CONSTRUCTION SPECIFICATIONS AND CONTRACT DOCUMENTS

RUNWAY 11/29 & PARALLEL TAXIWAY RECONSTRUCTION

FLANDREAU MUNICIPAL AIRPORT

FLANDREAU, SOUTH DAKOTA

AIP #3-46-0077-018-2026

HELMS # A-9873

I hereby certify, to the best of my professional ability, these plans and specifications were developed under my supervision in accordance with all applicable federal standards and requirements. No deviation from or modification to standards as set forth in the Federal Aviation Administration Advisory Circulars will be necessary other than those previously approved by the Federal Aviation Administration.

By: _____
Brooke B. Edgar P.E.

Registration Number: 13637

Date: 8/18/2026

By: _____
Brian D. Meyer, P.E.

Registration Number: 7286

Date: 8/18/2026

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PART I – NOTICE TO BIDDERS

NOTICE TO BIDDERS

Sealed bids will be received by the City Council of the, City of Flandreau, 1005 W. Elm Avenue, Flandreau, SD 57028, at the office of the City Administrator of said City until 11:00 AM (local time) on the 10TH day of September, 2026, and then be publicly opened and read, for furnishing all equipment, labor, and materials as set forth in the specifications and performing all work, incidental thereto for Runway 11/29 & Parallel Taxiway Construction, Flandreau Municipal Airport, Flandreau, South Dakota.

Base Bid-Runway 11/29 Grading and Aggregates
Primary Work: Approximately 121,000 CuYd Unclassified Excavation, 43,300 CuYd On-Site Borrow Material, 20,700 CuYd Subbase Course (Furnished), 34.000 SqYd Geotextile Separator Fabric, 1,500 SqYd Geogrid, 5.400 CuYd Aggregate Base Course, 6,630 Ft Furnish and Install Barbed Wire Fence, 3 Each Furnished and Install 20' Tubular Swing Gate, 280 Ft 48" RCP, 2 Each RCP Flared Ends, 114 Ft 24" RCP, 2 Each 24" RCP Flared Ends, 7,600 Ft 4" Perforated Underdrain Pipe, 130 Ft 4" Solid Underdrain Pipe, 20 Each Underdrain Cleanout, Various Underdrain Bends, 35 Acres Seeding and Fertilizing, 18,000 CuYd Topsoil (Removed from Stockpile), 169,000 SqYd Mulching, 3,920 Ft Remove and Dispose Existing Barbed Wire Fence, Erosion Control, 300 Ft Sand-Encased, Electrical Conduit Type II, Schedule 80 PVC in Trench and various other items of related construction

Alternate Bid 1-Runway 11/29 Asphalt Surfacing
Primary Work: Approximately 7,730 Ton Asphalt Base/Surface Course, 540 Ton Asphalt Binder (PG 64-34), 41 Emulsified Asphalt Prime Coat, 13 Emulsified Asphalt Tack Coat, Runway and Taxiway Pavement Markings, and various other items of related construction

Alternate Bid 2 – Parallel (Sta 801+75 to 819+75) and Connector Taxiways and Lighting
Primary Work: Approximately 2,500 SqYd Asphalt Cold Milling (2.5" Nominal Depth), 6,200 SqYd Asphalt Pavement/Base Removal (10" Nominal Depth). 23,500 CuYd Unclassified Excavation, 3,000 CuYd Disposal of Excess Material, 3,100 CuYd Subbase Course (Furnished), 2,000 CuYd Subbase Course (Recycled), 8,400 SqYd Geotextile Separator Fabric, 1,500 SqYd Geogrid, 1,300 CuYd Aggregate Base Course, 2,500 SqYd Reshape and Recompact Base Prior to Overlay, 2,400 Ton Asphalt Base/Surface Course, 170 Ton Asphalt Binder (PG 64-34), 13 Emulsified Asphalt Prime Coat, 3 Ton Emulsified Asphalt Tack Coat, Runway and Taxiway Pavement Markings, 292 Ft 24" RCP, 4 Each 24" RCP Flared Ends, 3,100 Ft 4" Perforated Underdrain Pipe, 11 Each Underdrain Cleanout, Various Underdrain Bends, 10 Acres Seeding and Fertilizing, 5,300 CuYd Topsoil (Removed from Stockpile), 48,400 SqYd Mulching, Erosion Control, Remove and Salvage Existing Windcone and Segmented Circle, 1 Each L-807, LED, Style 1B (Internally Lit), Size 2 (12 Feet), Primary Wind Cone w/ Single L-810 LED Steady Burn Red Obstruction Light, Including Concrete Footing & Concrete Site Pad, 10,000 Ft 1/C No. 8 AWG, 5kV, XLPE, L-824, Type C Cable Installed in Conduit, 2,820 Ft 1/C No. 4 Cu. AWG, 600V, THWN-2, Installed in Conduit, 1,410 Ft 1/C No. 8 Cu. AWG, 600V (GND), THWN-2, Installed in Conduit, 8,700 Ft 1/C No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Including Trenching or Plowing, Including Ground Rods, Connections, & Terminations, L-821 Airfield Lighting Control Panel, Type 1 (Conventional), Class W (Wall Mounted), Style 1

