counterpoise conductor shall be installed 8 inches minimum below grade. The counterpoise is not connected to the light base or mounting stake. An additional grounding electrode is required at each light base or mounting stake. The grounding electrode is bonded to the light base or mounting stake with a 6 AWG solid copper conductor.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Isolation Method of lightning protection.

**c. Common Installation requirements.** When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

When a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

**d. Parallel Voltage Systems.** Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

**108-3.7 COUNTERPOISE INSTALLATION ABOVE MULTIPLE CONDUITS AND DUCT BANKS.** Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

**108-3.8 COUNTERPOISE INSTALLATION AT EXISTING DUCT BANKS.** When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

**108-3.9 EXOTHERMIC BONDING.** Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

- a. All slag shall be removed from welds.

**b.** Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

**c.** If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

**108-3.10 TESTING.** The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

**a.** Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

**b.** Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

**c.** That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

**d.** That all affected circuits (existing and new) are free from unspecified grounds.

**e.** That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than 50 megohms. Verify continuity of all series airfield lighting circuits prior to energization.

**f.** That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

**g.** That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

**h.** That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

i. That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

### METHOD OF MEASUREMENT

**108-4.1** The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

**108-4.2** Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall not include additional quantities required for slack.

**108-4.3** No separate payment will be made for ground rods.

### BASIS OF PAYMENT

**108-5.1** Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the RPR. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

|             |                                                                                                                            |
|-------------|----------------------------------------------------------------------------------------------------------------------------|
| Item L-108a | No. 8 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit - per liner foot                           |
| Item L-108b | No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed in Trench, Including Connections/Terminations - per linear foot |

### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## Advisory Circulars (AC)

|                |                                                                                    |
|----------------|------------------------------------------------------------------------------------|
| AC 150/5340-26 | Maintenance of Airport Visual Aid Facilities                                       |
| AC 150/5340-30 | Design and Installation Details for Airport Visual Aids                            |
| AC 150/5345-7  | Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits |
| AC 150/5345-26 | Specification for L-823 Plug and Receptacle, Cable Connectors                      |
| AC 150/5345-53 | Airport Lighting Equipment Certification Program                                   |

## Commercial Item Description

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

## ASTM International (ASTM)

|            |                                                                                                  |
|------------|--------------------------------------------------------------------------------------------------|
| ASTM B3    | Standard Specification for Soft or Annealed Copper Wire                                          |
| ASTM B8    | Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft |
| ASTM B33   | Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes       |
| ASTM D4388 | Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes  |

## Mil Spec

|                |                                                                                             |
|----------------|---------------------------------------------------------------------------------------------|
| MIL-PRF-23586F | Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical |
| MIL-I-24391    | Insulation Tape, Electrical, Plastic, Pressure Sensitive                                    |

## National Fire Protection Association (NFPA)

|          |                                                               |
|----------|---------------------------------------------------------------|
| NFPA-70  | National Electrical Code (NEC)                                |
| NFPA-780 | Standard for the Installation of Lightning Protection Systems |

## American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

|                  |                                                                                                               |
|------------------|---------------------------------------------------------------------------------------------------------------|
| ANSI/IEEE STD 81 | IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System |
|------------------|---------------------------------------------------------------------------------------------------------------|

Federal Aviation Administration Standard

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

**END OF ITEM L-108**



**ITEM L-110**  
**AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS**

**DESCRIPTION**

**110-1.1** This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

**EQUIPMENT AND MATERIALS**

**110-2.1 GENERAL.**

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when identified by the RPR and replaced with materials, that comply with these specifications, at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

**110-2.2 STEEL CONDUIT.** Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

**110-2.3 PLASTIC CONDUIT.** Plastic conduit and fittings shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

- a. Type I—Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.
- b. Type II—Schedule 40 PVC suitable for either above ground or underground use.
- c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.
- d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

**110-2.4 SPLIT CONDUIT.** Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

**110-2.5 CONDUIT SPACERS.** Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

**110-2.6 CONCRETE.** Concrete shall conform to ADOT Class S requirements with a minimum allowable compressive strength of 4,000 psi.

**110-2.7 PRECAST CONCRETE STRUCTURES.** Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

**110-2.8 FLOWABLE BACKFILL.** Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**110-2.9 DETECTABLE WARNING TAPE.** Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches wide. Detectable tape is incidental to the respective bid item.

| SYSTEM TYPE                              | TAPE COLOR |
|------------------------------------------|------------|
| POWER OR COMMUNICATION DUCT BANK/CONDUIT | RED        |

### CONSTRUCTION METHODS

**110-3.1 GENERAL.** The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches per 100 feet. On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches below the subgrade; in other locations, the top of the duct bank or underground conduit shall not be less than 18 inches below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet.

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. Flowable backfill may alternatively be used.

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet.

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the RPR.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the RPR to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the RPR and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

**110-3.2 DUCT BANKS.** Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet beyond the edges of the pavement or 3 feet beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or

where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches wide tape, 8 inches minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch wide tape only for single conduit runs. Utilize the 6-inch wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the RPR shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the RPR.

**110-3.3 CONDUITS WITHOUT CONCRETE ENCASEMENT.** Trenches for single-conduit lines shall be not less than 6 inches nor more than 12 inches wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed

at 5-foot intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

**110-3.4 MARKERS.** The location of each end and of each change of direction of conduits and duct banks shall be marked as shown on plans or by a concrete slab marker 2 feet square and 4 - 6 inches thick extending approximately one inch above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word "DUCT" or "CONDUIT" on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches high and 3 inches wide with width of stroke 1/2 inch and 1/4 inch deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

**110-3.5 BACKFILLING FOR CONDUITS.** For conduits, 8 inches of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches in diameter.

Flowable backfill may alternatively be used with prior RPR approval.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

**110-3.6 BACKFILLING FOR DUCT BANKS.** After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 "Excavation and Embankment" except that the material used for backfill shall be select material not larger than 4 inches in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used with prior RPR approval.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.



Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

**110-3.7 RESTORATION.** Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

#### **METHOD OF MEASUREMENT**

**110-4.1** Underground conduits and duct banks shall be measured by the linear feet of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

#### **BASIS OF PAYMENT**

**110-5.1** Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals, necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

|             |                                                                                          |
|-------------|------------------------------------------------------------------------------------------|
| Item L-110a | Non-Encased, 2-Inch PVC Duct (Direct Earth Burial Including Trenching) - per linear foot |
| Item L-110b | Concrete Encased 2-Way, 4-Inch PVC Duct (Direct Earth Burial) – per linear foot          |

#### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

##### **Advisory Circular (AC)**

|                |                                                         |
|----------------|---------------------------------------------------------|
| AC 150/5340-30 | Design and Installation Details for Airport Visual Aids |
| AC 150/5345-53 | Airport Lighting Equipment Certification Program        |

##### **ASTM International (ASTM)**

|           |                                                                                            |
|-----------|--------------------------------------------------------------------------------------------|
| ASTM A615 | Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement |
|-----------|--------------------------------------------------------------------------------------------|



## National Fire Protection Association (NFPA)

NFPA-70

National Electrical Code (NEC)

## Underwriters Laboratories (UL)

UL Standard 6

Electrical Rigid Metal Conduit - Steel

UL Standard 514B

Conduit, Tubing, and Cable Fittings

UL Standard 514C

Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

UL Standard 1242

Electrical Intermediate Metal Conduit Steel

UL Standard 651

Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings

UL Standard 651A

Type EB and A Rigid PVC Conduit and HDPE Conduit

**END OF ITEM L-110**

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**ITEM L-125  
INSTALLATION OF AIRPORT LIGHTING SYSTEMS**

**DESCRIPTION**

**125-1.1** This item shall consist of airport lighting systems furnished and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the RPR.

**EQUIPMENT AND MATERIALS**

**125-2.1 GENERAL.**

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not perform as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

b. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when indicated by the RPR and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in electronic PDF format, tabbed by specification section. The RPR reserves the right to reject any or all equipment, materials or procedures, which, in the RPR's opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

## EQUIPMENT AND MATERIALS

**125-2.2 CONDUIT/DUCT.** Conduit shall conform to Specification Item L-110 *Airport Underground Electrical Duct Banks and Conduits*.

**125-2.3 CABLE AND COUNTERPOISE.** Cable and Counterpoise shall conform to Item L-108 *Underground Power Cable for Airports*.

**125-2.4 TAPE.** Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.

**125-2.5 CABLE CONNECTIONS.** Cable Connections shall conform to Item L-108 *Underground Power Cable for Airports*.

**125-2.6 RETROREFLECTIVE MARKERS.** Not required.

**125-2.7 RUNWAY AND TAXIWAY LIGHTS.** Runway and taxiway lights shall conform to the requirements of AC 150/5345-46. Lamps shall be of size and type indicated, or as required by fixture manufacturer for each lighting fixture required under this contract. Filters shall be of colors conforming to the specification for the light concerned or to the standard referenced.

### LIGHTS

| Type   | Class | Mode | Base                                  | Filter | Transformer | Notes                                     |
|--------|-------|------|---------------------------------------|--------|-------------|-------------------------------------------|
| L-861T | 2     | 1    | L-867, Class 1A, Size B, 24-Inch Deep | Blue   | L-830       | Match existing Taxiway Lighting (Not LED) |

**125-2.8 RUNWAY AND TAXIWAY SIGNS.** Runway and Taxiway Guidance Signs should conform to the requirements of AC 15/5345-44.

### SIGNS

(See Sign Table in Construction Drawings)

| Type   | Size | Style | Class | Mode | Notes                 |
|--------|------|-------|-------|------|-----------------------|
| L-858Y | 1    | 2     | 2     | 2    | Incandescent Fixtures |

**125-2.9 RUNWAY END IDENTIFIER LIGHT (REIL).** Not required.

**125-2.10 PRECISION APPROACH PATH INDICATOR (PAPI).** Not required.

**125-2.11 CIRCUIT SELECTOR CABINET.** Not required.

**125-2.12 Light Base and Transformer Housings.** Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type L-867, Class 1A, Size B, shall be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates shall be provided to accommodate various sizes of fixtures.

**125-2.13 ISOLATION TRANSFORMERS.** Isolation Transformers shall be Type L-830, size as required for each installation. Transformer shall conform to AC 150/5345-47.

## INSTALLATION

**125-3.1 INSTALLATION.** The Contractor shall furnish, install, connect and test all equipment, accessories, conduit, cables, wires, buses, grounds and support items necessary to ensure a complete and operable airport lighting system as specified here and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and state and local code agencies having jurisdiction.

The Contractor shall install the specified equipment in accordance with the applicable advisory circulars and the details shown on the plans.

**125-3.2 TESTING.** All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

**125-3.3 SHIPPING AND STORAGE.** Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the RPR, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

**125-3.4 ELEVATED AND IN-PAVEMENT LIGHTS.** Water, debris, and other foreign substances shall be removed prior to installing fixture base and light.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction. The outermost edge of fixture shall be level with the surrounding pavement. Surplus sealant or flexible embedding material shall be removed. The holding device shall remain in place until sealant has reached its initial set.

## METHOD OF MEASUREMENT

**125-4.1** New taxiway lights and signs will be measured by the number of each type installed as completed units in place, ready for operation, and accepted by the RPR. Guidance signs will be measured by the number of each relocated as completed units, in place, ready for operation, and accepted by the RPR.

## BASIS OF PAYMENT

**125-5.1** Payment will be made at the Contract unit price for each complete runway or taxiway light, guidance sign, reflective marker, runway end identification light, precision approach path indicator, or abbreviated precision approach path indicator installed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

|             |                                            |
|-------------|--------------------------------------------|
| Item L-125a | L-861T Taxiway Edge Light - per each       |
| Item L-125b | L-858Y Guidance Sign (2 Module) – per each |

### REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### Advisory Circulars (AC)

|                |                                                                                              |
|----------------|----------------------------------------------------------------------------------------------|
| AC 150/5340-18 | Standards for Airport Sign Systems                                                           |
| AC 150/5340-26 | Maintenance of Airport Visual Aid Facilities                                                 |
| AC 150/5340-30 | Design and Installation Details for Airport Visual Aids                                      |
| AC 150/5345-5  | Circuit Selector Switch                                                                      |
| AC 150/5345-7  | Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits           |
| AC 150/5345-26 | Specification for L-823 Plug and Receptacle, Cable Connectors                                |
| AC 150/5345-28 | Precision Approach Path Indicator (PAPI) Systems                                             |
| AC 150/5345-39 | Specification for L-853, Runway and Taxiway Retroreflective Markers                          |
| AC 150/5345-42 | Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories |
| AC 150/5345-44 | Specification for Runway and Taxiway Signs                                                   |
| AC 150/5345-46 | Specification for Runway and Taxiway Light Fixtures                                          |
| AC 150/5345-47 | Specification for Series to Series Isolation Transformers for Airport Lighting Systems       |
| AC 150/5345-51 | Specification for Discharge-Type Flashing Light Equipment                                    |
| AC 150/5345-53 | Airport Lighting Equipment Certification Program                                             |

#### Engineering Brief (EB)

|           |                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------|
| EB No. 67 | Light Sources Other than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures |
|-----------|-----------------------------------------------------------------------------------------------|

**END OF ITEM L-125**

## SPECIAL PROVISIONS

1. **GENERAL.** Work to be done under this Agreement consists of furnishing all labor, materials, equipment and accessories and performing all operations necessary to complete the Work in accordance with the Drawings and Specifications.

The following "Special Provisions" shall govern in case of any discrepancies in any or all of the following Specifications, and the intent, either expressed or implied in these "Special Provisions", shall govern in the interpretation of the Plans and Specifications.

The Bidder is required to examine carefully the site of the Proposed Work, the Proposal, Plans and Specifications. He shall satisfy himself as to the character, quality and quantities of Work to be performed, materials to be furnished, and as to the requirements of these Specifications. The submission of a Proposal shall be evidence that the Bidder has made such an examination.

2. **PLANS.** The Plans governing and controlling the Work and to which reference is made throughout the Technical Specifications and other Contract Documents are those plans prepared by Armstrong Consultants, Inc. entitled "Holbrook Municipal Airport – Holbrook, Arizona, AIP No. 3-04-0020-0xx-2024."
3. **LOCATION.** Holbrook Municipal Airport is located in Holbrook, Arizona.
4. **WORK SCHEDULE AND PROJECT PHASING.** After the Award of Contract and prior to receiving the Notice to Proceed, the Contractor shall submit to the Engineer a Safety Plan Compliance Document (located in Special Provisions 27). The Sponsor reserves the right to request changes in the sequence of Project schedules if such change is required in the interest of safety or airport operation.

Construction shall be phased in a manner to minimize disruption to air traffic operations. Access shall be maintained from the aircraft parking area to the runway at all times.

5. **PRE-CONSTRUCTION CONFERENCE.** After the Notice to Proceed has been issued and prior to commencement of any Work, the Airport Manager as the Sponsor's Representative will meet with the Engineer and the Contractor to discuss the Work in general, including administrative matters, the Contractor's Quality Control Program, accident prevention, and safety; to answer any questions of the Engineer or Contractor; and to resolve any potential problems before the Work commences.
6. **UNDERGROUND UTILITIES.** All known existing utilities have been depicted on the Plans as accurately as possible. In many cases, exact location, depth, and pipe size and type are not known. The Contractor is responsible for contacting appropriate utility locator services prior to construction.

In the State of Arizona call: Arizona Blue Stake, Inc. (800) 782-5348, [www.azbluestake.com](http://www.azbluestake.com) please notify 2 full business days. Where the Plans call for the Contractor to relocate an existing utility and the affected utility material composition differs from that shown on the Plans, the Contractor shall immediately notify the Engineer.

7. **PERMITS, TAXES & COMPLIANCE WITH LAWS.** The Contractor shall procure and pay for all permits, taxes, licenses, and bonds necessary for the prosecution of his Work, and/or required by local, State, and Federal regulations, and laws, as pertains particularly to permits and transportation of materials and equipment, or other operations which are not a specific requirement of these Specifications. The Contractor shall give all notices, pay all fees and taxes, and comply with all Federal, State and local laws, ordinances, rules, and regulations, and building and construction codes bearing on the conduct of the Work. Costs of compliance and/or all taxes shall be included in the Unit Prices Bid for each Contract Item.
8. **FIELD OFFICE.** The Contractor will not be required to provide a field office and furnishings as noted in Section 60, Paragraph 5 of the General Provisions.
9. **HAUL ROADS.** The Contractor shall obtain approval from the Engineer prior to establishing haul roads within the airport property. Once established, the haul roads shall be utilized for all equipment traffic, and the equipment shall not be allowed to stray or wander away from the established routes. The haul roads shall be the responsibility of the Contractor and shall be maintained and kept in good order at all times. Water when required, shall be applied at the locations and in the amounts necessary to minimize dust and dirt in the air operations area. Haul roads across any active runway or taxiway shall be kept clean and in good order at all times. The Contractor shall repair any damage caused by the movement of equipment on any of the haul roads, whether in designated or undesignated areas. After completion of the Project, the Contractor shall be required to regrade any unpaved portions of the haul road and to reseed the area with local native grasses to match the existing conditions of the area. The performance of any Work as specified by this provision, including watering, maintenance, and repair of the haul roads, shall not be measured and paid for directly, but shall be considered as necessary and incidental to the Work.
10. **TESTING & STAKING.** The Contractor is responsible for conducting and payment for all quality control testing, survey and staking noted in these Specifications. Acceptance testing will be furnished by an independent testing laboratory that is retained and paid by the Owner. The person responsible for conducting the testing/staking shall be approved by the Engineer. Field test results shall be furnished daily by the Contractor and the independent testing laboratory in written form to the Engineer's Representative on the Project site and shall be submitted weekly by the Contractor and the independent testing laboratory to the Engineer typed on the forms supplied with the Construction Management Plan. Failure to submit written test results daily or typed test results weekly shall be grounds for suspension of Work (but not Contract Time) until the test results are submitted to the Engineer. Any requested testing data and/or surveying notes shall be supplied to the Engineer by the Contractor and the independent testing laboratory at no cost.
11. **AIRPORT SECURITY.** During the course of the construction operations, the Contractor will be allowed to utilize an agreed upon number of airport accesses as entrances to the construction site. These gates and the associated haul roads shall be designated by the Engineer. The Contractor shall be required to keep these gates and all other temporary gaps in fencing closed during non-construction hours and guarded as necessary during construction hours to protect the runway from stray livestock. Occupants of any vehicles allowed on the airport shall be the responsibility of the Contractor and the Contractor shall control which vehicles are allowed to enter the airport property during construction except for normal airport operations uses.



12. **CLOSURE OF AIR OPERATIONS AREAS.** Barricades are considered a necessary and incidental part of the work and no separate measurement or payment will be made therefore. The Contractor shall consider the costs and distribute them to the various bid items.
13. **ACCIDENT PREVENTION.** Precautions shall be exercised at all times for the protection of persons (including employees) and property, and that the safety provisions of applicable laws and of applicable building construction codes shall be observed, and that machinery, equipment, and explosives shall be guarded and all hazards shall be eliminated in accordance with the safety provisions of the Manual of Accident Prevention in Construction published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable law.
14. **EXISTING UNDERGROUND CABLES.** The Contractor shall attempt to locate the Sponsor's and/or FAA's underground cables prior to construction. Damage to the underground cables by the Contractor will require replacement by the Contractor at no cost to the Sponsor. Any splicing or replacing of damaged cable shall meet current FAA specifications.
15. **UTILITIES.** Any utilities required by the Contractor for the prosecution of the Work shall be paid for by the Contractor.
16. **STANDARD OF CARE/WARRANTY.** The Contractor shall perform all of the work required under the Contract Documents, in accordance with the expertise and skill that would be expected of a Contractor, expert in airport construction projects in general, and the Work required under the Contract Documents, in particular. In addition, the Contractor warrants that materials and equipment furnished under the Contract Documents will be of good quality and new, unless otherwise required by the Contract Documents, that the Work will be free from defects not inherent in the Work involved, and that the Work will conform, in all respects, to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, shall be considered defective. The Contractor's warranty excludes defects due to abuse not caused by the Contractor, Subcontractors, or other third parties operating under the direction or control of the Contractor, modifications not executed or approved by the Contractor, improper or insufficient maintenance, by the Sponsor, improper operation by the Sponsor, or normal wear and tear under normal usage.
17. **ATTORNEY'S FEES.** Should either party breach its obligations under the Agreement to be executed between the Contractor and Sponsor, or under any of the other Contract Documents, the breaching party shall be responsible for reimbursing the non-breaching party for all reasonable Attorney's fees and court costs incurred by the non-breaching party in enforcing its rights under the Contractor's agreement or the other Contract Documents.
18. **DRUG FREE WORKPLACE.** While the federal provision for Drug Free Workplace does not apply to the Contractor as an entity, the airport that the Contractor is working on does have to comply with the provision. As such, the Contractor is hereby notified that while working on the airport and all Sponsor-owned land and facilities the Contractor and its representatives shall be drug free. Failure to comply can result in the Contractor being considered in breach of contract terms.
19. **CSPP VIOLATION PENALTIES.**

**Penalty for moving violation of Airport CSPP.** In addition to the suspension of work outlined in GP 80-04 and elsewhere in the Construction Agreement, a driver who causes an incursion into an open

runway area will be prohibited from driving any vehicle in the AOA until the contractor demonstrates understanding of the cause of the violation. A written proposed change in construction operations ensuring the cause is remedied shall be submitted by the Contractor to the Sponsor and the change must have been implemented to reinstate their AOA driving privileges. The second violation for the same driver will result in them and their immediate supervisor having their AOA driving privileges revoked for the duration of the project in progress at the time of the second violation.

**Penalty for non-moving violations of Airport CSPP.** These violations do not include driving violations but all other CSPP violations, such as the improper layout of barricades, construction traffic routing, or lack of communicating required events to Sponsor or Engineer. In addition to the suspension of work outlined in GP 80-04 and elsewhere in the Construction Agreement, all construction items' acceptance testing and measurement for payment shall cease at no cost to the project or Sponsor. Work may only resume after the violation is remedied.

None of this shall be construed as relating to any standard or recognized construction and construction safety activities outside of the CSPP. The Contractor is solely responsible for all recognized safety items relating to all aspects of applicable construction activities and material supply logistics operations. Such activities include, but are not limited to, OSHA requirements, trench shoring, proper driver licensing, personal protective equipment, confined space activities, asphalt and concrete plant safety, etc. The Sponsor and the Engineer have no authority or burden of review or acceptance of any such safety items and practices.

20. **OPERATIONS AFFECTED BY COVID-19 PANDEMIC.** If at any point construction is suspended due to issues related to the COVID-19 pandemic, the contract time for the project will be temporarily stopped at no penalty to the Contractor. Prior to ceasing operations, the Contractor shall ensure that the project site is safe and can be left largely unattended. The Contractor will be required to perform periodic inspections as directed by Airport Staff, to ensure that all safety equipment is functioning and that the project site is safe. The Contractor will not be eligible for any additional payment due to demobilizing/remobilizing to the site nor additional payment due to lost production.
21. **CONSTRUCTION MANAGEMENT PLAN.** At the Pre-Construction Conference, the Contractor will be given copies of the Construction Management Plan for this Project which will identify the various individuals along with their authority and responsibilities for quality control. That document will detail the measures and procedures to be followed to comply with the Quality Control Provision of the Construction Contract, including, but not limited to the quality control and acceptance tests required by the Project Specifications. The following pages include the Acceptance Testing Checklist and the forms which shall be used by the Contractor and the Independent Testing Laboratory to report test results to the Engineer. The checklist and forms will also be included in the Construction Management Plan when it is prepared for this Project.
22. **STORMWATER DISCHARGE PERMIT.** The Contractor shall secure and maintain a General Permit for Storm Water Discharges from Construction Sites for this project in accordance with Section 402(p) of the Federal Clean Water Act and Section 405 of the Federal Water Quality Act of 1987. A Notice of Intent shall be filed by the Contractor.

Arizona Department of Environmental Quality  
Surface Water Section / Permits Unit / Stormwater Program  
1110 W. Washington, 5415 A-1

Phoenix, AZ 85007  
(602) 771-2300

Information concerning the EPA Region 9 Stormwater Program may be obtained by calling (415) 972-3510.

Information concerning the Stormwater Program may be obtained from: <https://azdeq.gov/mydeq>

23. **SAFETY.** Representatives of the Owner or the Engineer are not responsible during site visits or as a result of observations or inspections of the Contractor's work in progress for any safety precautions or programs incident to the Work of the Contractor or for any failure of the Contractor to comply with laws, rules, regulations, ordinances, codes or orders applicable to safety precautions or programs.
24. **PROTECTION OF AIRPORT PAVEMENT.** The Contractor is specifically cautioned that this airport was constructed to support light aircraft. Pavement and other structures on the airport project site are not rated the same as the surrounding roadway network. Pavement or other structures damaged by the Contractor's equipment or operations must be repaired or replaced to a condition as good, or better than, before the project began. Cost of this repair or replacement shall be borne solely by the Contractor.
25. **CONTRACTORS AFFIDAVIT.** In addition to indemnification of the Owner on the release of claims that is to be delivered prior to the final payment, the Contractor shall extend that indemnification to Armstrong Consultants, Inc.
26. **CONSTRUCTION SAFETY AND PHASING PLAN WITH CONSTRUCTION SAFETY DRAWINGS.** To follow on next page.

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# HOLBROOK MUNICIPAL AIRPORT

Holbrook, Arizona

## CONSTRUCTION SAFETY AND PHASING PLAN

### **SCHEDULE I (AIP)**

Reconstruct Apron

### **SCHEDULE II (NON-AIP)**

Reconstruct Apron Hangar Connections

AIP No. 3-04-0020-021-2021

ADOT NO. XXXXX

ACI No. 216729

February 2022



**ARMSTRONG**

2345 South Alma School Road, Suite 208

Mesa, Arizona 85210

O: 602.803.7079

[www.armstrongconsultants.com](http://www.armstrongconsultants.com)



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**HOLBROOK MUNICIPAL AIRPORT**  
**AIP NO. 3-04-0020-021-2021**

The Contractor shall prepare a detailed Safety Plan Compliance Document (SPCD) as stated in the Advisory Circular 150-5370-2G. The SPCD should include a general statement by the Contractor that he/she has read and will abide by the Construction Safety and Phasing Plan (CSPP). In addition, the Contractor's SPCD shall identify specific methods, sequencing, and phasing that he/she intends to use in order to accomplish the project work. The final SPCD shall be the result of a coordinated effort between the Owner/Sponsor, the Engineer, and the Contractor.

The Contractor shall adhere to the approved SPCD and CSPP as agreed upon by the Owner/Sponsor, Engineer, and Contractor. Modifications or deviations from the approved safety plan shall be submitted to the Engineer for review and approval prior to implementation. The Engineer for this project is Armstrong Consultants, Inc. The Project Manager is Jason Musselman, (602) 803-7079.



## **1.0 COORDINATION**

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A pre-construction meeting will be held prior to the Contractor beginning work or staging material and equipment on-site. The Sponsor, the Contractor, and the Engineer representatives shall be present. The pre-construction meeting will discuss operational safety during construction as a priority.

No closures will be permitted without the applicable Notices to Airmen (NOTAM) in place for each specific closure. Emergency access for both Aircraft Rescue and Fire Fighting (ARFF) and off-airport (Police, Fire, and EMT) based emergency service shall be maintained at all times. Routing for such traffic shall be determined and made known to all supervisory personnel involved in the construction project. Coordination of this access will be proposed by the Contractor and approved by the Resident Engineer and the Airport Operations Manager.

### **1.1 Contractor Progress Meetings**

The location and time of the daily progress meetings will be determined during the pre-construction meeting. A continual review of the Contractor's adherence to the CSPP will be made by the Resident Engineer or Inspector and airport personnel and will be discussed at each meeting. The Contractor will be notified and required to immediately correct any deficiencies that may occur.

### **1.2 Scope or Schedule Changes**

Any proposed changes to the CSPP shall be pre-coordinated with the FAA Airports Regional or District Office prior to implementation of the change.

All parties involved will need to evaluate the impact(s) of the change and will determine what measures will need to be taken to maintain a safe construction site. Changes in the scope or duration of the project may necessitate revisions to the CSPP.

### **1.3 FAA Air Traffic Organization Coordination**

It is not anticipated that any shutdown or alteration to FAA facilities will be required for this project.

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## **2.0 PHASING**

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In order to minimize disruptions to airport operations during construction, construction will be sequenced in phases to limit the amount of aircraft operations affected at any given time. The phasing plan was developed with help from the airport and is considered to be the most effective way of maintaining the required aircraft access, while imposing the least amount of impact on Contractor operations, and without sacrificing safety. The phasing for this project is presented below, and is visually depicted in the CSPP Drawings attached in Appendix A.

This project will be completed in two (2) schedules with a single phase. The phase is discussed in further detail below and in the drawings.

### **2.1 Phasing Elements**

#### **2.1.1 Phase 1 – Reconstruct Apron**

Phase 1 will allow the Contractor to conduct pre-construction activities including the pre-construction meeting, mobilization, surveying, and to perform reconstruction work on the north portion of the apron. Work will include removals, grading, pavement placement, electrical and lighting installation, and marking.

Phase 1 will be maximum of Seventy (70) Calendar Days. The north portion of the apron will be fully closed throughout Phase 1. Low Profile Barriers shall be used to prevent aircraft from entering the work area.

Runway 3/21, Taxiways A, A1, A2, A3, A4, and B will remain open throughout Phase 1. Access to the southern portion of the apron will be maintained through Taxiway B.

The main airport access gate will be blocked during construction. An existing secondary gated access to the southern portion of the apron will be utilized for access to the open portions of the airport throughout construction.

The Contractor shall notify the Engineer at least 72 hours prior to any activities within the AOA so the Airport can provide any required NOTAM's.

## **2.2 Construction Safety and Phasing Plan Drawings**

The CSPP Drawings (Appendix A) of this document show the affected areas and associated closures. When closure is necessary, the Contractor shall obtain approval from the Sponsor and be required to place yellow closure crosses as shown on the plans. Low profile aviation barricades shall be placed to delineate the construction area on taxiways. The drawings have been reviewed and accepted.



### 3.0 AREAS AND OPERATIONS AFFECTED BY THE CONSTRUCTION ACTIVITY

All work within the AOA shall be accomplished in conformance with Advisory Circular 150/5370-2G, *Operational Safety on Airports during Construction*. The CSPP Drawings (Appendix A) include information regarding requirements for operational safety on the airport during construction.

| Project                                | Reconstruct Apron (23,000 SY)                        |                                                   |
|----------------------------------------|------------------------------------------------------|---------------------------------------------------|
| Scope of Work                          | Remove and reconstruct northern portion of the apron |                                                   |
| Phase                                  | Normal (Existing)                                    | Phase I Construction                              |
| Effects of Construction Operations     | None                                                 | North portion of Apron closed during construction |
| RW 3/21 Average Aircraft Operations    | Un-Available                                         | Un-Available, not altered by construction         |
| Runway 3/21 Aircraft Category          | B-1                                                  | B-1                                               |
| Runway 3 Approach Visibility Minimums  | Visual                                               | Visual                                            |
| Runway 21 Approach Visibility Minimums | Visual                                               | Visual                                            |
| Runway 3 Approach Procedures           | Visual                                               | Visual                                            |
| Runway 21 Approach Procedures          | Visual                                               | Visual                                            |
| RW 3/21 NAVAIDs                        | PAPI/PAPI                                            | PAPI/PAPI                                         |
| TW TDG                                 | 2                                                    | North portion of Apron closed during construction |
| ATCT (hours open)                      | N/A                                                  | N/A                                               |
| ARFF Index                             | N/A                                                  | N/A                                               |
| Special Conditions                     | N/A                                                  | N/A                                               |
| Information for NOTAMs                 | N/A                                                  | North portion of Apron closed for construction    |

| RUNWAY | AIRCRAFT APPROACH<br>CATEGORY<br>A, B, C OR D | AIRPLANE DESIGN<br>GROUP<br>I, II, III OR IV | RSA WIDTH IN FEET<br>DIVIDED BY 2 |
|--------|-----------------------------------------------|----------------------------------------------|-----------------------------------|
| 3      | B                                             | I                                            | 60 Feet                           |
| 21     | B                                             | I                                            | 60 Feet                           |
| 11     | B                                             | I                                            | 60 Feet                           |
| 29     | B                                             | I                                            | 60 Feet                           |

| RUNWAY END<br>NUMBER | RSA Length<br>Beyond RWY End | RSA Length Prior to<br>Landing Threshold | Minimum Distance to Threshold<br>based on Required Approach Slope |      |
|----------------------|------------------------------|------------------------------------------|-------------------------------------------------------------------|------|
| 3                    | 240 Feet                     | 240 Feet                                 | 500 Feet                                                          | 20:1 |
| 21                   | 240 Feet                     | 240 Feet                                 | 500 Feet                                                          | 20:1 |
| 11                   | 240 Feet                     | 240 Feet                                 | 240 Feet                                                          | 20:1 |
| 29                   | 240 Feet                     | 240 Feet                                 | 240 Feet                                                          | 20:1 |

### 3.1 Identification of Affected Areas

All of the work for this project will occur within the AOA. The CSPP Drawings (Appendix A) depict the limits of the project and their proximity to the AOA. The Contractor shall not enter the AOA unless approved by the Sponsor.

#### 3.1.1 Closing or Partial Closing of Runways, Taxiways and Aprons

The north portion of the apron will be fully closed throughout construction.

Runway 3/21 and Taxiways will remain open throughout Phase 1. Access to the southern portion of the apron will be maintained through Taxiway B.

The main airport access gate will be blocked during construction. An existing secondary gated access to the southern portion of the apron will be utilized for access to the open portions of the airport throughout construction.

No utilities should be interrupted by construction.

## **3.2 Mitigation of Effects**

To mitigate construction effects on airport operations, a detailed phasing requirement will be specified in the plans and specifications. In developing the phasing requirement, alternative routes allowing emergency and ARFF vehicles and aircraft taxiway and runway movements have been considered.

With the majority of construction taking place within the AOA, phasing will be designed to minimize impacts on airport operations.

It is imperative to adhere to the requirements established in the CSPP Drawings (Appendix A) to maintain safety and operations at the airport during construction. It is important that all involved personnel discuss current and upcoming phases during the required daily updates.

### **3.2.1 Temporary Changes to Runway and / or Taxi Operations**

Taxiways will remain open during construction, but access to the southern portion of the apron from Taxiway A and A1-A6 will be prevented due to construction. Planes will be required to back taxi along portions of Runway 3/21 to access the south portion of the apron through Taxiway B.

### **3.2.2 Detours for ARFF and Other Airport Vehicles**

Access for ARFF will be maintained throughout the site at all times.

### **3.2.3 Temporary Changes to Air Traffic Control Procedures**

None.

### **3.2.4 Runway Closure Procedure for Night Work**

Runway 3/21 will remain open throughout construction.

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#### **4.0 NAVIGATION AIDS (NAVAIDS) PROTECTION.**

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No NAVAIDS will be impacted by construction.

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## **5.0 CONTRACTOR ACCESS**

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In order for any person to have unescorted access to the AOA, that person must complete an access control class provided by the Airport. The Contractor will be required to submit detailed construction personnel information (full name, date of birth, and social security number) as required by the Airport.

### **5.1 Location of Stock Piled Construction Materials**

All stock piled materials shall be located in the contractor's staging area. See Construction Safety Plan for location. See Section 16 for discussion on hazard marking and lighting devices requirements. See Section 6 Wildlife Management for discussion on wildlife issues. See Section 7 Foreign Object Debris (FOD) Management for discussion on FOD control.

### **5.2 Vehicle and Pedestrian Operations**

The Contractor will be required to gain access to the airfield for this project. The project will require a haul route to cross the apron to bring in materials and remove waste. This area is located inside the movement area and communication with aircraft must be monitored by the Contractor. Pedestrians and personal vehicles will not be allowed to leave the staging area.

### **5.3 Construction Site Parking**

Construction site parking will be outside of the AOA and designated areas per the CSPP Drawings (Appendix A).

### **5.4 Construction Equipment Parking**

Construction equipment parking will be allowed at the contractor's staging area in the location shown on the CSPP Drawings (Appendix A) or at a location approved by the Resident Engineer or Airport Manager. No equipment or material shall be parked or stored in any active runway or taxiway safety area or object free area.

### **5.5 Access and Haul Roads**

During the course of the construction operations, the Contractor will be allowed to utilize an access security gate as entrance to the airfield and construction site. This gate and the haul route to the site are shown on the CSPP Drawings (Appendix A).

The gate may be opened only for authorized vehicles required for Contractor operations. Passengers in any authorized vehicles shall be the responsibility of the Contractor. Haul route designation on Airport property shall be the responsibility of the Airport and its representatives. Once established, the haul roads shall be utilized for all equipment traffic, and the equipment shall not be allowed to stray or wander away from the established routes. The haul roads shall be the responsibility of the Contractor and shall be maintained and kept in good order at all times. When required, water shall be applied at the locations and in the amounts necessary to minimize dust and dirt in the AOA. Since construction operations will be within active AOA, the Airport will require additional dust control measures be used on haul roads and the work area in order not to interfere with Airport operations. The Contractor shall be prepared at all times to repair any damage caused by the movement of equipment on any of the haul roads at the direction of the Engineer, whether in designated or undesignated areas. After completion of the project, the Contractor shall be required to regrade any unpaved portions of the haul road and to reseed the area with local native grasses to match the existing conditions of the area. The performance of any work as specified by this provision, including watering, maintenance, and repair of the haul roads, shall not be measured and paid for directly, but shall be considered as necessary and incidental to the work. Establishment of haul roads off of Airport property shall be the sole responsibility of the Contractor.

Contractor movement shall be restricted to the predetermined access routes as shown on CSPP Drawings (Appendix A) and within the work area. Work areas shall be delineated with barricades as shown on the CSPP Drawings (Appendix A). The Contractor shall not operate outside of these areas without approval of the Resident Engineer or Inspector. The Airport reserves the right to immediately remove any operator who does not comply with this section on a temporary basis, or at the Airport's discretion, permanently.

## **5.6 Marking and Lighting of Vehicles**

All vehicles operating within the AOA and in the movement areas must clearly identify themselves for control purposes. The identification symbols should be a minimum 8-inch block-type characters of a contrasting color and easy to read. They may be applied either by using tape or a water-soluble paint to facilitate removal. Magnetic signs are also acceptable. All authorized vehicles and construction equipment must display a three-foot by three-foot flag with international orange and white 12-inch squares displayed in full view above the vehicles or a rotating and/or flashing beacon. To operate in those areas, the vehicle must have a flag (day only) or beacon (day or night) attached to it. Any vehicle operation on the movement areas during hours of darkness or reduced visibility must be equipped with a beacon. All lighting of



vehicles must comply with FAA AC 150/5210-5, *Painting, Marking and Lighting of Vehicles Used on an Airport*.

## **5.7 Required Escorts**

When vehicles, without prior approval from the Airport operator, must travel over any portion of an aircraft movement area, the vehicle will be required to attain approval from the Airport operator and be properly identified. To operate in those areas during daylight hours, the vehicle must have a flag (day only) or beacon (day or night) attached to it. Any vehicle operation on the movement areas during hours of darkness or reduced visibility must be equipped with a flashing dome-type beacon.

## **5.8 Training Requirements of Vehicle Drivers**

Training is not required. Proper vehicle operations are described as confirming to all rules and regulation for driving as directed by the Airport.

## **5.9 Situational Awareness**

When on the AOA, vehicle drivers must confirm by personal observation that no aircraft is approaching their position (either in the air or on the ground) when given clearance to cross a runway, taxiway, or any other area open to aircraft operations. The Contractor shall be aware of boundaries to AOA at all times to avoid any vehicle/pedestrian deviation that could lead to any unauthorized entry onto the movement area.

## **5.10 Two-way Radio Communication Procedures**

The Contractor's superintendent shall be required to monitor transceiver radios tuned to the Holbrook Municipal Airport's Ground frequency 122.8 MHz at all times.

The Contractor shall supply aviation radios. Radios shall be used to obtain proper clearance in regards to the movement of equipment, trucks, etc., within the movement area.

Additionally, any unusual occurrences in the flight pattern of approaching or departing aircraft shall be acknowledged by all concerned so that operation of the airport and the construction work can be safely carried on at all times.

### **5.11 Maintenance of the Secured Area of the Airport**

Airport operators and contractors must take care to maintain security during construction when access points are created in the security fencing to permit the passage of construction vehicles or personnel.

Because the Airport is subject to 49 CFR Part 1542, *Airport Security*, even during construction, the Airport must meet standards for access control, movement of ground vehicles, and identification of construction contractor and tenant personnel.

## **6.0 WILDLIFE MANAGEMENT**

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In general, the Contractor must carefully control and continuously remove waste or excess material that might attract wildlife. Should the Contractor encounter any wildlife on the airfield, he should notify the Sponsor immediately so that appropriate actions to mitigate the problem can be implemented. The Contractor should contact the Sponsor for further guidance regarding any issues or questions regarding wildlife on the airport.

### **6.1 Trash**

The Contractor is responsible for completing a daily inspection of the construction site, including the Contractor's Staging Area, for any trash or objects that might attract wildlife. All trash found shall be disposed of properly.

### **6.2 Standing Water**

Because standing water can attract wildlife, the Contractor is responsible to complete a daily inspection of the construction site for any standing water. At discretion of the Airport Manager, Resident Engineer or Inspector, the Contractor shall promptly remove any standing water.

### **6.3 Tall Grass and Seeds**

Shrubs are prevalent at the airport and the existing airport perimeter fencing does not prevent smaller animal encroachment so the contractor may encounter smaller animals. Because shrubs can attract wildlife, the contract will be responsible to clear the area being disturbed to help mitigate the presence of wildlife in the work area.

### **6.4 Poorly Maintained Fencing and Gates**

The Contractor shall be required to maintain all fences and gates throughout the duration of the project, to the satisfaction of the Airport Operations Manager and Resident Engineer.

### **6.5 Disruption of Existing Wildlife Habitat**

The Contractor shall notify the Resident Engineer and Airport Operations Manager when any wildlife is sighted within the AOA.

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## **7.0 FOREIGN OBJECT DEBRIS MANAGEMENT**

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All excavated material, debris, etc. shall be cleaned from the site at least on a daily basis and more often if required by the Sponsor or Engineer. To control dust and/or blowing debris, any soil, debris or loose material shall immediately be swept up and removed. The Contractor shall ensure that the construction site is clean and FOD is not an issue for safe usage of the airport.

The Contractor is required to keep all areas within the construction site free from FOD at all times. The Contractor is required to maintain FOD control continually to the satisfaction of the Resident Engineer or Inspector. Prior to opening any pavement to aircraft, the Contractor shall conduct a sweep of the pavement to verify that it is FOD free.

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## **8.0 HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT**

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At the preconstruction meeting, the Contractor shall discuss the fueling operation for all equipment on site. Contractors operating construction vehicles and equipment on the Airport must be prepared to expeditiously contain spills resulting from fuel or hydraulic fluid leaks and immediately report to Airport Operations. Any spills that occur on site shall be brought to the attention of the Sponsor immediately. The Contractor shall also notify the Sponsor of any and all required remedial work required and follow appropriate methods for cleaning up the contaminate site. The Contractor shall also make sure the Resident Engineer and Sponsor are in attendance to witness the cleanup and provide written documentation to the Sponsor stating the remedial work is complete verifying regulation requirements are met. Spill prevention and response procedures for airport owned facilities include regular visual inspections, adopting good housekeeping practices, and reducing and reusing process materials to minimize waste generation on site. The Contractor should provide the Sponsor a list of all materials being delivered to the construction area and maintain Material Safety Data Sheets (MSDS) sheets for such materials on the airport site. The Contractor will also be required to verify that NPDES permits requirements are met. The Contractor shall be responsible for any costs and/or mitigation associated with any spills and/or leaks. MSDS are required for all hazardous materials used on Airport property. Also, disposal of contaminated material shall be in accordance with ADEQ and the manifest shall be acknowledged and signed by the designated landfill receiving the product as being compliant with all rules and regulations required by ADEQ and USEPA Region 9, San Francisco, CA.

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## 9.0 NOTIFICATION OF CONSTRUCTION ACTIVITIES

The Contractor shall list the names of individuals that will be responsible for specific items on the construction site. The names shall be given to the Sponsor, as well as posted on a bulletin board on the project. There is 911 emergency service at the Airport which shall be posted on the bulletin board. The following are contacts and names that need to be identified:

### 9.1 Maintenance of a List of Responsible Representatives / Points of Contact

Office/Testing Address and Phone Numbers:

Company Name:

Company Address:

City, State Zip

Ph.:

Fax:

Project Superintendent: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Superintendent: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

24-Hour Contact: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Safety Officer: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Quality Control Officer: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Job Site Environmental Officer: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Subcontractor information shall be available to the Sponsor and Engineer.

| Agency Contact                          | Type of Agency              | Telephone No.         |
|-----------------------------------------|-----------------------------|-----------------------|
| <b>Ted Soltis</b>                       | City Manager                | (928) 524-6225        |
| <b>Tim Kelley</b>                       | Airport Operator            | (928) 241-2438        |
| <b>Jason Musselman, Project Manager</b> | Armstrong Consultants, Inc. | (602) 803-7079        |
| <b>Holbrook Police Department</b>       | Police                      | (928) 524-3991 or 911 |
| <b>Holbrook City Fire House</b>         | Fire Department             | (928) 524-3898 or 911 |
| <b>Holbrook Specialty Center</b>        | Hospital                    | (928) 524-3751 or 911 |

## **9.2 Notices to Airmen**

Only the Airport Operations Manager may initiate or cancel NOTAMs on airport conditions, and is the only entity that can close or open a runway. The Airport Operations Manager must coordinate the issuance, maintenance, and cancellation of NOTAMs about airport conditions resulting from construction activities and must provide information on closed or hazardous conditions on airport movement areas to the FAA Flight Service Station (FSS) so it can issue a NOTAM. The Contractor must notify the Resident Engineer or Inspector and Airport Operations Manager when scheduling/scoping for the project has changed that would require a modification to the NOTAMs.

## **9.3 Emergency Notification Procedures**

In an event of an emergency, the Contractor shall notify the Resident Engineer or Inspector and Airport Operations Manager immediately and, when necessary, call 911. The Contractor must coordinate after hours contact procedures with the Airport prior to construction.

## **9.4 Coordinate with Airport Rescue and Fire Fighting (ARFF) Personnel**

This project shall not require any deactivation of water lines or fire hydrants, rerouting or blocking of any emergency access routes, or the use of any hazardous material on the airfield that would require coordination with ARFF personnel or emergency services. However, in the event that the Contractor must coordinate construction activities with ARFF Personnel, the Contractor will notify the Airport. The Airport Operations Manager and Resident Engineer or Inspector, or designated representative, will be responsible for notifying ARFF Personnel.

## **9.5 Notification to the FAA**

**Part 77:** Any person proposing construction or alteration of objects that affect navigable airspace, as defined in Part 77, must notify the FAA. This includes construction equipment, stockpiles, and proposed parking areas for this equipment.