(Unlighted), Mode 1 (Generic), L-854, Type 1 Air-to-Ground Radio Control Equipment w/ Heavy Duty Antenna & Mounting Brackets, L-829 Constant Current Regulator (CCR) w/ Monitoring Options, Class 1 (6.6A), Style 1 (3-Step), 7.5 kW Size, Electrical Vault Work, 10' x 12' Pre-Fabricated, Airfield Electrical, Lighting, & Control Vault Building, Including Footings, Floor, & Site Preparation & Restoration, 9,500 Ft Trenching and Backfilling or Plowing for Conduit, 10,790 Ft Non-Encased, Electrical Conduit, 1-2 Inch, Type I, Sch. 40 PVC in Trench or SDR 13 HDPE Plowed, 320 Ft Sand-Encased, Electrical Conduit, 2-2 Inch, Type III, Sch. 80 PVC in Trench, 120 Ft Sand-Encased, Electrical Conduit, 3-2 Inch, Type III, Sch. 80 PVC in Trench, Cable Markers, 9 Each L-867B (12"), Class 1A, Junction Box with Flat Etched Steel Cover, 1 Each L-867E (24"), Class 1A, Junction Box with Flat Etched Steel Cover, 12 Each Remove & Salvage Existing Runway Stake-Mounted Threshold Lights; Abandon Existing Transformers, 27 Each Remove & Salvage Existing Runway Stake-Mounted Edge Lights; Abandon Existing Transformers, 4 Each Remove & Salvage Existing Taxiway Stake-Mounted Edge Lights; Abandon Existing Transformers, 2 Set Remove & Salvage Existing Precision Approach Path Indicators (PAPI), Power Control Units, & Transformers; Remove & Dispose of Concrete Footings and Site Pads, Remove & Salvage Existing Sign; Remove & Dispose of Concrete Sign Pad, 145 Each L-853 Retroreflective Marker, Type II (Elevated), Style I (Plowable), Soil Anchored, 34 Each L-861, 30-Inch Elevated, Mode 1, LED, Medium Intensity Runway Light (MIRL), White/Yellow, Including Base Can & Concrete, 20 Each L-861T, 30-Inch Elevated, Mode 1, LED, Medium Intensity Taxiway Light (MITL), Blue, Including Light Base Can & Concrete, 4 Each L-858R, Mandatory, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 2-Module Including Concrete Sign Pad, 1 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 2-Module Including Concrete Sign Pad, 2 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 3-Module Including Concrete Sign Pad, 1 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 4-Module Including Concrete Sign Pad, 2 Set L-881 Abbreviated Precision Approach Path Indicator (PAPI), Style B (Current), Class 2, LED, w/ Baffles Including Concrete Footings, Site Pads, & Junction Boxes, and various other items of related construction

Alternate Bid 3 – Parallel and Connector Taxiway (Sta. 89+75 to 842+50)

Primary Work: Approximately 5,100 SqYd Asphalt Cold Milling (2.5” Nominal Depth), 8400 SqYd Asphalt Pavement/Base Removal (10” Nominal Depth). 28,800 CuYd Unclassified Excavation, 14,000 CuYd Disposal of Excess Material, 797 CuYd Subbase Course (Furnished), 2.329 CuYd Subbase Course (Recycled), 5,100 SqYd Geotextile Separator Fabric, 1,500 SqYd Geogrid, 900 CuYd Aggregate Base Course, 5,000 SqYd Reshape and Recompact Base Prior to Overlay, 2,300 Ton Asphalt Base/Surface Course, 160 Ton Asphalt Binder (PG 64-34), 12 Ton Emulsified Asphalt Prime Coat, 4 Ton Emulsified Asphalt Tack Coat, Runway and Taxiway Pavement Markings, 175 Ft 18” RCP, 2 Each 18” RCP Flared Ends, 2,000 4” Perforated Underdrain Pipe, 100 Ft 4” Solid Underdrain Pipe, 5 Each Underdrain Cleanout, Various Underdrain Bends, 10 Acres Seeding and Fertilizing, 9,200 CuYd Topsoil (Removed from Stockpile), 48,400 SqYd Mulching, 57 Each Retroreflective Marker, Type II (Elevated), Style I (Plowable), Soil Anchored, 1 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 3-Module Including Concrete Sign Pad, 1 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 4-Module Including Concrete Sign Pad and various other items of related construction

1. Plans and Specifications: Copies of the Plans and Specifications are available for inspection at:

   Office of the City of Flandreau, South Dakota, or at the Office of Helms and Associates, 416 Production Street, Aberdeen, South Dakota.

   Plans and Specifications may be obtained, at the Office of the latter, upon payment to Helms and Associates for shipping and handling in the amount of $100 for an 11" x 17" size set of plans and specifications.

   Plans and Specifications may be retrieved by registering with the Issuing Office at http://www.helmsengineering.com/biddocs.html. Following registration, complete sets of Plans and Specifications may be downloaded as portable document format (PDF) files. **Users who have downloaded the Plans and Specifications will be mailed an invoice of $20.00.** All payments are non-refundable.

   Additionally, upon request, in accordance with South Dakota Codified Law 5-18B-1, one copy of Plans and Specifications shall be furnished, without charge, to each Contractor resident in South Dakota who intends, in good faith, to bid upon the project.

2. Bid Guarantee: Each bid must be accompanied by a certified check, cashier's check or draft in the amount of five percent (5%) of the total bid, and drawn on a solvent State or National Bank, or a ten percent (10%) Bid Bond issued by a surety authorized to do business in the State of South Dakota and payable to the City of Flandreau, South Dakota.

3. Contract Bonds: Separate Payment and Performance Bonds guaranteeing faithful performance of the Contract and payment of all labor, materials, rentals, etc., will be required for an amount equal to one hundred percent (100%) of the amount of the Contract. All bonds must be issued or co-signed by a licensed resident agent of South Dakota.

4. Commencement and Completion: The Engineer will set the beginning date in a written "Notice to Proceed with Construction". The Contractor shall begin the work within ten (10) days of the date set forth in the written "Notice to Proceed" and shall complete the work within the number of calendar days, working days, or completion date or dates as shown in the Specifications.

5. Title VI: The City of Flandreau, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders or offerors that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in

response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

6. Minimum Wage Rates: The successful bidder will be required to comply with all applicable Federal Labor Laws, including the minimum wage rates decision of the United States Department of Labor.

7. Affirmative Action: A Contractor who may be awarded a contract of $10,000 or more and subcontractors who may be awarded a subcontract of $10,000 or more will be required to maintain an affirmative action program, the standards for which are contained in the advertised specifications.

8. Award of Contract: The right is reserved, as the interest of the City of Flandreau, South Dakota, may require, to reject any and all bids, to waive informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

9. The contractor will certify that he and any of his subcontractors meet the requirements of 49 CFR, Part 29, regarding debarment, suspension, ineligibility and voluntary exclusion as further described in these specifications.

10. The contractor will certify that he and his subcontractors will comply with the 49 CFR, 30.17, regarding Foreign Trade Restrictions as further noted in project specifications.

11. The contractor will certify that he and his subcontractors will comply with "BUY AMERICAN CERTIFICATION (JAN. 1991)" as further noted in project specifications.

12. The contractor will comply with "BUY AMERICAN-STEEL AND MANUFACTURED PRODUCTS FOR CONSTRUCTION CONTRACTS (JAN. 1991)" as further described in project specifications.

13. If an applicant (corporation) has either unpaid Federal tax liability or has been convicted of a criminal violation under any Federal law within the preceding 24 months, 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.

A Pre-Bid Conference will be held at 11:00 (local time), September 2, 2026 via Microsoft Teams. The conference is intended to clarify any questions regarding bidding and/or construction requirements. All interested contractors, subcontractors, and suppliers are encouraged to attend. Below is the link and call-in information:

Microsoft Teams meeting

Join: https://teams.microsoft.com/meet/296586961259292?p=ykSHoptzZ7snWaeIHt
Meeting ID: 296 586 961 259 292
Passcode: KE7gs9Jw

CITY OF FLANDREAU, SOUTH DAKOTA

BY /s/ Cohl Turnquist

City Administrator
Title

Advertising Date:
August 19, 2026
August 26, 2026

PART II – INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

IB-1. DESCRIPTION OF WORK.

A. **Work To Be Done.** The project shall consist of the reconfiguration of the runway and taxiways at the Flandreau Municipal Airport. A new 75' x 3,600' asphalt runway, and 2,890' of new 35' wide connector and partial parallel taxiways will be constructed with the project. Additionally, the airports existing runway will be repurposed as a parallel taxiway and will have its asphalt surfacing rehabilitated (mill & overlay). The major areas of work shall consist of: site clearing, excavation, grading, asphalt paving, storm sewer and underdrain pipe installation, site restoration, runway and taxiway electrical and lighting, and various other items of related construction.

B. **Location.** Flandreau Municipal Airport
Flandreau, South Dakota

IB-2. PRINCIPAL FEATURES.

The work to be performed includes the following principal features:

Base Bid-Runway 11/29 Grading and Aggregates
Primary Work: Approximately 121,000 CuYd Unclassified Excavation, 43,300 CuYd On-Site Borrow Material, 20,700 CuYd Subbase Course (Furnished), 34.000 SqYd Geotextile Separator Fabric, 1,500 SqYd Geogrid, 5.400 CuYd Aggregate Base Course, 6,630 Ft Furnish and Install Barbed Wire Fence, 3 Each Furnished and Install 20' Tubular Swing Gate, 280 Ft 48" RCP, 2 Each RCP Flared Ends, 114 Ft 24" RCP, 2 Each 24" RCP Flared Ends, 7,600 Ft 4" Perforated Underdrain Pipe, 130 Ft 4" Solid Underdrain Pipe, 20 Each Underdrain Cleanout, Various Underdrain Bends, 35 Acres Seeding and Fertilizing, 18,000 CuYd Topsoil (Removed from Stockpile), 169,000 SqYd Mulching, 3,920 Ft Remove and Dispose Existing Barbed Wire Fence, Erosion Control, 300 Ft Sand-Encased, Electrical Conduit Type II, Schedule 80 PVC in Trench and various other items of related construction

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Emulsified Asphalt Prime Coat, 3 Ton Emulsified Asphalt Tack Coat, Runway and Taxiway Pavement Markings, 292 Ft 24" RCP, 4 Each 24" RCP Flared Ends, 3,100 Ft 4" Perforated Underdrain Pipe, 11 Each Underdrain Cleanout, Various Underdrain Bends, 10 Acres Seeding and Fertilizing, 5,300 CuYd Topsoil (Removed from Stockpile), 48,400 SqYd Mulching, Erosion Control, Remove and Salvage Existing Windcone and Segmented Circle, 1 Each L-807, LED, Style 1B (Internally Lit), Size 2 (12 Feet), Primary Wind Cone w/ Single L-810 LED Steady Burn Red Obstruction Light, Including Concrete Footing & Concrete Site Pad, 10,000 Ft 1/C No. 8 AWG, 5kV, XLPE, L-824, Type C Cable Installed in Conduit, 2,820 Ft 1/C No. 4 Cu. AWG, 600V, THWN-2, Installed in Conduit, 1,410 Ft 1/C No. 8 Cu. AWG, 600V (GND), THWN-2, Installed in Conduit, 8,700 Ft 1/C No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Including Trenching or Plowing, Including Ground Rods, Connections, & Terminations, L-821 Airfield Lighting Control Panel, Type 1 (Conventional), Class W (Wall Mounted), Style 1 (Unlighted), Mode 1 (Generic), L-854, Type 1 Air-to-Ground Radio Control Equipment w/ Heavy Duty Antenna & Mounting Brackets, L-829 Constant Current Regulator (CCR) w/ Monitoring Options, Class 1 (6.6A), Style 1 (3-Step), 7.5 kW Size, Electrical Vault Work, 10' x 12' Pre-Fabricated, Airfield Electrical, Lighting, & Control Vault Building, Including Footings, Floor, & Site Preparation & Restoration, 9,500 Ft Trenching and Backfilling or Plowing for Conduit, 10,790 Ft Non-Encased, Electrical Conduit, 1-2 Inch, Type I, Sch. 40 PVC in Trench or SDR 13 HDPE Plowed, 320 Ft Sand-Encased, Electrical Conduit, 2-2 Inch, Type III, Sch. 80 PVC in Trench, 120 Ft Sand-Encased, Electrical Conduit, 3-2 Inch, Type III, Sch. 80 PVC in Trench, Cable Markers, 9 Each L-867B (12"), Class 1A, Junction Box with Flat Etched Steel Cover, 1 Each L-867E (24"), Class 1A, Junction Box with Flat Etched Steel Cover, 12 Each Remove & Salvage Existing Runway Stake-Mounted Threshold Lights; Abandon Existing Transformers, 27 Each Remove & Salvage Existing Runway Stake-Mounted Edge Lights; Abandon Existing Transformers, 4 Each Remove & Salvage Existing Taxiway Stake-Mounted Edge Lights; Abandon Existing Transformers, 2 Set Remove & Salvage Existing Precision Approach Path Indicators (PAPI), Power Control Units, & Transformers; Remove & Dispose of Concrete Footings and Site Pads, Remove & Salvage Existing Sign; Remove & Dispose of Concrete Sign Pad, 145 Each L-853 Retroreflective Marker, Type II (Elevated), Style I (Plowable), Soil Anchored, 34 Each L-861, 30-Inch Elevated, Mode 1, LED, Medium Intensity Runway Light (MIRL), White/Yellow, Including Base Can & Concrete, 20 Each L-861T, 30-Inch Elevated, Mode 1, LED, Medium Intensity Taxiway Light (MITL), Blue, Including Light Base Can & Concrete, 4 Each L-858R, Mandatory, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 2-Module Including Concrete Sign Pad, 1 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 2-Module Including Concrete Sign Pad, 2 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 3-Module Including Concrete Sign Pad, 1 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 4-Module Including Concrete Sign Pad, 2 Set L-881 Abbreviated Precision Approach Path Indicator (PAPI), Style B (Current), Class 2, LED, w/ Baffles Including Concrete Footings, Site Pads, & Junction Boxes, and various other items of related construction