**NAVAIDS:** For emergency notifications regarding both airport owned and FAA owned NAVAIDS, the airport shall contact 1-866-432-2622.

No planned NAVAID shutdowns are anticipated for this project.

## **10.0 INSPECTION REQUIREMENTS.**

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The Contractor will identify a Safety Officer who will be required to inspect on a daily basis, all barricades and flashers prior to work commencing and prior to leaving the work site. The Contractor will notify the Sponsor that all inspections have been completed. The Contractor shall determine if there is a need to increase the inspections based on the project and site conditions. There will be no decrease in the amount of required inspections. At the project final inspection, the project site shall be clean and free of all debris related to the project construction.

### **10.1 Daily (Or More Frequent Inspections)**

Inspections shall be conducted daily, or more frequently if deemed necessary by the Resident Engineer or Inspector to ensure conformance with this document. The inspections shall be completed by the Contractor to the Engineer's satisfaction and the Contractor shall submit a copy of all the completed checklists to the Engineer. The Contractor should fill out this checklist every day that construction operations occur on this project. Checklist is provided in Appendix B of this document.

### **10.2 Interim Inspections**

Inspections shall be conducted of all areas to be (re) opened to aircraft traffic to ensure the proper operation of lights and signs, for correct markings, and absence of FOD. The inspections should be completed by the Contractor, [Airport Operations Manager], [Sponsor], and Resident Engineer or Inspector. Ensure that all construction materials have been secured, all pavement surfaces have been swept clean, all transition ramps have been properly constructed, and that surfaces have been appropriately marked for aircraft to operate safely.

### **10.3 Final Inspections**

Final inspections shall be conducted prior to opening of any airfield facilities. The final inspection should be completed with the Contractor, Sponsor, and Resident Engineer.

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## **11.0 UNDERGROUND UTILITIES**

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The Contractor shall be responsible for contacting appropriate utility locator services prior to construction. The Contractor shall attempt to locate the Sponsor's and/or FAA's underground cables prior to construction. Damage to underground cables by the Contractor will require replacement by the Contractor at no cost to the Sponsor and/or FAA. Any splicing or replacing of damaged cable shall meet current FAA specifications. Damage caused to any underground utility through Contractor's negligence shall be repaired according to the relevant utility's standards and at no cost to the Sponsor.

If essential utilities or underground infrastructure is damaged by the Contractor during construction operations, the Contractor shall repair the item as quickly as possible. The Contractor shall notify the Resident Engineer and Inspector about deactivated utilities, the Resident Engineer or Inspector will then notify the Airport's Representative about items impacting Emergency Personnel. The Airport's Representative will then contact the Personnel who are responsible to make the necessary adjustments for the airport.

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## 12.0 PENALTIES

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If at any point a safety violation is noted, all construction activities in the area of the violation will be immediately terminated. Before construction can begin, the Contractor will provide a written statement demonstrating to the Owner that the construction can once again occur without violations to the Safety procedures. The Contractor is not eligible for additional compensation for the down time or any other claim when construction is terminated due to safety violations.

The Airport Manager or Inspector can suspend construction activities at any time during which they note safety violations. The duty of the Engineer or Owner to conduct construction review of the Contractor's performance is not intended to include review of adequacy of the Contractor's safety measures, in, or near the construction site. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for conditions on the job site including safety of all persons and property during performance of the work. This requirement shall apply continuously and will not be limited to working hours.

Penalties are based on the Airport's security policies. The Contractor is responsible for any penalties that the Airport may distribute.

The rules and procedures as set forth in this guide are enforceable by designated airport officials, law enforcement officials, and TSA officials. Violations of the procedures are considered as violations of the approved Airport Security Program.

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### **13.0 SPECIAL CONDITIONS**

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The Contractor shall monitor any weather conditions, aircraft emergencies, unexpected emergencies, and other elements that may cause safety on the project to be jeopardized.

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## **14.0 RUNWAY AND TAXIWAY VISUAL AIDS**

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The Airport Manager and the Contractor's Superintendent shall develop and oversee the lock-out/tag-out plan per 29 CFR Part 1910 Occupational Safety and Health Standards. Low profile barricades shall be installed on the taxiways and apron to delineate the construction areas prior to work being performed. The contractor must verify that construction and closure areas are clearly marked and remain visible for the duration of construction. The runway approaches will not be changed by this project.

### **14.1 General**

This project will not impact the runway or taxiway visual aids.

### **14.2 Markings**

No temporary painted markings are required for this project.

### **14.3 Lighting and Visual NAVAIDs**

No visual NAVAIDs will be affected by this project. A portion of the taxiway edge lighting circuit will be disconnected during installation of new conduit, cable, and edge lights proposed by the project. A NOTAM will be issued during the electrical installation.

### **14.4 Signs**

No temporary signs will be installed.

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## 15.0 MARKING AND SIGNS FOR ACCESS ROUTES

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Haul routes and other activities on the airport by the Contractor, subcontractors, and Engineer shall be coordinated with and approved in advance by the Airport Manager or his authorized agent. Any traffic signs and markings to delineate the haul route shall meet Advisory Circular 150/5340-18, *Standard for Airport Sign Systems*, Advisory Circular 150/5340-1M, *Standards for Airport Markings*, or the Manual on Uniform Traffic Control Devices (MUTCD) standards, including but not limited to the frangible and height requirements.

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## **16.0 HAZARD MARKING AND LIGHTING**

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### **16.1 Purpose**

The hazard marking and lighting prevents pilots from entering areas closed to aircraft and prevents construction personnel from entering areas open to aircraft. Prior to construction on or adjacent to any runway or taxiway, the Contractor shall, upon approval by the Engineer, close the runway or taxiway and begin work. The Contractor shall be responsible for clearly marking and defining the closed runways and taxiways by use of warning lights, barricades, flags and closed runway or taxiway markings. In addition, the Contractor is required to properly mark and light any open manholes, open trenches, excavations, small areas under repair, stockpiled material, waste areas, and any other areas associated with construction. Contractor shall be responsible for maintaining these barricades and keeping them clearly visible at all times.

### **16.2 Equipment**

Low profile barricades with the MUTCD standard reflective orange and white marking with the 20" min x 20" min flags mounted on the center of the barricade will be used to delineate the construction site. The barricades shall also be required to have the flashing red caution lights. Lights shall be placed on the barricades and spaced at no more than 10 ft. The barricades shall be weighed against propwash and capable of withstanding up to 100 MPH wind forces.

Flashing red caution lights shall maintain such intensity so as to be readily identified from distances of at least 200 feet during darkness. Lights must be operated between sunset and sunrise and during periods of low visibility whenever the airport is open for operations. They may be operated by photocell, but this may require that the Contractor turn them on manually during daytime periods of low visibility. The Contractor shall have a 24-hour on call representative for emergency maintenance of airport hazard lighting and barricades. Solar powered lights are highly encouraged to minimize battery replacement.

### **16.3 Lighting for Nighttime Construction**

Nighttime construction is not anticipated for this project. The contractor is to contact the Sponsor and Resident Engineer/Inspector for approval and guidance should nighttime construction become necessary.

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## **17.0 PROTECTION**

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The Contractor shall be required to close access to the northern portion of the apron. Safety areas impacted by construction shall be delineated.

### **17.1 Runway Safety Area**

The Airport defines the safety area for Runway 3/21 as the area that is within 60 feet from the centerline of Runway 3/21 and extends 240 feet beyond both ends of the runway. The Airport defines the safety area for Runway 11/29 as the area that is within 60 feet from the centerline of Runway 11/29 and extends 240 feet beyond both ends of the runway. While Runway 3/21 or Runway 11/29 is open, work in the safety area is prohibited. The Runway Safety Area (RSA) and associated dimensions are shown on the CSPP Drawings (Appendix A).

The Airport defines the Safety Area for all runways as the area that is within 60 feet from the centerline of each runway. Construction operations for this project shall not impede into the Runway Safety Area (RSA). During the construction process, construction personnel must not enter into any active RSA. Open trenches and excavations are not allowed in the RSA while the airport is operational. Trenches and excavations must be backfilled at the conclusion of night work. If it is not possible to backfill, appropriate methods such as trench plates may be used to cover the open trench or excavations.

Soil erosion must be controlled to maintain RSA standards. The RSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations. It must be capable under dry conditions of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing structural damage to the heaviest aircraft operating on the runway.

### **17.2 Runway Object Free Area**

The Airport defines the Runway Object Free Area (ROFA) for Runway 3/21 as the area that is within 200 feet from the centerline of Runway 3/21 and extends 240 feet beyond both ends of the runway. The Airport defines the Runway Object Free Area (ROFA) for Runway 11/29 as the area that is within 200 feet from the centerline of Runway 11/29 and extends 240 feet beyond both ends of the runway. The ROFA and associated dimensions are shown on the CSPP Drawings (Appendix A). Construction is allowed within the ROFA; however, equipment shall not be left in the ROFA when not in use. Materials are not to be stockpiled in the ROFA. Construction personnel shall not enter active ROFAs unless required by the project phasing and approved by the Airport Operations Manager.

### **17.3 Taxiway Safety Area**

The Airport defines the Taxiway Safety Area (TSA) for Taxiway A and the connector taxiways as the area that is within 24.5 feet from the centerline of each taxiway. Construction will be prohibited within any active TSA during operational hours. Construction activity, phased closures, and TSA with associated dimensions are shown on the CSPP Drawings (Appendix A).

The Airport defines the Safety Area for all taxiways as the area that is within 24.5 feet from the centerline of each taxiway. Construction operations for this project shall not impede into the TSA. During the construction process, construction personnel must not enter into any active TSA.

Open trenches and excavations are not permitted within the TSA while the taxiway is open. If possible, backfill any trenches before the taxiway is opened. If the taxiway must be opened before excavations are backfilled, cover the excavations appropriately.

The Contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

Soil erosion must be controlled to maintain TSA standards, that is, the TSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the heaviest aircraft operating on the taxiway.

### **17.4 Taxiway Object Free Area**

The Airport defines the Taxiway Object Free Area (TOFA) for the taxiway system as the area that is within 44.5 feet from the centerline of each taxiway. The TOFA and associated dimensions are shown on CSPP Drawings (Appendix A). No construction may occur within the TOFA while the taxiway is open for aircraft operations. Signs, embankments, and equipment within the TOFA must comply with the frangible requirements as stated in Advisory Circular 150/5220-23, Frangible Connections.

Construction personnel shall not enter active TOFAs unless required by the project phasing and approved by the Airport.

## **17.5    Obstacle Free Zone**

The Airport defines the Obstacle Free Zone (OFZ) for Runway 3/21 as the area that is within 200 feet from the centerline of Runway 3/21 and extends 200 feet beyond both ends of the runway. The Airport defines the Obstacle Free Zone (OFZ) for Runway 11/29 as the area that is within 200 feet from the centerline of Runway 11/29 and extends 200 feet beyond both ends of the runway. Personnel, material, and/or equipment may not penetrate the OFZ while the runway is open for aircraft operations.

Construction operations for this project shall impede into the OFZ. Construction activity, phase closures, and OFZ with associated dimensions are shown on CSPP Drawings (Appendix A).

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## **18.0 OTHER LIMITATIONS ON CONSTRUCTION**

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### **18.1 Prohibitions**

The use of open flame welding or torches is prohibited unless adequate fire safety precautions are provided and the airport operator has approved their use. The use of explosives is prohibited on or within 1,000 feet of the airport property, unless expressly authorized by the Sponsor and associated jurisdictions.

### **18.2 Restrictions**

Construction suspension may be required during specific airport operations. Project areas may be worked on simultaneously only if approved by the Engineer and Airport Operations Manager. Night construction may only be performed if approved by the Engineer and Airport Operations Manager.

Construction operations shall only be allowed in weather conditions compliant with the project specifications.

Temporary signs must be approved by the airport operator.

There may be a restriction on unplanned grade changes during construction that could result in unplanned effects on NAVAIDS.

Additional restrictions are placed on tall construction equipment. Typically, any piece of equipment over 20' tall will need to be evaluated to determine its potential impact to the airspace. For this project, there are restrictions on the height and the location of the asphalt plant and the construction crane required to erect and dismantle the plant. Refer to the CSPP for additional information.

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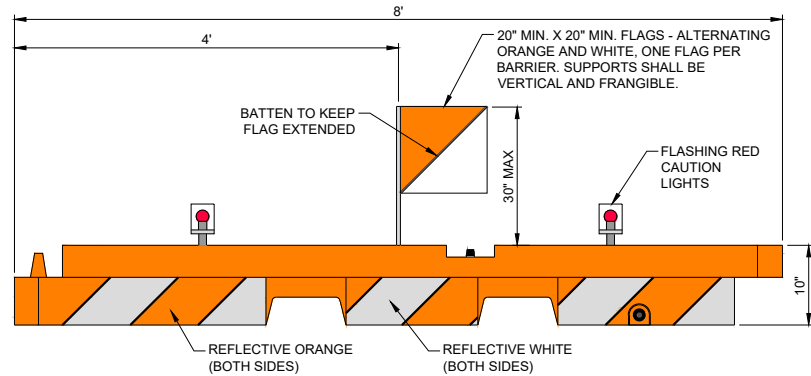
# **APPENDIX A**

## **CSPP DRAWINGS**





S:\\_Arizona\Holbrook\Project Files\Active Projects\216729 HOLBROOK - APRON RECON DESIGN\CAD\dwg\216729150.dwg 2/24/2022 2:06:20 PM MMONROE



- NOTES:
1. BARRIER SHALL BE SHERWIN INDUSTRIES, 10" x 96" LOW PROFILE AIRPORT BARRIER, AS SHOWN, OR APPROVED EQUAL.
  2. THE ENTIRE AREA OF ORANGE AND WHITE STRIPES SHALL BE REFLECTORIZED WITH SMOOTH SURFACE TYPE REFLECTIVE SHEETING.
  3. LIGHTS MUST BE MOUNTED ON BARRIERS AND SPACED AT NO MORE THAN 10 FT.
  4. THE BARRIERS SHALL BE WEIGHTED AGAINST PROWASH AND CAPABLE OF WITHSTANDING UP TO 100 M.P.H. WIND FORCES.
  5. FLASHING RED CAUTION LIGHTS SHALL BE BATTERY OPERATED AND SHALL MAINTAIN SUCH INTENSITY SO AS TO BE READILY IDENTIFIED FROM DISTANCES OF AT LEAST 200 FEET DURING DARKNESS.
  6. THE CONTRACTOR SHALL CHECK ALL BARRIERS AND LIGHTS EACH DAY BEFORE LEAVING THE AIRPORT TO ENSURE LIGHTS ARE WORKING PROPERLY AND MAY NOT LEAVE WITHOUT ALL BARRIERS AND LIGHTS BEING IN PROPER WORKING ORDER.

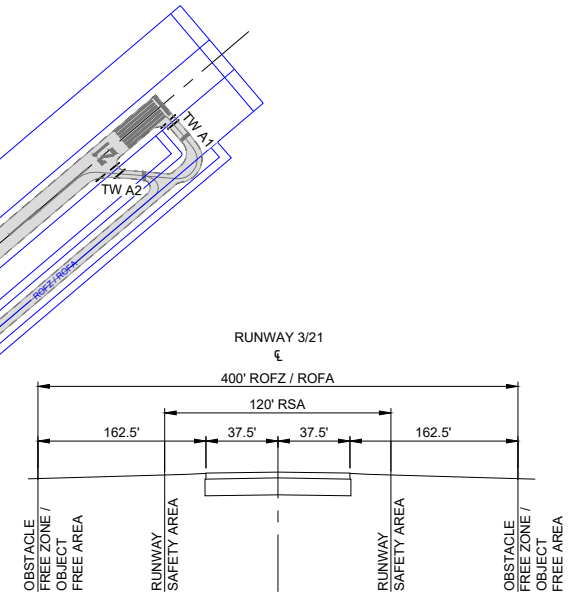
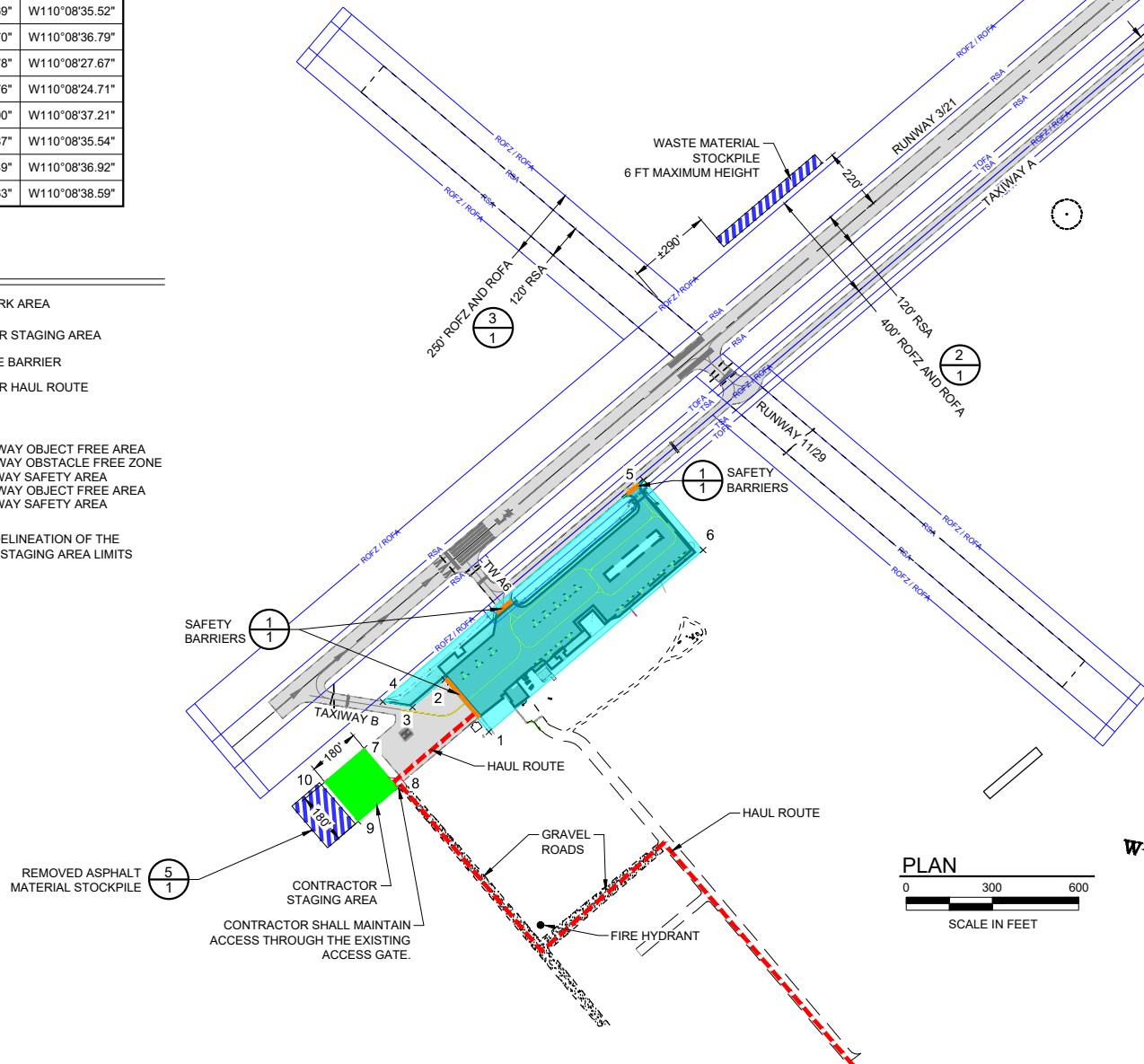
1 LOW PROFILE SAFETY BARRIER  
NOT TO SCALE

| WORK AREA COORDINATES |           |                |                |
|-----------------------|-----------|----------------|----------------|
| POINT #               | ELEVATION | LATITUDE       | LONGITUDE      |
| 1                     | 5237"     | N034°56'05.32" | W110°08'32.19" |
| 2                     | 5237"     | N034°56'06.81" | W110°08'34.39" |
| 3                     | 5237"     | N034°56'05.69" | W110°08'35.52" |
| 4                     | 5237"     | N034°56'05.70" | W110°08'36.79" |
| 5                     | 5237"     | N034°56'14.78" | W110°08'27.67" |
| 6                     | 5237"     | N034°56'12.76" | W110°08'24.71" |
| 7                     | 5237"     | N034°56'04.00" | W110°08'37.21" |
| 8                     | 5237"     | N034°56'02.87" | W110°08'35.54" |
| 9                     | 5236"     | N034°56'01.49" | W110°08'36.92" |
| 10                    | 5237"     | N034°56'02.63" | W110°08'38.59" |

LEGEND

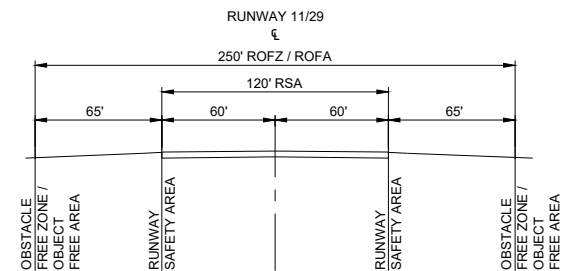
|  |                                  |
|--|----------------------------------|
|  | PHASE 1 WORK AREA                |
|  | CONTRACTOR STAGING AREA          |
|  | LOW PROFILE BARRIER              |
|  | CONTRACTOR HAUL ROUTE            |
|  | DETAIL #                         |
|  | SHEET #                          |
|  | ROFA = RUNWAY OBJECT FREE AREA   |
|  | ROFZ = RUNWAY OBSTACLE FREE ZONE |
|  | RSA = RUNWAY SAFETY AREA         |
|  | TOFA = TAXIWAY OBJECT FREE AREA  |
|  | TSA = TAXIWAY SAFETY AREA        |

LATITUDE AND LONGITUDES (LAT/LONG) DELINEATION OF THE CONSTRUCTION AREA AND CONTRACTOR STAGING AREA LIMITS



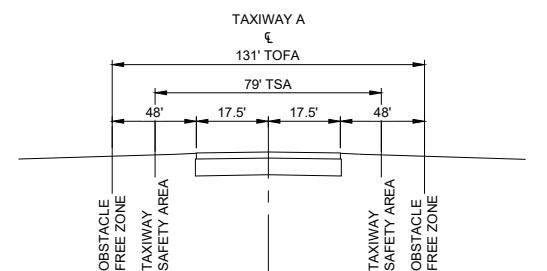
ALL CONSTRUCTION EQUIPMENT, STOCKPILES, AND TRAFFIC MUST REMAIN CLEAR OF ANY OPEN RUNWAY OBSTACLE FREE ZONE / OBJECT FREE AREA.

2 SAFETY AREAS  
NOT TO SCALE



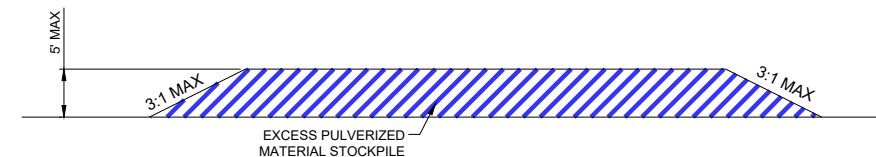
ALL CONSTRUCTION EQUIPMENT, STOCKPILES, AND TRAFFIC MUST REMAIN CLEAR OF ANY OPEN RUNWAY OBSTACLE FREE ZONE / OBJECT FREE AREA.

3 SAFETY AREAS  
NOT TO SCALE



ALL CONSTRUCTION EQUIPMENT, STOCKPILES, AND TRAFFIC MUST REMAIN CLEAR OF ANY OPEN TAXIWAY OBJECT FREE AREA.

4 SAFETY AREAS  
NOT TO SCALE



5 STOCKPILE  
NOT TO SCALE

| No. | Revision | Date | By |
|-----|----------|------|----|
|     |          |      |    |
|     |          |      |    |
|     |          |      |    |
|     |          |      |    |

ACI No. 216729  
Date: FEB 2023  
File Name: 216729150

Drawn: MLM  
Checked: CES  
Approved: JMTM

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**APPENDIX B**

**DAILY INSPECTION CHECKLIST**



# DAILY INSPECTION CHECKLIST

DATE: \_\_\_\_\_

DAY: \_\_\_\_\_

✓ Satisfactory

Inspector/Time: \_\_\_\_\_

X Unsatisfactory

|                   | CONDITIONS                                                                                                                                                                                                                                                                          | ✓/X | REMARKS | RESOLVED<br>Date/Initials |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------|---------------------------|
| General           | Check NOTAMs daily during construction projects to ensure they accurately reflect the conditions on the airport.                                                                                                                                                                    |     |         |                           |
|                   | Verify that closed taxiways or runways are properly marked and lighted.                                                                                                                                                                                                             |     |         |                           |
|                   | Report and monitor any dangerous condition created by construction activity, including damage to signs, lights, markings and NAVAIDS or equipment and supplies left in movement areas and safety areas.                                                                             |     |         |                           |
| Movement Areas    | All construction materials have been removed to the staging area.                                                                                                                                                                                                                   |     |         |                           |
|                   | Ensure all construction adjacent to movement area is identified with conspicuous marking and lighting.                                                                                                                                                                              |     |         |                           |
|                   | Check for open trenches adjacent to movement areas.                                                                                                                                                                                                                                 |     |         |                           |
| Safety Areas      | Check for open trenches in safety areas.                                                                                                                                                                                                                                            |     |         |                           |
|                   | Determine if construction equipment (such as bulldozers, cranes, etc.) are marked and lighted and parked clear of the safety areas.                                                                                                                                                 |     |         |                           |
| Construction Area | Ensure construction barricades are properly positioned to define the limits of construction and hazardous areas and, if barricades are lighted, check to ensure lights are working properly and are positioned correctly.                                                           |     |         |                           |
|                   | Check to ensure that debris and foreign objects are continuously being picked up around construction areas.                                                                                                                                                                         |     |         |                           |
|                   | Check operation of lighting in areas adjacent to construction daily before the construction crews depart for the day. In particular, ensure that mandatory instruction signs remain lit with the associated runway lights, even on taxiways that have been closed for construction. |     |         |                           |

Contractors Representative: \_\_\_\_\_

Date: \_\_\_\_\_

Engineers Representative: \_\_\_\_\_

Date: \_\_\_\_\_

Airports Representative: \_\_\_\_\_

Date: \_\_\_\_\_

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## 27. SAFETY PLAN COMPLIANCE DOCUMENT

I, \_\_\_\_\_ (Name), (CONTRACTOR), have read the Holbrook Municipal Airport, AIP No. 3-04-0020-0xx-2024 Construction Safety and Phasing Plan (CSPP), approved on \_\_\_\_\_, 2024, and will abide by it as written and with the following additions as noted:

Notes:

1. *If no supplemental information is necessary for any specific section, write "NO SUPPLEMENTAL INFORMATION"*
2. *Do not duplicate information in the CSPP.*

### 1. COORDINATION – Discuss details of proposed safety meetings with the airport operator and with contractor employees and subcontractors

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### 2. PHASING – Discuss proposed construction schedule elements including:

- a. Duration of each phase
- b. Daily start and finish of construction, including "night only" operation
- c. Duration of construction activities during:
  - i. Normal runway operations
  - ii. Closed runway operations
  - iii. Modified runway "Aircraft Reference Code" usage

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### 3. AREAS AND OPERATIONS AFFECTED BY THE CONSTRUCTION ACTIVITY – Areas and operations are identified in the CSPP

NO SUPPLEMENTAL INFORMATION \_\_\_\_\_

**4. PROTECTION OF NAVAIDS** – Discuss specific methods proposed to protect operating NAVAIDs

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**5. CONTRACTOR ACCESS** – Provide the following:

- a. Details on how the integrity of the airport security fence will be maintained (gate guards, daily log of construction personnel, or other
- b. List individuals required for driver training (as required)
- c. Radio communications
  - i. Types of radios and backup capabilities
  - ii. Who will be monitoring radios
  - iii. Whom to contact if ATCT cannot reach the contractor's designated person by radio
- d. Details on how material delivery vehicles will be escorted on site

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**6. WILDLIFE MANAGEMENT** – Discuss the following:

- a. Methods and procedures to prevent wildlife attraction
- b. Wildlife reporting procedures

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**7. FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT** – Discuss equipment and methods for controlling FOD, including construction debris and dust

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**8. HAZARDOUS MATERIAL (HAZMAT) MANAGEMENT** – Discuss equipment and methods for responding to hazardous spills

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**9. NOTIFICATION OF CONSTRUCTION ACTIVITIES** – Provide the following:

- a. Contractor points of contact
- b. Contractor emergency contact
- c. Listing of tall or other requested equipment proposed for use on the airport and the timeframe
- d. Batch plant details

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**10. INSPECTION REQUIREMENTS** – Discuss daily (or more frequent) inspections and special inspection procedures

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**11. UNDERGROUND UTILITIES** – Discuss proposed methods of identifying and protecting underground utilities

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**12. PENALTIES** – Penalties are identified in the CSPP

NO SUPPLEMENTAL INFORMATION

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**13. SPECIAL CONDITIONS** – Discuss proposed actions for each special condition identified in the CSPP

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**14. RUNWAY AND TAXIWAY VISUAL AIDS** – Discuss proposed visual aids (marking, lighting, signs, and visual NAVAIDs) including the following:

- a. Equipment and methods for covering signage and airfield lights
  - b. Equipment and methods for temporary closure markings (paint, fabric, other)
  - c. Types of temporary Visual Guidance Slope Indicators (VGSI)
- 
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- 

**15. MARKING AND SIGNS FOR ACCESS ROUTES** – Discuss proposed methods of demarcating access routes for vehicle drivers

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**16. HAZARD MARKING AND LIGHTING** – Discuss proposed equipment and methods for identifying excavation areas

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**17. PROTECTION OF RUNWAY AND TAXIWAY SAFETY AREAS** – Discuss proposed methods of identifying, demarcating, and protecting airport surfaces (safety areas, object free areas, obstacle free zones, and approach/departure zones) including:

- a. Equipment and method for maintaining Runway or Taxiway Safety Area standards
- b. Equipment and methods for separation of construction operations from aircraft operations, including details of barricades.

**18. OTHER LIMITATIONS ON CONSTRUCTION** – Other limitations (if any) shall be identified in the CSPP

NO SUPPLEMENTAL INFORMATION

This Safety Plan Compliance Document (SPCD) must be submitted and approved by the Sponsor prior to issuing the Notice to Proceed for Construction. The contractor should allow at least two weeks for review by the Sponsor.

(CONTRACTOR) certifies that it understands the operational safety requirements of the CSPP and will not deviate from the approved CSPP and this SPCD unless written approval is granted by the Sponsor. It is our understanding that upon review and approval of this SPCD, we may request issuance of Notice to Proceed.

By \_\_\_\_\_, \_\_\_\_\_  
Title Date

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U.S. Department  
of Transportation

Federal Aviation  
Administration

# Advisory Circular

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**Subject:** Painting, Marking, and Lighting of  
Vehicles Used on an Airport

**Date:** April 1, 2010

**AC No:** AC 150/5210-5D

**Initiated by:** AAS-100

**Change:**

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1. **PURPOSE.** This advisory circular (AC) provides guidance, specifications, and standards for painting, marking, and lighting of vehicles operating in the airport air operations area (AOA). The approved lights, colors, and markings herein assure the conspicuity of vehicles operating in the AOA from both the ground and the air.

2. **CANCELLATION.** This AC cancels AC 150/5210-5C, Painting, Marking, and Lighting of Vehicles Used on an Airport, dated August 31, 2007.

3. **APPLICATION.** The Federal Aviation Administration (FAA) recommends the guidelines and standards in this Advisory Circular for vehicles operating in the airport AOA. In general, use of this AC is not mandatory. **However**, use of this AC is mandatory for vehicles funded with federal grant monies through the Airport Improvement Program (AIP) and/or with revenue from the Passenger Facility Charges (PFC) Program. See Grant Assurance No. 34, "Policies, Standards, and Specifications," and PFC Assurance No. 9, "Standard and Specifications."

Vehicles covered by this AC that do not meet this standard may be used until the vehicle is repainted or replaced, but no later than **December 31, 2010**.

4. **PRINCIPAL CHANGES.** This AC contains new specifications and recommendations for the painting, marking, and lighting of Towbarless Tow Vehicles (TLTVs).

5. **METRIC UNITS.** To promote an orderly transition to metric units, this AC includes both English and metric dimensions. The metric conversions may not be exact equivalents, and until there is an official changeover to the metric system, the English dimensions will govern.

6. **COMMENTS OR SUGGESTIONS** for improvements to this AC should be sent to:

Manager, Airport Engineering Division  
Federal Aviation Administration  
ATTN: AAS-100  
800 Independence Avenue, S.W.  
Washington, DC 20591

Michael J. O'Donnell  
Director of Airport Safety and Standards

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## **PAINTING, MARKING, AND LIGHTING OF VEHICLES USED ON AN AIRPORT**

### **1. SOURCES OF APPLICABLE DOCUMENTS.**

- a.** American National Standards Institute, Inc. (ANSI), 25 West 43rd St. 4<sup>th</sup> Floor, New York, NY 10036. Website: **[www.ansi.org](http://www.ansi.org)**
- b.** American Society for Testing & Materials (ASTM), ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959. Website: **[www.astm.org](http://www.astm.org)**
- c.** The National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, Massachusetts 02169-7471. Website: **[www.nfpa.org](http://www.nfpa.org)**
- d.** The U. S. General Services Administration (GSA), Centralized Mailing List Services, 501 West Felix Street, Whse 9, South End P.O. Box 6477, Fort Worth, Texas 76115-6477. Website: **[www.gsa.gov](http://www.gsa.gov)**
- e.** The Superintendent of Documents, U.S. Government Printing Office, 732 North Capitol St. NW, Washington, DC 20401.
- f.** Society of Automotive Engineers, Inc. (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001. Website: **[www.sae.org](http://www.sae.org)**
- g.** FAA Advisory Circulars: U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75<sup>th</sup> Ave., Landover, MD 20785. Website: **[www.faa.gov](http://www.faa.gov)**
- h.** FAA Engineering Briefs: **[www.faa.gov/airports/engineering/engineering\\_briefs/](http://www.faa.gov/airports/engineering/engineering_briefs/)**

### **2. DEFINITIONS.** The following definitions apply in this AC:

- a. Vehicle** – All conveyances, except aircraft, used on the ground to transport persons, cargo, equipment or those required to perform maintenance, construction, service, and security duties.
- b. Air Operations Area (AOA)** – The portion of airport that encompasses the landing, take off, taxiing, and parking areas for aircraft.
- c. Airport Emergency Vehicles** – Vehicles that are authorized in the AOA for emergency purposes (e.g., ambulances, aircraft rescue and fire fighting (ARFF) vehicles and emergency response vehicles) as authorized by the airport traffic control tower (ATCT) or an authorized on-site accident/incident commander.
- d. Airport Operations Vehicles** – Vehicles routinely used by airport operations personnel for airport inspection and duties associated with airfield operations (such as airfield condition reporting and Incident Command) on the AOA and Movement Area.
- e. Airport Security Vehicles** – Vehicles that are authorized in the AOA for security purposes, as needed (e.g. police cars).

- f. Airfield Service Vehicles** – Vehicles that are routinely used in the AOA for airfield service, maintenance, or construction (e.g. snow blowers, snowplows, maintenance trucks, and tractors).
- g. Aircraft Support Vehicles** – Vehicles that are routinely used in the AOA to support aircraft operations (e.g. aircraft pushback tractors, baggage/cargo tractors or trucks, air conditioning and aviation fuel trucks). These vehicles are typically owned by airlines, vendors, or contractors and are not eligible for Federal funding.
- h. Reduced Visibility** – Prevailing visibility is less than one statute mile (1609 meters) and/or the runway visual range (RVR) is less than 6,000 feet (1830 meters).
- i. Movement Area** – The runways, taxiways, and other areas of an airport/heliport that are used for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with an operating airport traffic control tower (ATCT), specific approval for entry onto the movement area must be obtained from air traffic control (ATC).
- j. Other Vehicles** – Vehicles that are not routinely authorized in the AOA (e.g. construction vehicles). These vehicles are typically owned by airlines, vendors, or contractors and are not eligible for Federal funding.
- k. Peak Intensity** – Peak intensity, for purposes of this document, means the maximum magnitude of luminescence as measured in candela.
- l. Towbarless Tow Vehicle (TLTV)** – a type of aircraft support vehicle whose main purpose is to tow aircraft in the AOA by way of nose gear capture.

### 3. VEHICLE PAINTING.

**NOTE:** *Airport vehicle paint and markings are a safety of flight requirement. The approved colors/markings herein assure conspicuity of vehicles operating in the AOA from both the ground and air.*

#### **a. Airport Emergency Vehicles.**

**(1) Ambulances.** Ambulance vehicles are painted per the most current version of Federal Specification KKK-A-1822, *Federal Specification for the Star-of-Life Ambulance*. Ambulances are not considered vehicles routinely operating on the AOA.

**(2) Aircraft Rescue and Fire Fighting (ARFF) Vehicles.** Yellowish-green is the vehicle color standard. Color specifications are per Appendix A.

**NOTE:** *A yellowish-green color provides optimum visibility during all light levels encountered during a 24-hour day and under variations of light that result from weather and seasonal changes.*

**b. Airport Operations Vehicles.** Airport operations vehicles may be painted in colors designated by the airport operator. The characteristics must be coordinated with the respective ATCT and identified in the tower letter of agreement.

**c. Airport Security Vehicles.** Comply with specific state or local requirements.



**d. Airfield Service Vehicles.** Chrome yellow is the vehicle color standard. Color specifications are per Appendix A. When vehicles are equipped with bumper bars 8 inches (200 mm) or more in depth, the bars must be painted in alternate stripes 4 inches (100 mm) in width of chrome yellow and black inclined 45° to the vertical.

**e. Aircraft Support Vehicles.**

(1) Any color or combination of colors other than yellowish-green or chrome yellow. The bumper bar paint scheme in paragraph 3.d (of alternating chrome yellow and black stripe) is recommended.

(2) **TLTVs.** International orange is the vehicle color standard. Retroreflective tape covering more than 25 percent of the vehicle's vertical surfaces may be used as a temporary measure to meet this standard prior to scheduled vehicle painting.

**f. Other Vehicles.** Any color or combination of colors other than solid black or white.

#### 4. VEHICLE MARKING.

**a. Airport Emergency Vehicles.**

(1) **Ambulances.** Ambulances are marked per the most current version of Federal Specification KKK-A-1822.

(2) **ARFF Vehicles.** Emergency rescue and fire fighting vehicles are marked with the letters "ARFF," "Fire," or "Rescue" and in accordance with 4.c.(1)-(5) of this AC.

**b. Airport Operations Vehicles.** Airport operations vehicles may be marked as designated by the airport operator. Marking must be coordinated with the respective ATCT and identified in the tower letter of agreement.

**c. Airfield Service Vehicles and Aircraft Support Vehicles.**

(1) Airport operator owned vehicles must display an identification number on each side and on the roof (the hood should be used if the vehicle has no roof).

(2) Side numbers will be a minimum of 16 inches (410 mm) in height and conspicuously located.

(3) Roof numbers will be a minimum of 24 inches (610 mm) in height and affixed with their bases toward the front of the vehicle. The identification numbers should provide sharp color contrast to the vehicle color.

(4) In addition to the identification numbers, airport operator-owned vehicles must display either the name of the airport and/or the airport insignia.

(5) To further improve night-time recognition of vehicles, a minimum 8 inch (200 mm) wide horizontal band of high gloss white paint or white reflective tape (Retroreflective, ASTM-D 4956-09, *Standard Specification for Retroreflective Sheeting for Traffic Control*, Type III & above) must be used around the vehicle's surface. Figures 1, 2, and 3 show suggested locations for the horizontal reflective band.

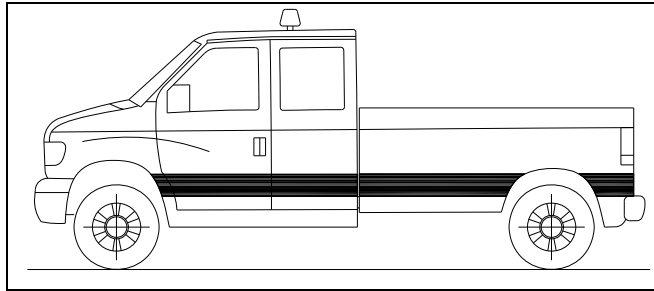


**Figure 1: Suggested location for the horizontal reflective band, Option 1**

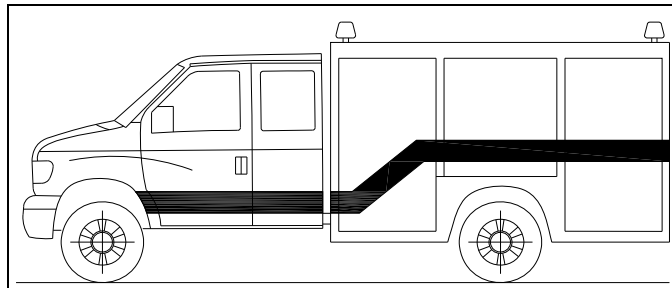


**Figure 2: Suggested location for the horizontal reflective band, Option 2**

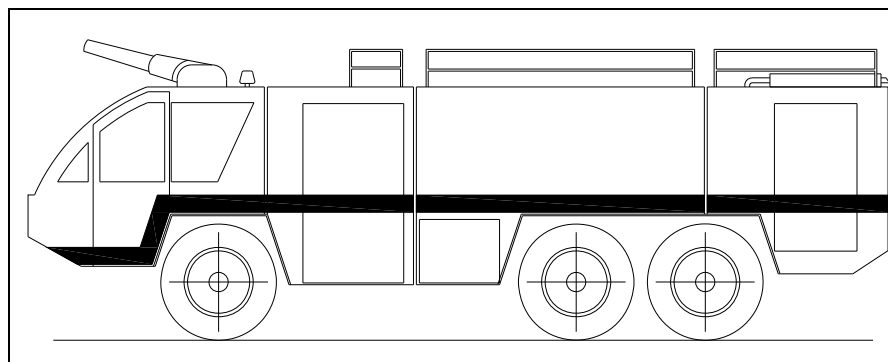


**Figure 3: Suggested location for the horizontal reflective band, Option 3**

(6) **TLTVs.** Retroreflective tape is used to outline the shape of a TLTV. If the vertical edge of the vehicle is rounded, the tape should be placed on the rounded portion to reflect light in both the horizontal and vertical planes. Where the placement of the tape may interfere with, or may be worn down by, maintenance or operational activities, tape is not required. Suggested locations for the retroreflective bands are shown in Figure 4.

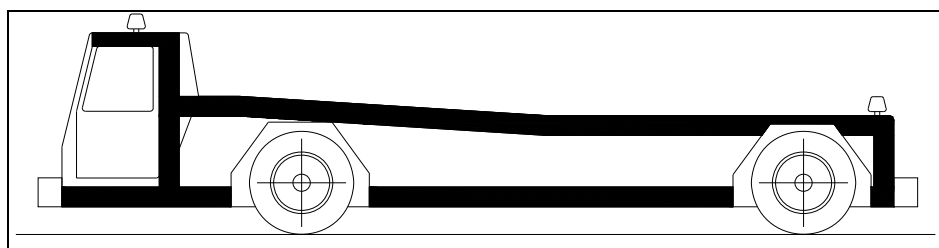


**Figure 4: Suggested placement of retroreflective tape on a TLTV**

**d. Airport Security and Other Vehicles.**

- (1) Vehicles other than those that routinely traverse any portion of the AOA under the control of ATC, which are not escorted by a vehicle in constant two-way radio communication with ATC and properly equipped and authorized to operate in the AOA, must be provided with a flag on a staff attached to the vehicle so that the flag will be readily visible.
- (2) At airports without air traffic control facilities, flags must be provided on all vehicles.
- (3) The flag must be at least a 3-foot by 3-foot (0.9 meter by 0.9 meter) square having a checkered pattern of international orange and white squares at least 1 foot (300 mm) on each side (see Appendix A for the fabric color specification).

**5. VEHICLE LIGHTING.**

**a. Airfield Service, Aircraft Support, and Airport Operations Vehicles.**

- (1) The standard for identification lighting is a yellow flashing light that is mounted on the uppermost part of the vehicle structure. A steady yellow light designates vehicles limited to non-movement areas.
- (2) The light must be visible from any direction, day and night, including from the air.
- (3) Color specifications for vehicle identification lights are per Appendix B.
- (4) **TLTVs.** An LED light bar placed above the operator's cab may be used in place of the rotating yellow flashing light. In addition, a yellow flashing light (of any type) must be installed on the upper left-rear and right-rear corners of the TLTV, and must be activated when an aircraft is in tow. The size of the rear flashing lights must be large enough to meet the requirements of Section 5.c, but not so large as to interfere with the normal or towing operations of the TLTV.

**b. Airport Emergency, Security, and Other Vehicles,** which are not escorted by a properly lighted vehicle, must be identified during periods of low visibility by a light.

**c. Characteristics of Flashing Lights:**

- (1) Ambulance lights must meet the specifications in the most current version of Federal Specification KKK-A-1822, and ARFF vehicles must meet NFPA, state, and local requirements.
- (2) Lights must have peak intensity within the range of 40 to 400 candelas (effective) from 0° (horizontal) up to 10° above the horizontal and for 360° horizontally. The upper limit of 400 candelas (effective) is necessary to avoid damage to night vision.
- (3) From 10° to 15° above the horizontal plane, the light output must be 1/10<sup>th</sup> of peak intensity or between 4 and 40 candelas (effective).

- (4) Lights must flash at  $75 \pm 15$  flashes per minute.

**NOTES:**

1. *The effective intensity of a flashing light is equal to the intensity of a steady-burning (fixed) light of the same color that produces the same visual range under identical conditions of observation.*
2. *If xenon flashtubes are used, refer to AC 150/5345-43, Specification for Obstruction Lighting Equipment, for guidance concerning methods of calculating effective intensity.*

**d. Light Colors.**

**(1) Airport Emergency Vehicles.**

(a) **Ambulances.** Per the most current version of Federal Specification KKK-A-1822.

(b) **ARFF Vehicles.** Red or a combination of red-and-white flashing lights per the chromaticity requirements in Appendix B.

**(2) Airport Security Vehicles.** Signal blue or a combination of red and signal blue flashing light per the chromaticity requirements in Appendix B.

**(3) Airfield Service, Aircraft Support, Airport Operations, and Other Vehicles.** Yellow flashing light per the chromaticity requirements in Appendix B.

**APPENDIX A. COLOR SPECIFICATIONS**

**A-1. SPECIFICATIONS.** Colors specified in Table A-1 are per the Commission Internationale de l'Eclairage (CIE) L\*a\*b\* system of color specification. For a description of this system, refer to American Society for Testing & Materials (ASTM) D 2244, *Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates*.

**Table A-1. Specification for vehicle and flag colors**

| Standard Illuminant D65 Usage | Chrome Yellow |      |      | Yellowish-Green |       |      | International Orange        |      |      |
|-------------------------------|---------------|------|------|-----------------|-------|------|-----------------------------|------|------|
|                               | Vehicle Paint |      |      | Vehicle Paint   |       |      | Vehicle Paint / Flag Fabric |      |      |
| CIELAB DATA                   | L*            | a*   | b*   | L*              | a*    | b*   | L*                          | a*   | b*   |
| Centroid Color                | 72.8          | 24.4 | 77.6 | 78.3            | -10.2 | 80.4 | 45.0                        | 53.5 | 52.0 |
| Point 1                       | 72.8          | 31.8 | 82.9 | 78.3            | -9.0  | 92.0 | 45.0                        | 61.4 | 47.8 |
| Point 2                       | 72.8          | 25.5 | 66.7 | 78.3            | -7.6  | 73.2 | 45.0                        | 53.9 | 41.4 |
| Point 3                       | 72.8          | 18.0 | 69.3 | 78.3            | -11.0 | 69.3 | 45.0                        | 53.5 | 53.4 |
| Point 4                       | 72.8          | 22.4 | 86.0 | 78.3            | -13.4 | 86.2 | 45.0                        | 49.7 | 60.4 |
| Light Limit                   | 77.8          |      |      | 83.3            |       |      | 49.9                        |      |      |
| Dark Limit                    | 67.8          |      |      | 73.3            |       |      | 41.6                        |      |      |
| Max ΔE                        | 11.1          |      |      | 11.7            |       |      | 10.7                        |      |      |

**A-2. COLOR TESTS.** Acceptable colors are those that meet the gloss rating test and either a visual or an instrumental color test as follows:

**NOTE:** *Flag fabric colors must meet either the instrumental tests in Table A-1 or the visual method described in paragraph A-2b(1).*

**a. Gloss Rating Test.** This test is performed per ASTM D 523, *Standard Test Method for Specular Gloss*, on a paint sample of the color to be applied on the vehicle. An acceptable color sample is high gloss with a minimum gloss rating of 70 units, for 60° geometry.

**b. Color Test Methods:**

**(1) Visual.** Prepare a master specimen of the color (per Table A-1) and gloss (per paragraph A-2a). This specimen will be the master color and be used as the basis of comparison per ASTM D 5531-05, *Standard Guide for the Preparation, Maintenance, and Distribution of Physical Product Standards for Color and Geometric Appearance of Coatings*. To verify the paint color of a vehicle visually, vehicle paint samples must be

prepared and viewed per ASTM D 1729-96 (Reapproved 2009), *Standard Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials*.

**(2) Instrumental.** This test requires a test specimen sample and reference to Table A-1. All test specimen measurements should be conducted per ASTM E 1164-09a *Standard Practice for Obtaining Spectrometric Data for Object-Color Evaluation*. Test specimen tolerances must be per Table A-1 per the following:

- (a) Plot the centroid color using the  $a^*$  and  $b^*$  CIELAB coordinate data from Table A-1 on graph paper or by entry of the coordinate data into a computer program. Plot and connect points 1 through 4 from the same table to form a quadrilateral; noting that the centroid color is within this figure. See Figure A-1 for plots of all three color specifications in Table A-1.
- (b) Perform color sample measurements per ASTM E 1164-09a. If necessary, convert measurements to CIELAB  $L^*$ ,  $a^*$ , and  $b^*$  color space. See ASTM E 308-08, *Standard Practice for Computing the Colors of Objects by Using the CIE System*, for color space conversion formulae.
- (c) An acceptable color is one that meets:
  - (i) the chromaticity requirements of the color samples  $a^*$  and  $b^*$  CIELAB coordinate data by falling within the quadrilateral;
  - (ii) the  $L^*$  data lightness requirement by falling within the range defined by the light and dark data of Table A-1;
  - (iii) the total color difference ( $\Delta E$ ) by not exceeding the limits in Table A-1 when the CIELAB data are computed in the following formula:

$$\Delta E = (\Delta L^{*2} + \Delta a^{*2} + \Delta b^{*2})^{\frac{1}{2}}$$

where  $\Delta L^*$ ,  $\Delta a^*$ , and  $\Delta b^*$  values are the differences between those values for the centroid color in Table A-1 and those of the color sample measurements.

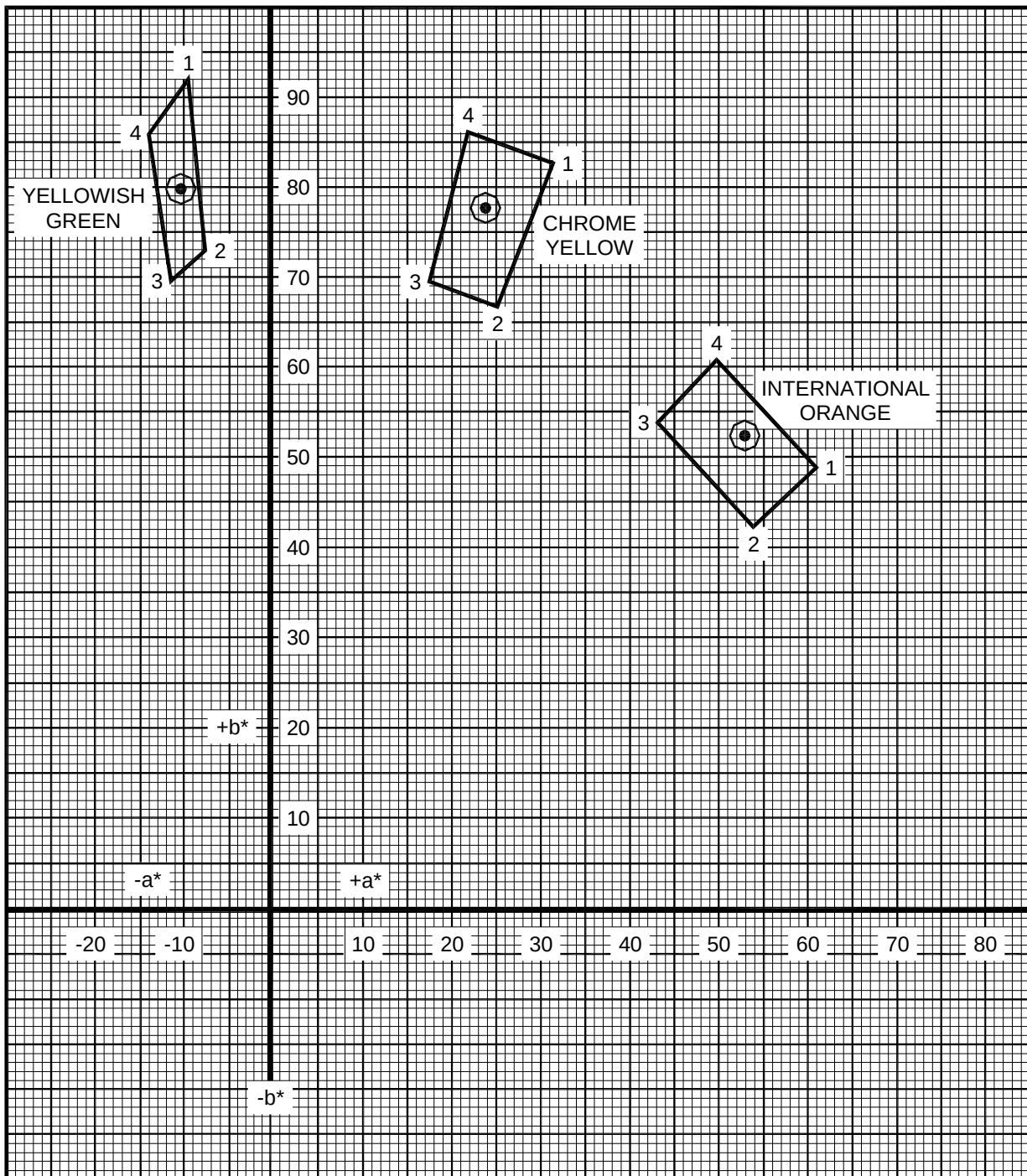


Figure A-1. Plot of selected color paint specifications

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**APPENDIX B. COLOR SPECIFICATIONS FOR VEHICLE IDENTIFICATION LIGHTS**

**B-1. SPECIFICATIONS.** The Society of Automotive Engineers (SAE) Standard J578 Revised December 2006, *Color Specification*, defines the acceptable color boundary limits and measurement of emitted red, white, signal blue, and yellow light for vehicle lights. This standard applies to the overall emitted color of light from the device in lieu of emitted light from any small area of the lens. The color of emitted light must fall within the color boundaries per SAE J578 Revised December 2006 (color boundary equations are in the standard) using color measurement methods detailed in the standard. See FAA Engineering Brief #67, *Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures*, for additional information and Alternative Lighting Devices.

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U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

# Advisory Circular

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**Subject:** Ground Vehicle Operations to include  
Taxiing or Towing an Aircraft on Airports

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**Date:** 9/1/2015

**AC No:** 150/5210-20A

**Initiated By:** AAS-300

1 **Purpose.**

This Advisory Circular (AC) and the attached appendices provide guidance to airport operators to develop training programs for safe ground vehicle operations, personnel taxiing or towing an aircraft, and pedestrian control on the movement and safety areas of an airport. The term vehicle includes aircraft being taxied under their own power by a non-pilot, or being towed with no intention for flight. Not all the items addressed in this document will be applicable at every airport. The Federal Aviation Administration (FAA) recommends that each airport operator evaluate their program on how it may apply to the size, complexity, and scope of operation of the airport. This AC contains recommended operating procedures, a sample Training Curriculum (Appendix A), sample Training Manual (Appendix B), and a sample Letter of Agreement (LOA) (Appendix C).

2 **Applicability.**

The overall responsibility for the operation of vehicles on an airport rests with the airport operator. The airport operator is also responsible for compliance with the requirements of part 139 at airports holding an airport operating certificate and with the provisions of any applicable Federal grant agreements. In general, use of this advisory circular is not mandatory. Adherence to the provisions contained in this AC may materially assist the airport operator in complying with these requirements. FAA recommends the guidelines and specifications in this AC for ground vehicle operations on airports.

3 **Cancellation.**

This AC cancels AC 150/5210-20, *Ground Vehicle Operations on Airports*, dated June 21, 2002, and Change 1 to AC 150/5210-20, dated March 31, 2008.

**4 Background.**

Each year accidents, incidents, and runway incursions occur involving aircraft, pedestrians, ground vehicle drivers, and personnel taxiing or towing aircraft at airports. These accidents and incidents can lead to property damage, injuries, and even death. Many of these events result from inadequate security, inadequate training, a failure to maintain visual aids, or a lack of such aids. Ground vehicle operation plans and training promote the safety of airport users by helping identify authorized areas of vehicle operation, outlining vehicle identification systems, addressing vehicle and operator requirements, and coordinating construction, maintenance, and emergency activities.

**5 Principal Changes.**

Changes to this AC include the following:

1. Addresses aircraft being taxied by persons other than certificated pilots;
2. Adds a definition for Airport Operations Area;
3. Revises the definition for Non-Movement Area;
4. Replaces the term “Ramp” with “Apron” to harmonize with the International Civil Aviation Organization (ICAO) Annex 14 Volume 1;
5. Adds a definition for Vehicle or Pedestrian Deviation;
6. Provides guidance for towered airports on Part 139 requirements for people and equipment in the Runway Safety Area (RSA);
7. Calls for a Letter of Agreement at towered airports between the airport operator, the tower, and FAA Technical Operations;
8. Provides guidance on taxiing and/or towing aircraft in the movement area by non-pilots; and
9. Incorporates numerous changes to format and content throughout the document.

**6 Comments or Suggestions.**

Use the Advisory Circular Feedback form at this end of this AC to send comments or suggestions for improving this AC.

**7 Related Reading Material.**

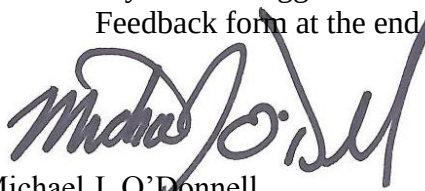
You will find additional information in the following publications:

1. 14 CFR part 139, Certification of Airports
2. Current editions of the following advisory circulars:
  - a. AC 90-67, *Light Signals from the Control Tower for Ground Vehicles, Equipment, and Personnel*
  - b. AC 120-57, *Surface Movement Guidance and Control System*
  - c. AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport*

- d. AC 150/5340-1, *Standards for Airport Markings*
  - e. AC 150/5340-18, *Standards for Airport Sign Systems*
  - f. AC 150/5340-30, *Design and Installation Details for Airport Visual Aids*
  - g. AC 150/5370-2, *Operational Safety on Airports During Construction*
  - h. AC 150/5300-13A, *Airport Design*
  - i. AC 150/5210-18, *Systems for Interactive Training of Airport Personnel*
  - j. AC 150/5200-30, *Airport Winter Safety and Operations*
  - k. AC 150/5210-21, *Airport Surface Safety Training Programs For Mechanics and Ramp Personnel*
  - l. AC 00-65, *Towbar and Towbarless Movement of Aircraft*
- 3. To view electronic copies of the ACs listed above, visit the FAA website at [http://www.faa.gov/regulations\\_policies/advisory\\_circulars/](http://www.faa.gov/regulations_policies/advisory_circulars/).
  - 4. FAA Order 5200.10, Procedures for Conducting Investigations of Vehicle/Pedestrian Deviations  
<https://www.faa.gov/airports/resources/publications/orders/>

8 **Feedback on this AC.**

If you have suggestions for improving this AC, you may use the Advisory Circular Feedback form at the end of this AC.



Michael J. O'Donnell  
Director, Office of Airport Safety and Standards

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## **CHAPTER 1. VEHICLE ACCESS PROCEDURES AND REGULATORY REQUIREMENTS**

### **1.1 Airport Procedures and Policies for Vehicle Access.**

Airport operators are ultimately responsible for establishing procedures and policies for vehicle access and operation on the movement and safety areas of the airport. Aircraft can also act as vehicles. When an aircraft is not intended for flight, anyone (except pilots) taxiing or towing an aircraft needs vehicle training to access the movement and safety areas of the airport. The airport operators may provide the employer, organization, or person (if the aircraft is privately owned) with procedures and policies to train their personnel. Airport operators can also incorporate vehicle and pedestrian operations and enforcement into tenant leases and agreements. The airport operator is accountable for the training and actions of all airfield vehicle operators approved to operate on the airport. The FAA Office of Airports is responsible for investigations and enforcement, where applicable, for any potential violations of all vehicle/pedestrian deviations. However, the FAA Flight Standards District Office is responsible for investigating and enforcing any potential violations of a mechanic taxiing an aircraft.

### **1.2 Regulatory Change.**

Establishing procedures for the safe and orderly access to the movement and safety areas, as well as procedures to operate in those areas, are required at all certificated airports under 14 C.F.R. §139.329(b). Initial and recurrent training in procedures for access to the movement and safety areas are required for all persons under revised §139.303(c). Additionally, initial and recurrent training is required for all persons, under revised § 139.329(e).

### **1.3 Ground Vehicle Operations During Construction.**

Each bidding document, such as construction plans and/or specifications, used for development work on an airport, or for installing an air navigation facility (NAVAID), will incorporate a section on ground vehicle operations on airports during construction activity if the project is funded through the Airport Improvement Program (AIP). The airport operator is encouraged to coordinate this plan with the local FAA Technical Operations office if the proposed construction affects their routes to and from their equipment worksites. Additional guidance on developing construction plans and/or specifications can be found in Appendix 1 of AC 150/5370-2, *Operational Safety on Airports during Construction*.

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## CHAPTER 2. TRAINING

### 2.1 **Vehicle Operator Requirements.**

Vehicle operators on airports face conditions that are not normally encountered on public streets and highways. Therefore, anyone with vehicular access to the movement and safety areas, and a need to be there, must have an appropriate level of knowledge of airport rules and regulations. The airport's ground vehicle driving program can give this information. Airport operators can require vehicle operators maintain a current driver's license, and may establish identification requirements that would permit the operation of a vehicle on the movement and safety areas of an airport. Any person expected to operate on the movement and safety areas should be qualified and authorized to operate in the environment.

### 2.2 **Training Requirements.**

Under Part 139, all personnel with duties requiring access to the movement and safety areas are required to have initial and recurrent training. We encourage non-certificated airports to develop a driver training program appropriate to their airports' needs.

#### 2.2.1 Sample Training Curriculum.

Appendix A includes a sample training curriculum. Airport operators may include this curriculum in initial, recurrent, and/or remedial instruction of airport employees, government employees, tenants, contractors, and other users with access to the movement and safety areas of the airport. The airport operator or his/her designated representative will retain records of this training for 24 months after an individual's access to the movement and safety areas ends. Escorts are to be properly trained. Those being escorted who intend to drive and follow the escort should be briefed on staying with the escort at all times. The airport operators may develop formalized procedures for escorting. Airport operators might find it beneficial to have a tiered program requiring different levels of training based on the type of airfield, movement, and non-movement areas access. Operators may modify these documents to meet their individual situations, such as one for vehicles operated on the movement area, one solely focused on the apron areas, and others as required. There also are commercial driving simulators available for airport driver training.

#### 2.2.2 Mandatory Requirements for Initial, Recurrent, and Remedial Training.

##### 2.2.2.1 **Initial Training.**

For Part 139 airports, initial training is the training provided to a new employee or airport user allowing a driver to demonstrate how to safely operate a vehicle under the airport's procedures, while functioning independently on the movement and safety areas. Airports may choose to conduct other training for operators who will drive in the non-movement area. A sample Ground Vehicle Operating Familiarization Program Training Record is in Appendix B.

#### 2.2.2.2 **Recurrent Training.**

Recurrent training (required for part 139 certificated airports) is the training provided to an employee or airport user every twelve Consecutive Calendar Months (CCM) to enable that person to maintain a satisfactory level of proficiency. An example of twelve CCM is when training occurs on July 1, 2014 and the training remains valid through July 31, 2015. The training would expire on August 1, 2015. Appropriate schedules for recurrent training will vary widely from airport to airport and from one employee to another. Airport operators should consider requiring annual recurrent training when a vehicle operator renews an expired airport ID badge, or when a tenant renews a lease agreement.

#### 2.2.2.3 **Remedial Training.**

Remedial training is required when a violation of the rules and regulations is committed. Use remedial training with the chosen enforcement action (see Chapter 6 Enforcement and Control).

#### 2.2.3 On-the-Job Training.

The FAA also recommends on-the-job training before personnel have unescorted access to the movement and safety areas of the airport. Supervised vehicle operations and practical exams are the recommended training curriculum process.

#### 2.2.4 Training Format.

Airports use a variety of methods, to include “train the trainer” for instructing ground vehicle operators. The airport operator is accountable for the training and actions of all airfield vehicle operators approved to operate on the airport. In some cases, airport operator delegates the requirement of employee training to airport tenants or a contractor. Airport operator will annually validate any training program that is provided to or used by the tenants for ground vehicle operations on the airport. Some airport operators choose to include training manuals or vehicle-operating requirements as part of tenant lease or use agreements. An airport operator may choose to distribute training manual information via a web page, videos, or booklets. Formal classroom instruction provided by the airport operator or tenant can include either personal instruction or a computer-based interactive training system. (See AC 150/5210-18, *Systems for Interactive Training of Airport Personnel*.)

#### 2.2.5 Testing.

The airport operator or a designated representative can test trainees on the information presented. In addition to standard question and answer classroom testing methods, potential ground vehicle operators can demonstrate their proficiency in operating a vehicle on the movement and safety areas before authorizing driving privileges.

## CHAPTER 3. VEHICLES

### 3.1 Vehicles on Airports.

Airport operators should keep vehicular and pedestrian activity on the movement and safety areas on the airport to the minimum required for operations. Vehicles on the movement and safety areas on the airport may be limited to those vehicles necessary to support the operation of aircraft services, cargo and passenger services, emergency services, and maintenance of the airport. Vehicles on the movement area should be limited to those necessary to inspect and maintain the movement areas, as well as emergency vehicles responding to an aircraft emergency. Vehicles should use service roads or public roads in lieu of crossing movement areas whenever possible. When activities need to take place in the RSA, they should occur either between aircraft operations or when a runway is closed via NOTAM.

#### 3.1.1 Runway Crossings.

When necessary, runway crossing should occur at the departure runway end rather than the midpoint. An aircraft has more time and runway length to react if the vehicle incursion is at the opposite end of the runway from the aircraft.

#### 3.1.2 Aircraft Operations.

Every airport will require individual solutions to prevent vehicle or pedestrian traffic from endangering aircraft operations. Aircraft ALWAYS have the right-of-way over vehicles when maneuvering on non-movement areas. Aircraft also have the right-of-way on the movement areas, except when the Airport Traffic Control Tower (ATCT) has specifically instructed an aircraft to hold or give way to vehicle(s) on a runway or taxiway.

#### 3.1.3 Vehicle Marking and Lighting.

Vehicles that routinely operate on the movement and safety areas will be marked or flagged for high daytime visibility and, if appropriate, lighted for nighttime operations. Vehicles that are equipped with marking and lighting devices can escort vehicles that are not marked and lighted. (See AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport.*) Vehicles needing intermittent identification can be marked with magnetically attached identification markers, which are commercially available.

#### 3.1.4 Runway Safety Areas.

3.1.4.1 The Runway Safety Area (RSA) must normally be clear at all times during air carrier/aircraft operations. However, there may be situations and/or circumstances where airport operations require vehicles or equipment to be in the RSA for a limited amount of time. Examples may include scheduled or unscheduled NAVAID maintenance/repair, mowing operations, or other airport safety-related circumstances where personnel and equipment will be in the RSA during air carrier/aircraft operations. When circumstances

allow, drivers will drop needed equipment within the RSA and park the vehicle outside the RSA.

3.1.4.2 A Letter of Agreement (LOA) is required at each towered airport to clarify the specific activities allowed in the RSA during air carrier/aircraft operations. This LOA will include the airport operator, the local Air Traffic Control Tower (ATCT), FAA Technical Operations, and any other airport tenant that may be permitted into the RSA during air carrier/aircraft operations. The LOA will describe the specific procedures for personnel and equipment in the RSA during air carrier/aircraft operations. Additionally, the LOA must also emphasize that vehicles avoid the Instrument Landing System (ILS) or Localizer arrays during low visibility conditions. Standard communication requirements between the ATCT and individuals operating in the RSA should be established in accordance with Order 7110.65. Any LOA between the airport operator and the ATCT must be included in the airport operator's Airport Certification Manual (ACM). See Appendix C, Sample Letter of Agreement for guidance and details on creating the LOA. Appropriate procedures must be implemented to notify air carriers and pilots when personnel and equipment are in the RSA.

3.1.4.3 The LOA's will be placed in the airport's ACM, if certificated. Office of Airport Regional Divisions will forward any issues associated with the LOA to the Office of Safety and Operations (AAS-300). AAS-300 will coordinate with ATO, the Office of Airports Regional Division, and the airport as required.

### 3.1.5 Surface Movement Guidance and Control System (SMGCS).

SMGCS is a system of lighting, markings, and signs on the airport that allow pilots to continue to operate in bad weather below minimums. Low Visibility Operations (LVO) allows an airport to continue operation when weather conditions deteriorate significantly below 1200 feet Runway Visual Range (RVR). Drivers need to be aware of and trained in this area to be safe when aircraft are moving around the airport during SMGCS condition. Only airports that have an active SMGCS program in use to control aircraft and vehicles in the movement area should train on it. For additional information on the SMGCS Plan, refer to AC 120-57, *Surface Movement Guidance and Control System*.

## 3.2 **Vehicular Access Control.**

Controlling vehicular activity on the movement and safety areas of an airport is vitally important. The airport operator is responsible for developing procedures, procuring equipment, and providing training on vehicle operations to ensure aircraft and personnel safety. Even with the most sophisticated procedures and equipment, vehicle operators need training to achieve safety. The airport operator should give special consideration to

training temporary operators, such as construction workers, even if escorts are being provided.

3.2.1 Airports with an Operating Air Traffic Control Tower (ATCT).

At airports with an operating ATCT, controllers and vehicle operators can use two-way radios to control vehicles when on the movement area. To accomplish this task, the FAA at each towered airport is creating with the airport operator a letter of agreement outlining standard operating procedures to include delineating movement and non-movement areas. When there is construction on an airport, whether federally funded or not, the airport operator can follow the ground vehicle practices contained in AC 150/5370-2, *Operational Safety on Airports During Construction*.

3.2.2 Airports without an Operating ATCT.

At airports without an operating ATCT, vehicles, fixed-based operators, or others can use two-way radio control. Everyone should pay attention to frequencies used by aircraft and announce intentions on Common Traffic Advisory Frequency (CTAF) to avoid inadvertent incidents and or accidents while operating on the movement and safety areas.

3.2.3 Restricting Movement and Safety Areas Access.

3.2.3.1 Inadvertent entry by vehicles onto movement and non-movement areas of an airport poses a danger to both the vehicle operator and aircraft on the airport. Methods for controlling access to the movement and safety areas will vary depending on the type and location of the airport. The ACM is a useful tool for accomplishing this. Airports may erect a fence or provide for other natural or physical barriers around the entire airport, in addition to providing control measures at each access gate, such as guards, magnetic card activated locks, or remotely controlled locks.

3.2.3.2 Gates may either be opened/closed electronically or secured by lock and chain. The FAA strongly encourages Airport Operators to change access gate codes regularly. A best practice that an airport may wish to consider is also to assign different codes to different gates. Physical barriers might include natural objects, such as earthen berms, large boulders, tree trunks, and manmade culverts that could help control remote vehicle access points.

3.3 **Vehicle Requirements.**

Requirements for vehicles will vary depending on the airport, the type of vehicle, and where the vehicle will operate on the airport. An airport operator should limit vehicle operations on the movement areas of the airport to only those vehicles necessary to support the operational activity of the airport. Airport operators might find it beneficial to have a tiered program requiring different levels of training based on the type of airfield, movement, and non-movement areas access.

### 3.3.1 Vehicle Inspection Programs.

Some airports have benefited from establishing their own vehicle inspection program to ensure that all vehicles are maintained in a safe operating condition. In establishing vehicle requirements, some items to consider include:

1. Marking and identifying vehicles.
2. Establishing fire extinguisher or other equipment requirements for vehicles, such as Super Tugs or Specialty Vehicles.
3. Placing in all vehicles a current placard diagram depicting the airport's movement area, including Hot Spots. Aircraft being taxied or towed are exempt from placard diagram placement. The diagram can display prominent landmarks and/or perimeter roads.
4. Placing in vehicles operating in the movement area a placard showing the meaning of ATCT light gun signals, as well as airfield sign, lighting, and marking information.
5. Establishing vehicle condition requirements and inspection.
6. Ensuring appropriate insurance coverage.

### 3.4 **Vehicle Operations.**

The airport's rules and regulations for vehicle operations should provide adequate procedures for the safe and orderly operation of vehicles and aircraft that are taxied or towed by anyone on the movement and safety areas of the airport. In developing such procedures, airport operators should consider:

1. Requiring vehicle operators and anyone authorized to taxi or tow an aircraft, an ability to communicate in and understand the English language. English language proficiency rests with the hiring authority.
2. Requiring that vehicles operating on the movement areas have radio contact with ATCT or are escorted by a radio-equipped vehicle. This is a requirement of Part 139.329 (b) for certificated airports.
3. Requiring specific procedures for vehicle operations on airports without an operating ATCT.
4. Requiring advanced notice and approval for operating a non-airport owned vehicle on the movement area.
5. Establishing speed limits.
6. Establishing procedures to reduce distracted driving. This can include reducing personal calls and texting on mobile devices while vehicle is in motion.
7. Prohibiting:
  - a. Passing other vehicles and taxiing aircraft;
  - b. Leaving a vehicle unattended and running;
  - c. Driving under an aircraft except when servicing the aircraft; and
  - d. Driving under passenger bridges.

8. Determining when drivers must use vehicle lights.
9. Using dedicated vehicle lanes and perimeter roads whenever possible.
10. Designating where vehicles may and may not park.
11. Establishing rules of right-of-way (e.g. for aircraft, emergency vehicles, other vehicles).
12. Designating areas where vehicles may be serviced.
13. Establishing procedures for inoperative radios while on a movement area.
14. Require reporting of all accidents involving ground vehicles on the movement and safety areas.
15. Require making the vehicle operator responsible for passenger's behavior in the movement area.
16. Ensuring each aircraft operator maintains a Memorandum of Understanding (MOU) with the airport to conduct tow operations.
  - a. Elements of the MOU can include but are not limited to:
    - i. Compliance with AC 00-65, *Towbar and Towbarless Movement of Aircraft*
    - ii. Local Operating Conditions
      1. Low Visibility
      2. Weather
      3. Driving Routes
      4. Time Constraints (placed on movement of aircraft)
      5. Tug-Type Requirements

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## CHAPTER 4. EMERGENCY OPERATIONS AND OTHER NON-ROUTINE OPERATIONS

### 4.1 Introduction.

Airport operators allow a number of non-routine operations to occur on the movement and safety areas of the airport. These include airfield construction, airshows, aircraft static displays, Very Important People (VIP) arrivals/departures, commercial photo shoots, and a host of other activities. In addition, airport operators can recognize and prepare for the unique challenges to vehicle operations during non-routine operations. Airport operators can review non-routine operations that involve ground vehicles and develop vehicle operation procedures to accommodate these special operations.

### 4.2 Planning Meetings for Non-Routine Operations.

Planning meetings associated with non-routine activities offer an opportunity to review driving rules and regulations, communications and procedures, and air traffic control procedures as well as NAVAID requirements that can be affected by vehicle operations and other important operational issues. These meetings can help with paying special attention to the following activities:

#### 4.2.1 Movement and Safety During Construction.

The airport operator or his/her designated representative can develop procedures, assess equipment, and ensure training has occurred on vehicle operations for aircraft safety during construction as specified in AC 150/5370-2, *Operational Safety on Airports During Construction*.

#### 4.2.2 Emergency Response/Mutual Aid.

Many airports rely on local emergency services to provide aircraft rescue and firefighting services or emergency medical services. Airport operators can ensure that such emergency service providers receive initial and recurrent training in the subject areas identified in **Chapter 3, Vehicles**, also maintain records of such training. Alternatively, the airport may escort the responders. In addition, any mutual aid agreement between the local emergency service providers and the airport operator can specify vehicle operations training requirements.

#### 4.2.3 Snow and Ice Removal.

Airport Operators who use contractors for snow and ice control operations can ensure agreements include vehicle operations procedures, training requirements, consequences of non-compliance, and vehicle communications requirements. The FAA recommends that, when possible, airport operators limit contractors to non-movement areas. When an ATCT is not in operation, or there is no ATCT, airports can develop procedures to advise air traffic on the CTAF of any intentions to remove snow and ice in the movement area.

#### 4.2.4 Low-Visibility Operations.

Additional consideration can be given to vehicle operations during low visibility. Poor weather conditions (snow, fog, rain, etc.) may obscure visual cues, roadway markings, and airport signs. During low visibility conditions, particular detail can address the emphasis of avoiding ILS or Localizer arrays, e.g. mowing operations and snow removal.

## **CHAPTER 5. SITUATIONAL AWARENESS**

### **5.1 Training for Situational Awareness.**

There are ways to enhance situational awareness. A ground vehicle operator's training program may concentrate on having vehicle operators visually scan fixed and moving objects coming into the vehicle's path. Airport operators can also promote using clear and concise communications by vehicle operators. Most importantly, airport operators can alert vehicle operators to distractions caused by social interactions while operating a vehicle on the movement and safety areas. Having an airport diagram and notepad available in each vehicle to record movement instructions is considered a best practice when communicating with ATCT.

### **5.2 Movement and Safety Areas Improvements to Increase Situational Awareness.**

Airport operators may also be able to increase situational awareness for vehicle operators with enhancements on the movement and safety areas. Such enhancements may include establishing dedicated marked routes for vehicles that avoid high activity, congested areas, or blind spots. Eliminating or relocating fixed objects that hinder a vehicle operator's line of sight or block radio transmissions may also enhance safety. Some airport operators may soon have an added aid in the fight against distractions – Automatic Dependent Surveillance - Broadcast (ADS-B) at select airports. This system enables equipped aircraft and ground vehicles to continually broadcast information, such as identification, current position, altitude, and velocity. More information on this technology will be available in a future advisory circular on Ground Vehicle ADS-B Operations. Technology can't totally replace clearing for aircraft. You must ensure that you look both ways down the runway to visually acquire aircraft landing or departing even if you have a clearance to cross.

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## **CHAPTER 6. ENFORCEMENT AND CONTROL**

### **6.1 Enforcement Procedures.**

Airport operators should establish consequences for non-compliance of airport rules, including penalties for violations. Tenant lease or use agreements may include these enforcement provisions.

### **6.2 Control Issues.**

Listed below are some control issues that airport operators can address as part of a control program for ground vehicle and anyone taxiing or towing aircraft. This list is not all inclusive.

1. Implementing a tiered identification badging system that permits easy recognition of a vehicle operator's permitted driving area privileges. A recommended practice is that the airport should have the ability to turn badges off for violations, or when access is no longer needed.
2. Prohibiting transferring registration media to different vehicles.
3. Creating policies for surrendering permits to airport management when a vehicle is no longer authorized entry into a facility.
4. Conducting periodic checks to ensure that only properly authorized persons operate vehicles, and only properly authorized personnel taxi or tow aircraft on the movement and safety areas.
5. Creating a system to control commercial or delivery truck movement onto and out of the movement and safety areas of an airport.
6. Briefing or training for commercial drivers if they are permitted direct access to the movement and safety areas.
7. Implementing a progressive penalty policy for violations of the airport's driving program.

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**APPENDIX A. GROUND VEHICLE ACCESS PROGRAM TRAINING CURRICULUM****A.1 Purpose of the Training Curriculum.**

- A.1.1 The purpose of the Ground Vehicle Access Program training curriculum is to provide airport operators with a minimum list of training topics for educating vehicle operators, with access to the movement and safety areas of an airport. This includes anyone taxiing or towing aircraft who is not a pilot. Each individual airport has unique situations that might require site-specific training. Airport operators may use this training curriculum as a guide for developing and implementing a detailed training program tailored to the airport's individual situation.
- A.1.2 The training program provides vehicle operators and anyone taxiing or towing aircraft with the level of training necessary for their positions to operate safely on the movement and safety areas of an airport and avoid causing a runway incursion. Airports may choose to tailor their specific programs from the items listed below:
1. Infield aircraft navigation aids
  2. Identifying a given point on a grid map or other standard map used at the airport
  3. Applicable airport rules, regulations, or procedures for vehicle operations
  4. Airport layout, including runways and taxiway designations
  5. Known hot spots
  6. Boundaries of movement, non-movement, and safety areas
  7. Interpretation and color coding of airfield signs, pavement markings, and lighting
  8. Location and understanding of critical areas associated with instrument landing system (ILS) and very high frequency omnidirectional ranges (VORs)
  9. Proper terminology (including phonetic alphabet) and procedures for radio communications with the ATCT
  10. ATCT light gun signals
  11. Established routes for emergency response vehicles
  12. Dangers associated with jet blast and prop wash
  13. Traffic patterns associated with each runway (left or right) and location of each leg ( i.e., downwind, base, final, and crosswind)
  14. Situational awareness (staying alert in the environment of operation)

**A.2 Training Program for Vehicle Operations on Apron Only.**

An airport operator may choose to develop tiered training programs for vehicle operators, such as airline employees and other tenants, who are restricted to operating ground vehicles only on the apron areas. This will allow them to have knowledge of the boundaries associated with the area.

**A.3 Areas of Training.**

All drivers should have training in the following areas:

**A.3.1 Discussion of Runway Incursions, Airfield Safety, and Security.**

**Training Outcome(s):** Trainee will be able to define a runway incursion, describe how to avoid causing an incursion, what they can do if involved in an incursion, and explain the benefits of airfield safety/security.

**A.3.2 Definitions and Terms.**

**Training Outcome(s):** Trainee will be knowledgeable of airport signage, runway markings, lighting, and the terms used on an airport.

**A.3.3 Vehicle Operating Requirements.**

1. Authorized Vehicles and Vehicle Identification
2. Vehicle Lighting
3. Vehicle Insurance
4. Vehicle Inspection
5. Vehicle Parking
6. Accident Reporting
7. Perimeter Roadways
8. Aircraft Lighting

**A.3.4 Anyone Taxiing or Towing an Aircraft Requirements.**

The employer will provide the airport operator with documentation showing that the individual is qualified to start, run, taxi or tow that particular type of aircraft.

**A.3.5 Rules and Regulations.**

1. Review
2. Noncompliance/Penalties

**Training Outcome(s):** Trainee will be knowledgeable of ground vehicle and aircraft taxiing and towing rules and regulations.

**A.3.6 Testing.**

3. Written Test
4. Practical Test

**Training Outcome(s):** Trainee can pass a written examination with a minimum score of 70 percent.

**A.3.7 Airport Familiarization at Least One Day and One Night Evaluation or as Required for Job Performance.**

1. Runway Configuration/Safety Area



2. Taxiway Configuration/Safety Area
3. Movement Areas and Non-Movement Areas
  - a. Confusing Areas and designated Hot Spots
4. Airport Lighting
  - a. Runway
    - i. Runway Edge Lights
    - ii. Centerline Lights
    - iii. Touchdown Zone
    - iv. Taxiway Lead-Off Lights
  - b. Threshold
    - i. Runway Approach Light System
  - c. Taxiway
    - i. Taxiway Edge Lights
    - ii. Taxiway Centerline Lights
    - iii. Stop Bars
    - iv. Runway Guard Lights
5. Airfield Signage (Airport Specific)
  - a. Runway Position Holding Sign
    - i. Runway Location Sign
    - ii. Destination Sign
    - iii. Information Sign
    - iv. Approach Sign
  - b. Taxiway Location Sign
  - c. ILS Critical Area Sign
  - d. Direction Sign
  - e. Distance Remaining Sign
6. Airfield Markings (Airport Specific)
  - a. Runways
    - i. Centerline
    - ii. Edge Markings
    - iii. Runway ID Numbers
    - iv. Threshold Markings
    - v. Fixed Distance Markers
    - vi. Hold Short Lines
  - b. Taxiways
    - i. Hold Lines

- ii. ILS Hold Line
- iii. Geographic Position Markings
- iv. Centerline and Enhanced Centerlines
- v. Edge Markings
- c. ILS Critical Areas
- d. Non-Movement Area Boundary Marking
- e. Surface Painted Signs
- 7. Airport NAVAIDS and Visual Approach Aids
  - a. Location
  - b. Non-interference

**Training Outcome(s):** Trainee will be able to label all critical parts on the airport, identify, and explain the purpose of all marking, lighting, and signs on the airport.

A.3.8 Communications.

- 1. Ground Vehicle, anyone towing an aircraft, and anyone taxiing an aircraft Communications
  - a. Radio Frequencies
  - b. Procedural Words and Phrases
- 2. Aviation Phonetic Alphabet
- 3. Aviation Terminology and phrases
- 4. Procedures for Contacting the ATCT
- 5. Airfield Communications at Airports without Operating ATCT
- 6. Light Gun Signals as a means of communication
- 7. Procedures for when the vehicle operator or anyone taxiing or towing aircraft are lost or disoriented in the movement areas or RSA, etc.
  - a. Description of how to respond to Light Gun Signals
  - b. Description of how to Signal the Tower

**Training Outcome(s):** Trainee will be able to adequately send and receive radio messages as well as interpret light gun signals and respond properly.

## APPENDIX B. SAMPLE GROUND VEHICLE OPERATIONS TRAINING MANUAL

**NOTE:** This sample training manual provides airport operators with a template for developing and implementing proposed policies or procedures for controlling ground vehicles, or taxiing, and towing aircraft. This includes equipment access in the movement and safety areas of an airport. Airport operators may use the format below but adapt the requirements to specific conditions found on their airport. The Operator would fill in the appropriate blanks or blocks of text and/or revise the document for specific airport conditions.

Section 1 covers the Authority, Applicability, and Definitions of the Ground Vehicle Operation Manual. It includes: driving, taxiing or towing aircraft rules and regulations that could be adopted by the airport operator.

Section 2 would serve as a suggested driver, taxiing, or towing aircraft training for the Non-Movement Area Manual.

Section 3 would serve as a suggested driver, taxiing, or towing aircraft training for the Movement Area Manual. In this section, the airport operator could add or delete information as it applies to the airport. For example, if the airport has no instrument approach, reference to the ILS signs and protection of critical areas could be deleted. Also, the airport operator is encouraged to replace illustrations of signs with those found on the airport.

Section 4 would serve as a suggested driver, taxiing, or towing aircraft training for Communications on the airport.

Finally, there is a sample Ground Vehicle Operations Training Record that can be modified by the airport operator to document training on the airport.

### **Section 1. Airport Driving and Anyone Taxiing or Towing Aircraft Rules and Regulations**

- 1.1 Authority for Implementation of Rules and Regulations.** The (NAME) Airport operates under the authority of (JURDISTICTION). (CITY/COUNTY ORDINANCE OR STATE STATUTE) has granted the (AIRPORT OPERATOR) the authority to make bylaws for the management and supervision of its airport affairs.
- 1.2 Applicability.** This regulation applies to all users of, and persons on any portion of, the property owned or controlled by (Airport Operator). No persons are exempt from airport operating training requirements for operating a vehicle on the movement and safety areas of an airport. Tenant organizations must be responsible for the dissemination of, accessibility to, and compliance with these rules and regulations by their employees.

These Rules and Regulations may be amended, changed, or modified by (Airport Operator), as necessary.

- 1.3 Definitions.** The following terms are defined as indicated in this section for the purpose of this Ground Vehicle Operation Training Manual. *(The airport operator can include only those definitions applicable to its airport and conditions.)*

- 1.3.1 Accident**—a collision between one aircraft or vehicle and another aircraft, vehicle, person, or object that results in property damage, personal injury, or death.
- 1.3.2 Air Carrier Apron**—an apron for air carriers. Only authorized personnel and vehicles may operate on this apron. Unauthorized vehicles and aircraft are prohibited from operating on it.
- 1.3.3 Air Operations Area (AOA)** – the air operations area includes paved or unpaved areas used or intended to be used for the unobstructed movement of aircraft, in addition to its associated runways, taxiways, or aprons. Commonly refers to anything within the secured and fenced-in area of the airport.
- 1.3.4 Airport Traffic Control Tower (ATCT)**—operated by an appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.
- 1.3.5 Aircraft**—a device that is used or intended to be used for flight in the air.
- 1.3.6 Airport**—(NAME) International Airport Facility, owned and operated by (Airport Operator), including all improvements and equipment existing or to be developed.
- 1.3.7 Apron**—a defined area on an airport or heliport intended to accommodate aircraft for the purposes of parking, loading and unloading passengers or cargo, refueling, or maintenance.
- 1.3.8 Common Traffic Advisory Frequency (CTAF)**—radio frequency designed for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating ATCT or when the tower is closed. The CTAF may be a UNICOM, MULTICOM, FSS, or tower frequency and is identified in appropriate aeronautical publications. (See below for definitions of UNICOM, MULTICOM, and FSS.)
- 1.3.9 Fixed-Based Operator (FBO)**—a person, firm, or organization engaged in a business that provides a range of basic services to general aviation. Services may include the sale and dispensing of fuel, line services, aircraft parking and tie-down, pilot and passenger facilities, airframe and power plant maintenance, aircraft sales and rental, and pilot instruction.
- 1.3.10 Flight Service Station (FSS)**—air traffic facilities that provide pilot briefings, en route communications, and visual flight rules search and rescue services; assist lost aircraft and aircraft in emergency situations; relay air traffic control clearances; originate Notices to Airmen; broadcast aviation weather and National Airspace System information; receive and process instrument flight rules flight plans; and monitor NAVAIDs. In addition, at selected locations, FSSs provide En Route Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of trans-border flights.
- 1.3.11 Foreign Object Debris (FOD)**—debris that can cause damage to aircraft engines, tires, or fuselage from rocks, trash, or the actual debris found on runways, taxiways, and aprons.

- 1.3.12 General Aviation (GA)**—that portion of civil aviation that encompasses all facets of aviation except air carriers holding a certificate of public convenience and necessity.
- 1.3.13 Ground Vehicle**—all conveyances and aircraft not operated for the purpose of flight, vehicles used on the ground to reposition aircraft, transport persons, cargo, fuel, or equipment.
- 1.3.14 ILS Critical Area**—an area provided to protect the signals of the localizer and glideslope.
- 1.3.15 Jet Blast**—jet engine exhaust or propeller wash (thrust stream turbulence).
- 1.3.16 Law Enforcement Officer (LEO)**—any person vested with police power of arrest under Federal, state, county, or city authority and identifiable by uniform, badge, and other indication of authority.
- 1.3.17 Light Gun**—a hand-held, directional light-signaling device that emits a bright narrow beam of white, green, or red light, as selected by the tower controller. The color and type of light transmitted can be used to approve or disapprove anticipated pilot or vehicle actions where radio communication is not available. The light gun is used for controlling traffic operating in the vicinity of the airport and on the airport movement area.
- 1.3.18 Mobile Fueler**—a vehicle owned and/or operated by authorized agents to pump and dispense Jet A and 100 LL fuel at an airport. This may include fuel tankers, in-to-plane fueling pumpers, and hydrant carts.
- 1.3.19 Movement Area**—the runways, taxiways, and other areas of an airport that aircraft use for taxiing, takeoff, and landing, exclusive of loading aprons and aircraft parking areas.
- 1.3.20 MULTICOM**—a mobile service not open to public correspondence used to provide communications essential to conduct the activities being performed or directed from private aircraft.
- 1.3.21 Non-movement Areas**—the area, other than that described as the movement area, used for the loading, unloading, parking of aircraft. This may include the apron areas and on-airport fuel farms.
- 1.3.22 Operator**—any person who is in actual physical control of an aircraft or a motor vehicle.
- 1.3.23 Owner**—a person who holds the legal title of an aircraft or a motor vehicle.
- 1.3.24 Protected Area**—the protected area of a surface intended for landing or takeoff includes the area inside the runway hold position markings (e.g., hold line) on paved taxiways or bridges and the designated runway safety area.
- 1.3.25 Restricted Areas**—areas of the airport posted to prohibit or limit entry or access by the general public. All areas other than public areas.
- 1.3.26 Runway**—a defined rectangular area on a land airport prepared for the landing and takeoff run of aircraft along its length.