Alternate Bid 3 – Parallel and Connector Taxiway (Sta. 89+75 to 842+50)

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2.329 CuYd Subbase Course (Recycled), 5,100 SqYd Geotextile Separator Fabric, 1,500 SqYd Geogrid, 900 CuYd Aggregate Base Course, 5,000 SqYd Reshape and Recompact Base Prior to Overlay, 2,300 Ton Asphalt Base/Surface Course, 160 Ton Asphalt Binder (PG 64-34), 12 Ton Emulsified Asphalt Prime Coat, 4 Ton Emulsified Asphalt Tack Coat, Runway and Taxiway Pavement Markings, 175 Ft 18" RCP, 2 Each 18" RCP Flared Ends, 2,000 4" Perforated Underdrain Pipe, 100 Ft 4" Solid Underdrain Pipe, 5 Each Underdrain Cleanout, Various Underdrain Bends, 10 Acres Seeding and Fertilizing, 9,200 CuYd Topsoil (Removed from Stockpile), 48,400 SqYd Mulching, 57 Each Retroreflective Marker, Type II (Elevated), Style I (Plowable), Soil Anchored, 1 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 3-Module Including Concrete Sign Pad, 1 Each L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 4-Module Including Concrete Sign Pad and various other items of related construction

IB-3. FORM OF PROPOSAL.

All bids for work specified herein shall be filled out on forms, which shall be furnished by the Engineer. The proposal shall be delivered in a sealed envelope to the Office of the City Administrator, Flandreau, South Dakota, on or before the time specified in the notice. The outside of the sealed envelope shall be addressed as follows:

Office of the	City Administrator, City of Flandreau, SD
Contractors Bid for	Runway 11/29 & Parallel Taxiway Construction
	AIP# 3-46-0077-018-2026
	Base Bid & Alternate Bids 1, 2, and 3

Each Proposal shall be headed by the name and post office address of the bidder and in case the bid is made by a corporation, the proposal shall be signed by a legally authorized representative of the Corporation.

IB-4. CONSTRUCTION OPERATIONS SCHEDULE.

The Construction Contractor shall submit to the Engineer for his approval prior to issuance of the Notice to Proceed, a schedule of construction operations.

IB-5. FEDERAL WAGE, LABOR AND EQUAL EMPLOYMENT OPPORTUNITY DBE PROVISIONS.

Special attention of all bidders is directed to the Federal Wage, Labor and Equal Employment opportunity provisions contained herein.

The applicable minimum wage rates as determined by the Secretary of Labor for this project are included in the specifications as part of the contract and shall be posted in a prominent place at the site of work.

Also, each bidder must complete, sign and furnish with his bid, the statements entitled "Statement on Participation on Contracts Subject to Equal Employment Opportunity Clause", "Certification of Nonsegregated Facilities", and "Disadvantaged Business Assurance". Failure to furnish these statements with the bid will be cause for rejection of the bid.

IB-6. NOTICE TO PROSPECTIVE CONTRACTORS AND SUBCONTRACTORS OF FEDERAL REQUIREMENTS.

The Contractor shall be responsible to review and be in compliance with all contract provisions included in Part VII, Contract Documents.

The contractor shall insert the applicable federal contract provisions in each lower tier contract.

IB-7. METHOD OF BIDDING.

The quantities set up in the Form of Proposal are estimated quantities as determined from the plans, and may be varied during construction accordingly as conditions require.

Unreasonable or unbalanced unit prices may be reason for rejecting any bid.

The Disadvantaged Business Enterprise assurance must be completed and submitted with the proposal.

Bidding shall be as follows:

The contract will be awarded for the Base Bid and selected alternate bid(s) to the lowest responsible bidder. Bid quantities and/or the selection of the alternate bid(s) may be adjusted by the Sponsor to stay within project funds. Where a conflict between unit prices and total price exists unit prices will control.

PART III – SPECIAL CONDITIONS

SPECIAL CONDITIONS

SC-1. TIME FOR COMPLETION AND LIQUIDATED DAMAGES.