- 1.3.27 Runway Incursion**—any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.
- 1.3.28 Runway in Use or Active Runway**—any runway or runways currently being used for takeoff or landing. When multiple runways are used, they are all considered active runways.
- 1.3.29 Runway Safety Area**—a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes (Typically 250 feet off the runway centerline and 1,000 feet off each end or as required) in the event of an excursion, overshoot, or undershoot from the runway. Note: Guidance for RSA is located in AC 150/5300-13A, *Airport Design*.
- 1.3.30 Surface Incident**— Unauthorized or unapproved movement within the designated movement area (excluding runway incursions) or an occurrence in that same area associated with the operation of an aircraft that affects or could affect the safety of flight.
- 1.3.31 Surface Movement Guidance and Control System (SMGCS)**—a system of guidance, control, and regulation of all aircraft, ground vehicles, and personnel of the airport during low-visibility operations. Guidance relates to facilities and information necessary for pilots and ground vehicle operators to find their way about the airport. Control or regulation means the measures necessary to prevent collisions and to ensure that traffic flows smoothly and efficiently.
- 1.3.32 Taxiways**—those parts of the movement and safety areas designated for the surface maneuvering of aircraft to and from the runways and aircraft parking areas.
- 1.3.33 Tie Down Area**—an area used for securing aircraft to the ground.
- 1.3.34 Uncontrolled Airport**—an airport without an operating airport traffic control tower or when airport traffic control tower is not operating.
- 1.3.35 UNICOM**—a non-Federal communication facility that may provide airport information at certain airports. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications.
- 1.3.36 Vehicle or Pedestrian Deviation (V/PD)**—any entry or movement on the airport movement area or safety area by a vehicle operator or pedestrian that has not been authorized by air traffic control (includes surface incidents involving aircraft operated by non-pilots, such as anyone).
- 1.3.37 Vehicle Service Road**—a designated roadway for vehicles in a non-movement area.
- 1.3.38 Very High Frequency Omnidirectional Range (VOR)**—a ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the National Airspace System.

- 1.3.39 Wake Turbulence**—phenomenon resulting from the passage of an aircraft through the atmosphere. The term includes vortices, thrust stream turbulence, jet blast, jet wash, propeller wash, and rotor wash both on the ground and in the air.
- 1.4 Severability.** If any section, subsection, subdivision, paragraph, sentence, clause, or phrase of these Rules and Regulations or any part thereof is for any reason held to be unconstitutional, invalid, or ineffective by any court of competent jurisdiction or other competent agency, such decision will not affect the validity or effectiveness of the remaining portions of these Rules and Regulations.
- 1.5 Violation of Rules—Penalties and Suspension of Driving or Anyone taxiing or towing an aircraft Privileges.** Any person, who does not comply with any of the provisions of these Rules and Regulations, or any lawful order issued pursuant thereto, will be subject to progressive penalties for repeat violations. These penalties may include being denied use of the Airport by (Airport Operator) in addition to the penalties described pursuant to Federal, state, or local authorities. *(The airport operator can tailor this section to discuss its enforcement policies.)*
- 1.5.1** Penalties for failure to comply with the Movement and safety areas Vehicular Traffic Regulations must consist of written warnings, suspension of movement and safety areas driving privileges, and/or revocation of movement and safety areas driving privileges. Receipt of \_\_\_\_\_ written warnings by an operator of a vehicle in any 12-month period will automatically result in suspension of movement and safety areas driving privileges. Receipt of written warnings in any 12-month period will automatically result in revocation of movement and safety areas driving privileges.
- 1.5.2** Based on an evaluation of the circumstances or the severity of a particular incident or incidents, the (Airport Operator) reserves the exclusive right to assess any penalty it deems appropriate at any time to any individual authorized to operate a vehicle on the movement and safety areas without regard to prior operating history.
- 1.5.3** Suspension of movement and safety areas driving privileges must be no less than \_\_\_\_\_ calendar days and no greater than \_\_\_\_\_ calendar days.
- 1.5.4** The (Airport Operator) will provide a copy of all written warnings issued to an operator to the local manager of the company owning or in possession and control of the vehicle or vehicles involved in the violation(s).
- 1.6** The (Airport Operator) must require any individual involved in a runway incursion or other vehicle incident to complete remedial airfield driver training.
- 1.7** Regulations on the Movement and Safety Areas of an Airport for Drivers and Anyone Taxiing or Towing an Aircraft.
- 1.7.1** Vehicle Operator and Anyone Taxiing or Towing and Aircraft Requirements.
- All applicants must satisfactorily complete the applicable driver's training class before receiving a movement and safety areas driver's license or

badge. Non-based personnel require escort from airport qualified movement/non movement area personnel.

- b. All applicants are required to pass the written test with a grade of at least \_\_\_\_ percent. Applicants who do not pass the written test may retake the test after additional study and a \_\_\_\_ day period.
- c. Applicants for movement area driving, taxiing, or towing an aircraft privileges are required to successfully complete a movement and safety areas driving test by a designated representative of (Airport Operator).
- d. No vehicle can be operated or anyone taxi or tow an aircraft on the movement and safety areas unless—
  - (1) The driver is authorized to operate the class of vehicle by an appropriate state-licensing agency and/or by the driver's employer through a company training/certification program.
  - (2) The driver properly displays an approved, airport-issued ID card with the Authorized Driver designation (*if applicable*).
- e. For taxiing or towing an aircraft, the owner/operator needs to ensure the person is trained by the owner or aircraft operator to start, run, taxi, or tow that particular type of aircraft. When towing an aircraft with a "Towbarless tractor," to guard against if the tow bar breaks, there should be a trained person in the cockpit that can stop the aircraft.
- f. No person operating or driving a vehicle on any aircraft apron should exceed a speed greater than \_\_\_\_\_ miles per hour. Factors including, but not limited to, weather and visibility should be taken into consideration when determining safe operating speed.
- g. No vehicle may pass another ground vehicle in a designated vehicle roadway.
- h. FAA recommends: No vehicles pass between an aircraft and passenger terminal or passenger lane when the aircraft is parked at a gate position except those vehicles servicing the aircraft. All other vehicles must drive to the rear of the aircraft and must pass no closer than
- i. Moving aircraft and passengers enplaning or deplaning aircraft must have the right-of-way at all times over vehicular traffic. Vehicle drivers must yield the right-of-way.
- j. No vehicle operator may enter the movement and safety areas (includes controlled and non- controlled movement areas) unless authorized by (Airport Operator) or the vehicle is properly escorted.
- k. No vehicle operator or anyone taxiing or towing an aircraft can enter the movement area—
  - (1) Without first obtaining the permission of Airport Operator, Aircraft operator, and clearance from the ATCT to enter the movement area for taxiing or towing;



- (2) Unless equipped with an operable two-way radio in communication with the ATCT; or
  - (3) Unless escorted by an (Airport Operator) approved vehicle and as long as the vehicle remains under the control of the escort vehicle.
  - (4) Anyone taxiing or towing an aircraft, without the authorization of the airport operator, must receive ATCT clearance to enter the airport movement area.
- l. No person may operate any motor vehicle that is in such physical or mechanical condition as to endanger persons or property or that the (Airport Operator) considers an endangerment.
- m. No person may—
  - (1) Operate any vehicle that is overloaded or carrying more passengers than for which the vehicle was designed.
  - (2) Ride on the running board or stand up in the body of a moving vehicle.
  - (3) Ride with arms or legs protruding from the body of a vehicle except when the vehicle was designed for such use.
- n. A vehicle guide person is required whenever the vision of the vehicle operator is restricted.
- o. No fuel truck may be brought into, stored, or parked within 50 feet of a building. Fuel trucks may not be parked within 10 feet from other vehicles.
- p. Container carriers and tugs may tow no more carts, pods, or containers than are practical, under control, tracking properly, and safe.
- q. When not serving aircraft or undertaking their intended functions, apron vehicles and equipment may be parked only in approved areas.
- r. Vehicle operators should not operate or park vehicles under any passenger loading bridge.
- s. No person may park a vehicle in an aircraft parking area, safety area, grass area, or in a manner that obstructs or interferes with operations in the aircraft movement area or apron area.
- t. No person may park, or leave unattended, vehicles or other equipment that interfere with the use of a facility by others or prevent movement or passage of aircraft, emergency vehicles, or other motor vehicles or equipment.
- u. No person may park a vehicle or equipment within \_\_\_\_ feet of a fire hydrant or in a manner that prohibits a vehicle from accessing the fire hydrant.

- v. No person may operate a vehicle or other equipment within the movement and safety areas under the influence of alcohol or any drug that impairs, or may impair, the operator's abilities.
- w. Each vehicle operator using an airport perimeter (security) gate must ensure the gate closes behind the vehicle prior to leaving the vicinity of the gate. The vehicle operator must also ensure no unauthorized vehicles or persons gain access to the movement and safety areas while the gate is open.
- x. Vehicle operators must not operate vehicles in a reckless or careless manner. A reckless or careless manner is one that intentionally or through negligence threatens the life or safety of any person or threatens damage or destruction to property.
- y. Vehicles may not enter the movement area or cross runways unless the operator of the vehicle has received required training and authorization from the (Airport Operator) to operate on the movement area. Whenever possible, all airport vehicles must utilize the airport perimeter and service roads to transition between areas on the airport.
- z. Each vehicle operator is responsible for the activities of each vehicle passenger on the movement and safety areas of the airport.

#### **1.7.2 Vehicle Regulations.**

- a. No vehicle may be operated on the movement and safety areas unless it has proper registration in the (State) or is a qualified off-road vehicle that is not normally operated on public streets but has received the approval of the (Airport Operator).
- b. All vehicles operated on the movement and safety areas must have vehicle liability insurance, as required by the (Airport Operator).
- c. The (Airport Operator) must approve tenant vehicles operated on the movement area. It is highly recommended the airport operator institute similar approval procedures for vehicles operated in the non-movement area. These vehicles may display a (Airport Operator) sticker or an airport-approved company logo that is at least \_\_\_\_\_ inches.
- d. Carts or pieces of equipment being towed or carried after darkness must have side and rear reflectors or rear lights.
- e. No vehicle must be permitted on the movement and safety areas unless—
  - (1) It is properly marked, as outlined in FAA Advisory Circular 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport*.
  - (2) It is in sound mechanical condition with unobstructed forward and side vision from the driver's seat.
  - (3) It has the appropriately rated and inspected fire extinguishers (fuel trucks or other vehicles).

- (4) It has operable headlamps and brake lights.
- f. Vehicles operating on the movement area must be equipped with operating rotating beacon or equivalent per AC 150/5210-5 as required.
- g. All aircraft refueling vehicles and any other vehicles 8-feet or more in width must be equipped with clearance lights, a flashing amber beacon and flashing front, and tail lights that are activated at all times when operating on the movement and safety areas.

**1.7.3 Vehicular Accidents.** Operators of vehicles involved in an accident on the airport that results in injury to a person or damage to an aircraft, airport property, or a vehicle must—

- (1) Immediately stop and remain at the scene of the accident.
- (2) Render reasonable assistance, if capable, to any person injured in the accident.
- (3) Report the accident immediately to the (Airport Operator) before leaving the scene, if possible.
- (4) Provide and surrender the following to any responding (Airport Operator) personnel: name and address, airport identification card, state driver's license, and any information such personnel need to complete a motor vehicle accident report.

**Section 2. Driving on the Non-Movement Areas**

**2.1** Non-movement areas include aprons, portions of the runway safety areas (RSA), and other areas not under control of the ATCT. Anyone authorized to operate a motorized vehicle on the movement and safety areas may do so on the non-movement areas (except RSA) without being in positive radio contact with the ATCT. These areas include—

- a. Service roads
- b. Cargo aprons
- c. General aviation apron
- d. Air carrier apron(s)

**2.2 Driving.** Operating within the apron areas requires the vehicle driver to exercise extreme caution as aircraft are always moving, aircraft passengers may be walking from an aircraft to the gate, and noise levels are high.

**2.2.1** Vehicle drivers—

- a. Never drive between safety cones or across delineated passenger walkways.
- b. Watch cockpit blind spots—pilots typically cannot see behind or below the aircraft.
- c. Avoid jet blast or prop wash, which can blow debris or overturn vehicles.

- d. Be aware and avoid moving propellers that can cause damage, injury, or death.
  - e. Be aware of other vehicle movements—you may not hear them approaching due to aircraft engine noise.
  - f. Yield to aircraft, passengers, and emergency vehicles, which ALWAYS have the right-of-way on the Air Operations Area of the airport.
  - g. Pay particular attention when aircraft beacons are illuminated, as they may be moving or preparing to move. Obey the directions of flaggers (if available).
- 2.2.2** When traveling on the apron, always use designated vehicle service roads. Driving close to buildings, around vehicles, or aircraft is prohibited. This policy helps to establish a predictable order to vehicle movements in congested areas and helps to ensure their visibility to aircraft and other vehicles.
- 2.2.3** Parked aircraft may still have their engines running, so be aware of the hazards of jet blast or prop wash, which may overturn vehicles. Before an aircraft engine is started, pilots are supposed to turn on the anti-collision beacon(s) which may be flashing red or white. However, don't assume that if the beacon(s) aren't flashing that the engine(s) isn't (aren't) running. In some instances, propellers and engine spinners are marked to indicate when the engine is operating. A pilot's ability to maneuver quickly on the ground is limited. Propellers and jet engines can cause significant damage and injury to personnel. In addition, cockpit visibility prohibits the pilot from seeing under the nose or behind the aircraft and limits the pilot's ability to avoid ground vehicles.
- 2.2.4** **Nighttime and Poor Weather Driving Conditions.** Poor weather (snow, fog, rain, etc.) conditions can and will obscure visual cues, roadway markings, and airport signs. Vehicle operators will remain vigilant of their surroundings and operating boundaries. Watch out for snow removal equipment and aircraft operating in the vicinity under low-visibility conditions. There are additional risks present under these conditions consult AC 150/5200-30C, *Airport Winter Safety and Operations* and the airports *Snow and Ice Control Plan*.

### **Section 3. Driving, Taxiing or Towing Aircraft on the Movement Areas**

- 3.1** Drivers, anyone taxiing, or towing an aircraft who are authorized to operate on the movement area require more training and vigilance since there are dangers associated with this area that are not present on non-movement areas. In addition to the principals for driving on the non-movement area, drivers and anyone that has access to the movement area must be cognizant of the meanings of airfield signs, markings, and lighting configurations. Additionally, they must be able to communicate with air traffic control (ATC) and be able to follow ATC directions. Airport Operator must have a MOU or LOA with the local ATCT regarding any specific procedures for operations on the movement areas.

**3.2 ATCT Control all Movement Areas** as defined: the runways, taxiways, and other areas of the airport that are used for taxiing, hover taxiing, air taxiing, and takeoff and landing of aircraft, exclusive of loading aprons and aircraft parking areas. Movement areas are considered “positive control,” meaning that all vehicle operators and anyone taxiing or towing an aircraft will need permission from ATC before entering the area.

**3.3 Authorized Vehicles and Anyone Taxiing or Towing an Aircraft.** Only vehicles, taxiing, or towing an aircraft, that are needed for airport operations may enter a movement area with radio contact through ATCT. Therefore, fuel trucks, maintenance vehicles, catering trucks, and other non-essential vehicles will not be permitted to enter the movement areas without being escorted. Exceptions may include Airport Operator authorized (radio equipped) vehicles with appropriately trained personnel. Airport Operations/Maintenance must coordinate all other vehicle operations within the movement areas.

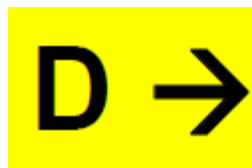
**3.4 Taxiways.**

**3.4.1 Designations.** Aircraft use taxiways to move to and from the aprons and the runways. Taxiways are designated by letters or by a letter/number combination such as A, B, G2, or B3. (The Airport Operator can include a diagram of the airport here with the taxiway and runway designations.)

**3.4.2 Lighting.** Taxiways are lighted with **blue** edge lighting and/or reflectors. Some taxiways are also lighted with **green** in-pavement, centerline lighting that also include Taxiway Lead On/Off lights, which alternate yellow/green. *(Use airport-specific example here.)*

**3.4.3 Signs.** The signs used on taxiways are direction, destination, location, and taxiway ending marker signs.

**3.4.3.1 Direction and Designation Signs** have black lettering and a directional arrow or arrows on a yellow background. The arrow indicates the direction to that taxiway, runway, or destination.



**Taxiway Direction Sign**

**3.4.3.2 Location Signs** have yellow lettering on a black background. The location sign below indicates that the operator of the vehicle/equipment is located on the named taxiway or runway. Black square, you are here.



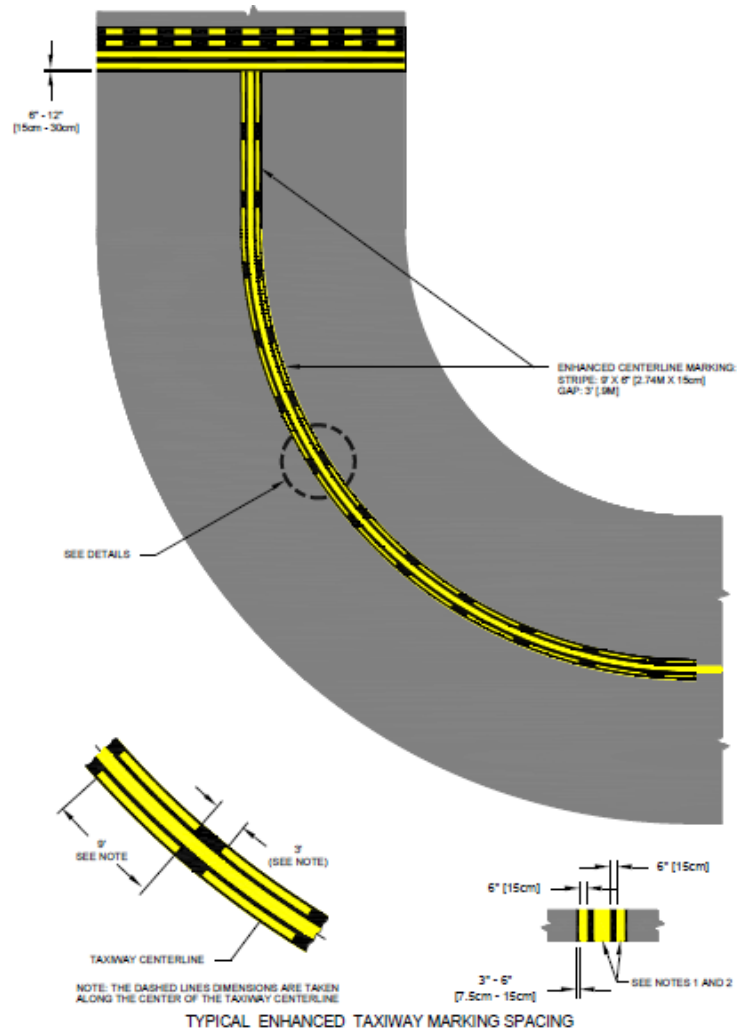
**Taxiway Location Sign**

- 3.4.3.3** ***Runway Safety Area/Object Free Zone (RSA/OFZ) and Runway Approach Area Boundary Signs***, when required, identify the boundary of the runway safety area/OFZ or the runway approach area to the pilot and vehicle operator. The driver can use these signs to identify when the vehicle is clear of the runway environment. It has a **black inscription** that depicts the hold line marking on a **yellow background**.



**Runway Safety Area/OFZ and Runway Approach Boundary Symbol**

- 3.4.4** ***Markings.*** Pavement markings on taxiways are always yellow. The taxiway centerline is painted on all taxiways. On the edges of some taxiways, there is a solid, double yellow line or double-dashed line. If pavements are usable on both sides of the line, the lines will be dashed; if not, the lines will be solid.
- 3.4.4.1** ***Enhanced Taxiway Centerline Markings*** provide supplemental visual cues to alert pilots of an upcoming runway holding position marking (Pattern A) for minimizing the potential for runway incursions. To reinforce situational awareness before entering a runway, this safety enhancement is only used on those taxiways that directly enter a runway.

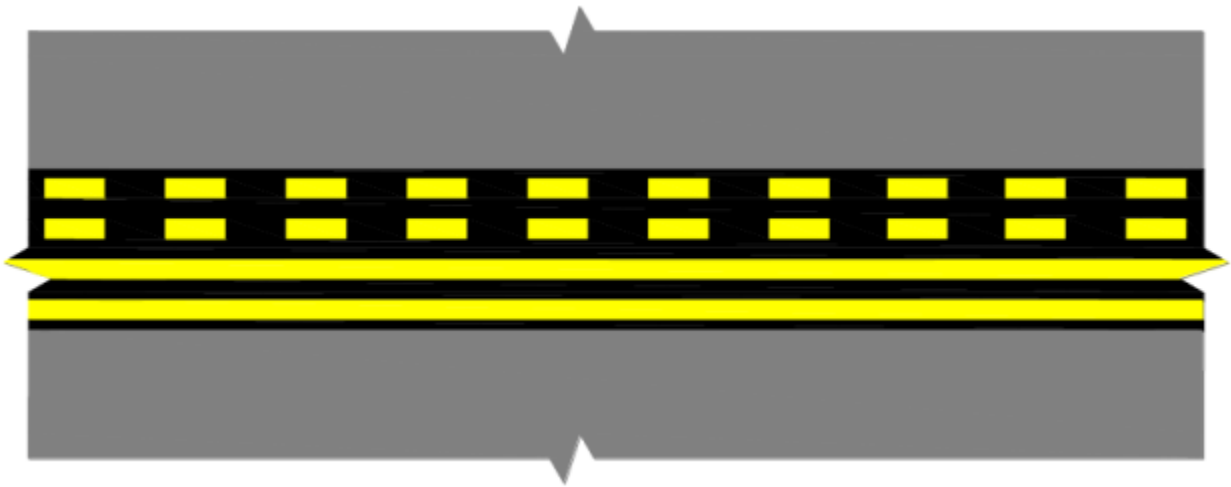


### Enhanced Taxiway Centerline Markings

#### Notes:

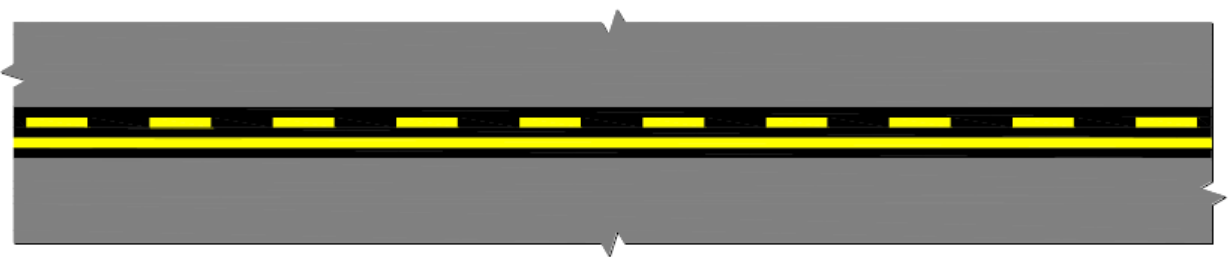
1. Dashed lines for the enhanced taxiway centerline marking are 6 inches (15 cm) in width and separated 6 inches (15 cm) from the taxiway centerline. This applies to both 6 inches (15 cm) and 12 inches (30 cm) taxiway centerline markings.
2. The taxiway centerline markings may be shifted left or right to avoid interference with the taxiway centerline lights.

- 3.4.4.2** *Runway Holding Position Markings* are located across each taxiway that leads directly onto a runway. These markings are made up of **two solid lines and two broken yellow lines** and denote runway holding position markings. These markings are always co-located with a Runway Holding Position Sign. A vehicle operator must not cross from the solid-line side of the marking without first obtaining clearance.



**Runway Holding Position Marking**

- 3.4.4.3** *Non-Movement Area Boundary Markings* consist of two yellow lines (one solid and one dashed). The solid line is located on the non-movement area side, while the dashed yellow line is located on the movement area side. A vehicle operator is not to cross from the solid-line side without first contacting the ATCT and obtaining a clearance to operate on the movement area.

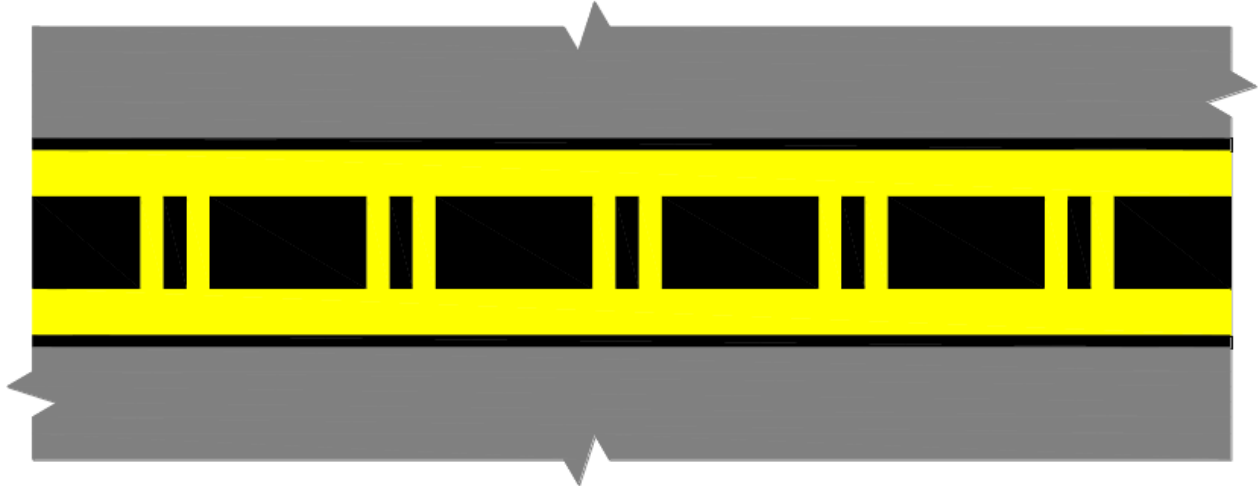


**Non-Movement Area Boundary Marking**

- 3.4.4.4** *Instrument Landing System (ILS) Critical Area Holding Position Markings* are comprised of **two parallel yellow lines** with lines running perpendicular between the two parallel yellow lines. These markings identify the location on a taxiway where an aircraft or vehicle is to stop when it does not have clearance to

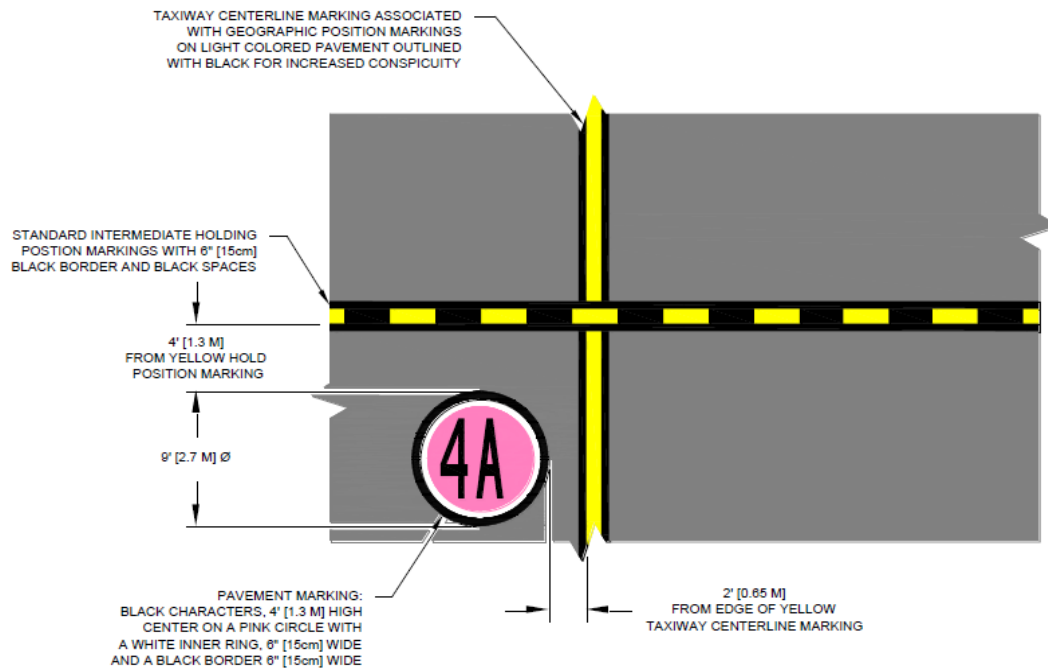


enter ILS critical areas. The ILS critical area must remain clear, especially in inclement weather. If a vehicle proceeds past this ILS marking, it might cause a false signal to be transmitted to the landing aircraft.



**ILS Hold Position Marking**

- 3.4.4.5**     *The geographic position marking (GPM)* is used repeatedly along a designated taxi route to serve as an indicator of a location (a spot) so that pilots can confirm holding points or report their location while taxiing during periods of low-visibility operations.



### Geographic Position Markings

## 3.5 Runways (Use Airport Specific Examples).

**3.5.1 Designations.** Runways are areas where aircraft land and take off. Runways are always designated by a number such as 1 or 19. The number indicates the compass heading of the runway. An aircraft taking off on runway 19 is headed 190 degrees. In the event of parallel runways, a letter designation is added to indicate either the right or left runway; e.g., **1L-19R, 1R-19L.**

**3.5.2 Lighting.** Runways are lighted with a variety of colored lights.

**3.5.2.1 Runway Edge Lights** are white. If the runway has an **instrument approach**, the last 2,000 feet of the runway will be yellow in color.

**3.5.2.2 Runway Centerline Lights** are white except for the last 3,000 feet of the runway, where they begin to alternate **red** and **white**. For the last 1,000 feet of runway the centerline lights are all **red**.

**3.5.2.3 Runway Touchdown Zone Lights** are white.

**3.5.2.4 Runway End/Threshold Lights** are split lenses that are **red/green**.

**3.5.3 Signs.**

**3.5.3.1 Mandatory Holding Position Signs for Runways** have white numbering/lettering with a black outline on a red background with a white border. These are located at each entrance to a runway and at the edge of the runway safety area/obstacle-free zone and are co-located with runway holding position markings.

**Do not proceed beyond these signs until clearance is given by the ATCT to enter onto the runway.**



**Holding Position Sign**

- 3.5.3.2** *Instrument Landing System (ILS) Holding Position Signs* have white letters with a black outline on a red background with a white border. These signs tell pilots and vehicle operators where to stop to avoid interrupting a type of navigational signal used by landing aircraft. This is a critical area, and a vehicle/equipment operator must remain clear of it (*use airport-specific policy*). If a vehicle proceeds past this microwave landing system/ILS marking, it may cause a false signal to be transmitted to the landing aircraft.



**ILD Hold Sign**

- 3.5.3.3** *Holding Position Signs for Runway Approach Areas.* The inscription on a sign for a runway approach area is the associated runway designation followed by a dash and the abbreviation APCH for approach. This sign has **white numbering with a black outline on a red background** with a **white border**. The sign is installed on taxiways located in approach areas where an aircraft on a taxiway would either cross through the runway safety area or penetrate the airspace required for the approach or departure runway.



**Approach Sign**

- 3.5.3.4** *Runway Distance Remaining Signs* provide distance remaining information to pilots during takeoff and landing operations. They have white numbering on a black background. The number on the sign provides the remaining runway length in 1,000-foot increments.



**Runway Distance Remaining Sign**

- 3.5.3.5** *Runway Exit Sign* is a destination sign located prior to the runway/ taxiway intersection on the side and in the direction of the runway where the aircraft is expected to exit. This sign has **black lettering** and a **directional arrow** on a **yellow background**.



**Direction/Runway Exit Sign**

**3.5.4 Markings.**

- 3.5.4.1** *Pavement markings on a runway are white.* Runway Threshold Markings and Runway Threshold Bars, Runway Aiming Point Markings, Runway Designation Markings, Runway Touchdown Zone Markings, Runway Centerline Markings, Runway Side Stripes, and Displaced Threshold Markings are white. The only non-white lines on a runway are yellow lead-in/-off lines that

extend from the runway centerline and hold lines for a specific operation known as land and hold short.

#### Section 4. Communications

- 4.1 Any vehicle driving and anyone taxiing, or towing an aircraft on the movement areas **(runways and taxiways)** must have contact with the ATCT or be capable of monitoring and transmitting on the CTAF. Vehicle operators, anyone taxiing, or towing an aircraft must always monitor the appropriate radio frequency when in the movement areas on controlled airports. Permission must be requested and clearance given prior to driving, taxiing, or towing an aircraft on a movement area. A vehicle that is equipped with a radio and a driver who is movement area qualified may escort vehicles or anyone towing an aircraft without radios; these vehicles must stay under the control of the escort at all times. When a movement area is closed for construction, vehicles may traverse that area without ATCT contact but must be escorted if their travels require them to cross an active movement area or the protected area of the RSA.
- 4.2 The ATCT controller may use separate or common radio frequency to control all ground traffic, vehicle, and aircraft in the movement areas. These frequencies are only to be used to get clearance onto and off the movement areas. When the ATCT is closed, the CTAF can be used to announce a driver's intentions when operating within the movement area.
- 4.3 **Phraseology.** Vehicle operators and anyone taxiing or towing an aircraft must contact the ATCT ground controller each and every time they proceed onto or leave the movement area. When proceeding onto a movement area, vehicle operators and anyone taxiing or towing an aircraft must tell the controller three things: **WHO you are, WHERE you are, and WHAT your intentions are.** Vehicle operators must always acknowledge all communications with ATC phraseology i.e. read back the clearance with their vehicle, tug or aircraft identification so ground control and other persons know that the message was received. **Vehicle operators must always give aircraft and ground control transmissions priority unless an emergency exists.** Very high frequency frequencies are for the primary use of aircraft and ATCT personnel. Some typical transmissions are as follows:
- Vehicle: (AIRPORT NAME) ground control; this is Airport 21 vehicle at Charlie 6. Request permission on all taxiways for a pavement inspection."
  - Vehicle: (AIRPORT NAME) ground control; this is Airport 21 vehicle at Taxiway Alpha. Request clearance south on runway 19 right for a light inspection."
  - Anyone taxiing or towing an aircraft: (AIRPORT NAME) ground control; this is (Airline personnel or maintenance) taxi, and Aircraft identification number, at, blast fence, gate#, apron name, request taxi (or tow) to gate#, or terminal name.

Reply transmissions may be brief, such as—

- ATCT: "Airport 21 vehicle, hold short of runway 19 right."
- Driver: "Airport 21 vehicle holding short of runway 19 right."
- ATCT: "Airport 21 vehicle cleared off south on runway 19 right."
- "Please expedite, landing aircraft on a 10 mile final for runway 19 right."
- Driver: "Airport 21 vehicle proceeding off south on runway 19 right will expedite."

- Driver: "Ground control, Airport 21 vehicle is off of runway 19 right."

ATCT Communication with anyone taxiing or towing an Aircraft.

- ATCT: "Sunrise 21, N1234, or tug XXX, taxi/tow to terminal 5, via taxiway A, C, Z. (If the clearance includes to hold short of a runway, hold short of that specific runway)"
- Anyone: "Sunrise 21, N1234, or tug XXX, taxi/tow to terminal 5, via A, C, Z Terminal hold short of runway 19 right." (If the clearance includes to hold short of a runway, repeat the runway to hold short of.)

**NOTE:** If you are unsure what the controller has said, or if you don't understand an instruction, you can ask the controller to repeat it. Good communications only occur when each party knows and understands what the other is saying.

#### 4.4 Common Use Phrases. (Reference Pilot Controller Glossary Aeronautical Information Manual)

| What Is Said:                | What It Means:                                                                                                                                                                |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Acknowledge                  | Let me know you have received and understand this message.                                                                                                                    |
| Advise Intentions            | Let me know what you plan to do and do not do it until ATCT provides authorization.                                                                                           |
| Affirmative                  | Yes.                                                                                                                                                                          |
| Correction                   | An error has been made in the transmission, and the correct version follows.                                                                                                  |
| Go Ahead                     | Proceed with your message only.                                                                                                                                               |
| Hold/Hold Short              | Phrase used during ground operations to keep a vehicle or aircraft within a specified area or at a specified point while awaiting further clearance from air traffic control. |
| How do you hear me?          | Question relating to the quality of the transmission or to determine how well the transmission is being received.                                                             |
| Immediately or without delay | Phrase used by ATC when such action compliance is required to avoid an imminent situation.                                                                                    |
| Negative                     | "No" or "permission not granted" or "that is not correct."                                                                                                                    |
| Out                          | The radio conversation is ended, and no response is expected.                                                                                                                 |
| Over                         | My radio transmission is ended, and I expect a response                                                                                                                       |

| What Is Said: | What It Means:                                                                                                                                                                                                                   |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Read Back     | Repeat my message to me.                                                                                                                                                                                                         |
| Roger         | I have received all of your last transmission.                                                                                                                                                                                   |
| Stand By      | Means the controller or pilot must pause for a few seconds, usually to attend to other duties of a higher priority. Also means to wait as in "stand by for clearance." The caller can reestablish contact if a delay is lengthy. |
| Unable        | Indicates inability to comply with a specific instruction, request, or clearance.                                                                                                                                                |
| Verify        | Request confirmation of information.                                                                                                                                                                                             |
| Wilco         | I have received your message, understand it, and will comply with it.                                                                                                                                                            |

- 4.5 Phonetic Aviation Alphabet.** Because some letters have similar sounds, like B and P, the international aviation industry uses the following words to reduce confusion. For example; Taxiway B would be referred to as Taxiway Bravo on the radio.

|          |          |          |          |
|----------|----------|----------|----------|
| <b>A</b> | Alpha    | <b>N</b> | November |
| <b>B</b> | Bravo    | <b>O</b> | Oscar    |
| <b>C</b> | Charlie  | <b>P</b> | Papa     |
| <b>D</b> | Delta    | <b>Q</b> | Quebec   |
| <b>E</b> | Echo     | <b>R</b> | Romeo    |
| <b>F</b> | Fox-Trot | <b>S</b> | Sierra   |
| <b>G</b> | Golf     | <b>T</b> | Tango    |
| <b>H</b> | Hotel    | <b>U</b> | Uniform  |
| <b>I</b> | India    | <b>V</b> | Victor   |
| <b>J</b> | Juliet   | <b>W</b> | Whiskey  |
| <b>K</b> | Kilo     | <b>X</b> | X-Ray    |
| <b>L</b> | Lima     | <b>Y</b> | Yankee   |
| <b>M</b> | Mike     | <b>Z</b> | Zulu     |

- 4.6 ATCT Light Gun Signals.** Air traffic controllers have a backup system for communicating with aircraft or ground vehicles if their radios stop working. The controller has a light gun in the tower that can send out different colored lights to tell the pilot or driver what to do.

If a vehicle operator or anyone taxiing or towing an aircraft experiences a radio failure on a runway or taxiway, the operator can vacate the runway as quickly and safely as possible and contact the ATCT by other means, such as a cellular telephone, and advise the ATCT of the situation. If this is not practical, then the driver, or anyone taxiing or towing an aircraft after vacating the runway, can turn the vehicle, tug or aircraft toward the tower and start flashing the vehicle, tug, or aircraft (landing lights) headlights and wait for the controller to signal with the light gun.

ATC Light Signals, and their meaning, are as follows:

### Light Signal Meanings

| Color and type of signal  | Aircraft on the ground                           | Aircraft in flight                                                     | Movement of vehicles, equipment and personnel    |
|---------------------------|--------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------|
| Steady green              | Cleared for takeoff                              | Cleared to land                                                        | Cleared to cross; proceed; go                    |
| Flashing green            | Cleared to taxi                                  | Return for landing (to be followed by steady green at the proper time) | Not applicable                                   |
| Steady red                | Stop                                             | Give way to other aircraft and continue circling                       | Stop                                             |
| Flashing red              | Taxi clear of landing area or runway in use      | Airport unsafe- Do not land                                            | Clear the taxiway/runway                         |
| Flashing white            | Return to starting point on airport              | Not applicable                                                         | Return to starting point on airport              |
| Alternating red and green | General Warning Signal- Exercise Extreme Caution | General Warning Signal- Exercise Extreme Caution                       | General Warning Signal- Exercise Extreme Caution |

**4.7 Safety.** The FAA defines runway incursion as any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take -off of aircraft.

**4.7.1 Runway Incursions.** Runway incursions are primarily caused by error in one or more of the following areas:

- Pilot/Anyone taxiing or towing an aircraft/ground and vehicle/controller communication failure
- Airport unfamiliarity
- Loss of situational awareness and not using a current airport diagram

An example of an incursion is a vehicle at an airport with an operating ATCT straying onto a runway in front of an aircraft causing the pilot to take an action to avoid a collision.

**4.7.2 Right-of-Way.** When driving on the airfield, vehicle operators and anyone taxiing or towing an aircraft need to always be aware of their location and the meaning of all pavement markings, lights, and signs. When on the aprons and



taxiways, stay away and steer clear of aircraft. **Aircraft always have the right-of-way.**

**NOTE:** Any individual involved in a runway incursion can receive remedial airfield drivers, taxiing or towing an aircraft training given by the (AIRPORT OPERATOR or their designated representative). Remedial drivers training is not in lieu of the airport operators established consequences of non-compliance with the airport operator's drivers training program, remedial drivers training is in addition to the airport operator's implementation of a progressive penalty program. Remedial drivers training is not considered acceptable consequences of noncompliance

*This is an appropriate place to describe an individual airport's runway and taxiway identification system. In addition to the system description, the FAA recommends that the airport operator provide a runway (RY) and taxiway (TWY) diagram, especially if the airport's identification system varies from the norm or is otherwise complicated.*

**SAMPLE**

**GROUND VEHICLE OPERATIONS & TAXIING OR  
TOWING AN AIRCRAFT FAMILIARIZATION PROGRAM**

**TRAINING RECORD**

Employee's Name: \_\_\_\_\_

Employee's Position: \_\_\_\_\_

Company Name: \_\_\_\_\_

Driver's License State and Number: \_\_\_\_\_

Driver's License Expiration Date: \_\_\_\_\_

I agree to abide by all rules and regulations prescribed for the operations of a vehicle within the airport operations area.

Vehicle Operator: As of this time, I certify that I hold a current and valid driver's license. If for any reason my license becomes invalid, I will notify the (AIRPORT OPERATOR) immediately.

**Anyone Taxiing or Towing an Aircraft:** I certify that I hold a current and valid FAA A&P certificate, are authorized by my maintenance facility or operator to taxi or tow their aircraft and trained by my company to start, run, and taxi or tow that particular type of aircraft. Further, the operator will ensure that during an aircraft towing operation, a trained person or pilot will attend the aircraft controls during the operation. Operations with a "Towbarless tractor", with maximum gross weight of 12,500 pounds or greater, there will be a trained person in the cockpit that can stop the aircraft if the tow bar breaks. If for any reason my company authorization becomes invalid, I will notify the (AIRPORT OPERATOR) immediately.

Sign your name and indicate today's date below:

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Date)

## PERMITTED VEHICLE OPERATING AREAS

## Location

- ☐ General Aviation Apron
- ☐ Air Carrier/Terminal Apron
- ☐ Firehouse
- ☐ Air Cargo
- ☐ Tie-downs
- ☐ General Aviation Hangars
- ☐ All Areas

***I certify that the above named individual has satisfactorily completed the Driver and Anyone Taxiing or Towing an Aircraft Training Program.***

Instructor's Signature:

---

**APPENDIX C. SAMPLE LETTER OF AGREEMENT GUIDANCE AND DETAILS**

(Insert Airport Operator/ Authority) Federal Aviation Administration (FAA) (Insert Air Traffic Control Tower (ATCT) associated with Airport), (Insert Technical Operations Maintenance (Tech Ops)), and (Insert Tenants, Fix Base Operations (FBO), or Department of Defense (DoD) as required).

**LETTER OF AGREEMENT (LOA)**

**Effective: Date Here**

**SUBJECT: Requirements for Operating in the Runway Safety Areas (RSAs)****1. Purpose.**

- 1.1** This Letter of Agreement (LOA) defines the responsibilities and procedures parties entering into this agreement must consider for accessing, operating, and exiting the airport's RSA during air carrier or aircraft operations. The LOA will typically be between the Airport Operator/Authority, Air Traffic Control Tower, and Technical Operations. However, it may include others agencies such as airport tenants, Fix Base Operators or Department of Defense.

**2. Cancellation.** Previous letter (date) is cancelled.**3. Responsibilities.**

- 3.1** Each line of business identified in Para 1.1 has some responsibility for ensuring the RSA is protected during air carrier or aircraft operations. In order to ensure that responsibility is covered for any given airport, a list of responsibilities by line of business is identified in the ensuing paragraph. The list of responsibilities are not all inclusive, but should be used as a framework to build specific airport requirements for accessing, operating, or exiting their RSA.

**3.1.1** Airport Operator responsibilities will be to:

- 3.1.1.1** Identify the movement area which consists of the runways, taxiways, and other areas of the airport that aircraft use for taxiing, takeoff, and landing, exclusive of loading aprons and aircraft parking areas.
- 3.1.1.2** Include an Attachment 1 depicting the established movement area with the identified RSA.
- 3.1.1.3** Establish the premise that the RSA shall normally be clear at all times during air carrier/aircraft operations.
- 3.1.1.4** Develop a procedure that permits vehicles or equipment to be in the RSA for a limited amount of time. (Examples may include scheduled or unscheduled NAVAID maintenance or repair,

mowing operations, or other airport safety related circumstances where personnel and equipment will be in the RSA during air carrier/aircraft operations). When circumstances allow, drivers may drop off needed equipment within the RSA and park the vehicle outside the RSA if practicable.

- 3.1.1.5** Establish procedures for entry/exit from RSA based on conditions at the airport, e.g. inclement weather, night operations, construction, etc.
- 3.1.1.6** 3.1.1.6. Collaborate with ATCT on establishing required radio frequency for RSA entry/exit.
- 3.1.1.7** 3.1.1.7. Identify specific/general RSA entry/exit location(s).
- 3.1.1.8** 3.1.1.8. Ensure/establish positive control procedures for entry/exit of RSA.
- 3.1.1.9** 3.1.1.9. Establish/monitor communication procedures for the entry/exit of the RSA.
- 3.1.1.10** 3.1.1.10. Address both vehicle/pedestrian operations in the RSA. (List not all inclusive.)
  - During air carrier operations.
  - Emergency responses to the RSA.
  - Maintenance of NAVAIDs, signs, and lighting outside of the movement area.
  - Vehicle operation (i.e. Wildlife Biologist, Tech Ops, etc.).
- 3.1.1.11** Establish non-towered procedures for entry/exit of the RSA, e.g. CTAF, PCL utilization.
- 3.1.1.12** Accomplish coordination for activities that can occur in the RSA during air carrier operations.
- 3.1.1.13** Provide/supplement training for operators with permission to enter/exit the RSA.
- 3.1.1.14** Collaborate with all airport agencies in describing any enforcement action for violating RSA entry/exit procedures.
- 3.1.1.15** Establish monitoring/assurance tracking matrix to gauge compliance with RSA procedures.
- 3.1.2** Air Traffic Control Tower responsibilities will be to:
  - 3.1.2.1** Collaborate with the airport operator on RSA entry/exit requirements.