It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning, rate of progress, and the time for completion of the work to be done hereunder are essential conditions of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced within ten (10) calendar days after the date of the notice to proceed and all work shall be completed as follows:

See Section SC-6 of this specification for completion dates and construction limitations.

The Contractor agrees that said work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified.

It is expressly understood and agreed by and between the Contractor and the Owner that the time for completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

If the work embraced by this contract is not completed on or before the dates set for completion, the actual damages for the delay will be impossible to determine and in lieu thereof, the Contractor shall pay the Owner as fixed, agreed, and liquidated damages according to the schedule of liquidated damages as follows:

SCHEDULE OF LIQUIDATED DAMAGES

Original Contract Amount		**Amount of Liquidated Damages Per Calendar Day**
More Than	Up To and Including	
$0	$50,000	$250.00
$50,000	$100,000	$325.00
$100,000	$500,000	$500.00
$500,000	$1,000,000	$725.00
$1,000,000	$2,000,000	$900.00
$2,000,000	$4,000,000	$1,450.00
$4,000,000	$6,000,000	$1,650.00
$6,000,000	$8,000,000	$1,800.00
$8,000,000	$10,000,000	$2,150.00
Over $10,000,000		$2,300.00

Whatever sums may be due the Owner as liquidated damages for delay may be deducted from payments due the Contractor or may be collected from the Contractor or the Contractor's surety. Liquidated damages, if incurred, will run continuously until completion of the entire project. Stopping of the liquidated damages day count due to weather, specified time limitations, or shut down for the season **will not** be considered.

SC-2. PAYMENTS.

Unless otherwise provided in the specifications, partial payments will be made as the work progresses at the end of each calendar month, or as soon thereafter as practicable. In preparing estimates, the material delivered on the site may be taken into consideration if approved by the Engineer. The Contractor may prepare all estimates, on forms, which will be provided by the Engineer, and the same shall be submitted to the Engineer for his approval on or about the first day of each month. Upon approval of the estimates, they shall be transmitted to the Owner for payment.

In making such partial payments, there shall be retained 10 percent on the amount of work completed until final completion and acceptance of all work covered by the Contract. When not less than 95 percent of the work has been completed, the Engineer may, at the Owner's discretion and with the consent of the surety, prepare an estimate from which will be retained 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. All material and work covered by partial payments made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for all materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all the terms of the Contract.

Upon completion and acceptance of all work required hereunder, the amount due the Contractor under this Contract will be paid upon presentation of a final estimate properly executed and duly certified, after the Contractor shall have furnished the Owner with a release, if required, of all claims against the Owner arising under and by virtue of this Contract.

SC-3. CONTRACT DRAWINGS, MAPS AND SPECIFICATIONS.

Five (5) sets of contract drawings, maps and specifications will be furnished the Contractor without charge. Additional sets will be furnished on request at the cost of reproduction. The work shall conform to the following contract drawings and maps, all of which form a part of these specifications:

INDEX OF SHEETS

1.	COVER SHEET
2.	PROJECT LAYOUT PLAN
3-4.	CONSTRUCTION SAFETY PHASING PLAN
5-8.	CONSTRUCTIN SAFETY PHASING PLAN NOTES
9.	GENERAL PLAN NOTES
10.	ESTIMATE OF QUANTITIES
11.	EXISTING PAVEMENT TYPICAL SECTIONS
12-13.	TYPICAL SECTIONS
14-24.	RUNWAY 11/29 PLAN AND PROFILE
25-33.	PARALLEL TAXIWAY PLAN AND PROFILE
34.	APRON TAXIWAY PLAN AND PROFILE
35.	MID POINT TAXIWAY PLAN AND PROFILE

36.	TURF RUNWAY TIE-IN PLAN AND PROFILE
37-38.	MARKING PLAN
39.	FENCING PLAN
40-41.	DETAILS
42-47.	STORM WATER POLLUTION PREVENTION PLAN
48-81.	CROSS SECTIONS
E1.	LEGEND, NOTES & INDEX OF SHEETS
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E3.	SHEET LAYOUT – LIGHTING REMOVALS
E4-E10.	LIGHTING REMOVALS
E11.	SHEET LAYOUT – LIGHTING PLAN
E12-E27.	LIGHTING PLAN
E201-E213.	LIGHTING DETAILS
V1-V9.	VAULT PLAN

SC-4. SURVEYS.

A. Layout of Work. The limits of all work shown on the plans and herein specified shall be as designated and approved by the Engineer at the site of the work at the time of construction.

B. Quantity Surveys. The Contractor will be required to furnish personnel, equipment and material to make such surveys as are necessary to determine the quantities of work performed or placed during the period covered by the progress payment if he does not accept or agree with the Engineer's survey and computations. All original field notes, computations and other records taken by the Contractor for the purpose of progress surveys shall be furnished promptly to the Engineer and shall be used to the extent necessary in determining the proper amount of progress payment due to the Contractor.

SC-5. ORDER OF WORK.

The Contractor shall submit a proposed schedule of the work for the project 7 days prior to the Preconstruction Conference for review and approval by the Owner, Engineer, SD-DOT and F.A.A. A “Notice to Proceed” will not be issued without a schedule of work.

The order in which the project is constructed shall be in accordance with the approved schedule of work, which must indicate the order of work by corresponding item number from the Proposal.

SC-6. CONSTRUCTION LIMITATIONS.

The Contractor shall comply with the requirements of the Construction Safety Phasing Plan as shown on Sheets three (3) through eight (8) of the project plans. The Contractor shall have a continuous operation once work begins.

Phase 1 – Base Bid & Alternate Bid 1
The excavation, grading (subgrade, subbase and aggregate base course), and utility installation (underdrain and storm sewer piping) of Runway 11/29 shall be brought to the established lines/grades shown in the plans by July 31st, 2027. Phase 1 paving operations (Alternate Bid 1), with the exception of final pavement markings, shall be completed by August 14th, 2027. Liquidated Damages as set forth in section SC-1 of the Special Conditions may be assessed if either of these timeframes are not met.

Phase 2 – Alternate Bids 2 & 3.
Work on Phase 2 (Alternate Bids 2 & 3) shall not commence until June 14th, 2027 unless written permission in obtained from the owner. After this date, work on Phase 1 and Phase 2 may be completed concurrently. Phase 2 paving operations (Alternate Bids 2 &3), with the exception of final pavement markings, shall be completed by October 1st, 2027. Liquidated Damages as set forth in section SC-1 of the Special Conditions may be assessed if either of these timeframes are not met.

Both phases of the Project, shall be substantially completed by October 22nd, 2027. Liquidated Damages set forth in section SC-1 of the Special Conditions may be assessed if this timeframe is not met.

The work shall be completed in accordance with Paragraph 50-15 of the General Provisions and ready for final payment by November 13th, 2027. Liquidated Damages as set forth in section SC-1 of the Special Conditions may be assessed if this timeframe is not met.

SC-7. CONTRACTOR'S RESPONSIBILITY.

Any damages resulting from the Contractor's use of any roads or drives outside the construction area or into or on the area shall be repaired by the Contractor, at his expense, to a condition similar or equal to that existing before such damage was done.

SC-8. EXISTING UTILITIES.

The Contractor shall, before starting any excavation or trenching, familiarize himself with the location of all underground utilities. Any underground utilities, which are encountered and severed or otherwise damaged, shall be repaired immediately. Any damage resulting from the Contractor's operation shall be satisfactorily repaired by him at his expense.

SC-9. EXEMPTION FROM PAYMENT OF FEDERAL TAX ON TRANSPORTATION OF PROPERTY.

The Contractor shall be authorized to ship all property necessary for the work to the City in care of the Contractor's bid and that all transportation charges shall be borne by the Contractor.

SC-10. SAFETY DURING CONSTRUCTION.

The Contractor shall take all precautions necessary to insure the safety of operating aircraft as well as his/her own equipment and personnel. Special consideration should be given to flight schedules and miscellaneous aircraft operations. The Contractor shall obey all instructions as to routes to be taken by equipment traveling within the airport area and keep all such equipment marked with red or yellow flags. The Contractor shall make his/her own estimate of all difficulties to be encountered. Equipment not actually in operation shall be kept clear of landing and aircraft operation areas; personnel shall not enter areas of the airport where aircraft are operating without specific permission. All equipment within construction safety area must be marked and/or lighted in accordance with the Construction Safety Phasing Plan.

The Contractor shall take all steps necessary to protect the existing runway lights and electric cables during construction.

Materials stored upon the airport shall be so placed and the work shall, at all times, be so conducted as to cause no greater obstruction to the air and ground traffic than is considered necessary by the Engineer. No runway, taxiway, or roadway shall be closed or opened except by express permission by the Engineer, or Airport Manager.

The Contractor shall provide, erect and maintain all necessary barricades, signs, danger signals and lights for the protection of the work and the safety of the public for both land and air traffic. Before closing or commencing construction on existing runways or taxiways, warning signs for air traffic shall be placed at such locations and be visible from the air. An airport or runway closed because of construction or other activities or hazards shall have appropriate FAA standard markings and lights in accordance with FAA Advisory Circular 150/5340-1 and 150/5210-5, or latest revisions. The Contractor will also be required to comply with the requirements of FAA Advisory Circular 150/5370-2, “Operational Safety of Airports During Construction”.

The contractor shall comply with all construction safety items as noted on the plans.

SC-11. COOPERATION BETWEEN CONTRACTORS.

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

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

SC-12. CONSTRUCTION EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS.

POSTER

The specifications for this project require that the poster "Equal Employment Opportunity Is The Law" be posted by the contractor at the construction work site and office site in a prominent place where it can be easily seen by the employees.

Annual EEO-1 Report (Standard Form 100)

Each contractor that (1) has 50 or more employees; and has a contract of $50,000 or more; or (2) has contracts which total $50,000 or more, or which reasonably may be expected to total $50,000 or more, in any 12-month period is required to file annual compliance reports on Standard Form 100 with the Joint Reporting Committee. If the contractor has not filed this report within the past 12 months he must do so within 30 days after the award of the contract.

Subcontractors must also file Standard Form 100 within 30 days after award of the subcontract if they have 50 or more employees and a subcontract amounting to $50,000 or more.

Stand Form 100 is to be filed with:

Joint Reporting Committee
EEO-1 P.O. Box 2596
Norfolk, VA 22501

Construction Contractor Identification Data

This form is to be filed within 10 working days of award of any construction contract or subcontract in excess of $10,000. For subcontractors, the name of the prime contractor should be used as the Contracting Agency/Company in Section 2 of the form. Refer to the following page for a copy of form.

CONSTRUCTION CONTRACTOR IDENTIFICATION DATA
(FOR AWARD NOTIFICATIONS)

Section 1 Prime _____ Sub _____

Employer/Contractor Identification Number _____
Contractor/Subcontractor Name _____
Permanent Address (Pay Office) _____
City, State, Zip Code _____
Chief Executive Officer Name and Title _____
EEO Officer Name and Title _____
Area Code and Phone Number _____

Section 2

Funding Agency and Location Federal Aviation Administration, Bismarck, ND
Applicant/Grantee Agency Name and Location _____

Contracting Agency/Company (Prime) Name _____
Address, City, State, Zip Code _____

Contracting Agency/Company Contact Point Name _____
Area Code and Phone Number _____

Project Name and Number _____
Project City, County, State, Zip Code _____

Contract/Subcontract Award Date _____
Contract/Subcontract Dollar Amount _____
Contract/Subcontract Number _____
Estimated Contract/Subcontract Completion Date _____

MAIL TO: U.S. Department of Labor/ESA
Office of Federal Contract
Compliance Programs
Dallas District Office
525 S. Griffin St., Rm 512
Dallas, TX 75202

SEND COPY OF FORM TO:
Mr. Jack Dokken
South Dakota Dept. of Transportation
Division of Air, Rail & Transit
700 Broadway Avenue East
Pierre, South Dakota 57501-2586

SC-13. ACCIDENT PREVENTION.