- |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.1.2.2 | Perform controller training on RSA procedures based on requirements established by the airport operator.                                                                                                                                                                                                                                                                                                                                                    |
| 3.1.2.3 | Accept/accomplish positive control of vehicle/pedestrians while in the RSA. A clearance by ATCT to proceed into an active RSA is also required (see 7110.65, 3-1-5). Permit vehicle operator's or maintenance personnel with equipment (in direct communications with the control tower), authorization to operate up to the edge of an active runway surface when necessary (e.g. between air carrier operations during agreed upon emergency situations). |
| 3.1.2.4 | Collaborate with the airport operator on establishing required radio frequency for RSA entry/exit.                                                                                                                                                                                                                                                                                                                                                          |
| 3.1.3   | Technical Operation responsibilities will be to:                                                                                                                                                                                                                                                                                                                                                                                                            |
| 3.1.3.1 | Collaborate with the airport operator and air traffic control tower on permission to operate in the RSA.                                                                                                                                                                                                                                                                                                                                                    |
| 3.1.3.2 | Adhere to any established RSA entry/exit procedures identified at the airport.                                                                                                                                                                                                                                                                                                                                                                              |
| 3.1.3.3 | Coordinate/obtain prior permission from the airport operator to enter the RSA during air carrier operations.                                                                                                                                                                                                                                                                                                                                                |
| 3.1.3.4 | Obtain/accept training on procedures for entering/exiting the RSA at the airport as established by the airport operator.                                                                                                                                                                                                                                                                                                                                    |
| 3.1.3.5 | Maintain positive radio communication with controlling authority while operating in the RSA.                                                                                                                                                                                                                                                                                                                                                                |
| 3.1.3.6 | Collaborate with airport operator, air traffic control tower on procedures for entering the RSA.                                                                                                                                                                                                                                                                                                                                                            |
| 3.1.3.7 | Coordinate/establish specific routes of travel with the airport operator to access equipment located in the RSA.                                                                                                                                                                                                                                                                                                                                            |
| 3.1.3.8 | Accept responsibility and enforcement actions that airport operator levies for procedural violations.                                                                                                                                                                                                                                                                                                                                                       |
| 3.1.4   | Tenants, Fix Base Operations (FBO), or Department of Defense (DoD) responsibilities will be to:                                                                                                                                                                                                                                                                                                                                                             |
| 3.1.4.1 | Accept all RSA entry/exit requirements that apply as prescribed by the airport operator.                                                                                                                                                                                                                                                                                                                                                                    |

**4. Attachments.**

- 4.1** Attachment 1 - Airport diagram denoting Movement Areas with RSA delineated.

**5. Deviations.**

- 5.1** Deviations from procedures identified herein must be approved only after coordination between the Airport Operator/Authority, Air Traffic Control Tower, Tech Ops, or any other agency that are signatory on the LOA. At Non-towered locations, the Airport Operator/Authority, Tech Ops, and any other agency that are signatory on the LOA are the approval authority.

Name  
Air Traffic Manager  
Airport Traffic Control Tower

Name  
Technical Operation Manager  
Tech Operation

Name  
Director of Operations  
Metropolitan Airports Commission

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## SOIL BORING LOGS



# Geotechnical Evaluation Holbrook Municipal Airport Apron Reconstruction West Visa and Commerce Avenue Holbrook, Arizona

Armstrong Consultants

2345 South Alma School Road, Suite 208 | Mesa, Arizona 85210

August 20, 2021 | Project No. 606843001



Geotechnical | Environmental | Construction Inspection & Testing | Forensic Engineering & Expert Witness

Geophysics | Engineering Geology | Laboratory Testing | Industrial Hygiene | Occupational Safety | Air Quality | GIS

**Ninyo & Moore**  
Geotechnical & Environmental Sciences Consultants



August 20, 2021  
Project No. 606843001

Mr. Colin Sterns, PE  
Airport Project Engineer  
Armstrong Consultants  
2345 South Alma School Road, Suite 208  
Mesa, Arizona 85210

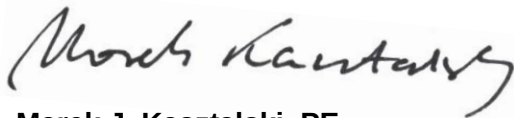
Subject: Geotechnical Evaluation  
Holbrook Municipal Airport Apron Reconstruction  
West Visa and Commerce Avenue  
Holbrook, Arizona

Dear Mr. Sterns:

In accordance with your authorization, Ninyo & Moore is pleased to submit this geotechnical evaluation report, for the above-referenced site. The attached report presents our methodology, findings, conclusions, and recommendations regarding the geotechnical conditions at the project sites.

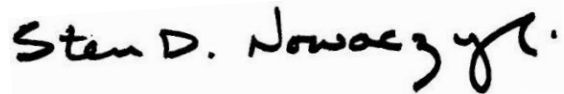
Ninyo & Moore appreciates the opportunity to be of service to you on this project.

Respectfully submitted,  
**NINYO & MOORE**

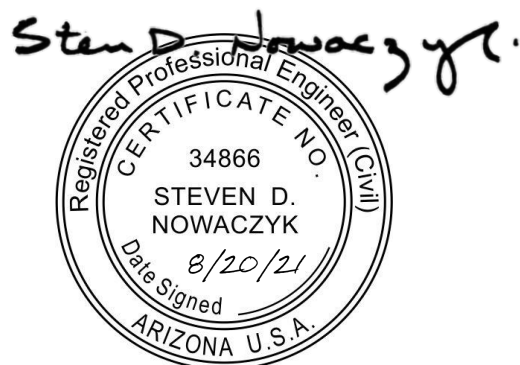
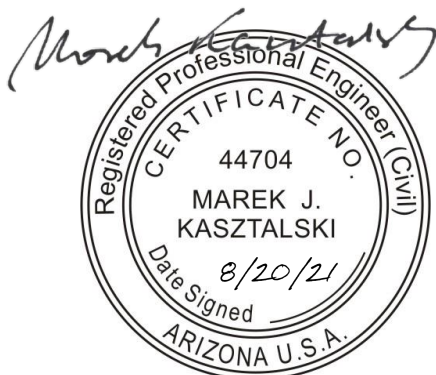
A handwritten signature in black ink, appearing to read "Marek Kasztalski".

**Marek J. Kasztalski, PE**  
Senior Geotechnical Engineer

MJK/SDN/jom

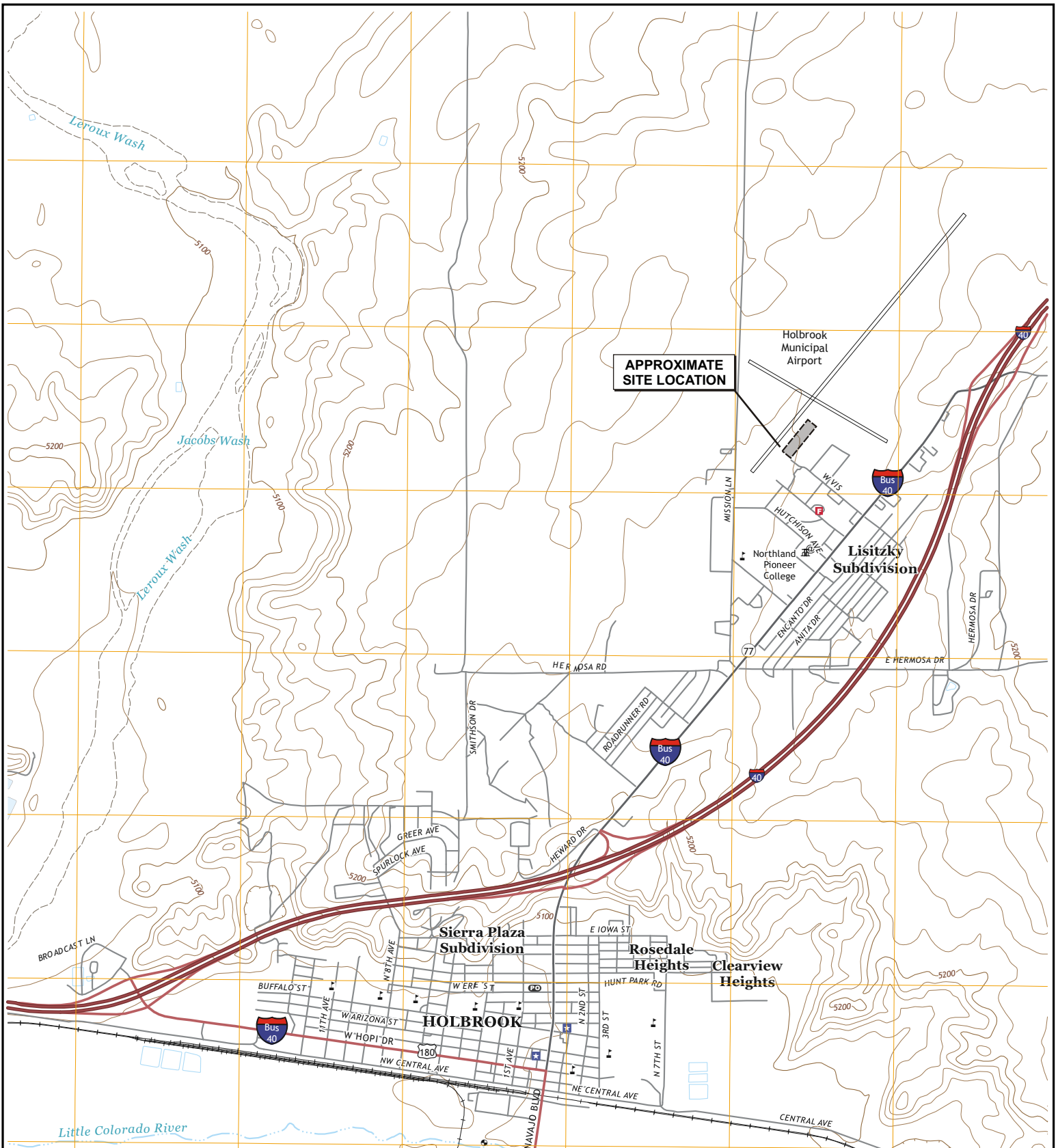
A handwritten signature in black ink, appearing to read "Steven D. Nowaczyk".

**Steven D. Nowaczyk, PE**  
Managing Principal Engineer





# FIGURES



Source: US Geological Survey 7.5-minute topographic map, Holbrook, Arizona, 2018.



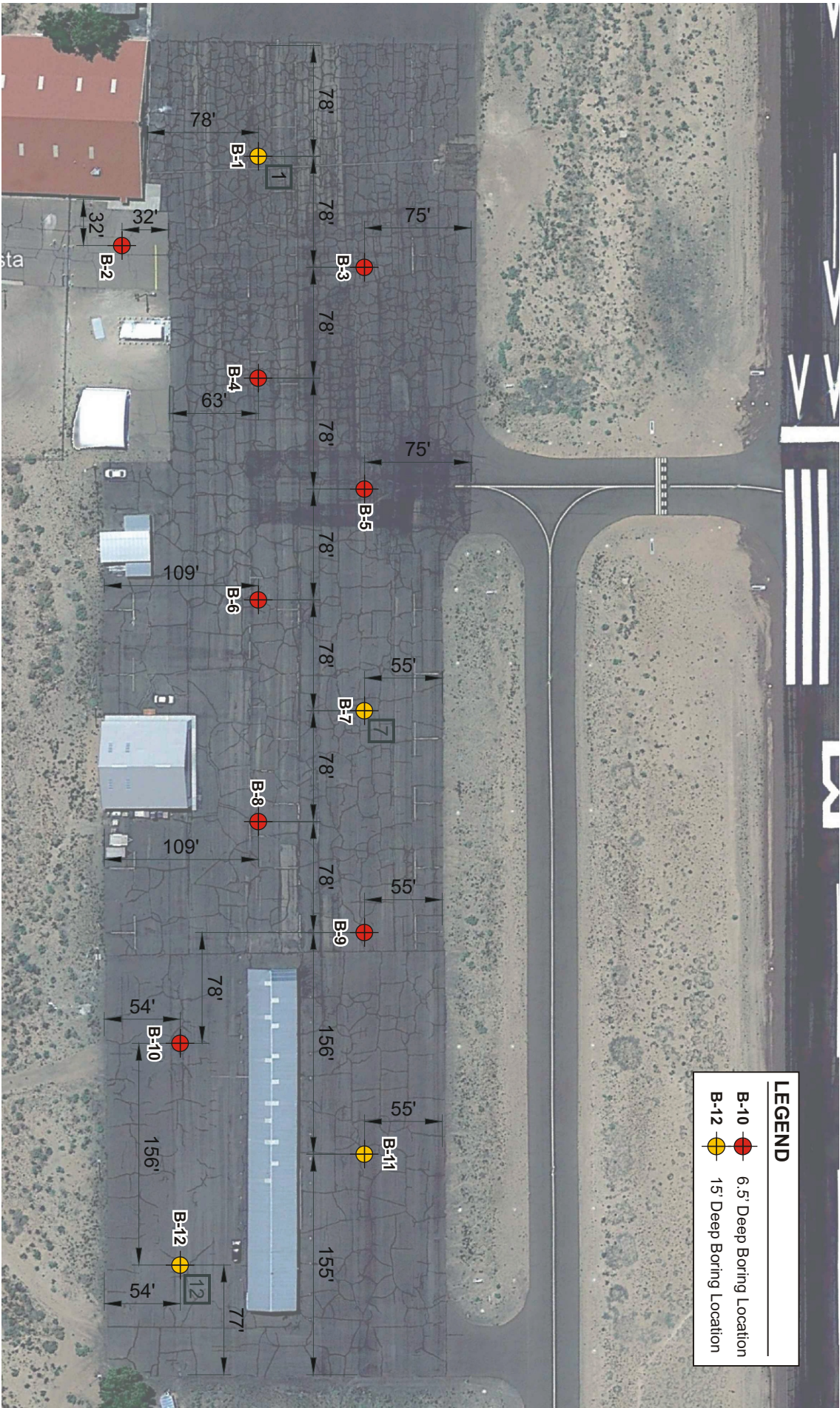
NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

FIGURE 1

## SITE LOCATION

HOLBROOK MUNICIPAL AIRPORT APRON RECONSTRUCTION  
HOLBROOK, ARIZONA





**LEGEND**

- B-10 ● 6.5' Deep Boring Location
- B-12 ● 15' Deep Boring Location

**FIGURE 2**

**BORING LOCATIONS**

HOLBROOK MUNICIPAL AIRPORT APRON RECONSTRUCTION  
HOLBROOK, ARIZONA

606843001 | 8/21





# APPENDIX A

## Boring Logs

# APPENDIX A

## BORING LOGS

### **Field Procedure for the Collection of Disturbed Samples**

Disturbed soil samples were obtained in the field using the following methods.

#### **Bulk Samples**

Bulk samples of representative earth materials were obtained from the exploratory borings and test pits. The samples were bagged and transported to the laboratory for testing.

#### **The Standard Penetration Test (SPT) Sampler**

Disturbed drive samples of earth materials were obtained by means of a SPT sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of 1-3/8 inches. The sampler was driven into the ground 12 to 18 inches with a 140-pound hammer falling freely from a height of 30 inches in general accordance with ASTM D1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the logs are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed and transported to the laboratory for testing.

### **Field Procedure for the Collection of Relatively Undisturbed Samples**

Relatively undisturbed soil samples were obtained in the field using the following methods.

#### **The Modified Split-Barrel Drive Sampler**

The sampler, with an external diameter of 3.0 inches, was lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a hammer or the kelly bar of the drill rig in general accordance with ASTM D1586. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer or bar, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

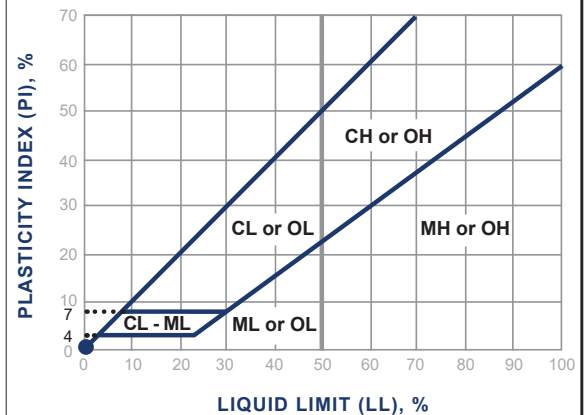
## Soil Classification Chart Per ASTM D 2488

| Primary Divisions                                                      |                                                                           |                                                     | Secondary Divisions                                                                                                 |                                |
|------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------|
|                                                                        |                                                                           |                                                     | Group Symbol                                                                                                        | Group Name                     |
| <b>COARSE-GRAINED SOILS</b><br>more than 50% retained on No. 200 sieve | <b>GRAVEL</b><br>more than 50% of coarse fraction retained on No. 4 sieve | CLEAN GRAVEL<br>less than 5% fines                  |  GW                                | well-graded GRAVEL             |
|                                                                        |                                                                           |                                                     |  GP                                | poorly graded GRAVEL           |
|                                                                        |                                                                           | GRAVEL with DUAL CLASSIFICATIONS<br>5% to 12% fines |  GW-GM                             | well-graded GRAVEL with silt   |
|                                                                        |                                                                           |                                                     |  GP-GM                             | poorly graded GRAVEL with silt |
|                                                                        |                                                                           |                                                     |  GW-GC                             | well-graded GRAVEL with clay   |
|                                                                        |                                                                           |                                                     |  GP-GC                             | poorly graded GRAVEL with      |
|                                                                        |                                                                           | GRAVEL with FINES<br>more than 12% fines            |  GM                                | silty GRAVEL                   |
|                                                                        |                                                                           |                                                     |  GC                                | clayey GRAVEL                  |
|                                                                        |                                                                           |                                                     |  GC-GM                             | silty, clayey GRAVEL           |
|                                                                        | <b>SAND</b><br>50% or more of coarse fraction passes No. 4 sieve          | CLEAN SAND<br>less than 5% fines                    |  SW                                | well-graded SAND               |
|                                                                        |                                                                           |                                                     |  SP                                | poorly graded SAND             |
|                                                                        |                                                                           | SAND with DUAL CLASSIFICATIONS<br>5% to 12% fines   |  SW-SM                             | well-graded SAND with silt     |
|                                                                        |                                                                           |                                                     |  SP-SM                             | poorly graded SAND with silt   |
|                                                                        |                                                                           |                                                     |  SW-SC                             | well-graded SAND with clay     |
|                                                                        |                                                                           |                                                     |  SP-SC                             | poorly graded SAND with clay   |
|                                                                        |                                                                           | SAND with FINES<br>more than 12% fines              |  SM                                | silty SAND                     |
|                                                                        |                                                                           |                                                     |  SC                                | clayey SAND                    |
|                                                                        |                                                                           |                                                     |  SC-SM                             | silty, clayey SAND             |
| <b>FINE-GRAINED SOILS</b><br>50% or more passes No. 200 sieve          | <b>SILT and CLAY</b><br>liquid limit less than 50%                        | INORGANIC                                           |  CL                               | lean CLAY                      |
|                                                                        |                                                                           |                                                     |  ML                              | SILT                           |
|                                                                        |                                                                           |                                                     |  CL-ML                           | silty CLAY                     |
|                                                                        |                                                                           | ORGANIC                                             |  OL (PI > 4)                     | organic CLAY                   |
|                                                                        |                                                                           |                                                     |  OL (PI < 4)                     | organic SILT                   |
|                                                                        | <b>SILT and CLAY</b><br>liquid limit 50% or more                          | INORGANIC                                           |  CH                              | fat CLAY                       |
|                                                                        |                                                                           |                                                     |  MH                              | elastic SILT                   |
|                                                                        |                                                                           |                                                     |  OH (plots on or above "A"-line) | organic CLAY                   |
|                                                                        |                                                                           | ORGANIC                                             |  OH (plots below "A"-line)       | organic SILT                   |
|                                                                        |                                                                           |                                                     |  PT                              | Peat                           |

## Grain Size

| Description |        | Sieve Size   | Grain Size      | Approximate Size               |
|-------------|--------|--------------|-----------------|--------------------------------|
| Boulders    |        | > 12"        | > 12"           | Larger than basketball-sized   |
| Cobbles     |        | 3 - 12"      | 3 - 12"         | Fist-sized to basketball-sized |
| Gravel      | Coarse | 3/4 - 3"     | 3/4 - 3"        | Thumb-sized to fist-sized      |
|             | Fine   | #4 - 3/4"    | 0.19 - 0.75"    | Pea-sized to thumb-sized       |
| Sand        | Coarse | #10 - #4     | 0.075 - 0.19"   | Rock-salt-sized to pea-sized   |
|             | Medium | #40 - #10    | 0.017 - 0.075"  | Sugar-sized to rock-salt-sized |
|             | Fine   | #200 - #40   | 0.0029 - 0.017" | Flour-sized to sugar-sized     |
| Fines       |        | Passing #200 | < 0.0029"       | Flour-sized and smaller        |

## Plasticity Chart



## Apparent Density - Coarse-Grained Soil

| Apparent Density | Spooling Cable or Cathead |                                    | Automatic Trip Hammer |                                    |
|------------------|---------------------------|------------------------------------|-----------------------|------------------------------------|
|                  | SPT (blows/foot)          | Modified Split Barrel (blows/foot) | SPT (blows/foot)      | Modified Split Barrel (blows/foot) |
| Very Loose       | ≤ 4                       | ≤ 8                                | ≤ 3                   | ≤ 5                                |
| Loose            | 5 - 10                    | 9 - 21                             | 4 - 7                 | 6 - 14                             |
| Medium Dense     | 11 - 30                   | 22 - 63                            | 8 - 20                | 15 - 42                            |
| Dense            | 31 - 50                   | 64 - 105                           | 21 - 33               | 43 - 70                            |
| Very Dense       | > 50                      | > 105                              | > 33                  | > 70                               |

## Consistency - Fine-Grained Soil

| Consistency | Spooling Cable or Cathead |                                    | Automatic Trip Hammer |                                    |
|-------------|---------------------------|------------------------------------|-----------------------|------------------------------------|
|             | SPT (blows/foot)          | Modified Split Barrel (blows/foot) | SPT (blows/foot)      | Modified Split Barrel (blows/foot) |
| Very Soft   | < 2                       | < 3                                | < 1                   | < 2                                |
| Soft        | 2 - 4                     | 3 - 5                              | 1 - 3                 | 2 - 3                              |
| Firm        | 5 - 8                     | 6 - 10                             | 4 - 5                 | 4 - 6                              |
| Stiff       | 9 - 15                    | 11 - 20                            | 6 - 10                | 7 - 13                             |
| Very Stiff  | 16 - 30                   | 21 - 39                            | 11 - 20               | 14 - 26                            |
| Hard        | > 30                      | > 39                               | > 20                  | > 26                               |

# BORING LOG EXPLANATION SHEET

| DEPTH (feet) | Bulk<br>Driven<br>SAMPLES | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION<br>U.S.C.S. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|---------------------------|------------|--------------|-------------------|--------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0            |                           |            |              |                   |        |                            | <p>Bulk sample.</p> <p>Modified split-barrel drive sampler.</p> <p>No recovery with modified split-barrel drive sampler.</p> <p>Sample retained by others.</p> <p>Standard Penetration Test (SPT).</p> <p>No recovery with a SPT.</p> <p>Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.</p> <p>No recovery with Shelby tube sampler.</p> <p>Continuous Push Sample.</p> <p>Seepage.</p> <p>Groundwater encountered during drilling.</p> <p>Groundwater measured after drilling.</p> |
| 5            |                           | XX/XX      |              |                   |        |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 10           |                           |            |              |                   |        |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 15           |                           |            |              |                   |        | SM                         | <p><u>MAJOR MATERIAL TYPE (SOIL):</u></p> <p>Solid line denotes unit change.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|              |                           |            |              |                   |        | CL                         | <p>Dashed line denotes material change.</p> <p>Attitudes: Strike/Dip<br/>b: Bedding<br/>c: Contact<br/>j: Joint<br/>f: Fracture<br/>F: Fault<br/>cs: Clay Seam<br/>s: Shear<br/>bss: Basal Slide Surface<br/>sf: Shear Fracture<br/>sz: Shear Zone<br/>sbs: Shear Bedding Surface</p>                                                                                                                                                                                                                                    |
| 20           |                           |            |              |                   |        |                            | <p>The total depth line is a solid line that is drawn at the bottom of the boring.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                   |

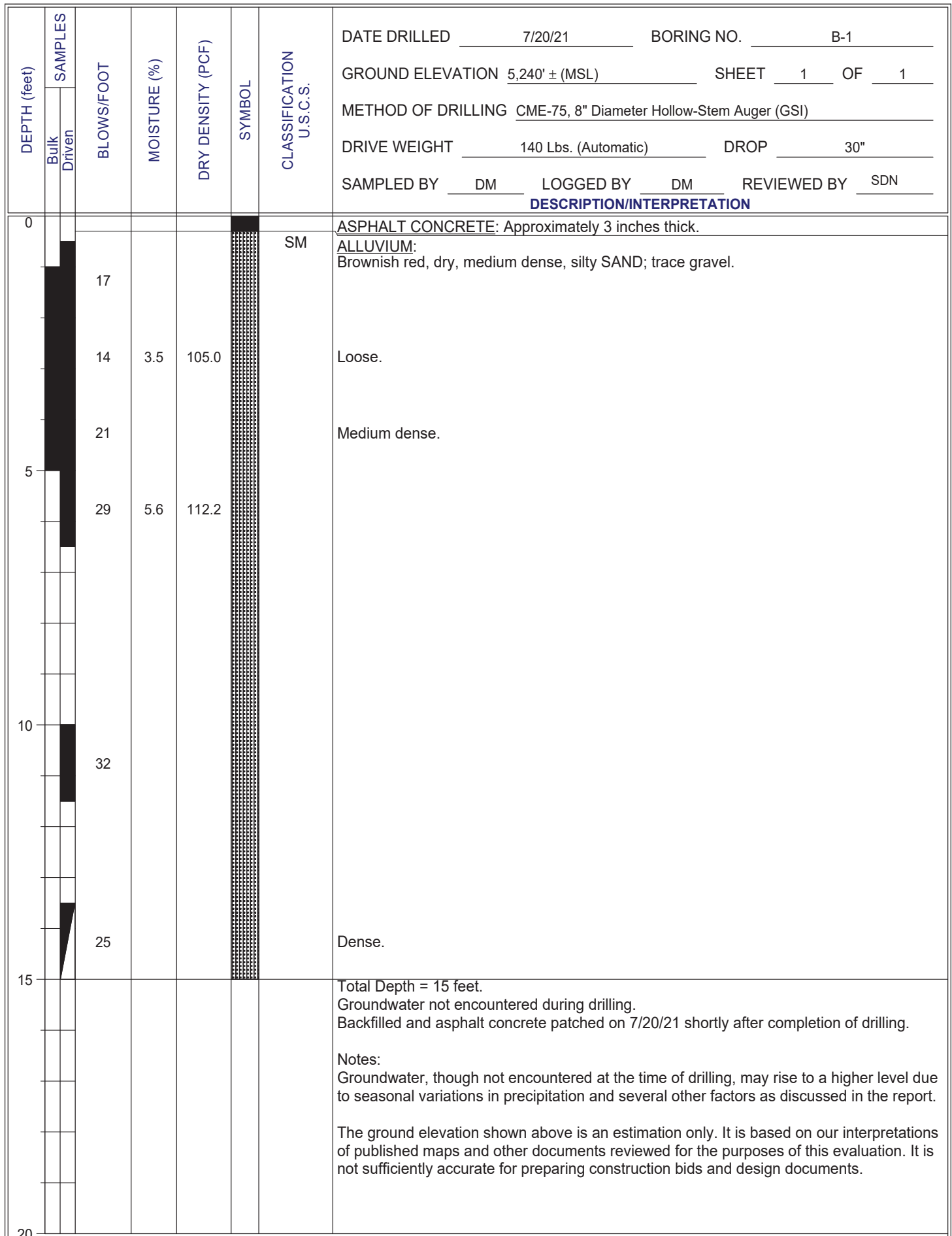


FIGURE A -1

| DEPTH (feet) | SAMPLES |        | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION<br>U.S.C.S. | DATE DRILLED <u>7/20/21</u>                                                                                                                                                                                                                                          | BORING NO. <u>B-2</u>                      |
|--------------|---------|--------|------------|--------------|-------------------|--------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|              | Bulk    | Driven |            |              |                   |        |                            | GROUND ELEVATION <u>5,240' ± (MSL)</u>                                                                                                                                                                                                                               | SHEET <u>1</u> OF <u>1</u>                 |
|              |         |        |            |              |                   |        |                            | METHOD OF DRILLING <u>CME-75, 8" Diameter Hollow-Stem Auger (GSI)</u>                                                                                                                                                                                                |                                            |
|              |         |        |            |              |                   |        |                            | DRIVE WEIGHT <u>140 Lbs. (Automatic)</u>                                                                                                                                                                                                                             | DROP <u>30"</u>                            |
|              |         |        |            |              |                   |        |                            | SAMPLED BY <u>DM</u>                                                                                                                                                                                                                                                 | LOGGED BY <u>DM</u> REVIEWED BY <u>SDN</u> |
|              |         |        |            |              |                   |        |                            | <b>DESCRIPTION/INTERPRETATION</b>                                                                                                                                                                                                                                    |                                            |
| 0            |         |        |            |              |                   |        |                            | ASPHALT CONCRETE: Approximately 3 1/2 inches thick.                                                                                                                                                                                                                  |                                            |
|              |         |        |            |              |                   |        |                            | AGGREGATE BASE: Approximately 5 1/2 inches thick.                                                                                                                                                                                                                    |                                            |
|              |         |        | 35         |              |                   |        | SP-SM                      | ALLUVIUM:<br>Brownish red, dry, medium dense, poorly graded SAND with silt.                                                                                                                                                                                          |                                            |
|              |         |        | 20         | 4.6          | 115.0             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        | 25         | 5.3          | 116.9             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 5            |         |        | 24         |              |                   |        | SP                         | Brownish red, dry, medium dense, fine to medium SAND with gravel.                                                                                                                                                                                                    |                                            |
|              |         |        |            |              |                   |        |                            | Total Depth = 6.5 feet.<br>Groundwater not encountered during drilling.<br>Backfilled and asphalt concrete patched on 7/20/21 shortly after completion of drilling.                                                                                                  |                                            |
|              |         |        |            |              |                   |        |                            | Notes:<br>Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.                                                                  |                                            |
|              |         |        |            |              |                   |        |                            | The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents. |                                            |
| 10           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 20           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |

FIGURE A -2

| DEPTH (feet) | SAMPLES |        | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION<br>U.S.C.S. | DATE DRILLED <u>7/20/21</u>                                                                                                                                                                                                                                          | BORING NO. <u>B-3</u>                      |
|--------------|---------|--------|------------|--------------|-------------------|--------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|              | Bulk    | Driven |            |              |                   |        |                            | GROUND ELEVATION <u>5,240' ± (MSL)</u>                                                                                                                                                                                                                               | SHEET <u>1</u> OF <u>1</u>                 |
|              |         |        |            |              |                   |        |                            | METHOD OF DRILLING <u>CME-75, 8" Diameter Hollow-Stem Auger (GSI)</u>                                                                                                                                                                                                |                                            |
|              |         |        |            |              |                   |        |                            | DRIVE WEIGHT <u>140 Lbs. (Automatic)</u>                                                                                                                                                                                                                             | DROP <u>30"</u>                            |
|              |         |        |            |              |                   |        |                            | SAMPLED BY <u>DM</u>                                                                                                                                                                                                                                                 | LOGGED BY <u>DM</u> REVIEWED BY <u>SDN</u> |
|              |         |        |            |              |                   |        |                            | <b>DESCRIPTION/INTERPRETATION</b>                                                                                                                                                                                                                                    |                                            |
| 0            |         |        |            |              |                   |        |                            | ASPHALT CONCRETE: Approximately 2 1/2 inches thick.                                                                                                                                                                                                                  |                                            |
|              |         |        |            |              |                   |        | SP-SM                      | AGGREGATE BASE: Approximately 3 inches thick.                                                                                                                                                                                                                        |                                            |
|              |         |        | 11         | 3.2          | 108.7             |        |                            | ALLUVIUM:<br>Brown, dry, loose, poorly graded SAND with silt.                                                                                                                                                                                                        |                                            |
|              |         |        | 12         |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        | SM                         | Brown, dry, loose, silty SAND.                                                                                                                                                                                                                                       |                                            |
|              |         |        | 15         | 6.9          | 114.4             |        |                            | Medium dense.                                                                                                                                                                                                                                                        |                                            |
| 5            |         |        | 24         |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            | Total Depth = 6.5 feet.                                                                                                                                                                                                                                              |                                            |
|              |         |        |            |              |                   |        |                            | Groundwater not encountered during drilling.                                                                                                                                                                                                                         |                                            |
|              |         |        |            |              |                   |        |                            | Backfilled and asphalt concrete patched on 7/20/21 shortly after completion of drilling.                                                                                                                                                                             |                                            |
|              |         |        |            |              |                   |        |                            | Notes:                                                                                                                                                                                                                                                               |                                            |
|              |         |        |            |              |                   |        |                            | Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.                                                                            |                                            |
| 10           |         |        |            |              |                   |        |                            | The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents. |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 20           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |

FIGURE A -3

| DEPTH (feet) | SAMPLES |        | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION<br>U.S.C.S. | DATE DRILLED <u>7/20/21</u>                                                                                                                                                                                                                                          | BORING NO. <u>B-4</u>                      |
|--------------|---------|--------|------------|--------------|-------------------|--------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|              | Bulk    | Driven |            |              |                   |        |                            | GROUND ELEVATION <u>5,240' ± (MSL)</u>                                                                                                                                                                                                                               | SHEET <u>1</u> OF <u>1</u>                 |
|              |         |        |            |              |                   |        |                            | METHOD OF DRILLING <u>CME-75, 8" Diameter Hollow-Stem Auger (GSI)</u>                                                                                                                                                                                                |                                            |
|              |         |        |            |              |                   |        |                            | DRIVE WEIGHT <u>140 Lbs. (Automatic)</u>                                                                                                                                                                                                                             | DROP <u>30"</u>                            |
|              |         |        |            |              |                   |        |                            | SAMPLED BY <u>DM</u>                                                                                                                                                                                                                                                 | LOGGED BY <u>DM</u> REVIEWED BY <u>SDN</u> |
|              |         |        |            |              |                   |        |                            | <b>DESCRIPTION/INTERPRETATION</b>                                                                                                                                                                                                                                    |                                            |
| 0            |         |        |            |              |                   |        | SP-SM                      | ASPHALT CONCRETE: Approximately 3 1/2 inches thick.                                                                                                                                                                                                                  |                                            |
|              |         |        | 36         |              |                   |        |                            | ALLUVIUM:                                                                                                                                                                                                                                                            |                                            |
|              |         |        |            |              |                   |        |                            | Brown, dry, medium dense, poorly graded SAND with silt.                                                                                                                                                                                                              |                                            |
|              |         |        | 12         | 3.7          | 104.6             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        | 20         |              |                   |        |                            | Medium dense.                                                                                                                                                                                                                                                        |                                            |
| 5            |         |        |            |              |                   |        | CL                         | Brown, moist, hard, sandy lean CLAY.                                                                                                                                                                                                                                 |                                            |
|              |         |        | 65         | 13.5         | 120.1             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            | Total Depth = 6.5 feet.                                                                                                                                                                                                                                              |                                            |
|              |         |        |            |              |                   |        |                            | Groundwater not encountered during drilling.                                                                                                                                                                                                                         |                                            |
|              |         |        |            |              |                   |        |                            | Backfilled and asphalt concrete patched on 7/20/21 shortly after completion of drilling.                                                                                                                                                                             |                                            |
|              |         |        |            |              |                   |        |                            | Notes:                                                                                                                                                                                                                                                               |                                            |
|              |         |        |            |              |                   |        |                            | Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.                                                                            |                                            |
| 10           |         |        |            |              |                   |        |                            | The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents. |                                            |
| 15           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 20           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |

FIGURE A -4



FIGURE A -5

| DEPTH (feet) | SAMPLES |        | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION<br>U.S.C.S. | DATE DRILLED <u>7/20/21</u>                                                                                                                                                                                                                                          | BORING NO. <u>B-6</u>                      |
|--------------|---------|--------|------------|--------------|-------------------|--------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|              | Bulk    | Driven |            |              |                   |        |                            | GROUND ELEVATION <u>5,240' ± (MSL)</u>                                                                                                                                                                                                                               | SHEET <u>1</u> OF <u>1</u>                 |
|              |         |        |            |              |                   |        |                            | METHOD OF DRILLING <u>CME-75, 8" Diameter Hollow-Stem Auger (GSI)</u>                                                                                                                                                                                                |                                            |
|              |         |        |            |              |                   |        |                            | DRIVE WEIGHT <u>140 Lbs. (Automatic)</u>                                                                                                                                                                                                                             | DROP <u>30"</u>                            |
|              |         |        |            |              |                   |        |                            | SAMPLED BY <u>DM</u>                                                                                                                                                                                                                                                 | LOGGED BY <u>DM</u> REVIEWED BY <u>SDN</u> |
|              |         |        |            |              |                   |        |                            | <b>DESCRIPTION/INTERPRETATION</b>                                                                                                                                                                                                                                    |                                            |
| 0            |         |        |            |              |                   |        |                            | ASPHALT CONCRETE: Approximately 3 inches thick.                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        | SM                         | AGGREGATE BASE: Approximately 3 inches thick.                                                                                                                                                                                                                        |                                            |
|              |         |        | 17         |              |                   |        |                            | ALLUVIUM:<br>Brown, dry to moist, medium dense, silty SAND.                                                                                                                                                                                                          |                                            |
|              |         |        | 10         | 5.2          | 110.8             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        | 16         | 5.3          | 123.8             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 5            |         |        |            |              |                   |        | SC                         | Brown, dry to moist, medium dense, clayey SAND; scattered caliche nodules.                                                                                                                                                                                           |                                            |
|              |         |        | 36         |              |                   |        |                            | Medium dense with gravel.                                                                                                                                                                                                                                            |                                            |
|              |         |        |            |              |                   |        |                            | Total Depth = 6.5 feet.                                                                                                                                                                                                                                              |                                            |
|              |         |        |            |              |                   |        |                            | Groundwater not encountered during drilling.                                                                                                                                                                                                                         |                                            |
|              |         |        |            |              |                   |        |                            | Backfilled and asphalt concrete patched on 7/20/21 shortly after completion of drilling.                                                                                                                                                                             |                                            |
|              |         |        |            |              |                   |        |                            | Notes:                                                                                                                                                                                                                                                               |                                            |
|              |         |        |            |              |                   |        |                            | Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.                                                                            |                                            |
| 10           |         |        |            |              |                   |        |                            | The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents. |                                            |
| 15           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 20           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |

FIGURE A -6

| DEPTH (feet) | SAMPLES |        | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION<br>U.S.C.S. | DATE DRILLED <u>7/20/21</u>                                                                                                                                                                                                                                          | BORING NO. <u>B-7</u>                      |
|--------------|---------|--------|------------|--------------|-------------------|--------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|              | Bulk    | Driven |            |              |                   |        |                            | GROUND ELEVATION <u>5,240' ± (MSL)</u>                                                                                                                                                                                                                               | SHEET <u>1</u> OF <u>1</u>                 |
|              |         |        |            |              |                   |        |                            | METHOD OF DRILLING <u>CME-75, 8" Diameter Hollow-Stem Auger (GSI)</u>                                                                                                                                                                                                |                                            |
|              |         |        |            |              |                   |        |                            | DRIVE WEIGHT <u>140 Lbs. (Automatic)</u>                                                                                                                                                                                                                             | DROP <u>30"</u>                            |
|              |         |        |            |              |                   |        |                            | SAMPLED BY <u>DM</u>                                                                                                                                                                                                                                                 | LOGGED BY <u>DM</u> REVIEWED BY <u>SDN</u> |
|              |         |        |            |              |                   |        |                            | <b>DESCRIPTION/INTERPRETATION</b>                                                                                                                                                                                                                                    |                                            |
| 0            |         |        |            |              |                   |        | SP-SM                      | ASPHALT CONCRETE: Approximately 3 inches thick.                                                                                                                                                                                                                      |                                            |
|              |         |        | 22         |              |                   |        |                            | ALLUVIUM:<br>Brownish red, dry, medium dense, poorly graded SAND with silt.                                                                                                                                                                                          |                                            |
|              |         |        | 13         | 6.2          | 107.6             |        |                            | Loose.                                                                                                                                                                                                                                                               |                                            |
|              |         |        | 16         | 4.9          | 118.9             |        |                            | Medium dense.                                                                                                                                                                                                                                                        |                                            |
| 5            |         |        | 15         |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        | SM                         | Brown, dry, dense, silty SAND; scattered caliche nodules.                                                                                                                                                                                                            |                                            |
| 10           |         |        | 50         |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        | 41         |              |                   |        |                            | Very dense,                                                                                                                                                                                                                                                          |                                            |
| 15           |         |        |            |              |                   |        |                            | Total Depth = 15 feet.<br>Groundwater not encountered during drilling.<br>Backfilled and asphalt concrete patched on 7/20/21 shortly after completion of drilling.                                                                                                   |                                            |
|              |         |        |            |              |                   |        |                            | Notes:<br>Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.                                                                  |                                            |
|              |         |        |            |              |                   |        |                            | The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents. |                                            |
| 20           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |

FIGURE A -7

| DEPTH (feet) | SAMPLES |        | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION<br>U.S.C.S. | DATE DRILLED <u>7/20/21</u>                                                                                                                                                                                                                                          | BORING NO. <u>B-8</u>                      |
|--------------|---------|--------|------------|--------------|-------------------|--------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|              | Bulk    | Driven |            |              |                   |        |                            | GROUND ELEVATION <u>5,240' ± (MSL)</u>                                                                                                                                                                                                                               | SHEET <u>1</u> OF <u>1</u>                 |
|              |         |        |            |              |                   |        |                            | METHOD OF DRILLING <u>CME-75, 8" Diameter Hollow-Stem Auger (GSI)</u>                                                                                                                                                                                                |                                            |
|              |         |        |            |              |                   |        |                            | DRIVE WEIGHT <u>140 Lbs. (Automatic)</u>                                                                                                                                                                                                                             | DROP <u>30"</u>                            |
|              |         |        |            |              |                   |        |                            | SAMPLED BY <u>DM</u>                                                                                                                                                                                                                                                 | LOGGED BY <u>DM</u> REVIEWED BY <u>SDN</u> |
|              |         |        |            |              |                   |        |                            | <b>DESCRIPTION/INTERPRETATION</b>                                                                                                                                                                                                                                    |                                            |
| 0            |         |        |            |              |                   |        |                            | ASPHALT CONCRETE: Approximately 3 inches thick.                                                                                                                                                                                                                      |                                            |
|              |         |        | 16         | 3.6          | 116.0             |        | SP-SM                      | ALLUVIUM:<br>Brown, dry to moist, medium dense, poorly graded SAND with silt.                                                                                                                                                                                        |                                            |
|              |         |        | 13         |              |                   |        |                            | Loose.                                                                                                                                                                                                                                                               |                                            |
|              |         |        | 10         | 5.2          | 119.9             |        | SM                         | Brown, dry, loose, silty SAND.                                                                                                                                                                                                                                       |                                            |
| 5            |         |        | 6          |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 10           |         |        |            |              |                   |        |                            | Total Depth = 6.5 feet.<br>Groundwater not encountered during drilling.<br>Backfilled and asphalt concrete patched on 7/20/21 shortly after completion of drilling.                                                                                                  |                                            |
| 15           |         |        |            |              |                   |        |                            | Notes:<br>Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.                                                                  |                                            |
| 20           |         |        |            |              |                   |        |                            | The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents. |                                            |

FIGURE A -8

| DEPTH (feet) | SAMPLES |        | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION<br>U.S.C.S. | DATE DRILLED <u>7/20/21</u>                                                                                                                                                                                                                                          | BORING NO. <u>B-9</u>                      |
|--------------|---------|--------|------------|--------------|-------------------|--------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|              | Bulk    | Driven |            |              |                   |        |                            | GROUND ELEVATION <u>5,240' ± (MSL)</u>                                                                                                                                                                                                                               | SHEET <u>1</u> OF <u>1</u>                 |
|              |         |        |            |              |                   |        |                            | METHOD OF DRILLING <u>CME-75, 8" Diameter Hollow-Stem Auger (GSI)</u>                                                                                                                                                                                                |                                            |
|              |         |        |            |              |                   |        |                            | DRIVE WEIGHT <u>140 Lbs. (Automatic)</u>                                                                                                                                                                                                                             | DROP <u>30"</u>                            |
|              |         |        |            |              |                   |        |                            | SAMPLED BY <u>DM</u>                                                                                                                                                                                                                                                 | LOGGED BY <u>DM</u> REVIEWED BY <u>SDN</u> |
|              |         |        |            |              |                   |        |                            | <b>DESCRIPTION/INTERPRETATION</b>                                                                                                                                                                                                                                    |                                            |
| 0            |         |        |            |              |                   |        |                            | ASPHALT CONCRETE: Approximately 3 inches thick.                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        | SM                         | AGGREGATE BASE: Approximately 3 inches thick.                                                                                                                                                                                                                        |                                            |
|              |         |        | 13         |              |                   |        |                            | ALLUVIUM:<br>Brown, dry, loose, silty SAND.                                                                                                                                                                                                                          |                                            |
|              |         |        | 12         | 5.9          | 110.1             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        | 17         |              |                   |        |                            | Medium dense.                                                                                                                                                                                                                                                        |                                            |
| 5            |         |        | 15         | 7.0          | 118.2             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            | Total Depth = 6.5 feet.                                                                                                                                                                                                                                              |                                            |
|              |         |        |            |              |                   |        |                            | Groundwater not encountered during drilling.                                                                                                                                                                                                                         |                                            |
|              |         |        |            |              |                   |        |                            | Backfilled and asphalt concrete patched on 7/20/21 shortly after completion of drilling.                                                                                                                                                                             |                                            |
|              |         |        |            |              |                   |        |                            | Notes:                                                                                                                                                                                                                                                               |                                            |
|              |         |        |            |              |                   |        |                            | Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.                                                                            |                                            |
| 10           |         |        |            |              |                   |        |                            | The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents. |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 20           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |

FIGURE A -9

| DEPTH (feet) | SAMPLES |        | BLOWS/FOOT | MOISTURE (%) | DRY DENSITY (PCF) | SYMBOL | CLASSIFICATION<br>U.S.C.S. | DATE DRILLED <u>7/20/21</u>                                                                                                                                                                                                                                          | BORING NO. <u>B-10</u>                     |
|--------------|---------|--------|------------|--------------|-------------------|--------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|              | Bulk    | Driven |            |              |                   |        |                            | GROUND ELEVATION <u>5,240' ± (MSL)</u>                                                                                                                                                                                                                               | SHEET <u>1</u> OF <u>1</u>                 |
|              |         |        |            |              |                   |        |                            | METHOD OF DRILLING <u>CME-75, 8" Diameter Hollow-Stem Auger (GSI)</u>                                                                                                                                                                                                |                                            |
|              |         |        |            |              |                   |        |                            | DRIVE WEIGHT <u>140 Lbs. (Automatic)</u>                                                                                                                                                                                                                             | DROP <u>30"</u>                            |
|              |         |        |            |              |                   |        |                            | SAMPLED BY <u>DM</u>                                                                                                                                                                                                                                                 | LOGGED BY <u>DM</u> REVIEWED BY <u>SDN</u> |
|              |         |        |            |              |                   |        |                            | <b>DESCRIPTION/INTERPRETATION</b>                                                                                                                                                                                                                                    |                                            |
| 0            |         |        |            |              |                   |        |                            | ASPHALT CONCRETE: Approximately 3 1/2 inches thick.                                                                                                                                                                                                                  |                                            |
|              |         |        |            |              |                   |        |                            | AGGREGATE BASE: Approximately 5 1/2 inches thick.                                                                                                                                                                                                                    |                                            |
|              |         |        | 39         |              |                   |        | SP-SM                      | ALLUVIUM:<br>Brown, dry, medium dense, poorly graded SAND with silt.                                                                                                                                                                                                 |                                            |
|              |         |        | 18         | 4.2          | 109.5             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        | 16         | 6.3          | 109.8             |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 5            |         |        |            |              |                   |        | SC                         | Brown, dry, medium dense, clayey SAND with gravel; scattered caliche nodules.                                                                                                                                                                                        |                                            |
|              |         |        | 21         |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            | Total Depth = 6.5 feet.<br>Groundwater not encountered during drilling.<br>Backfilled and asphalt concrete patched on 7/20/21 shortly after completion of drilling.                                                                                                  |                                            |
|              |         |        |            |              |                   |        |                            | Notes:<br>Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.                                                                  |                                            |
|              |         |        |            |              |                   |        |                            | The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents. |                                            |
| 10           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
|              |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |
| 20           |         |        |            |              |                   |        |                            |                                                                                                                                                                                                                                                                      |                                            |

FIGURE A -10

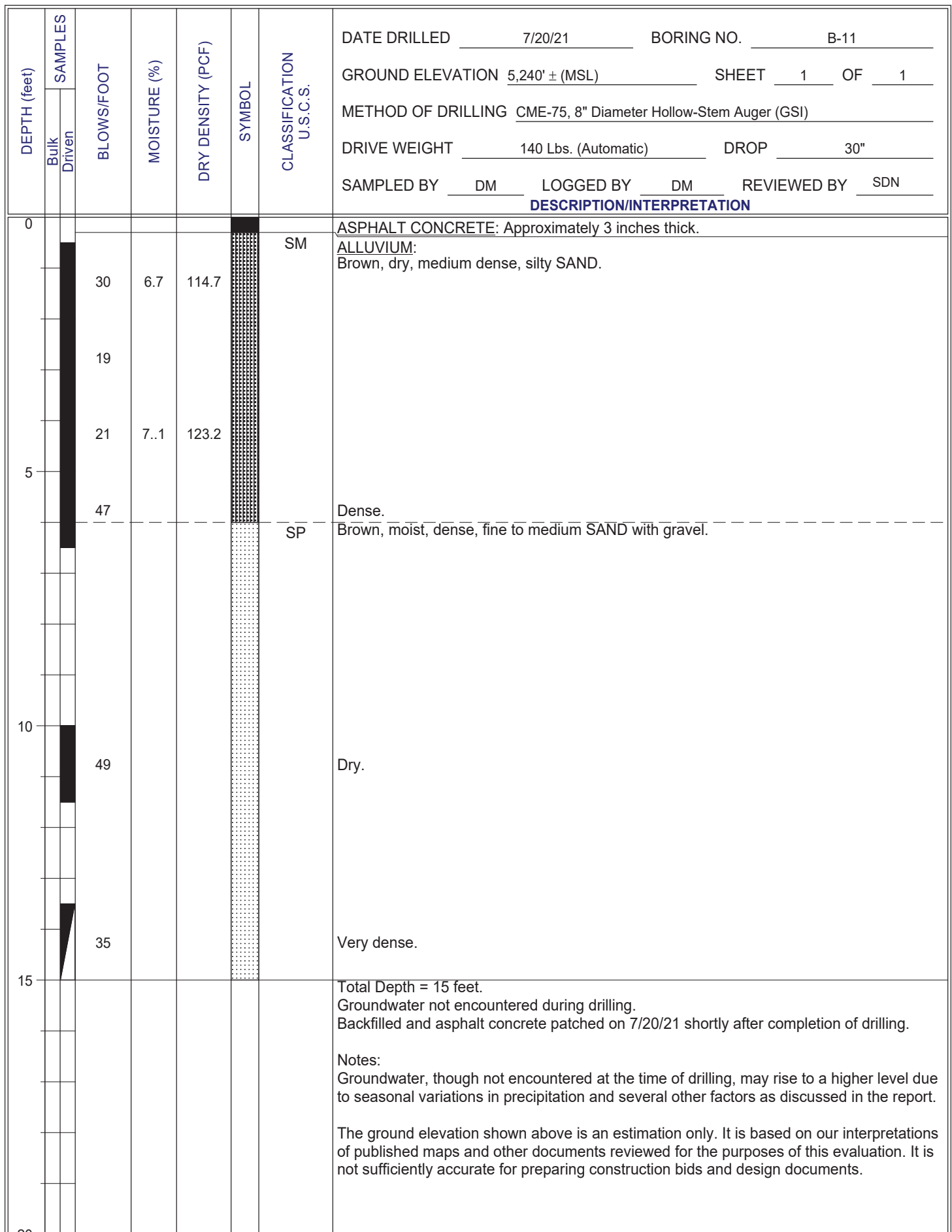


FIGURE A -11

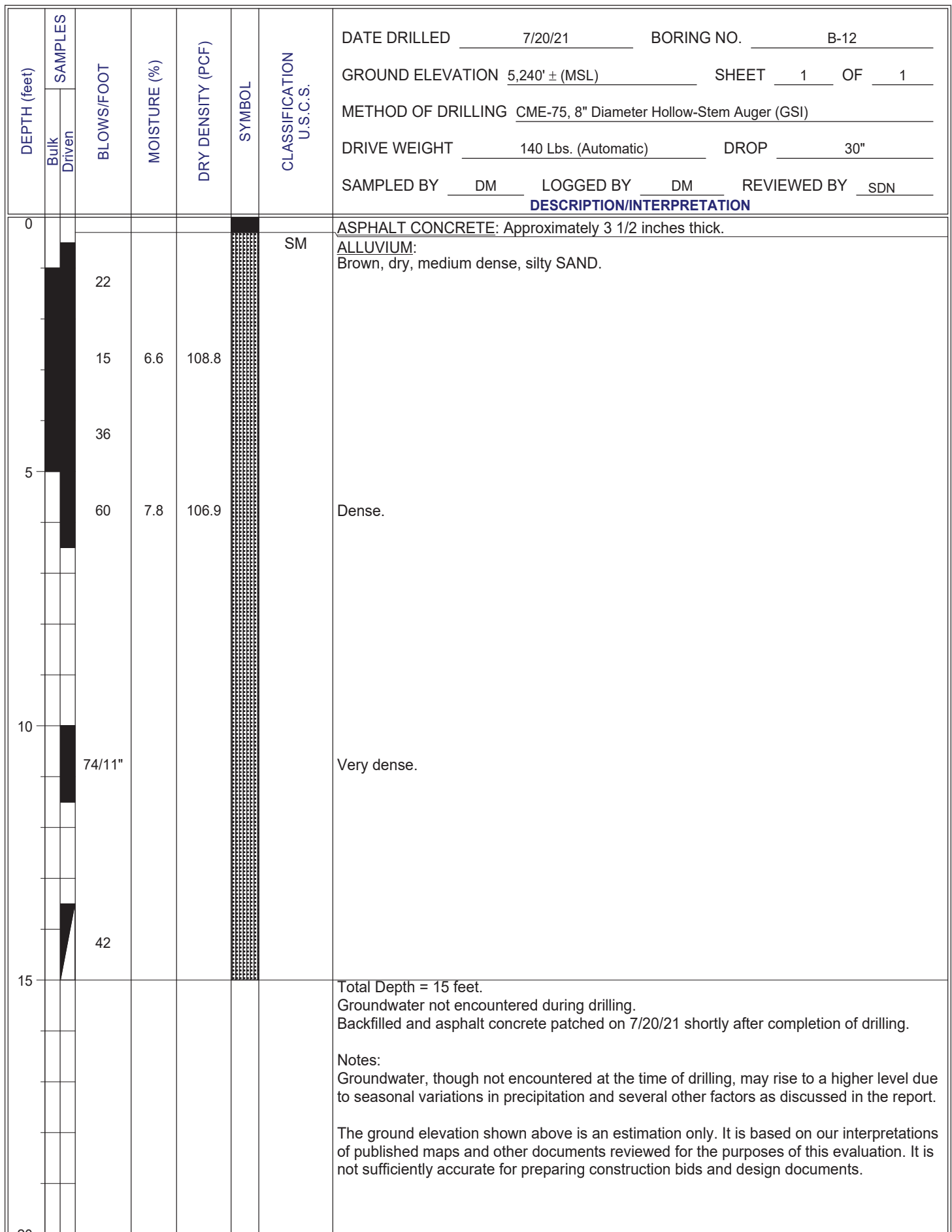


FIGURE A -12



## **ADOT REFERENCE DOCUMENTS**



**SECTION 1006 PORTLAND CEMENT CONCRETE:****1006-1 General Requirements:**

Portland cement concrete shall consist of a mixture of hydraulic cement, fine aggregate, coarse aggregate, and water. It may also contain air-entraining admixtures, chemical admixtures, and a supplementary cementitious material.

The contractor shall determine the mix proportions and shall furnish concrete which conforms to the requirements of these specifications. All concrete shall be sufficiently workable, at the slump proposed by the contractor within the specified range, to allow proper placement of the concrete without harmful segregation, bleeding, or incomplete consolidation. It shall be the responsibility of the contractor to proportion, mix, place, finish, and cure the concrete properly in accordance with the requirements of these specifications.

**1006-2 Materials:****1006-2.01 Hydraulic Cement:**

Hydraulic cement shall consist of either Portland cement or Portland-pozzolan cement.

Portland cement shall conform to the requirements of ASTM C 150 for Type II, III, or V. However, at the option of the manufacturer, processing additions may be used in the manufacture of the cement, provided such processing additions have been shown to meet the requirements of ASTM C 465, and the total amount of such material used does not exceed one percent of the weight of the Portland cement clinker.

Portland-pozzolan cement shall conform to the requirements of ASTM C 595 for Type IP (MS).

Hydraulic cement shall not contain more than 0.60 percent total alkali. The word alkali as used in these specifications shall be taken as the sum of sodium oxide and potassium oxide calculated as sodium oxide.

Certificates of Analysis conforming to the requirements of Subsection 106.05 shall be submitted.

Cement of different types or brands shall not be intermingled or used in the same batch. The contractor shall provide suitable means for storing and protecting the cement against dampness. Cement which for any reason has become partially set or which contains caked lumps shall not be used.

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The use of either sacked cement or bulk cement is permissible. The use of fractional bags of sacked cement will not be permitted unless the contractor elects to weigh the cement into each batch.

### **1006-2.02      Water:**

The water used shall be free from injurious amounts of oil, acid, alkali, clay, vegetable matter, silt or other harmful matter. Water shall contain not more than 1,000 parts per million of chlorides as Cl and not more than 1,000 parts per million of sulfates as SO<sub>4</sub>.

Water shall be sampled and tested in accordance with the requirements of AASHTO T 26. Potable water obtained from public utility distribution lines will be acceptable.

### **1006-2.03      Aggregates:**

#### **(A)      General Requirements:**

When concrete is to be placed at elevations above 4,500 feet, the fine and coarse aggregate shall be subject to five cycles of the sodium sulfate soundness test in accordance with the requirements of AASHTO T 104. The total loss shall not exceed 10 percent by weight of the aggregate as a result of the test. Tests for soundness may be waived when aggregates from the same source have been approved and the approved test results apply to the current production from that source.

When aggregates show potential for alkali silica reaction (ASR), as indicated by expansions of 0.10% or greater at 16 days after casting when tested in accordance with ASTM C 1260, sufficient mitigation for the expansion shall be determined in accordance with ASTM C 1567.

Mill tailings or material from mine dumps shall not be used in the production of fine or coarse aggregate.

The handling and storage of concrete aggregate shall be such as to minimize segregation or the intermixing and contamination with foreign materials. The Engineer may require that aggregates be stored separately. Different sizes of aggregate shall be separated by bulkheads or stored in separate stockpiles sufficiently removed from each other to prevent the material from becoming intermixed.

When aggregates are stored on the ground, the sites for the stockpiles shall be clear of all vegetation and level. The bottom one-foot layer of aggregate shall not be disturbed or used.

The handling and storage of concrete aggregate for Class P concrete at the job site shall be such as to minimize segregation. Stockpiles shall be neat and regular in form and shall occupy as small an area as possible. Stockpiles shall be constructed by first distributing the aggregate over the entire base and then building upward in successive

layers not more than five feet in depth. Aggregate shall not be dumped or spilled over the side of the pile. When a conveyor is used to stockpile aggregate, it shall be equipped with an adequate rock tremie or rock ladder to reduce segregation and it shall be moved continuously across the stockpile. The distance the material drops from the tremie shall not exceed 10 feet. Aggregate shall be distributed over the stockpile so that the formation of conical piles higher than 10 feet is prevented.

Contamination of concrete aggregate for Class P concrete by contact with the ground at the job site shall be positively prevented. The contractor shall take the necessary measures to prevent such contamination. Such preventive measures shall include, but not necessarily be limited to, placing aggregate on hardened surfaces consisting of Portland cement concrete, asphaltic concrete, or cement treated material.

The contractor shall maintain at least two full days worth of production of fine and coarse aggregate stockpiled at the batch plant for Class P concrete prior to starting and throughout the duration of Portland cement concrete paving operations. This requirement is waived for the last two days of production.

The following test methods will be used to evaluate the quality of aggregates for concrete:

|                                                                                             |                         |
|---------------------------------------------------------------------------------------------|-------------------------|
| Sampling                                                                                    | Arizona Test Method 105 |
| Reducing field samples to testing size                                                      | AASHTO T 248            |
| Potential for Alkali Silica Reaction (ASR)                                                  | ASTM C 1260 & C 1567    |
| Clay lumps and friable particles                                                            | AASHTO T 112            |
| Lightweight particles                                                                       | AASHTO T 113 (See Note) |
| Organic impurities                                                                          | AASHTO T 21             |
| Aggregate gradation                                                                         | Arizona Test Method 201 |
| Soundness (Sodium Sulfate)                                                                  | AASHTO T 104            |
| Mortar Strength                                                                             | AASHTO T 71(See Note)   |
| Sand equivalent                                                                             | AASHTO T 176            |
| L.A. abrasion                                                                               | AASHTO T 96             |
| Fractured Coarse Aggregate Particles                                                        | Arizona Test Method 212 |
| Note: AASHTO T 113 and T 71 are modified as specified in Subsections 1006-2.03 (B) and (C). |                         |

**(B) Fine Aggregate:**

Fine aggregate shall be a natural sand, or other approved inert material with similar characteristics, composed of clean, hard, strong, durable, uncoated particles. The aggregate shall be washed and shall conform to the requirements of AASHTO M 6, with the following exceptions:

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The amount of deleterious substances in the washed fine aggregate shall not exceed the following limits by dry weight, when tested in accordance with the following test methods:

|                                                                                        |                                                                                                         |                                                  |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Clay lumps and friable particles                                                       | AASHTO T 112                                                                                            | 0.5%                                             |
| Lightweight particles                                                                  | AASHTO T 113 (Except that the percent of lightweight particles shall be reported to the nearest 0.01%.) | 1.25%<br>(0.25%<br>Max. Coal<br>and<br>Lignite*) |
| * Only material that is brownish-black, or black, shall be considered coal or lignite. |                                                                                                         |                                                  |

The total amount of all deleterious substances listed in the table above shall not exceed 1.25 percent by dry weight.

Fine Aggregate shall meet the following gradation requirements when tested in accordance with Arizona Test Method 201.

| Sieve Size | Percent Passing |
|------------|-----------------|
| 3/8 in.    | 100             |
| No. 4      | 95 - 100        |
| No. 16     | 45 - 80         |
| No. 50     | 0 - 30          |
| No. 100    | 0 - 10          |
| No. 200    | 0 - 4.0         |

Fine aggregate shall have a sand equivalent value of not less than 75.

Fine aggregates shall be subjected to testing under AASHTO T 21 for organic impurities. Aggregates producing a color darker than the standard color shall be rejected unless the material passes the mortar strength specified in the following paragraph:

Fine aggregate shall be made into mortar and subjected to testing under AASHTO T 71, except that the mortar shall develop a compressive strength at seven and 28 days of not less than 90 percent of that developed by a mortar prepared in the same manner with the same Type II cement and graded Ottawa sand having a fineness modulus of  $2.40 \pm 0.10$ .

### (C) Coarse Aggregate:

Coarse aggregate shall consist of crushed stone, gravel, crushed gravel, or other approved inert material of similar characteristics, including cinders when specified, having hard, strong and durable pieces free of clay and other deleterious substances. The aggregate shall be washed. The aggregate gradation, when tested in accordance with Arizona Test Method 201, shall conform to the appropriate size designation of AASHTO M 43, except as shown below.

The amount of deleterious substances in the washed coarse aggregate shall not exceed the following limits by dry weight, when tested in accordance with the following test methods, except as noted:

|                                                                                        |                                                                                                         |                                                  |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Clay lumps and friable particles                                                       | AASHTO T 112                                                                                            | 0.3%                                             |
| Lightweight particles                                                                  | AASHTO T 113 (Except that the percent of lightweight particles shall be reported to the nearest 0.01%.) | 1.25%<br>(0.25%<br>Max. Coal<br>and<br>Lignite*) |
| Material passing No. 200 sieve                                                         | Arizona Test Method 201                                                                                 | 1.0%                                             |
| * Only material that is brownish-black, or black, shall be considered coal or lignite. |                                                                                                         |                                                  |

The total amount of all deleterious substances listed in the table above shall not exceed 1.25 percent by dry weight.

The percent of wear of coarse aggregate at 500 revolutions, when tested in accordance with the requirements of AASHTO T 96, shall not exceed 40.

#### **1006-2.04      Admixtures:**

##### **(A)      General Requirements:**

The contractor shall furnish Certificates of Compliance conforming to the requirements of Subsection 106.05 for each type of admixture furnished.

Calcium chloride as a separate admixture shall not be acceptable.

All concrete admixtures shall be stored in suitable containers in accordance with the manufacturer's recommendations. All liquid admixtures shall be protected from freezing. Liquid admixtures that have frozen shall not be used.

Admixtures shall be uniform in properties throughout their use in the work.

If more than one admixture is used, the admixtures shall be compatible with each other so that the desired effects of all admixtures used will be realized.

##### **(B)      Air-Entraining Admixtures:**

Air-entraining admixtures shall conform to the requirements of ASTM C 260.

## SECTION 1006

Only those air-entraining admixtures shown on the Department's Approved Products List (APL) shall be used. Copies of the most current version of the APL are available on the internet from the Arizona Transportation Research Center (ATRC), through its PRIDE program.

Air-entraining admixtures having a chloride concentration of 10,000 parts per million (one percent by mass of the admixture) or less, as determined in accordance with Arizona Test Method 738, are acceptable unless otherwise specified.

### **(C) Chemical Admixtures:**

Chemical admixtures shall conform to the requirements of ASTM C 494.

Only those chemical admixtures shown on the Department's Approved Products List (APL) shall be used. Copies of the most current version of the APL are available on the internet from the Arizona Transportation Research Center (ATRC), through its PRIDE program.

Chemical admixtures having a chloride concentration of 10,000 parts per million (one percent by mass of the admixture) or less, as determined in accordance with Arizona Test Method 738, are acceptable unless otherwise specified.

### **(D) Supplementary Cementitious Material (Fly Ash, Natural Pozzolan, and Silica Fume):**

Supplementary cementitious materials shall be approved prior to their use in accordance with Materials Policy and Procedure Directive "Certification and Acceptance of Hydraulic Cement, Fly Ash, Natural Pozzolan, and Silica Fume".

Fly ash and natural pozzolan shall conform to the requirements of ASTM C 618 for Class C, F, or N mineral admixture, except that the loss on ignition shall not exceed 3.0 percent.

Silica fume shall conform to the requirements of ASTM C 1240.

When a supplementary cementitious material with a calcium oxide content greater than 15 percent is used, or when the Special Provisions specify sulfate resistant concrete, the cement intended to be used shall be tested for sulfate expansion in accordance with ASTM C 1157 and ASTM C 1012. For moderate sulfate resistance, the maximum expansion shall be 0.10 percent at six months. For high sulfate resistance, the maximum expansion shall be 0.05 percent at six months and 0.10 percent at one year.

When Class C fly ash is used, the cement intended to be used shall be tested for sulfate expansion in accordance with ASTM C 1157 and



ASTM C 1012 and shall have a maximum expansion of 0.05 percent at six months and 0.10 percent at one year.

### **1006-2.05 Concrete Curing Materials:**

Liquid membrane forming compound shall conform to the requirements of AASHTO M 148. Type 2 compound with either a Class A or Class B vehicle shall be used for concrete pavement, bridge decks, and approach slabs. Type 1-D compound with either a Class A or Class B vehicle shall be used for other concrete items.

Certificates of Compliance conforming to the requirements of Subsection 106.05 shall be submitted.

### **1006-3 Design of Mixtures:**

#### **1006-3.01 Design Criteria:**

Portland cement concrete shall conform to the requirements specified in Table 1006-A for each of the classes listed therein.

| TABLE 1006-A      |                                                                       |                                                                                  |                            |                     |
|-------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------|---------------------|
| Class of Concrete | Minimum 28-Day Compressive Strength Required: psi<br>(See Note 1)     | Hydraulic Cement Content: Lbs per Cu Yd Minimum-Maximum<br>(See Notes 2, 3, & 4) | Maximum Water/Cement Ratio | Slump Range: Inches |
| B                 | 2,500                                                                 | 470 – 658                                                                        | None                       | (See Note 6)        |
| S or E            | 2,500                                                                 | 520 – 752                                                                        | 0.55                       |                     |
|                   | 3,000<br>(See Note 5)                                                 |                                                                                  |                            |                     |
|                   | 3,500                                                                 |                                                                                  |                            |                     |
|                   | 4,000                                                                 |                                                                                  |                            |                     |
|                   | 4,500 and greater                                                     | 564 – 752                                                                        | 0.50                       |                     |
| P                 | 4,000                                                                 | 564 – 658                                                                        | None                       | 0 – 4.5             |
| H                 | High performance concrete as specified in project special provisions. |                                                                                  |                            |                     |

**TABLE 1006-A (continued)**

Note 1: Testing for compressive strength of cylinders for all classes of concrete shall be in accordance with the requirements of Arizona Test Method 314.

Note 2: A supplementary cementitious material (fly ash, natural pozzolan, or silica fume) conforming to the requirements of Subsection 1006-2.04(D) may be used at the option of the contractor only when Portland cement is used. The use of a supplementary cementitious material is not allowed for replacement of cement when Portland-pozzolan cement [Type IP (MS)] is used. A maximum of 25 percent of the required weight of Portland cement may be replaced with fly ash or natural pozzolan. A maximum of 10 percent of the required weight of Portland cement may be replaced with silica fume, or a maximum of 10 percent silica fume may be added to the required weight of Portland cement. When supplementary cementitious material is used as a replacement for Portland cement, the replacement shall be made on a 1.0 pound to 1.0 pound basis. If performance enhancement of the concrete, such as the mitigation of an alkali silica reaction or for increased sulfate resistance is necessary, additional quantities of fly ash or natural pozzolan may be incorporated into the concrete without a corresponding Portland cement replacement, if approved by the Engineer.

Note 3: The hydraulic cement content shall be as shown unless otherwise specified.

Note 4: Concrete to be placed under water, tremie concrete, shall conform to the requirements for the class and strength required except the minimum hydraulic cement content shall be increased by 50 pounds per cubic yard of concrete.

Note 5: Unless otherwise shown on the plans.

Note 6: The proposed slump shall be chosen by the contractor. Concrete at the proposed slump shall be sufficiently workable to allow proper placement without harmful segregation, bleeding, or incomplete consolidation.

Air-entraining admixtures will be required for all classes of concrete placed at an elevation of 3,000 feet or above. The amount of entrained air in the concrete mixture shall not be less than four percent nor more than seven percent by volume. However, no air-entrainment will be required for minor precast structures, precast pipe, and precast, prestressed structural members supporting a concrete deck slab or impervious overlay. Also, no air-entrainment will be required for any precast items constructed using the dry pack or no-slump method.

For elevations below 3,000 feet, air-entraining admixtures may be used at the option of the contractor. If air-entraining admixtures are used, the amount of entrained air in the concrete shall not exceed seven percent by volume.

Concrete that fails to conform to the entrained air content requirements listed above for the respective elevation as determined by the Engineer, shall be rejected prior to placement.

Unless specifically required, water-reducing admixtures may be used at the option of the contractor.

The coarse aggregate size designation for Class S, Class B, and Class E concrete shall be chosen by the contractor and approved by the Engineer and shall conform to the size designation and grading requirements of AASHTO M 43. In choosing the size designation, the maximum size of coarse aggregate shall not be larger than one fifth of the narrowest dimension between sides of adjacent forms, or two thirds of the minimum clear spacing between reinforcing bars, or one third the depth of the slab, whichever is least. If two or more stockpiles are utilized to manufacture an AASHTO M 43 size designation, at the time of proportioning for mixing, the aggregate from each stockpile shall be measured by weight and proportioned so that the resulting mixture of coarse aggregate meets the requirements for the chosen size designation. The percent of fractured coarse aggregate particles shall be at least 30 when tested in accordance with the requirements of Arizona Test Method 212.

Coarse aggregate for Class P concrete used to construct Portland cement concrete pavement without load transfer dowels shall be separated into two stockpiles. At the time of proportioning for mixing, the aggregate from each stockpile shall be measured by weight and proportioned so that the resulting mixture of coarse aggregate meets the requirements for size designation No. 467, as specified in AASHTO M 43. The percent of fractured coarse aggregate particles for this coarse aggregate composite shall be at least 30 when tested in accordance with the requirements of Arizona Test Method 212.

Coarse aggregate for Class P concrete used to construct Portland cement concrete pavement with load transfer dowels and adjacent shoulders shall meet the requirements for size designation No. 57, as specified in AASHTO M 43. The percent of fractured coarse aggregate particles shall be at least 30 when tested in accordance with the requirements of Arizona Test Method 212.

Coarse aggregate for Class P concrete placed in pavement ramp tapers not exceeding a width of 10 feet and in pavement gore areas may be size designation No. 57, as specified in AASHTO M 43. The use of size designation No. 57 coarse aggregate may be used in concrete placed in other inaccessible pavement areas when approved in writing by the Engineer.

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### **1006-3.02      Design Procedures:**

At least two weeks prior to the appropriate concreting operation, the contractor shall furnish a mix design for each class of concrete and each strength of Class S and Class E concrete for review and approval. More than one mix design for each class of concrete and each strength of Class S and Class E concrete may be submitted for approval provided specific items and locations of intended uses accompany the mix design. The contractor shall substantiate each mix design by furnishing test data and providing all details of the mixtures proposed for use. The mix design shall be prepared under the direct supervision of, and signed by, a registered professional engineer, a NICET Level III or higher certified technician in the concrete subfield, or an ACI certified Concrete Laboratory Testing Technician Grade II. Individuals preparing and submitting mix designs shall have experience in the development of mix designs and mix design testing.

The complete solid volume mix designs submitted for approval shall include all weights and volumes of all ingredients. The brand, type, and source of hydraulic cement and admixtures, the coarse aggregate size number designation, source of aggregates, the specific gravities of all ingredients, the proposed slump, the water/cement ratio, a product code to identify the mix design, and the intended use of each mix design shall be an integral part of each mix design.

The use of new and previously used mix designs, and the requirements for trial batches, will be as required by the Materials Policy and Procedure Directive "Submittal and Approval of Portland Cement Concrete Mix Designs".

Changes in approved mix designs may be made by the contractor with the approval of the Engineer.

In no case shall the approval of a mix design relieve the contractor of the responsibility for the results obtained by the use of such approved mix design.

A new mix design shall be submitted for approval any time the test results of an approved mix design indicate that the concrete does not meet the required compressive strength.

When approved by the Engineer, concrete from trial batches may be used in the work at locations where concrete of a lower strength is required and such concrete will meet the requirements of the class of concrete at that location. The basis of payment for such concrete shall be that which applies to the concrete required at that location.

### **1006-4            Concrete Production:**

#### **1006-4.01        General Requirements:**

The contractor may obtain concrete for each class of concrete and for each strength of Class S and Class E concrete from a source approved by the Engineer in lieu of establishing a batch plant at the project site.

For each class of concrete and each strength of Class S and Class E concrete, except for Class P concrete produced in a batch plant at the site and used exclusively for Class P work, the contractor shall furnish a delivery ticket for each batch of concrete. The minimum information to be shown on each delivery ticket shall be the date, time batched, truck identification number, name or identification of batch plant, name of contractor, name and location of project, the quantity of concrete, the batch weights or mix design product code, the amount of permissible additional water to meet the design water/cement ratio, and the number of revolutions that the concrete has been mixed at mixing speed in a truck mixer. An authorized representative of the contractor shall be responsible for each delivery ticket and shall sign each delivery ticket accepting the contractor's responsibility for the concrete. The representative shall immediately furnish the delivery ticket to the Engineer.

#### **1006-4.02      Proportioning:**

##### **(A)      Hydraulic Cement:**

A separate scale shall be used to weigh the hydraulic cement. A load indicating device, positioned so as to be easily visible to the Engineer and accurate to  $\pm 0.2$  percent of scale capacity, shall be provided to weigh all hydraulic cement. The batching accuracy shall be within  $\pm 1.0$  percent of the required weight. Load-indicating devices for the scale, or a load cell providing a digital printed readout will be required when weighing all hydraulic cement.

The cement shall be conveyed by means of an enclosed conveying system and the weighing hopper shall be equipped with one or more vibrators as required to ensure the complete discharge of all cement from the hopper after each batch is weighed.

##### **(B)      Water:**

Water shall be measured by volume or by weight. Measurement by volume will be by metering.

Scales shall be accurate within  $\pm 0.2$  percent of scale capacity. Volumetric measuring devices shall have an accuracy of  $\pm 1.5$  percent. The batching devices shall be capable of routinely batching water within  $\pm 1.5$  percent.

##### **(C)      Aggregates:**

All aggregates shall be proportioned by weight.

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Suitable scales shall be provided by the contractor to weigh each size of aggregate. Load indicating devices for the scales shall be positioned so as to be easily visible to the Engineer and accurate to  $\pm 0.2$  percent of scale capacity. The batching accuracy shall be within  $\pm$  two percent of the target weight. The weighing equipment shall be arranged so as to permit the convenient removal of excess material from the weighing hopper and the equipment shall be arranged to enable the operator to have convenient access to all controls. The scales and load indicating devices shall be so graduated and equipped that the weights of materials can be accurately determined. Necessary efforts shall be made to obtain and preserve uniform moisture content in the coarse and fine aggregates. The moisture content shall not vary more than three percent during any day's concrete production. The estimated percent of free moisture in each of the coarse and fine aggregates shall be determined by the contractor using acceptable test methods.

The moisture content of the aggregate shall be such that no free drainage of water from the aggregate will be visible during transportation from the stockpile to the point of mixing. Aggregate containing excess moisture shall be stockpiled prior to use until it is sufficiently dry to meet the above requirement.

In the event that either the coarse or fine aggregate has a moisture absorption rate of more than 1.5 percent, the materials shall be thoroughly prewetted and allowed to drain in advance of use until the moisture content is stable.

### **(D) Admixtures:**

The equipment and the procedures used to measure admixtures and dispense them into the concrete batch shall be approved by the Engineer prior to use.

Dry admixtures shall be measured by weight with a separate scale. A load indicating device for the scale shall be positioned so as to be easily visible to the Engineer and accurate to within  $\pm 1.0$  percent of the amount being weighed. Paste or liquid admixtures shall be measured either by weight or by volume. Only mechanical dispensing equipment shall be used for adding admixtures. Dosage rates shall conform to the manufacturer's recommendations or approved rates, or as determined from field trial batches.

Dispensers for admixtures shall have sufficient capacity to measure at one time the full quantity required for each batch. Admixtures shall be added in accordance with the manufacturer's recommendations and in a manner such that the admixture is incorporated uniformly in the concrete mixture. The amount of liquid admixtures shall not vary from the required amount by more than  $\pm 3.0$  percent.

Equipment for measurement shall be designed for convenient confirmation of measurement accuracy. If more than one liquid

admixture is used, each admixture shall be dispensed by separate equipment unless otherwise permitted in writing by the Engineer.

When a supplementary cementitious material (such as fly ash, natural pozzolan, or silica fume) is specified in the mix design, it may be weighed cumulatively with the hydraulic cement on the same scale. If the same scale is used, the hydraulic cement shall be weighed first, then the supplementary cementitious material. If the same scale is not used, a separate scale with a load-indicating device, positioned so as to be easily visible to the Engineer and accurate to  $\pm 0.2$  percent of scale capacity, shall be provided to weigh the supplementary cementitious material.

When the quantity of hydraulic cement exceeds 30 percent of the full capacity of the scale, the batching accuracy of mixtures containing supplementary cementitious material shall be such that the quantity of the hydraulic cement, and the cumulative quantity of the hydraulic cement plus the supplementary cementitious material, is within  $\pm 1.0$  percent of the sum of their designated batch weights.

Supplementary cementitious material shall be conveyed by means of an enclosed conveying system, and the weighing hopper shall be equipped with one or more vibrators as required to ensure the complete discharge of the supplementary cementitious material from the hopper after each batch is weighed.

#### **1006-4.03      Mixing:**

##### **(A)      General Requirements:**

The concrete may be mixed in a stationary mixer, either at a central mixing plant or at the site, or it may be mixed in a truck mixer, either at a central mixing plant or at the site. Concrete may be mixed in a mobile mixer at the site for Class S, Class B, and Class E concrete, provided written permission of the Engineer is granted.

Each mixer shall meet the specified requirements for type and size and shall have attached in a prominent place a manufacturer's plate showing the gross volume of the mixer and the recommended speeds of the mixer for mixing and for agitating.

Each batch plant shall be equipped to control the time when the water enters the mixer during the mixing cycle. Batch and mixing time shall be from the time hydraulic cement is combined with water.

Mixers shall be cleaned at suitable intervals. Water used for cleaning the mixer shall be discharged prior to further batching.

Equipment having components made of aluminum or magnesium alloys, which would have contact with plastic concrete during mixing and transporting, shall not be used.



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All concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of un-dispersed cement.

### **(B) Mixing in a Stationary Mixer:**

The volume of concrete mixed per batch shall not exceed the capacity of the mixer as shown on the manufacturer's plate. No spillage of concrete will be allowed during the process of mixing.

While mixing, the mixer shall be operated at the speed shown on the manufacturer's plate as the mixing speed.

The mixing time shall not be less than 60 seconds per batch on Class P concrete and the mixing time shall be increased if directed by the Engineer. The mixing time shall be not less than 60 seconds for one cubic yard and shall be increased 15 seconds for each additional cubic yard or fraction thereof for Class S, Class B, and Class E concrete.

The mixers shall have an automatic timing device which locks the discharge equipment until the required mixing time has been completed. The mixer shall be operating at mixing speed at the time that all ingredients enter the mixer to ensure the immediate beginning of the mixing cycle. Mixing time shall end when the discharge chute opens. The contents of the mixer shall be completely discharged before the succeeding batch is placed in the mixer.

Any concrete discharged before the mixing time is completed shall be disposed of by the contractor at no additional cost to the Department.

Stationary mixers shall be equipped with automatic batch meters for counting the batches for Class P concrete. The contractor shall furnish the batch count daily to the Engineer.

Mixed concrete shall be transported in truck mixers, truck agitators or in non-agitating trucks having special bodies.

When truck mixers or truck agitators are used, the concrete shall be continuously agitated from the time of loading until the time of discharge. Agitation shall be by rotation of the drum at the speed shown on the manufacturer's plate as agitating speed.

The truck mixer or truck agitator shall be loaded and operated within a capacity not to exceed 80 percent of the gross volume of the drum. The rate of discharge shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully opened.

Discharge from the truck mixer or truck agitator shall be completed within 90 minutes from the time batched, unless otherwise noted in the mix design and approved by the Engineer.



Bodies of non-agitating trucks shall be smooth, mortar-tight, metal containers and shall be capable of discharging the concrete at a satisfactory controlled rate without segregation. If discharge of concrete is accomplished by tilting the body, the surface of the load shall be retarded by a suitable baffle. Covers shall be provided when needed for protection.

Discharge from non-agitating trucks shall be completed within 45 minutes from the time concrete is batched.

Concrete hauled in open-top vehicles shall be protected against rain. When the ambient temperature exceeds 85 degrees F, the concrete shall be covered if it will be exposed to the sun for more than 30 minutes.

**(C) Mixing in Truck Mixers:**

Truck-mixed concrete shall be mixed entirely in the truck mixer and shall be mixed at the batch plant or at the site.

Truck mixers shall be operated within a capacity not to exceed 63 percent of the gross volume of the drum and at speeds shown on the manufacturer's plate as mixing and agitating speeds.

Each batch of concrete shall be mixed for not less than 70 nor more than 100 revolutions of the drum at mixing speed after all materials have been loaded into the drum, except that when approved by the Engineer, the maximum of 100 revolutions may be increased. Any revolving of the drum beyond the maximum number of revolutions shall be at the agitating speed. Mixing shall begin within 10 minutes after the cement has been combined with either the aggregate or water.

The truck mixer shall be equipped with an electrically or mechanically activated revolution counter by which the number of drum revolutions may be verified. The counter shall accurately register the number of revolutions. It shall be mounted on the truck mixer or just inside the truck cab, so that it may be safely and conveniently read from beside the truck. The revolution counter shall be reset to zero after all materials have been loaded into the drum.

Discharge from the truck mixer shall be completed within 90 minutes from the time batched, unless otherwise noted in the mix design and approved by the Engineer.

If additional mixing water is required to maintain the mix design water/cement ratio, the concrete shall be mixed by a minimum of 30 revolutions of the drum at mixing speed after the water has been added, prior to discharge of any concrete for placement. Any additional mixing water and required mixing revolutions shall be recorded on the delivery ticket specified in Subsection 1006-4.01. This additional mixing may be in excess of the maximum revolutions previously specified.

**(D) Mixing in Mobile Mixers:**

Concrete mixing in mobile mixers for Class S, Class B, and Class E concrete shall be performed in accordance with the requirements of AASHTO M 241.

**1006-4.04 Consistency:**

The contractor shall furnish Class P Concrete having a slump within the range specified in Table 1006-A.

The contractor shall furnish Class S, Class B, and Class E concrete having the slump shown on the approved mix designs with a permissible variation of  $\pm$  one inch; however, the permissible variation will be  $\pm$  two inches when an approved high range water reducing chemical admixture (ASTM C 494, Type F or Type G) conforming to the requirements of Subsection 1006-2.04 is used.

Concrete that fails to conform to the consistency requirements will be rejected.

When concrete is pumped, samples for consistency will be taken both as the concrete leaves the mixer and at the pump hose discharge. If the Engineer determines that there is a good correlation between the results of consistency tests on samples obtained from the mixer and from the pump hose, the Engineer may discontinue sampling from one of the sources; however, the Engineer may take periodic samples from both sources to verify the correlation of test results.

**1006-5 Weather Limitations:**

**1006-5.01 General Requirements:**

Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to cause a flow or wash of the concrete surface or have a detrimental effect on the finished concrete and acceptance parameters.

Placing of concrete shall immediately cease if the hauling vehicles or any equipment or pedestrian traffic tracks mud on the prepared base or changes the allowable subgrade dimensional tolerances for Class P concrete and slabs placed on subgrade for Class S, Class B, and Class E concrete.

**1006-5.02 Hot Weather Concreting:**

The temperature of the concrete mixture immediately before placement shall not exceed 90 degrees F.

Forms, subgrade and reinforcing steel, shall be sprinkled with cool water just prior to placement of concrete.

Mix water may be cooled by refrigeration, liquid nitrogen, or well-crushed ice of a size that will melt completely during the mixing operation. Crushed ice may be substituted for part of the mix water on a pound for pound basis.

### **1006-5.03 Cold Weather Concreting:**

The temperature of the mixed concrete immediately before placing shall not be less than 50 degrees F.

Concrete shall not be placed on or against ice-coated forms, reinforcing steel, structural steel, conduits or construction joints, nor on or against snow, ice, or frozen earth materials.

Concrete operations shall be discontinued when a descending air temperature in the shade and away from artificial heat falls below 40 degrees F nor shall concrete operations be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35 degrees F unless otherwise approved by the Engineer.

Mixing and placing concrete shall continue no later in any day than that time which will allow sufficient time to place and protect the concrete already poured before the air temperature drops to 35 degrees F.

Concrete operations may be allowed although the air temperature at any time during the cure period in the shade and away from artificial heat is below the limit permitted above. Where concrete operations are thus allowed, the contractor shall use equipment to heat the aggregates or water, or both, prior to mixing. If aggregates are heated, the minimum temperature shall be 60 degrees F and the aggregates shall have no chunks of ice or frozen aggregate present. Equipment used to heat the aggregates shall be such that consistent temperatures are obtained throughout the aggregate within each batch and from one batch to another. Water shall not be heated in excess of 150 degrees F unless the water is mixed with the aggregate prior to the addition of cement to the batch.

When concreting operations are allowed when the air temperature falls below the limits permitted in the shade and away from artificial heat, the contractor shall provide adequate insulation or heat, or both, to protect the concrete after placement. This protection shall be to the extent required to maintain a concrete surface temperature of not less than 50 degrees F for a period of 72 hours after placement and at not less than 40 degrees F for an additional 96 hours. When artificial heating is required, the heating units shall not locally heat or dry the surface of the concrete. A written outline of the proposed protection method shall be submitted to the Engineer for approval.

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The placing of concrete will not be permitted until the Engineer is satisfied that all the necessary protection equipment and materials are on hand at the site and in satisfactory working condition.

Concrete requiring cold weather protection shall have such protection removed at the end of the required period in a manner that will permit a gradual drop in the concrete temperature.

### **1006-6 Curing Concrete:**

#### **1006-6.01 Curing Cast-in-Place Concrete:**

##### **(A) General Requirements:**

All cast-in-place concrete shall be cured by one or by a combination of more than one of the methods specified herein and curing shall begin immediately after completion of machine or hand finishing of the fresh concrete.

Curing shall be continued for a period of at least seven days after placing if either Type II Portland cement or Portland pozzolan cement has been used, or for at least three days if Type III Portland cement has been used.

Surfaces requiring a Class II finish shall not be cured by the Liquid-Membrane Forming Compound Method until after the finishing operations are completed.

No traffic, hauling, storing of material or other work shall be allowed on any concrete surface during the required curing periods.

##### **(B) Water Curing Method:**

All surfaces not covered by reasonably waterproof forms shall be kept damp by applying water with a nozzle that so atomizes the flow of the water that a fog mist and not a spray is formed until the surface of the concrete is covered with a curing medium or sprinkling of the surface is permitted. The moisture from the nozzle shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface.

If a curing medium is used, the concrete shall be kept continuously wet by sprinkling with water for the entire curing period. Burlap, rugs, carpets, or earth or sand blankets may be used as a curing medium to retain the moisture during the curing period. Application of the curing medium shall not begin until such time that placement can be made without marring the surfaces of the concrete.

If a curing medium is not used, the entire surface of the concrete shall be kept damp by the application of water with an atomizing nozzle as

specified above until the concrete has set, after which the entire surface of the concrete shall be sprinkled continuously with water for the entire curing period.

In no case shall curing be interrupted by more than one hour during the curing period.

**(C) Liquid-Membrane Forming Compound Method:**

All surfaces not covered by reasonably waterproof forms shall be cured by the liquid-membrane forming compound method. The curing compound shall be applied to the concrete immediately following the surface finishing operation in one or more applications totaling a rate of not less than one gallon per 100 square feet.

The curing compound shall form a continuous unbroken surface.

If the membrane film is broken during the curing period, the broken area shall be given a new application of compound at a rate sufficient to assure uniform coverage.

In no case shall curing be interrupted by more than one hour during the curing period.

**(D) Forms in Place Method:**

Formed surfaces of concrete may be cured by retaining the forms in place. The forms shall remain in place for the entire curing period.

All joints in the forms and the joints between the end of forms and concrete shall be kept moisture-tight during the curing period.

Cracks in the forms and cracks between the forms and the concrete shall be resealed by methods approved by the Engineer.

**(E) Curing Bridge Decks, Approach Slabs, and Anchor Slabs:**

The top surface of bridge decks, approach slabs, and anchor slabs shall be cured by the liquid-membrane forming compound method and by the water curing method. The curing compound shall be applied progressively immediately following the surface finishing operation. Liquid-membrane forming compound shall be applied at a rate of one gallon per 100 square feet. The curing compound shall form a continuous unbroken surface.

Water curing shall be applied not later than four hours after the completion of the surface finishing operations and shall be applied as specified herein.

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The top surface of bridge decks, approach slabs, and anchor slabs that will be covered with a special riding surface or waterproofing membrane shall be cured by the water curing method only. Water curing shall be applied progressively immediately following the surface finishing operation as specified herein.

### **1006-6.02      Curing Precast Concrete:**

#### **(A)      General Requirements:**

The contractor may cure precast concrete in accordance with the requirements specified above for curing cast-in-place concrete or if it elects, the curing of precast concrete may be performed by external heating. This may be accomplished by the use of low-pressure steam or radiant heat with moisture.

If curing of the concrete is accomplished by low-pressure steam or radiant heat with moisture, curing will be considered completed after termination of steam or radiant heat curing. Rapid temperature changes in the concrete shall be avoided during the cooling period.

If curing of the concrete is accomplished by the water curing method, the liquid-membrane forming compound method, or the forms-in-place method, such curing shall be continued for a period of at least seven days after placement of the concrete. The curing time may be reduced to a minimum of three days when a Type III Portland cement has been used.

#### **(B)      Low-Pressure Steam Curing:**

After placement of the concrete, precast items shall be held for a minimum two-hour presteaming period. If the ambient air temperature is below 50 degrees F, steam shall be applied during the presteaming period to hold the air surrounding the precast item at a temperature between 50 and 90 degrees F.

To prevent moisture loss on exposed surfaces during the presteaming period, precast items shall be covered as soon as possible after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.

Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner to prevent the loss of steam and moisture.