The Contractor shall take all reasonable steps to prevent injury to persons (including employees) and property in performance of this contract, including all steps and actions required under the safety provisions of applicable laws and applicable building construction codes. The Contractor shall further be required to guard all machine, equipment and explosives and to eliminate all hazards in accordance with the safety provisions of the Manual of Accident Prevention and Construction published by the Associated General Contractors of America.

SC-14. SPECIAL PROVISION FOR DISADVANTAGED BUSINESS ENTERPRISE

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 the City of Flandreau-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 City of Flandreau deems appropriate.

I. Definitions

A. Specified Goal: A DBE participation goal for a contract as indicated by a specific numerical percentage of the total dollar amount of the contract in the bidding documents.

B. Not Specified: No specific DBE participation goal is specified for a contract.

C. Disadvantaged Business Enterprise (DBE): A for-profit small business that is certified by the City of Flandreau and is listed in the DBE Directory available on the City of Flandreau's web site.

D. Good Faith Effort (GFE): Efforts to achieve a DBE goal which; by their scope, intensity, and appropriateness to the objective; can reasonably be expected to meet the objective of the City of Flandreau's DBE program pursuant to 49 CFR 26.1.

E. Positive Contact: Communication between the bidder and the DBE in which the bidder receives an oral or written response from the DBE stating the DBE's intention to quote or not quote a project.

F. Commitment: The dollar amount of work to be subcontracted to DBEs, according to the bidder's bid. The commitment may be compared to the dollar amount of all contract items in the bidder's bid and expressed as a percentage of the total bid amount.

II. Bidding Requirements

A bidder must not discriminate on the basis of race, color, national origin, or sex in the solicitation or award to subcontractors and material suppliers. Bidders who demonstrate a pattern of possible discrimination through consistent and repeated under-utilization of DBEs may be subject to investigation and sanctions allowed by regulation, administrative rule, or law.

The Bidder's failure to carry out the requirements of this special provision will be treated as a non-responsive bid.

On contracts that specify a specific DBE contract participation goal, all bidders must include their DBE commitment for the contract in the bidding files provided by the City of Flandreau.

If the contract indicates "Not Specified," all bidders are encouraged to include their anticipated DBE utilization for the contract in the bidding files provided by the City of Flandreau.

Each bidder must submit a list of all subcontractors and suppliers (DBEs and non-DBEs) the bidder received quotes from for that contract with the bid files.

A Contractor must make reasonable efforts to provide opportunities for DBEs to participate on Federal-aid contracts throughout the life of the contract.

On contracts let with a specified DBE contract participation goal, where the low bidder has not met or exceeded that goal, the bidder must provide GFE documentation as indicated in Section III of this special provision.

When the DBE participation is "Not Specified" on a contract, each bidder is encouraged to use DBE Contractors; however no bidder will be required to furnish GFE documentation.

The apparent low bidder must submit GFE documentation, when requested by the City of Flandreau, within 2 business days from the date the apparent low bidder is contacted by the City of Flandreau. Section III of this special provision provides information on the types of action bidders should make as part of their GFE to obtain DBE participation. The apparent low bidder may submit documentation with the bidding files provided all pertinent information is included. The apparent low bidder must submit any missing documentation within 2 business days from the date the City of Flandreau contacts the low bidder.

If the apparent low bidder does not provide documentation showing GFE as required by this special provision, the City of Flandreau will consider that bid nonresponsive and may either award the contract to the next lowest responsible bidder with a responsive bid, or reject all bids. Subsequent to the DBE committee's decision that the apparent low bidder's efforts do not establish GFE, the apparent low bidder will be notified that the bid is not responsive. The apparent low bidder will have 2 business days from the date of notification to contact the Bid Letting Engineer to arrange a meeting with the City of Flandreau Secretary, or the Secretary's designee, to present documentation and argument about why the bid should not be rejected. The City of Flandreau Secretary or the Secretary's designee will issue a written decision on responsiveness of the bid within 2 business days after the meeting.

If the apparent low bid is rejected for failure to meet the GFE or other requirements, the next apparent low bidder will be notified, unless all bids are rejected. The next apparent low bidder's DBE commitment will also be reviewed, and GFE documentation may be requested. Unless all bids are rejected, award of the contract will be made to the lowest

bidder with a responsive bid.

The lowest responsive bidder will be required to complete form DOT-289B, as included in the contract documents, when the contract is sent for signature. This form requires a signature from each DBE identified in the low bidder's DBE commitment. A separate form will be supplied for each DBE and will be included in the contract documents.

Bidders are encouraged to assist interested DBEs in obtaining bonding, lines of credit, insurance, necessary equipment, supplies, materials, or other related services.