Steam at the jets shall be low pressure and in a saturated condition. Steam jets shall not impinge directly on the concrete, test cylinders or forms. During application of the steam, the ambient air temperature rise within the enclosure shall not exceed 40 degrees F per hour. The average curing temperature throughout the enclosure shall not exceed

160 degrees F and shall be maintained at a constant level for a sufficient length of time so as to ensure the development of the required compressive strength by the age of 28 days in concrete items which are not be prestressed. For items which are to be prestressed, the constant temperature shall be maintained for sufficient time necessary to develop the concrete compressive strength required for prestressing. The ambient curing temperature shall not exceed 175 degrees F at any point. Control cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.

Temperature recording devices that will provide an accurate continuous permanent record of the ambient curing temperature shall be provided. A minimum of two temperature recording devices or one for every 200 feet of continuous bed length will be required for checking temperature.

In the event the side forms are removed before the precast unit has attained the required release compressive strength, the curing method shall be continuous in maintaining the temperature and moisture level as described above, within the enclosure, as nearly as practical. There shall not be a delay in re-covering the girder or prestress member.

**(C) Radiant Heat With Moisture:**

Radiant heat shall be applied by means of pipes circulating steam, hot oil or hot water, or by heating elements or electric blankets on the forms. Pipes, blankets or elements shall not be in contact with the concrete surfaces.

Moisture shall be applied in such a manner as to keep the top surface of the precast unit continuously moist during the curing period by fogging or spraying. Moisture shall be maintained by a cover of burlap or cotton matting and further covered by a waterproof tarpaulin with an insulating cover.

Temperature limits and the use of recording thermometers shall be the same as curing with low-pressure steam. Application of the heat cycle may be accelerated to meet climatic conditions upon the approval of the Engineer. A temperature sensing device shall be placed two  $\pm 1/2$  inches from the heated form.

**1006-7 Acceptance Sampling and Testing**

**1006-7.01 General:**

Rejection of concrete will occur due to improper temperature, slump, and/or air content for the concrete mixture delivered to the site. The Engineer may allow failed concrete mixture already placed to remain in place subject to acceptance by compressive strength or may require its removal.



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Rejection of concrete will also occur due to insufficient compressive strength. Concrete compressive strength requirements consists of the specified strength which the concrete shall attain before various loads or stresses are applied and a minimum strength at 28 days.

Acceptance and penalties for placed concrete which meets the above mixture requirements or is allowed to remain in place shall be determined by the results of the 28-day compressive strength, and additionally in the case of Class P concrete, on the measured thickness of concrete pavement in place according to Section 401. Sampling and testing for compressive strength will be performed on all classes of concrete furnished, including each strength specified on the project plans for Class S or Class E concrete.

### **1006-7.02      Sampling and Testing of Concrete:**

A sample of concrete for determination of temperature, slump, and air content (when required) as well as for fabrication of test cylinders for compressive strength determination at 28 days will be taken at random at the specified sampling frequency for each type of concrete.

Samples of concrete shall be of sufficient size to perform all the required tests and fabricate the necessary test cylinders. The samples shall be taken in accordance with the requirements of AASHTO T 141, except as follows:

- (1) Concrete for Class S, Class B, or Class E shall be sampled only once during discharge in the middle portion of the batch. At the discretion of the Engineer, a sample may be obtained at the beginning of the discharge if, in the Engineer's opinion, the properties of the concrete do not appear to be within the specification limits for slump or temperature.
- (2) Concrete for Class P shall be sampled immediately before going into the paver or forms, or as otherwise directed by the Engineer.

If concrete is pumped to facilitate placement, at the discretion of the Engineer, samples may be taken from the truck and pump hose discharge to determine that the compressive strength specifications are met in the structure, and to correlate temperature, slump and air content results. If the correlation is satisfactory and meets with the approval of the Engineer, sampling may continue from the most convenient location with occasional re-testing for correlation. Rejection of concrete due to improper temperature or slump may occur at either the truck or pump hose discharge; however, rejection of concrete due to improper air content will only occur due to a failing test for a sample obtained at the final point of discharge.



Temperature of the concrete mixture will be determined in accordance with ASTM C 1064. Slump of the concrete mixture will be determined in accordance with AASHTO T 119. Air content of the concrete mixture will be determined in accordance with AASHTO T 152. All compressive strength test cylinders will be made, cured, handled, protected, and transported in accordance with the requirements of AASHTO T 23. Testing for compressive strength of cylinders shall be in accordance with the requirements of Arizona Test Method 314.

For Class S concrete with a compressive strength requirement less than 4000 psi, or Class B concrete, a strength test will consist of the average strength of two test cylinders. However, if the compressive strengths of the two test cylinders differ by more than 10 percent from the average of the two, the strength test result shall be the cylinder with the highest compressive strength.

For Class S concrete with a compressive strength requirement equal to or greater than 4000 psi, or Class P concrete, the compressive strength of each sample shall be determined by averaging the results of the three test cylinders fabricated as specified in Subsection 1006-7.03. However, if the compressive strength of any one of the three test cylinders differs by more than 10 percent from the average of the three, its result shall be discarded and the compressive strength shall be the average of the remaining two cylinders. Should the individual compressive strength of any two of the three test cylinders differ by more than 10 percent from the average of the three, the results of both will be discarded and the compressive strength shall be the strength of the remaining cylinder.

#### **1006-7.03      Sampling Frequency for Cast-In-place Concrete:**

##### **(A)      Class S and Class B Concrete:**

For Class S concrete with a compressive strength requirement less than 4000 psi, or Class B concrete, a sample of concrete for the required tests, as specified in Subsection 1006-7.02, will be taken on a daily basis for each 100 cubic yards, or fraction thereof, of continuously placed concrete from each batch plant. For Class S concrete with a compressive strength requirement equal to or greater than 4000 psi, a sample of concrete for the required tests, as specified in Subsection 1006-7.02, will be taken on a daily basis for each 50 cubic yards, or fraction thereof, of continuously placed concrete from each batch plant. For Class S or Class B concrete placed at elevations of 3,000 feet or above, air content testing shall be performed for each 50 cubic yards placed, regardless of the compressive strength requirement. An additional sample or samples for any of the required tests may be taken at an interval of less than the sampling frequency specified above, at the discretion of the Engineer, on any batch or load of concrete. A sample for the required tests on daily placements of 10 cubic yards or less may be taken at the discretion of the Engineer.

##### **(B)      Class E Concrete:**

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Class E concrete shall be sampled and tested for compressive strength by the sub-lot. A sub-lot will be 30 cubic yards or an accumulation of quantities of a specified strength of concrete to total 30 cubic yards. A sample will be obtained for each portion of concrete between 10 and 30 cubic yards, inclusive, for each specified strength of concrete. For each specified concrete strength, the quantity of concrete represented by four samples will be defined as a lot. However, for a continuous pour of greater than 120 cubic yards of a specified strength of concrete, the total amount of concrete in that pour will be considered to be a lot, and four samples will be taken at randomly selected locations as directed by the Engineer. The Engineer may exclude certain locations from random sampling should the Engineer determine that the location of the work precludes normal construction operations. Three test cylinders shall be fabricated from each sample and tested for 28-day compressive strength in accordance with Subsection 1006-7.02.

Class E concrete shall be sampled and tested for temperature and slump for each 30 cubic yards. For concrete placed at an elevation of 3,000 feet or above, a sample will be taken for each 30 cubic yards for testing of air content. For quantities of concrete less than 30 cubic yards, the sampling and testing frequency for temperature, slump, and air content may be reduced with the concurrence of the Engineer. Additional samples for any of the required tests may be taken at the discretion of the Engineer.

### **(C) Class P Concrete:**

Class P concrete shall be sampled and tested for compressive strength by the lot. A lot shall be considered to be one shift's production; however, a new lot shall begin when the mix design is changed. For partial shifts due to weather or other reasons, more than one day's production may be included in a lot. When such partial shifts occur, the contractor and the Engineer will jointly determine the lot limits. Five samples shall be obtained from each lot at random locations as directed by the Engineer. The Engineer may exclude certain locations from random sampling should the Engineer determine that the location of the work precludes normal construction operations. Three test cylinders shall be fabricated from each sample and tested for 28-day compressive strength in accordance with Subsection 1006-7.02.

Class P concrete shall be sampled and tested for temperature, slump, and air content (if applicable) a minimum of five times per lot. The frequency may be reduced for partial shifts with the concurrence of the Engineer. Additional samples for any of the required tests may be taken at the discretion of the Engineer.

### **1006-7.04 Sampling Frequency for Precast Concrete:**

A sample of concrete for the required tests as specified in Subsection 1006-7.02 will be taken for either each precast concrete

member or for each day's production at the discretion of the Engineer, when the method of measurement is by the unit.

An additional sample or samples for any of the required tests may be taken at the discretion of the Engineer. The Engineer will determine the quantity of concrete represented by each sample of concrete for any test performed.

When a sample of concrete for the required compressive strength test is taken to represent a single day's production and not each precast member, the degree of acceptance for all precast concrete members in that day's production will be established by the results of such compressive strength test.

#### **1006-7.05      Testing for Minor Precast Concrete Structures:**

A strength test on each precast unit produced will consist of the average rebound number as determined from readings taken on the precast unit with a rebound hammer. The average rebound number will be determined in accordance with the requirements of ASTM C 805.

The compressive strength of the concrete will be determined from the average rebound number and the calibration chart established for the specific rebound hammer being used. The calibration chart will be established from rebound readings taken on concrete test cylinders fabricated at the precast plant and the actual compressive strength of the cylinders. The test cylinders will be fabricated in accordance with the requirements of AASHTO T 23. Testing for compressive strength of cylinders shall be in accordance with the requirements of Arizona Test Method 314.

#### **1006-7.06      Acceptance for Compressive Strength:**

##### **(A)      Class P Concrete:**

Class P concrete will be accepted for compressive strength in accordance with the provisions of Section 401. All concrete failing to meet the compressive strength requirement or otherwise rejected in accordance with Section 401 or Subsection 1006-7.01, shall be replaced with concrete meeting the requirements of these specifications.

If the contractor chooses to contest the compressive strength results of any sample for purposes of acceptability or improving a negative pay factor, the contractor may elect to rely on the results of compressive strengths of cores. Three cores shall be obtained at no additional cost to the Department, at the approximate location where the contested test cylinders were obtained. Such cores shall be obtained and tested in accordance with Arizona Test Method 317. Cores must be obtained under the observation of an ADOT representative and delivered to the Engineer in time to allow complete testing within 48 days of placement. The contractor may elect to have a representative present during

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testing. Compressive strength shall be the average of the results of the three cores. However, if the compressive strength of any one of the three cores differs by more than 10 percent from the average of the three, its result shall be discarded and the compressive strength shall be the average of the remaining two cores. Should the individual compressive strength of any two of the three cores differ by more than 10 percent from the average of the three, the results of both shall be discarded and the compressive strength shall be the result of the remaining core. Results of the core testing will be binding on both the contractor and the Department, and will replace the results of the test cylinders for that sample.

### (B) Class S and Class B Concrete:

Class S and Class B concrete will be accepted for compressive strength and paid for in accordance with the following table. Concrete will be paid for by the linear foot or by the cubic yard, complete in place, except that an adjustment in the contract unit price, to the nearest cent, will be made for the quantity of concrete represented by 28-day compressive strength test results less than the specified requirement.

| <b>Adjustment in Contract Unit Price For Compressive Strength of Class S and Class B Concrete</b>                  |                                                       |                                                                                       |                                                       |                                                                                       |                                                       |
|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------|
| <b>3000 psi and Below</b>                                                                                          |                                                       | <b>3500 psi</b>                                                                       |                                                       | <b>4000 psi and Above</b>                                                             |                                                       |
| Percent of Specified 28-Day Compressive Strength Attained, to the Nearest One Percent                              | Percent Reduction in Contract Unit Price (See Note 1) | Percent of Specified 28-Day Compressive Strength Attained, to the Nearest One Percent | Percent Reduction in Contract Unit Price (See Note 1) | Percent of Specified 28-Day Compressive Strength Attained, to the Nearest One Percent | Percent Reduction in Contract Unit Price (See Note 1) |
| 100 or More                                                                                                        | 0                                                     | 100 or More                                                                           | 0                                                     | 100 or More                                                                           | 0                                                     |
| 97 – 99                                                                                                            | 3                                                     | 98 – 99                                                                               | 2                                                     | 99                                                                                    | 1                                                     |
| 94 – 96                                                                                                            | 6                                                     | 96 – 97                                                                               | 4                                                     | 98                                                                                    | 2                                                     |
| 91 – 93                                                                                                            | 9                                                     | 94 – 95                                                                               | 6                                                     | 97                                                                                    | 3                                                     |
| 88 – 90                                                                                                            | 12                                                    | 92 – 93                                                                               | 8                                                     | 96                                                                                    | 4                                                     |
| 85 – 87                                                                                                            | 15                                                    | 90 – 91                                                                               | 10                                                    | 95                                                                                    | 5                                                     |
| Less than 85                                                                                                       | 30 (See Note 2)                                       | Less than 90                                                                          | 30 (See Note 2)                                       | Less than 95                                                                          | 30 (See Note 2)                                       |
| Note 1: For items measured and paid for by the cubic yard, the reduction shall not exceed \$150.00 per cubic yard. |                                                       |                                                                                       |                                                       |                                                                                       |                                                       |
| Note 2: If allowed to remain in place.                                                                             |                                                       |                                                                                       |                                                       |                                                                                       |                                                       |

Concrete failing to meet at least 85 percent of the 28-day compressive strength for specified strengths of 3,000 pounds per square inch and below, 90 percent for a specified strength of 3,500 pounds per square

inch, or 95 percent for specified strengths of 4,000 pounds per square inch and above, or any concrete failing to meet the other requirements of Subsection 1006-7.01, will be rejected and removed in accordance with the provisions of Subsection 106.11 at no additional cost to the Department, unless the contractor can submit evidence that will indicate to the Engineer that the strength and quality of the concrete is such that the concrete should be considered acceptable and be allowed to remain in place.

If such evidence consists of cores, the contractor shall obtain three cores from the concrete represented by the failing cylinder strength test. The cores shall be obtained at no additional cost to the Department, under the observation of an ADOT representative, and delivered to the Engineer in time to allow complete testing of such cores within 48 days after the placement of the concrete. All cores shall be obtained and tested in accordance with the requirements of Arizona Test Method 317. The contractor may elect to have a representative present during testing. The concrete represented by the cores will be considered for acceptance, in accordance with the requirements of the table above. If the average compressive strength does not meet the specified requirement, all concrete so represented shall be removed at no additional cost to the Department unless permitted to remain in place by the Engineer. Results of the core testing will be binding on both the contractor and the Department, and will replace the results of the test cylinders for that sample.

**(C) Class E Concrete:**

Class E concrete will be accepted for compressive strength in accordance with the provisions of Section 611. All concrete failing to meet the compressive strength requirement or otherwise rejected in accordance with Section 611 or Subsection 1006-7.01, shall be replaced with concrete meeting the requirements of these specifications.

If the contractor chooses to contest the compressive strength results of any sample for purposes of acceptability or improving a deficiency in compressive strength, the contractor may elect to rely on the results of compressive strengths of cores. Three cores shall be obtained at no additional cost to the Department, at the approximate location where the contested test cylinders were obtained. Such cores shall be obtained and tested in accordance with Arizona Test Method 317. Cores must be obtained under the observation of an ADOT representative and delivered to the Engineer in time to allow complete testing within 48 days of placement. The contractor may elect to have a representative present during testing. Compressive strength shall be the average of the results of the three cores. However, if the compressive strength of any one of the three cores differs by more than 10 percent from the average of the three, its result shall be discarded and the compressive strength shall be the average of the remaining two cores. Should the individual compressive strength of any two of the three cores differ by more than 10 percent from the average of the

## SECTION 1006

three, the results of both shall be discarded and the compressive strength shall be the result of the remaining core. Results of the core testing will be binding on both the contractor and the Department, and will replace the results of the test cylinders for that sample.

### **1006-8 Method of Measurement and Basis of Payment:**

The method of measurement and basis of payment will be made as specified herein and under the provisions specified in the various sections of the specifications covering construction requiring the use of concrete.

## **SECTION 1007 RETROREFLECTIVE SHEETING:**

### **1007-1 General Requirements:**

Retroreflective sheeting shall consist of a retroreflective system having a smooth outer surface. The sheeting shall have a pre-coated adhesive on the back side protected by an easily removable liner, except for self-supporting products having a Class V backing, such as roll-up signs and some types of traffic cone collars. Sheeting shall conform to criteria listed in ASTM D 4956-04 for the applicable type and class, unless otherwise specified. All references herein to ASTM D 4956 shall refer to ASTM D 4956-04.

Only those retroreflective sheeting, inks, and film products that are currently shown in the Department's Approved Products List (APL) shall be used. Copies of the APL are available on the internet from the Arizona Transportation Research Center (ATRC), through its PRIDE program.

A Certificate of Compliance, conforming to the requirements of Subsection 106.05, shall be submitted. The Certificate of Compliance shall identify the retroreflective sheeting type, backing class, make of sheeting, inks, and film intended for use in all manufactured devices, including signs, channeling devices, mileposts, object markers, guard rail markers, delineators and reference markers. The Engineer may accept all materials based on the certification or may require the contractor to furnish additional information or laboratory test results. Additionally, the Engineer may perform measurements on materials to determine their compliance with these specifications. Signs and other devices that have sheeting, inks or films that do not meet these requirements shall be rejected and shall be replaced at no additional cost to the Department.

### **1007-2 Material Types:**

The type of sheeting to be used in any given application will be called out on the project plans. Type VI is a flexible sheeting material suitable for use with roll-up signs. For applications where more than



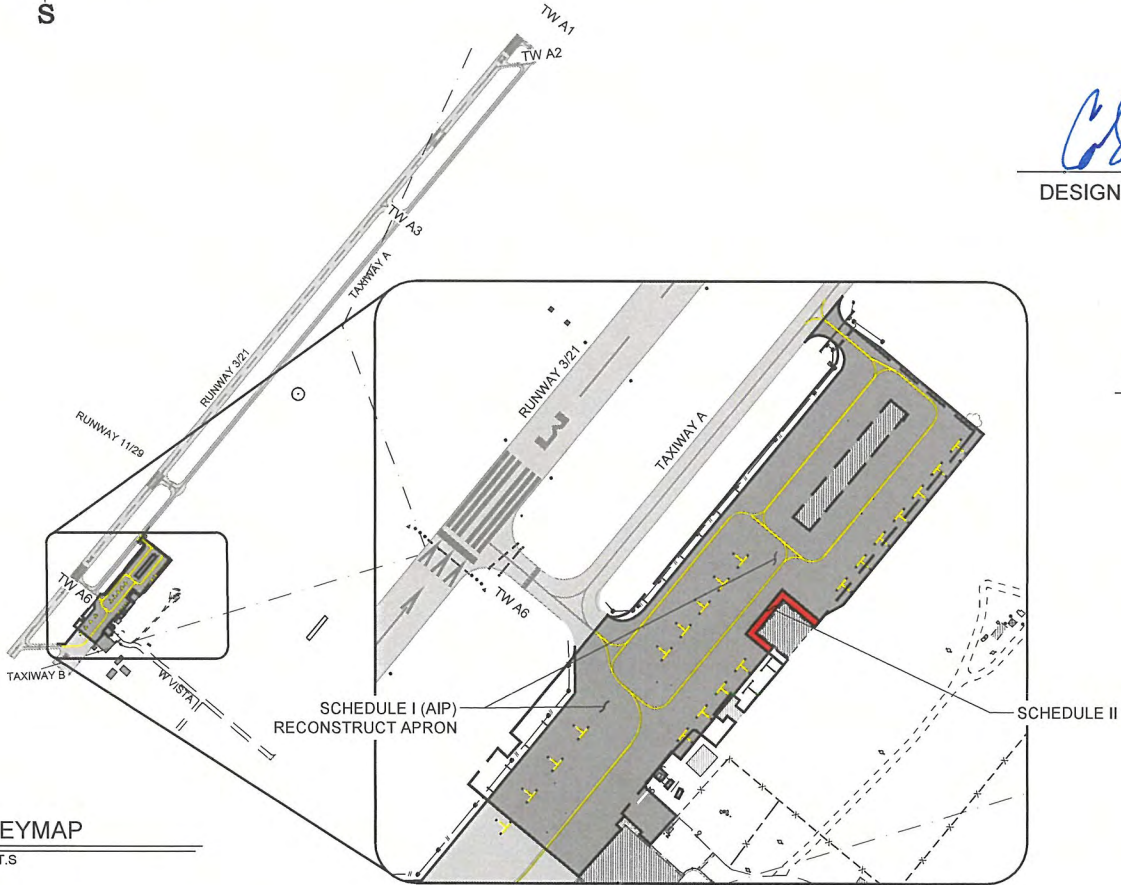
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VICINITY MAP



KEYMAP



# HOLBROOK MUNICIPAL AIRPORT

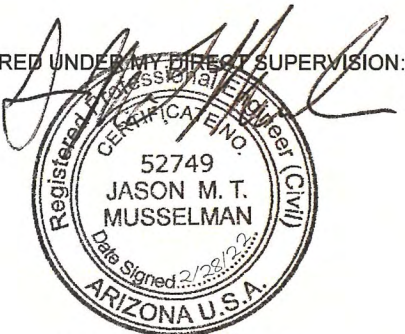
## HOLBROOK, ARIZONA

### RECONSTRUCT APRON

AIP No. 3-04-0020-022-2023  
ACI No. 216729

PREPARED BY:  
ARMSTRONG CONSULTANTS, INC.  
FEBRUARY 2022

REVIEWED BY AND PREPARED UNDER MY DIRECT SUPERVISION:



EXPIRES 9/30/2023

*CSA*

2/28/22

DESIGNED BY:

DATE

REGISTERED PROFESSIONAL ENGINEER

DATE

SCHEDULE I (AIP)  
RECONSTRUCT APRON

SCHEDULE II (NON-AIP)  
RECONSTRUCT APRON  
HANGAR CONNECTION

#### INDEX TO SHEETS

|                                       |           |
|---------------------------------------|-----------|
| COVER SHEET                           | 1.1       |
| LEGEND, GENERAL NOTES, SURVEY CONTROL | 1.2       |
| DEMOLITION PLAN                       | 2.1       |
| GRADING PLAN                          | 3.1 - 3.2 |
| DETAILS                               | 4.1       |
| LIGHTING AND SIGNAGE PLAN             | 5.1       |
| LIGHTING AND SIGNAGE DETAILS          | 5.2       |
| MARKING PLAN AND DETAILS              | 6.1       |

CONSTRUCTION SAFETY & PHASING PLAN ATTACHED  
SHEET 1.1





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UNICOM: 122.8

NOTES TO SURVEYOR:

- THE PROJECT CONTROL IS **NOT** IN A STATE PLANE COORDINATE SYSTEM.
- ALL DISTANCE UNITS ARE IN FEET AT GROUND.
- ANY SURVEY INFORMATION SUPPLIED TO ACI SHALL BE POINT STATION, NORTHING, EASTING, ELEVATION, AND DESCRIPTION FORMAT. INFORMATION IN ANY OTHER FORMAT WILL BE REJECTED.

RW 3/21  
STA 65+68.29, 252.71' LT  
NGS MONUMENT P14A 062821  
FOUND 3" BRASS CAP IN CONCRETE POST  
N - 1,436,583.66  
E - 710,430.51  
ELEV: 5252.07'

HORIZONTAL CONTROL POINT  
NGS MONUMENT P14A 062921  
FOUND STEEL ROD IN SLEEVE  
N - 1,436,260.98  
E - 709,347.27  
ELEV: 5252.07'

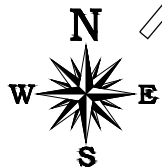
VERTICAL CONTROL POINT  
FOUND 3" BC IN CONC STAMPED L346 1959  
N - 1,432,379.17  
E - 710,051.21  
EL: 5266.76

CONTROL POINT  
REBAR WITH CAP  
N - 1,432,604.25  
E - 707,766.90  
ELEV: 5235.24'

CONTROL POINT  
REBAR WITH CAP  
N - 1,432,127.57  
E - 707,374.67  
ELEV: 5235.27'

CONTROL POINT  
1/2 IN REBAR W / CAP  
N - 1,431,752.03  
E - 707,058.57  
EL: 5235.69'

NGS SACS DESIG P14B  
FOUND 3" BRASS CAP ON CONCRETE  
N - 1,431,404.56  
E - 706,820.08  
EL: 5235.94



AIRFIELD LAYOUT AND SURVEY CONTROL

SCALE IN FEET

## GENERAL NOTES

- ESTIMATED QUANTITIES ARE CONSIDERED APPROXIMATE ONLY EXCEPT WHERE PLAN QUANTITIES ARE SPECIFIED FOR PAYMENT. ACTUAL QUANTITIES SHALL BE DETERMINED BY FIELD MEASUREMENT OR SPECIFICATIONS.
- THE CONTRACTOR SHALL PROVIDE MATERIAL SUBMITTALS FOR THE ENGINEER'S APPROVAL PRIOR TO ORDERING.
- THE CONTRACTOR IS REQUIRED TO OBTAIN ALL NECESSARY CONSTRUCTION PERMITS AS NECESSARY FOR THE PROJECT.
- THE CONTRACTOR SHALL BE REQUIRED TO SUBMIT A WORK SCHEDULE AND PROPOSED CONSTRUCTION METHODS AT THE PRE-CONSTRUCTION CONFERENCE.
- THE CONTRACTOR SHALL OBTAIN APPROVAL FROM AIRPORT MANAGEMENT AND THE ENGINEER PRIOR TO ESTABLISHING CONSTRUCTION ACCESS OR HAUL ROADS. EXISTING PAVEMENT SURFACES OTHER THAN AIRFIELD PAVEMENTS SHALL BE USED TO THE MAXIMUM EXTENT POSSIBLE.
- THE CONTRACTOR SHALL MINIMIZE DISTURBANCE INCLUDING RUTS PRODUCED BY VEHICLES AND EQUIPMENT IN NON-PAVEMENT AREAS WITHIN ALL CONSTRUCTION AREAS. ALL DISTURBED AREAS IN THESE LOCATIONS SHALL BE RECLAIMED AT NO ADDITIONAL COST TO THE SPONSOR. DAMAGE CAUSED TO EXISTING AIRFIELD PAVEMENT OR FACILITIES DURING CONSTRUCTION SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE SPONSOR.
- CONTRACTOR SHALL COORDINATE ALL WASTE MATERIAL DISPOSAL WITH ENGINEER AND AIRPORT.

## CAUTION - NOTICE TO CONTRACTOR

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND WHERE POSSIBLE, MEASUREMENTS IN THE FIELD. THE INFORMATION IS PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR AND IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL ARIZONA 811 (802-659-7500) AT LEAST 48 HOURS BEFORE ANY EXCAVATION/EMBANKMENT TO REQUEST FIELD LOCATION OF UTILITIES.



## LEGEND

| × 0.00 | EXISTING SPOT ELEVATION                  | × 99.99 | PROPOSED FINISHED GRADE ELEVATION       |
|--------|------------------------------------------|---------|-----------------------------------------|
| ---    | EXISTING GROUND CONTOUR (5' INTERVAL)    | ---     | PROPOSED GROUND CONTOUR (1' INTERVAL)   |
| ⊗      | EXISTING RUNWAY EDGE LIGHT               | ⊗       | PROPOSED RUNWAY EDGE LIGHT              |
| ⊙      | EXISTING TAXIWAY EDGE LIGHT              | ⊙       | PROPOSED TAXIWAY EDGE LIGHT             |
| ○      | EXISTING RETROREFLECTIVE MARKER          | ●       | PROPOSED TAXIWAY RETROREFLECTIVE MARKER |
| ◇      | EXISTING SPLICE BASE                     | ■       | PROPOSED SPLICE BASE / PULL BOX         |
| ⊠      | EXISTING AIRFIELD SIGN                   | ⊠       | PROPOSED AIRFIELD SIGN                  |
| ⊙      | EXISTING BEACON                          | ⊙       | PROPOSED BEACON AND TOWER               |
| ⊙      | EXISTING WIND CONE                       | ⊙       | PROPOSED LIGHTED WIND CONE              |
| ⊙      | EXISTING SEGMENTED CIRCLE                | ⊙       | PROPOSED SEGMENTED CIRCLE               |
| ⊙      | EXISTING PAPI / VASI                     | ⊙       | PROPOSED PAPI                           |
| ⊙      | EXISTING REIL                            | ⊙       | PROPOSED REIL                           |
| ⊙      | EXISTING AWOS/ASOS/UNICOM                | ⊙       | PROPOSED AWOS                           |
| ⊙      | EXISTING TIEDOWN ANCHOR                  | ⊙       | PROPOSED TIEDOWN ANCHOR                 |
| ⊙      | EXISTING UTILITY POLE                    | ⊙       | PROPOSED UTILITY POLE                   |
| ⊙      | EXISTING AREA LIGHT                      | ⊙       | PROPOSED SUPPLEMENTAL WIND CONE         |
| ⊙      | EXISTING GUY                             | ⊙       | PROPOSED AREA LIGHT (S)                 |
| ⊙      | EXISTING PAD MOUNTED TRANSFORMER         | ⊙       | PROPOSED ELECTRIC TRANSFORMER           |
| ⊙      | EXISTING FIRE HYDRANT                    | ⊙       | PROPOSED FIRE HYDRANT                   |
| ⊙      | EXISTING WATER VALVE                     | ⊙       | PROPOSED WATER VALVE                    |
| ⊙      | EXISTING AREA INLET                      | ⊙       | PROPOSED STORM DRAIN INLET              |
| ⊙      | EXISTING MANHOLE / CLEAN-OUT             | ⊙       | PROPOSED SANITARY SEWER CLEAN-OUT       |
| ⊙      | EXISTING TELEPHONE RISER                 | ⊙       | PROPOSED MANHOLE                        |
| ⊙      | EXISTING TREE                            | ⊙       | PROPOSED SURVEY MONUMENT                |
| ⊙      | EXISTING ROAD SIGN(S)                    | ⊙       | PROPOSED AIRFIELD POWER CABLE(S)        |
| ⊙      | EXISTING SECTION CORNER                  | ⊙       | PROPOSED COUNTERPOISE CABLE             |
| ⊙      | EXISTING SURVEY CONTROL MONUMENT         | ⊙       | PROPOSED CONCRETE ENCASED DUCT BANK     |
| ⊙      | EXISTING PROPERTY CORNER PIN/CAP         | ⊙       | PROPOSED CULVERT W/END SECTIONS         |
| ⊙      | EXISTING AIRFIELD POWER CABLE(S)         | ⊙       | PROPOSED SWALE DIRECTION                |
| ⊙      | EXISTING DUCT                            | ⊙       | PROPOSED BARBED WIRE FENCE              |
| ⊙      | EXISTING CULVERT                         | ⊙       | PROPOSED CHAIN LINK FENCE               |
| ⊙      | EXISTING SWALE DIRECTION                 | ⊙       | PROPOSED WILDLIFE FENCE                 |
| ⊙      | EXISTING BARB WIRE FENCE                 | ⊙       | PROPOSED SANITARY SEWER LINE            |
| ⊙      | EXISTING CHAIN LINK FENCE                | ⊙       | PROPOSED STORM DRAIN LINE               |
| ⊙      | EXISTING WILDLIFE FENCE                  | ⊙       | PROPOSED WATERLINE                      |
| ⊙      | EXISTING SANITARY SEWER LINE             | ⊙       | PROPOSED GAS LINE                       |
| ⊙      | EXISTING STORM DRAIN LINE                | ⊙       | PROPOSED UNDERGROUND POWER/TELE         |
| ⊙      | EXISTING WATER LINE                      | ⊙       | PROPOSED UNDERDRAIN W/ CLEAN-OUT        |
| ⊙      | EXISTING GAS LINE                        | ⊙       | PROPOSED SEDIMENT LOG                   |
| ⊙      | EXISTING UNDERGROUND POWER OR TELE. LINE | ⊙       | PROPOSED SILT FENCE                     |
| ⊙      | EXISTING OVERHEAD POWER CABLE            | ⊙       | PROPOSED CONCRETE PAVEMENT              |
| ⊙      | EXISTING UNDERGROUND COMMUNICATION LINE  | ⊙       | PROPOSED ASPHALT PAVEMENT               |
| ⊙      | EXISTING FIBER OPTIC CABLE               | ⊙       | PROPOSED ASPHALT PAVEMENT OVERLAY       |
| ⊙      | EXISTING UNDERDRAIN W/ CLEAN-OUT         | ⊙       | PROPOSED ASPHALT REMOVAL                |
| ⊙      | EXISTING ASPHALT PAVEMENT EDGE           | ⊙       | PROPOSED GRAVEL                         |
| ⊙      | EXISTING CONCRETE PAVEMENT EDGE          | ⊙       | PROPOSED ROCK RIPRAP                    |
| ⊙      | EXISTING GRAVEL EDGE                     | ⊙       | PROPOSED BUILDING                       |
| ⊙      | EXISTING CONCRETE PAVEMENT               | ⊙       | PROPOSED SEEDING AREA                   |
| ⊙      | EXISTING ASPHALT PAVEMENT                | ⊙       | PROPOSED GRADING AREA                   |
| ⊙      | EXISTING GRAVEL                          | ⊙       |                                         |
| ⊙      | EXISTING BUILDING                        | ⊙       |                                         |
| ⊙      | EXISTING WETLANDS                        | ⊙       |                                         |

NOTE: LEGEND APPLIES TO ALL SHEETS IN THIS PLAN SET, IS GENERIC, AND NOT ALL SYMBOLS MAY BE IN PLAN SHEETS.

HOLBROOK MUNICIPAL AIRPORT

HOLBROOK, ARIZONA

CONSTRUCTION PLANS

RECONSTRUCT APRON

AIP No. 3-04-0020-022-2023

| No. | Revision | Date | By |
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ACI No. 216729  
Date: NOV. 2021  
File Name: 216729101

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Checked: CES  
Approved: JMTM

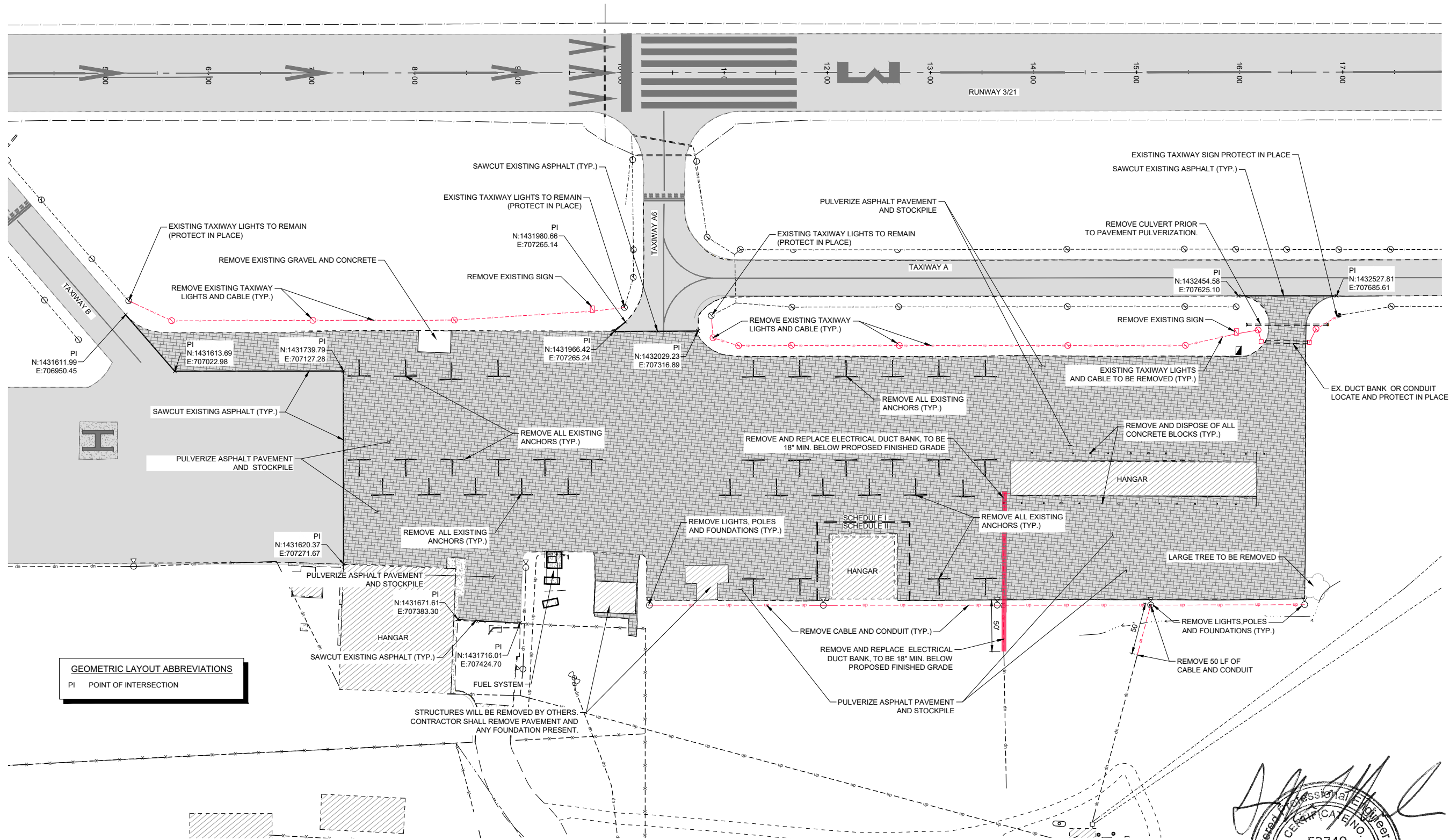
LEGEND,  
GENERAL  
NOTES,  
SURVEY  
CONTROL

Sheet: 1.2

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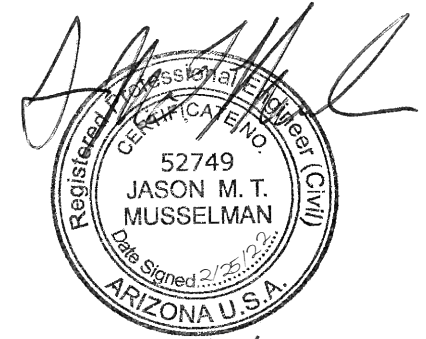
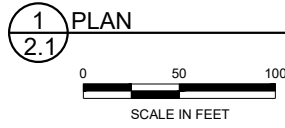
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GEOMETRIC LAYOUT ABBREVIATIONS  
PI POINT OF INTERSECTION

### CAUTION - NOTICE TO CONTRACTOR

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HOLBROOK, ARIZONA  
CONSTRUCTION PLANS  
RECONSTRUCT APRON  
AIP No. 3-04-0020-022-2023

| No. | Revision | Date | By |
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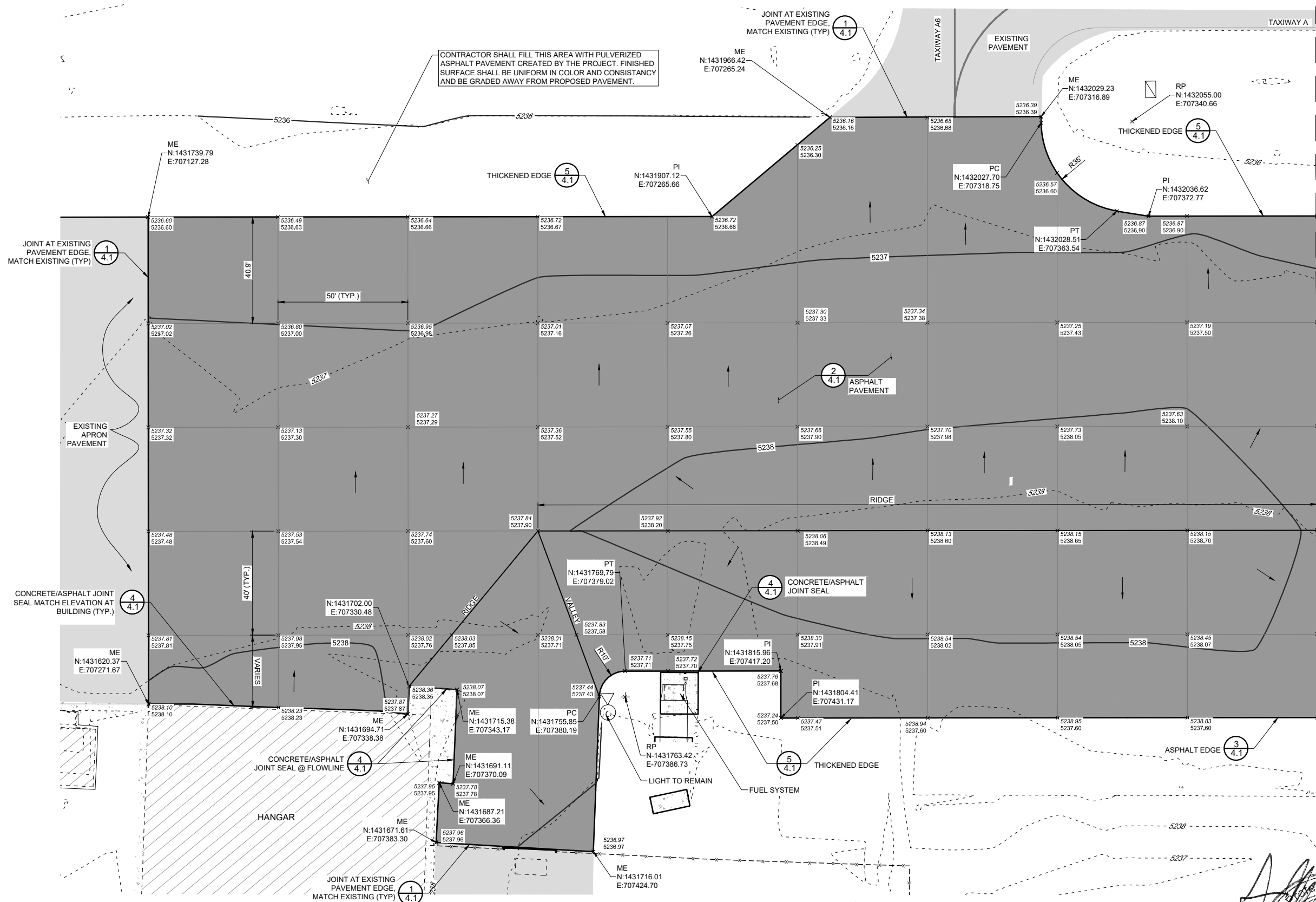
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Approved: JMTM

DEMOLITION PLAN

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HOLBROOK MUNICIPAL AIRPORT  
HOLBROOK, ARIZONA  
CONSTRUCTION PLANS  
RECONSTRUCT APRON  
AIP No. 3-04-0020-022-2023

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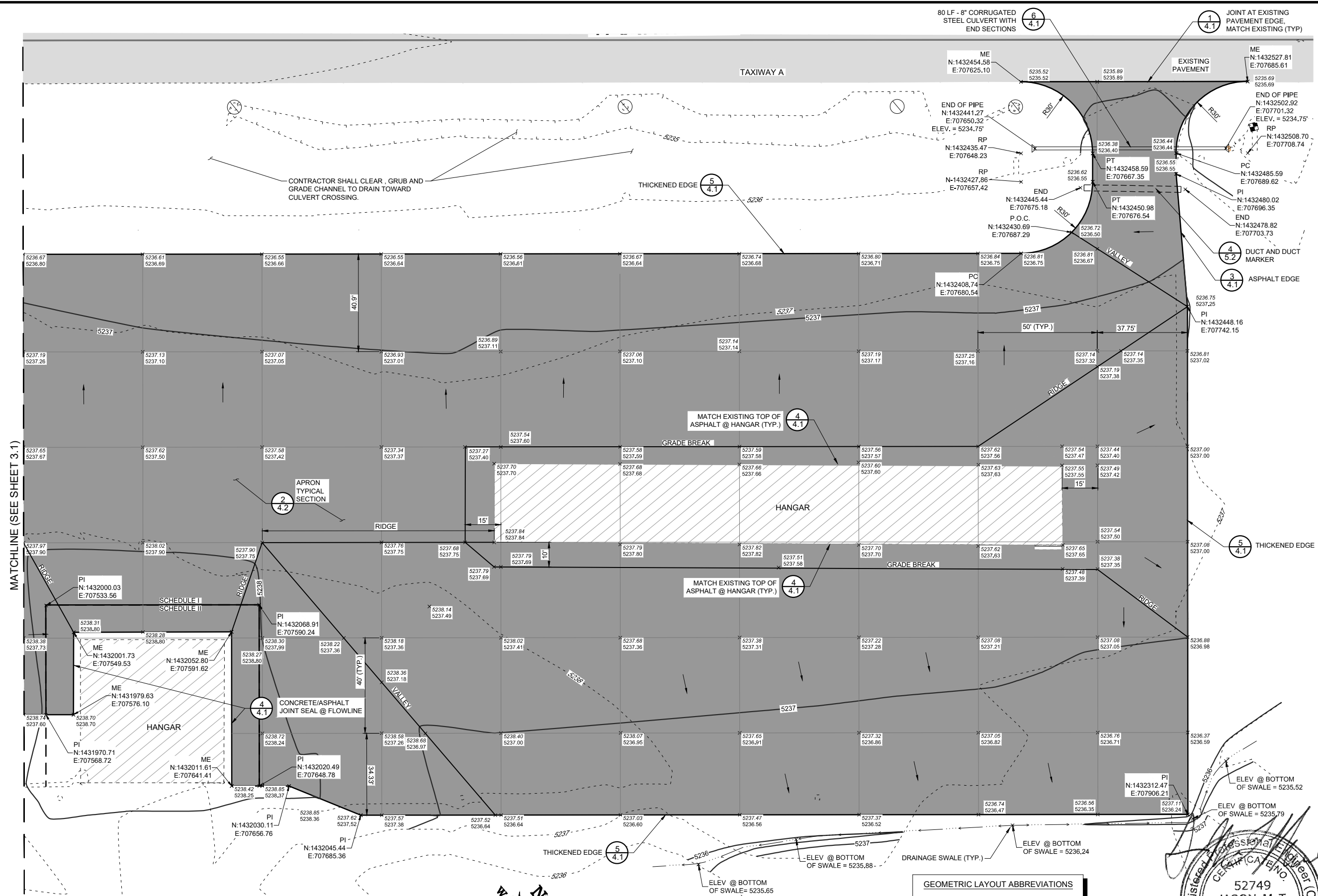
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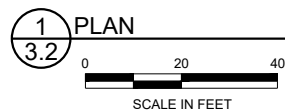
GRADING  
PLAN

Sheet: 3.1



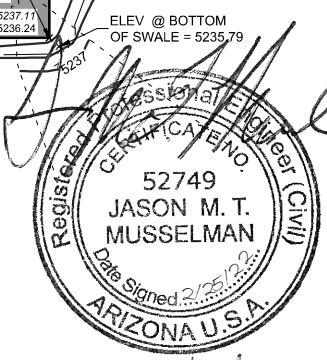


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## GEOMETRIC LAYOUT ABBREVIATIONS

|                                                  |                                                                                                    |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------|
| PT                                               | POINT OF TANGENCY                                                                                  |
| PC                                               | POINT OF CURVATURE                                                                                 |
| PI                                               | POINT OF INTERSECTION                                                                              |
| POC                                              | POINT ON CURVE                                                                                     |
| RP                                               | RADIUS POINT                                                                                       |
| ME                                               | MATCH EXISTING                                                                                     |
| $\begin{array}{l} 5237.82 \\ \times \end{array}$ | $\begin{array}{l} \text{EXISTING GROUND ELEVATION} \\ \text{FINISHED GRADE ELEVATION} \end{array}$ |



EXPIRES 9/30/2023

HOLBROOK MUNICIPAL AIRPORT  
HOLBROOK, ARIZONA  
CONSTRUCTION PLANS  
RECONSTRUCT APRON  
AIP No. 3-04-0020-022-2023

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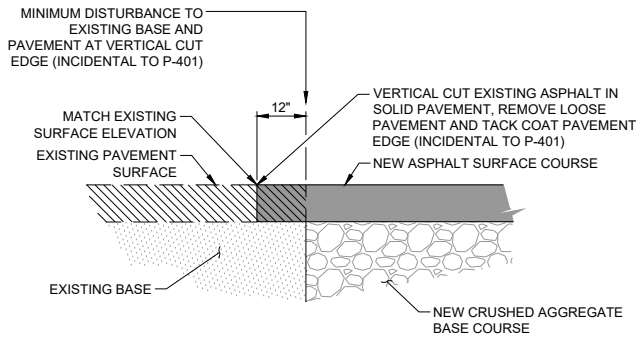
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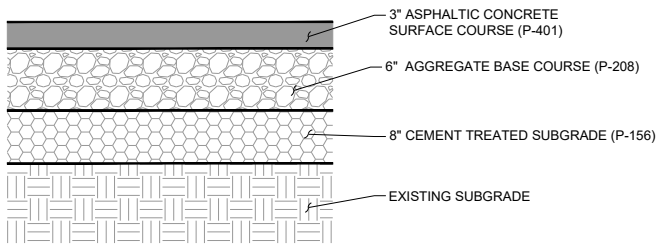
## GRADING PLAN

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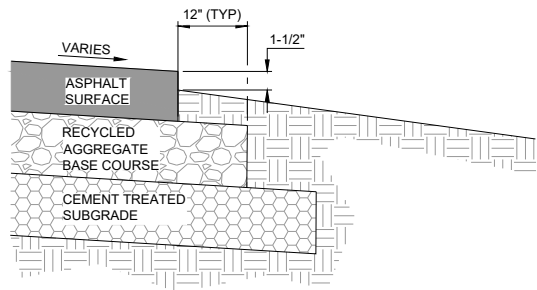
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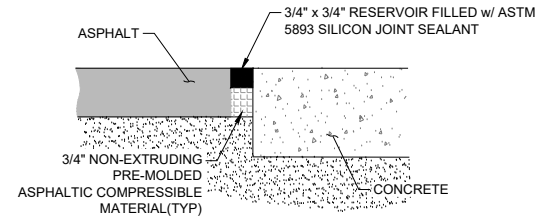
1 JOINT AT EXISTING PAVEMENT EDGE  
4.1 NOT TO SCALE



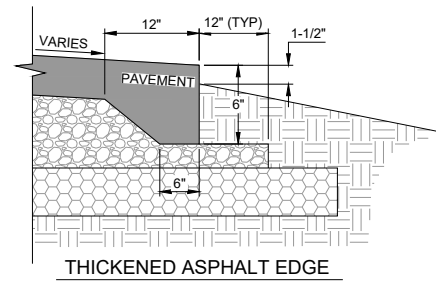
2 APRON TYPICAL SECTION  
4.1 NOT TO SCALE



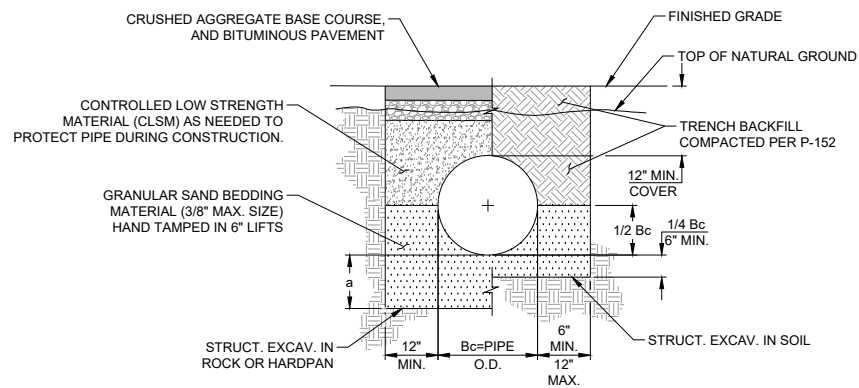
3 ASPHALT EDGE  
4.1 NOT TO SCALE



4 CONCRETE / ASPHALT JOINT SEAL  
4.1 NOT TO SCALE



5 THICKENED EDGE  
4.1 NOT TO SCALE



a = 12 INCHES MIN. OR 1/2 INCH FOR EACH FOOT OF FILL OVER THE TOP OF THE PIPE WHICHEVER IS GREATER, BUT NOT MORE THAN 3/4 Bc.

6 PIPE CULVERT BEDDING & BACKFILL DETAIL  
4.1 NOT TO SCALE



HOLBROOK MUNICIPAL AIRPORT  
HOLBROOK, ARIZONA  
CONSTRUCTION PLANS  
RECONSTRUCT APRON  
AIP No. 3-04-0020-022-2023

| No. | Revision | Date | By |
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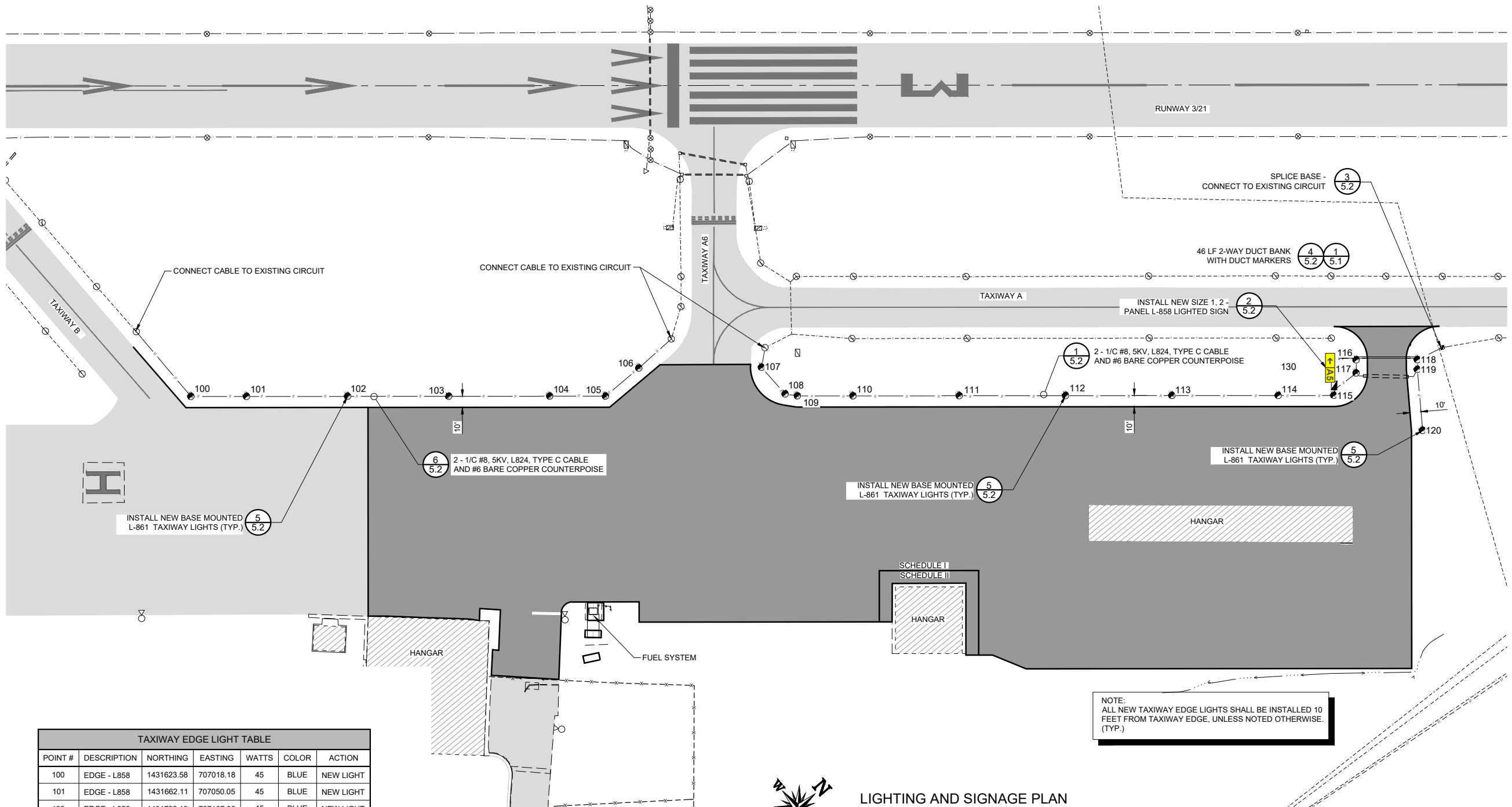
ACI No. 216729  
Date: NOV. 2021  
File Name: 216729102

Drawn: MLM  
Checked: CES  
Approved: JMTM

DETAILS

Sheet: 4.1

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| TAXIWAY EDGE LIGHT TABLE |             |            |           |       |       |           |
|--------------------------|-------------|------------|-----------|-------|-------|-----------|
| POINT #                  | DESCRIPTION | NORTHING   | EASTING   | WATTS | COLOR | ACTION    |
| 100                      | EDGE - L858 | 1431623.58 | 707018.18 | 45    | BLUE  | NEW LIGHT |
| 101                      | EDGE - L858 | 1431662.11 | 707050.05 | 45    | BLUE  | NEW LIGHT |
| 102                      | EDGE - L858 | 1431732.13 | 707107.96 | 45    | BLUE  | NEW LIGHT |
| 103                      | EDGE - L858 | 1431802.14 | 707165.86 | 45    | BLUE  | NEW LIGHT |
| 104                      | EDGE - L858 | 1431872.16 | 707223.77 | 45    | BLUE  | NEW LIGHT |
| 105                      | EDGE - L858 | 1431910.69 | 707255.64 | 45    | BLUE  | NEW LIGHT |
| 106                      | EDGE - L858 | 1431949.78 | 707255.37 | 45    | BLUE  | NEW LIGHT |
| 107                      | EDGE - L858 | 1432035.73 | 707324.72 | 45    | BLUE  | NEW LIGHT |
| 108                      | EDGE - L858 | 1432036.21 | 707357.16 | 45    | BLUE  | NEW LIGHT |
| 109                      | EDGE - L858 | 1432043.61 | 707365.58 | 45    | BLUE  | NEW LIGHT |
| 110                      | EDGE - L858 | 1432082.14 | 707397.44 | 45    | BLUE  | NEW LIGHT |
| 111                      | EDGE - L858 | 1432155.75 | 707458.32 | 45    | BLUE  | NEW LIGHT |
| 112                      | EDGE - L858 | 1432229.36 | 707519.21 | 45    | BLUE  | NEW LIGHT |
| 113                      | EDGE - L858 | 1432302.97 | 707580.09 | 45    | BLUE  | NEW LIGHT |
| 114                      | EDGE - L858 | 1432376.58 | 707640.97 | 45    | BLUE  | NEW LIGHT |
| 115                      | EDGE - L858 | 1432415.11 | 707672.84 | 45    | BLUE  | NEW LIGHT |
| 116                      | EDGE - L858 | 1432450.88 | 707660.97 | 45    | BLUE  | NEW LIGHT |
| 117                      | EDGE - L858 | 1432443.27 | 707670.17 | 45    | BLUE  | NEW LIGHT |
| 118                      | EDGE - L858 | 1432493.29 | 707695.99 | 45    | BLUE  | NEW LIGHT |
| 119                      | EDGE - L858 | 1432487.73 | 707702.72 | 45    | BLUE  | NEW LIGHT |
| 120                      | EDGE - L858 | 1432456.37 | 707747.86 | 45    | BLUE  | NEW LIGHT |
| 130                      | L-858       | 1432418.30 | 707668.98 | 45    | BLUE  | NEW LIGHT |

| SIGN TABLE |        |      |       |      |         |                             |                  |
|------------|--------|------|-------|------|---------|-----------------------------|------------------|
| SIGN #     | LEGEND | TYPE | STYLE | SIZE | MODULES | LOCATION (RWY 3/21 STATION) | ACTIONS          |
| 1          | ← A5   | (Y)  | 2     | 1    | 2       | TWY A                       | NEW LIGHTED SIGN |

NOTES:  
(R) = TYPE L-858R, MANDATORY INSTRUCTION SIGN, CLEAR LEGEND ON RED BACKGROUND  
(L) = TYPE L-858L, LOCATION SIGN, YELLOW LEGEND ON BLACK BACKGROUND  
(Y) = TYPE L-858Y, DIRECTION SIGN, BLACK LEGEND ON YELLOW BACKGROUND  
  
STYLE 2 = INTERNALLY LIGHTED (3 STEP) (SEE DETAIL ON THIS SHEET FOR INSTALLATION DETAILS)  
  
SIZE 1 = 18" PANEL WITH 12" LEGEND  
  
HOLD POSITION SIGNS ALIGN WITH HOLD BARS.

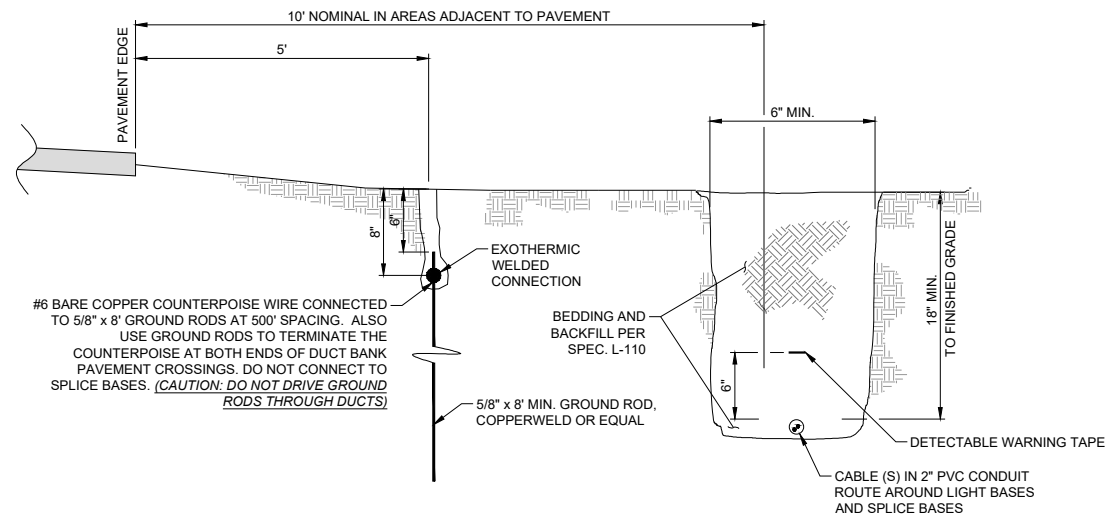
LIGHTING AND SIGNAGE PLAN



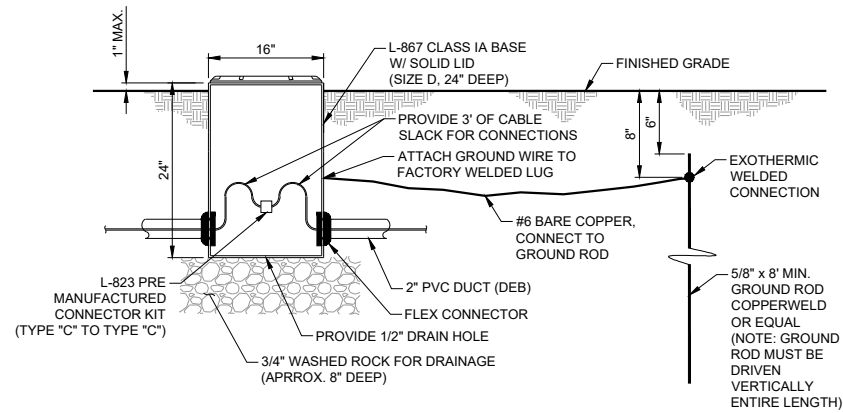
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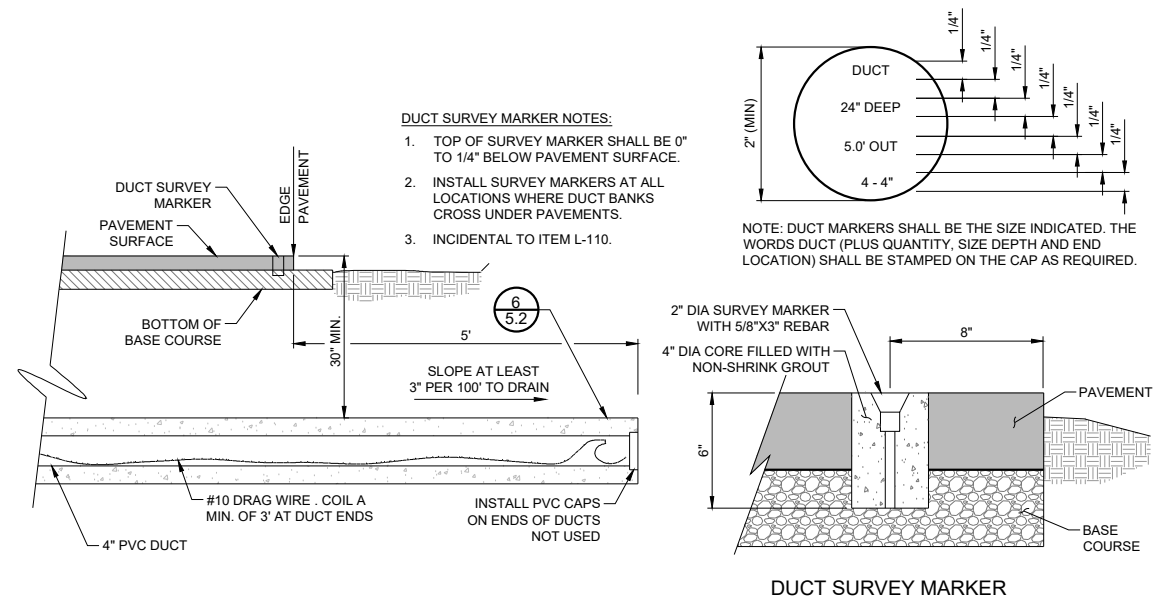
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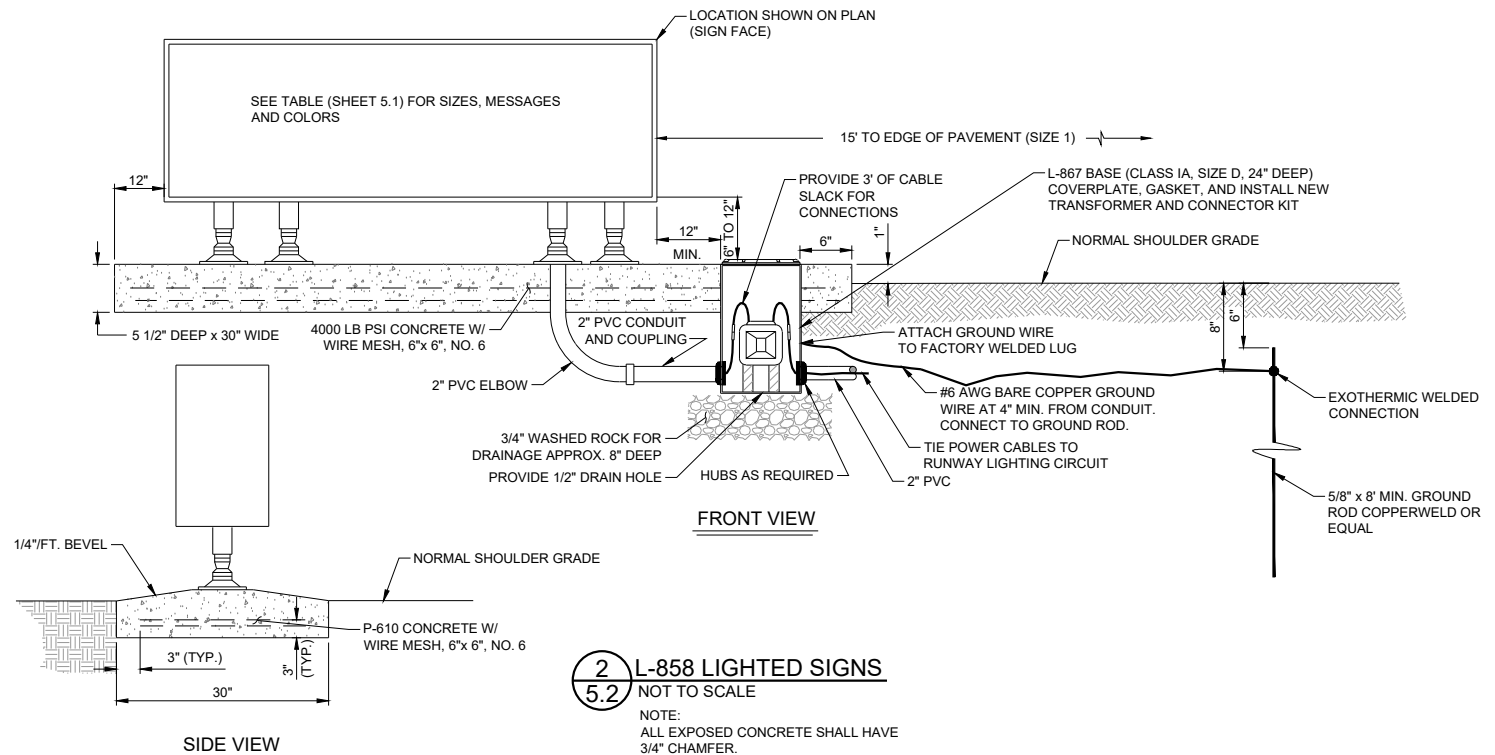
1 TRENCH & CABLE PLACEMENT  
5.2 NOT TO SCALE



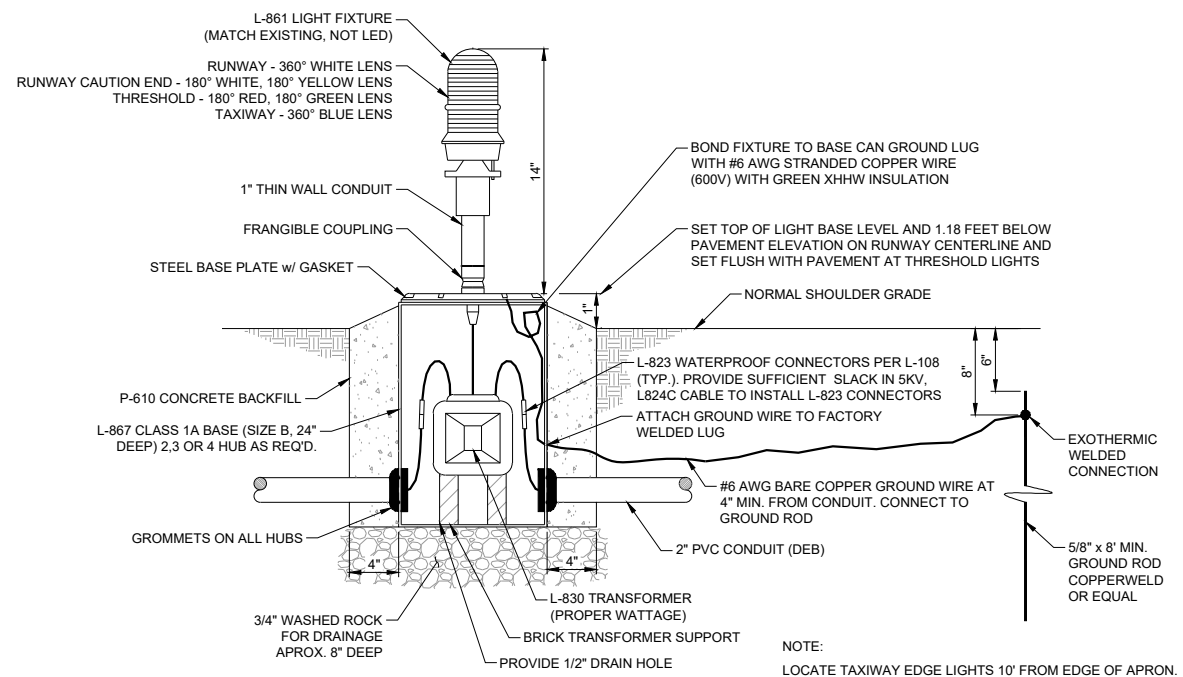
3 SPLICE BASE DETAIL (L-867)  
5.2 NOT TO SCALE



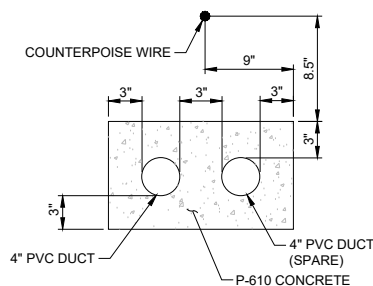
4 DUCT & DUCT MARKER  
5.2 NOT TO SCALE



2 L-858 LIGHTED SIGNS  
5.2 NOT TO SCALE



5 BASE MOUNTED L-861 LIGHT  
5.2 NOT TO SCALE (MIRL CIRCUIT)



6 2-WAY DUCT BANK  
5.2 NOT TO SCALE



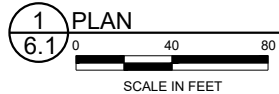
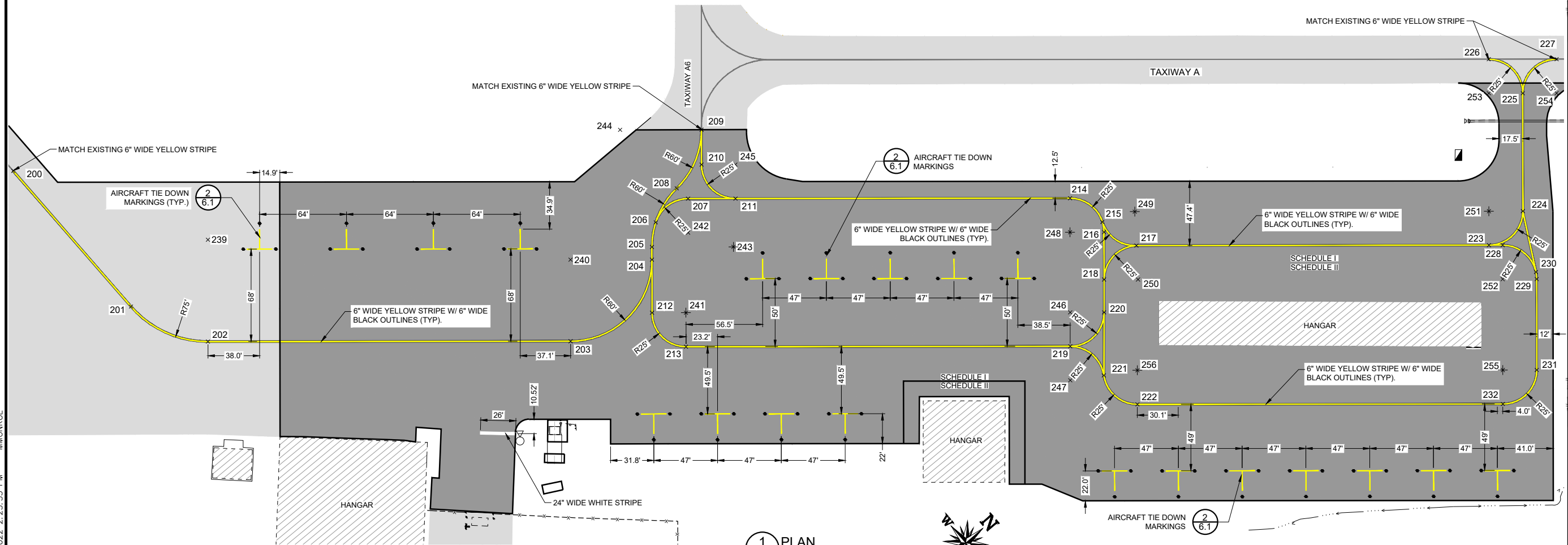
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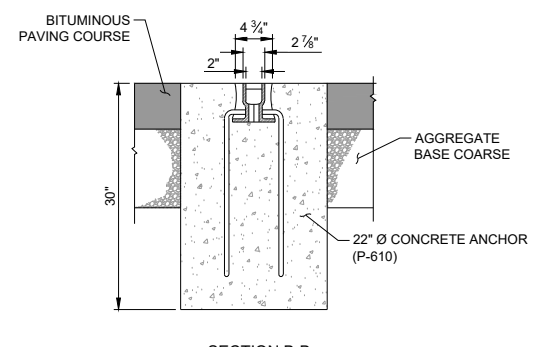
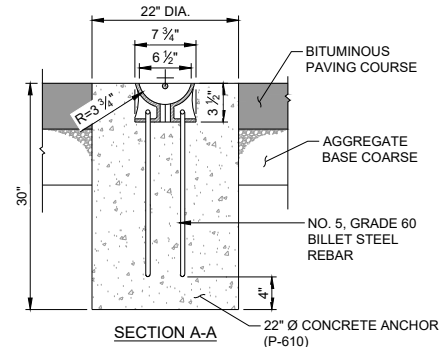
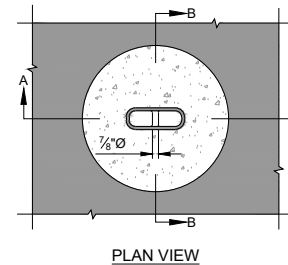
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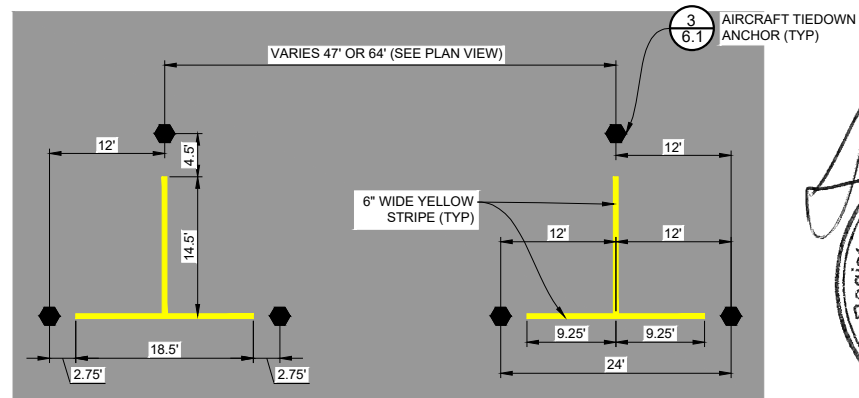
| MARKING POINT TABLE |             |            |           |
|---------------------|-------------|------------|-----------|
| POINT #             | DESCRIPTION | NORTHING   | EASTING   |
| 200                 | PI          | 1431593.85 | 706995.64 |
| 201                 | PC          | 1431596.97 | 707127.97 |
| 202                 | PT          | 1431624.15 | 707184.00 |
| 203                 | PC          | 1431829.95 | 707354.21 |
| 204                 | PT          | 1431914.43 | 707346.21 |
| 205                 | PC          | 1431920.40 | 707339.00 |
| 206                 | PC          | 1431934.07 | 707326.84 |
| 207                 | PT          | 1431963.57 | 707328.58 |
| 208                 | PRC         | 1431961.96 | 707317.42 |
| 209                 | PT          | 1432003.53 | 707295.84 |
| 210                 | PC          | 1431987.16 | 707315.64 |
| 211                 | PT          | 1431990.49 | 707350.84 |
| 212                 | PC          | 1431889.52 | 707376.34 |
| 213                 | PT          | 1431892.85 | 707411.53 |
| 214                 | PC          | 1432180.39 | 707507.90 |
| 215                 | PRC         | 1432187.50 | 707536.54 |
| 216                 | PT          | 1432183.72 | 707543.10 |
| 217                 | PT          | 1432195.80 | 707565.90 |
| 218                 | PC          | 1432161.52 | 707569.95 |
| 219                 | PC          | 1432110.92 | 707591.90 |
| 220                 | PT          | 1432146.12 | 707588.57 |
| 221                 | PRC         | 1432116.36 | 707624.14 |
| 222                 | PT          | 1432121.80 | 707656.37 |
| 223                 | PC          | 1432395.90 | 707731.37 |
| 224                 | PT          | 1432431.10 | 707728.04 |
| 225                 | PC          | 1432486.13 | 707661.51 |

| MARKING POINT TABLE |             |            |           |
|---------------------|-------------|------------|-----------|
| POINT #             | DESCRIPTION | NORTHING   | EASTING   |
| 226                 | PT          | 1432482.79 | 707626.31 |
| 227                 | PT          | 1432521.32 | 707658.17 |
| 228                 | PC          | 1432403.72 | 707737.83 |
| 229                 | PT          | 1432407.05 | 707773.03 |
| 230                 | PI          | 1432409.96 | 707768.64 |
| 231                 | PC          | 1432364.41 | 707824.58 |
| 232                 | PT          | 1432329.21 | 707827.91 |
| 239                 | RP          | 1431671.95 | 707126.20 |
| 240                 | RP          | 1431868.19 | 707307.97 |
| 241                 | RP          | 1431908.78 | 707392.27 |
| 242                 | RP          | 1431947.64 | 707347.84 |
| 243                 | RP          | 1431966.63 | 707377.24 |
| 244                 | RP          | 1431957.30 | 707257.60 |
| 245                 | RP          | 1432006.42 | 707331.58 |
| 246                 | RP          | 1432126.86 | 707572.63 |
| 247                 | RP          | 1432094.99 | 707611.16 |
| 248                 | RP          | 1432164.46 | 707527.17 |
| 249                 | RP          | 1432210.82 | 707545.91 |
| 250                 | RP          | 1432180.78 | 707585.89 |
| 251                 | RP          | 1432411.84 | 707712.10 |
| 252                 | RP          | 1432387.78 | 707757.09 |
| 253                 | RP          | 1432466.86 | 707645.57 |
| 254                 | RP          | 1432505.39 | 707677.44 |
| 255                 | RP          | 1432345.14 | 707808.65 |
| 256                 | RP          | 1432137.73 | 707637.11 |

| GEOMETRIC LAYOUT ABBREVIATIONS |                            |
|--------------------------------|----------------------------|
| PT                             | POINT OF TANGENCY          |
| PC                             | POINT OF CURVATURE         |
| PI                             | POINT OF INTERSECTION      |
| PRC                            | POINT OF REVERSE CURVATURE |
| RP                             | RADIUS POINT               |



3 AIRCRAFT TIEDOWN DETAIL  
6.1 NOT TO SCALE



2 TIEDOWN MARKING DETAIL  
6.1 NOT TO SCALE



| No. | Revision | Date | By |
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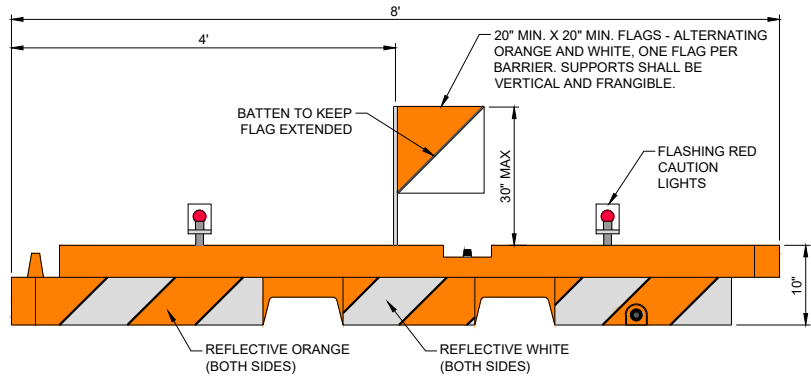
ACI No. 216729  
Date: NOV. 2021  
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Drawn: MLM  
Checked: CES  
Approved: JMTM

MARKING  
PLAN AND  
DETAILS

Sheet: 6.1

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#### NOTES:

1. BARRIER SHALL BE SHERWIN INDUSTRIES, 10" x 96" LOW PROFILE AIRPORT BARRIER, AS SHOWN, OR APPROVED EQUAL.
2. THE ENTIRE AREA OF ORANGE AND WHITE STRIPES SHALL BE REFLECTORIZED WITH SMOOTH SURFACE TYPE REFLECTIVE SHEETING.
3. LIGHTS MUST BE MOUNTED ON BARRIERS AND SPACED AT NO MORE THAN 10 FT.
4. THE BARRIERS SHALL BE WEIGHTED AGAINST PROPWASH AND CAPABLE OF WITHSTANDING UP TO 100 M.P.H. WIND FORCES.
5. FLASHING RED CAUTION LIGHTS SHALL BE BATTERY OPERATED AND SHALL MAINTAIN SUCH INTENSITY SO AS TO BE READILY IDENTIFIED FROM DISTANCES OF AT LEAST 200 FEET DURING DARKNESS.
6. THE CONTRACTOR SHALL CHECK ALL BARRIERS AND LIGHTS EACH DAY BEFORE LEAVING THE AIRPORT TO ENSURE LIGHTS ARE WORKING PROPERLY AND MAY NOT LEAVE WITHOUT ALL BARRIERS AND LIGHTS BEING IN PROPER WORKING ORDER.

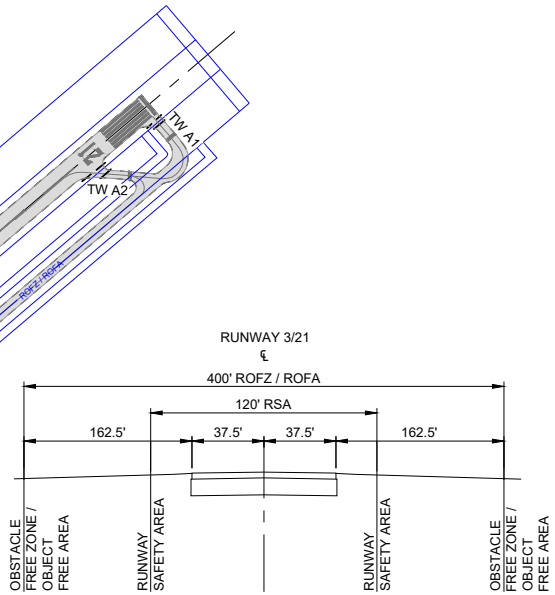
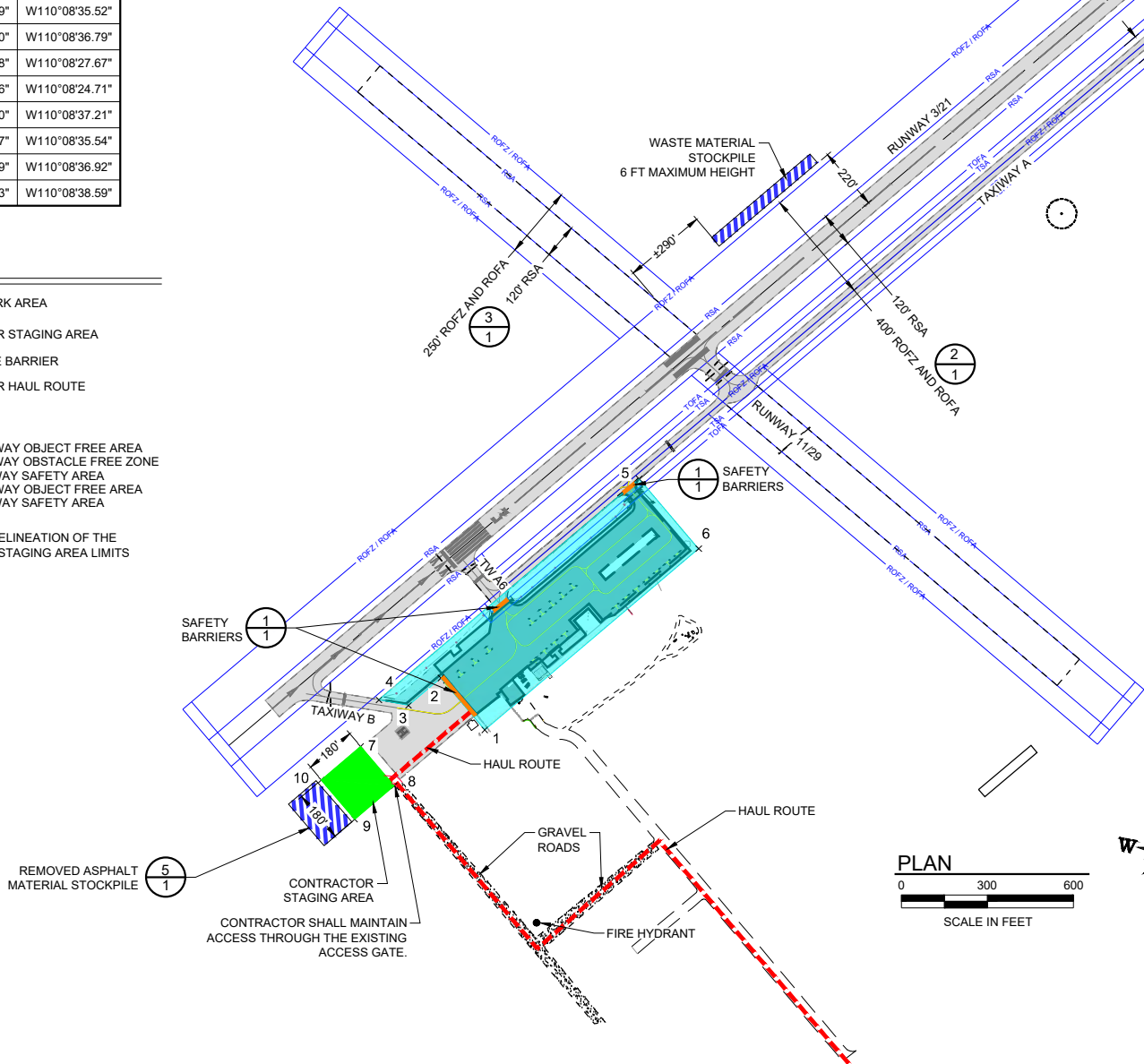
1 LOW PROFILE SAFETY BARRIER  
NOT TO SCALE

| WORK AREA COORDINATES |           |                |                |
|-----------------------|-----------|----------------|----------------|
| POINT #               | ELEVATION | LATITUDE       | LONGITUDE      |
| 1                     | 5237"     | N034°56'05.32" | W110°08'32.19" |
| 2                     | 5237"     | N034°56'06.81" | W110°08'34.39" |
| 3                     | 5237"     | N034°56'05.69" | W110°08'35.52" |
| 4                     | 5237"     | N034°56'05.70" | W110°08'36.79" |
| 5                     | 5237"     | N034°56'14.78" | W110°08'27.67" |
| 6                     | 5237"     | N034°56'12.76" | W110°08'24.71" |
| 7                     | 5237"     | N034°56'04.00" | W110°08'37.21" |
| 8                     | 5237"     | N034°56'02.87" | W110°08'35.54" |
| 9                     | 5236"     | N034°56'01.49" | W110°08'36.92" |
| 10                    | 5237"     | N034°56'02.63" | W110°08'38.59" |

#### LEGEND

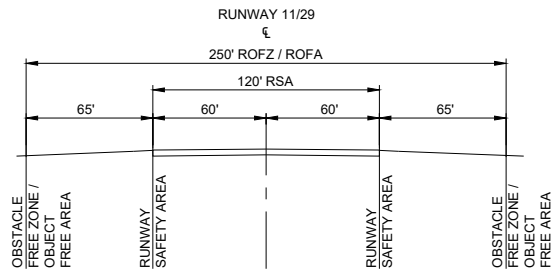
|  |                                  |
|--|----------------------------------|
|  | PHASE 1 WORK AREA                |
|  | CONTRACTOR STAGING AREA          |
|  | LOW PROFILE BARRIER              |
|  | CONTRACTOR HAUL ROUTE            |
|  | DETAIL #                         |
|  | SHEET #                          |
|  | ROFA = RUNWAY OBJECT FREE AREA   |
|  | ROFZ = RUNWAY OBSTACLE FREE ZONE |
|  | RSA = RUNWAY SAFETY AREA         |
|  | TOFA = TAXIWAY OBJECT FREE AREA  |
|  | TSA = TAXIWAY SAFETY AREA        |

LATITUDE AND LONGITUDES (LAT/LONG) DELINEATION OF THE CONSTRUCTION AREA AND CONTRACTOR STAGING AREA LIMITS



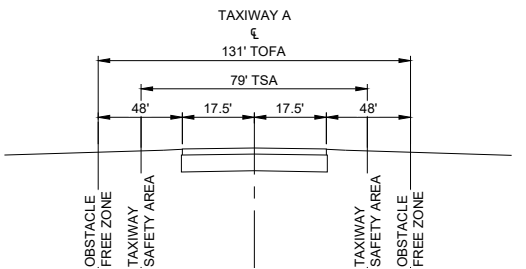
ALL CONSTRUCTION EQUIPMENT, STOCKPILES, AND TRAFFIC MUST REMAIN CLEAR OF ANY OPEN RUNWAY OBSTACLE FREE ZONE / OBJECT FREE AREA.

2 SAFETY AREAS  
NOT TO SCALE



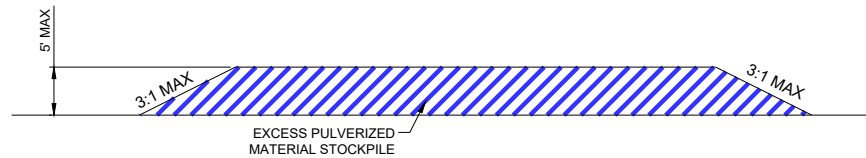
ALL CONSTRUCTION EQUIPMENT, STOCKPILES, AND TRAFFIC MUST REMAIN CLEAR OF ANY OPEN TAXIWAY OBSTACLE FREE ZONE / OBJECT FREE AREA.

3 SAFETY AREAS  
NOT TO SCALE



ALL CONSTRUCTION EQUIPMENT, STOCKPILES, AND TRAFFIC MUST REMAIN CLEAR OF ANY OPEN TAXIWAY OBJECT FREE AREA.

4 SAFETY AREAS  
NOT TO SCALE



5 STOCKPILE  
NOT TO SCALE

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