III. Good Faith Efforts

If a GFE package is requested on a contract with a specified goal, the apparent low bidder must submit documentation showing compliance with the following requirements:

A. The apparent low bidder will submit a contact log of all solicitation efforts including:
   - Name of the DBE firm
   - Name and phone number of the individual with whom contact was made
   - Date, time, and manner of each and every contact (by phone, in person, fax, mail, e-mail, etc.)
   - The DBE's response to the solicitation
   - Result of the solicitation effort

B. The apparent low bidder will also submit documentation that shows GFE in relation to the following requirements:
   1. The bidder must select contract work items to encourage DBE participation. This includes breaking out contract work items into economically feasible units to facilitate DBE participation, even when the bidder might otherwise prefer to perform these work items with its own forces.
   2. The bidder must solicit all certified DBEs that are listed in the appropriate work classifications in the DBE directory and that have indicated in the directory they are willing to work in the project's geographic area. Without exception, all DBEs who are listed on the plan holders list by 10 AM central time 7 calendar days prior to the bid letting must be solicited in accordance with Section III.B.3 of this special provision. If the bidder has not solicited any DBE meeting these requirements, the bidder will provide a detailed written explanation showing why the DBE was not solicited.
   3. To provide adequate time for the DBE to respond with a quote in the normal course of business, the bidder must make the initial solicitation at least 6 calendar days by mail or 5 calendar days by phone, fax, or e-mail prior to the letting date. Without exception, all DBEs who are listed on the plan holders list by 10 AM central time 7 calendar days prior to the bid letting must be solicited.
   4. If the bidder does not receive a positive contact from a DBE, the bidder must follow up the initial solicitation with a second solicitation by phone,

fax, or e-mail to determine whether the DBE is interested in quoting. The bidder must make this second solicitation at least 2 business days prior to the letting.

5. The bidder will provide interested DBEs with adequate and timely information about plans, specifications, and requirements of the contract to assist DBEs in responding to a solicitation.
6. If a bidder rejects a DBE quote because of previous problems with a particular DBE, the bidder must prepare a detailed written explanation of the problem. Additional cost involved in finding and using DBEs is not, in itself, sufficient reason for a bidder to reject a quote. A bidder must not reject a DBE as being unqualified without sound reasons based on a thorough investigation of the DBE's capabilities.
7. Any additional information requested by the City of Flandreau.

C. The bidder must consider qualified DBEs whose quotes are reasonably competitive. If the bidder rejects any quote because it is considered not to be "reasonably competitive," the bidder must provide copies of all DBE and nonDBE quotes, and a work item price spreadsheet comparing DBE quotes to non-DBE quotes. The spreadsheet must show which quote was included in the bid for the work items being compared. The ability or desire of a bidder to perform the work with its own forces does not relieve the bidder of the responsibility to make GFE. In the event a bidder elects to use its own forces over a DBE, the bidder must include, on the spreadsheet, documentation of the costs of using the bidder's own forces. This can be shown in a number of ways, which may include submitting portions of the bidder's work sheets used to prepare the bid.

D. The bidder must explain why the specified goal could not be met.

E. The bidder must identify any additional efforts the bidder made to secure DBE participation.

IV. Counting DBE Participation

On projects with a specified goal, the contract commitment, as submitted with the bid, will be documented on form DOT-289R/C as included in the contract documents.

If the project is shown as "Not Specified," the anticipated DBE utilization, as submitted with the bid, will be documented on form DOT-289 R/N – DBE Utilization Form, as included in the contract documents. The DBE utilization shown on this form is not a commitment to use the DBE. This information will be used by the City of Flandreau to track anticipated DBE usage.

Only the portion of a contract performed by the DBE's own forces will count toward DBE participation. Included is the cost of supplies and materials obtained by the DBE for the contract, including supplies purchased or equipment leased by the DBE. Supplies and equipment the DBE subcontractor purchased or leased from the Contractor or its affiliate is not allowed to be included.

When a DBE performs as a participant in an approved joint venture, only the portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work of the contract that the DBE performs with its own forces will count toward DBE

participation.

A bidder may count toward its DBE participation only that percentage of expenditures to DBEs that perform a commercially useful function (CUF) in the performance of a contract. A DBE performs a CUF when the DBE is responsible for execution of the work of a contract and is carrying out the DBE's responsibilities by actually performing, managing and supervising the work involved. To perform a CUF, the DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating prices, determining quality and quantity, ordering and installing (where applicable) the materials, and paying for the material itself. To determine whether a DBE is performing a CUF, the City of Flandreau will evaluate the amount of work subcontracted, the industry practice, and whether the amount the DBE is to be paid is commensurate with the work it is actually performing, DBE credit claimed for performance of the work, and other relevant factors.

A DBE is not performing a CUF if the DBE performs less than 30% of the total cost of its contract with its own work force, or if its role is limited to that of an extra participant in a transaction, project, or contract through which funds are passed in order to obtain the appearance of DBE participation. In determining whether a DBE is simply an extra participant, the City of Flandreau will examine similar transactions, particularly those in which DBEs do not participate.

DBE participation will be counted for trucking services as follows:

> The bidder/Contractor will receive credit toward DBE participation for the total value of the transportation services the DBE provides on the contract using trucks the DBE owns, insures, and operates and which are driven by drivers the DBE employs.
>
> A DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. When a DBE leases trucks from another DBE, the bidder/Contractor can count the total value of the transportation services the lessee DBE provides on the contract toward DBE participation.
>
> The DBE may also lease trucks from a non-DBE firm, including an owner/operator. When a DBE leases trucks from a non-DBE, the bidder/Contractor can count toward DBE participation only the fee or commission the DBE receives as a result of the lease arrangement. The bidder/Contractor does not receive credit toward DBE participation for the total value of the transportation services, since all services are not provided by a DBE.

The bidder may count toward DBE participation expenditures to DBE firms for materials, supplies, or services as follows:

> If the materials or supplies are obtained from a DBE manufacturer, count 100% of the cost of the materials or supplies toward DBE participation. A manufacturer is a firm that operates or maintains a factory or establishment that produces, on the

premises, the materials, supplies, articles, or equipment required under the contract and of general character described by the specifications.

If the materials or supplies are purchased from a DBE regular dealer, count 60% of the cost of the materials or supplies toward DBE participation. A regular dealer is a firm that owns, operates, or maintains a store, warehouse
DBE Special provision approved (20150520).docx 6 or other establishment in which the materials, supplies, articles, or equipment are bought, kept in stock, and regularly sold or leased to the public in the usual course of business.

If the materials or supplies are purchased from a DBE which is neither a manufacturer nor a regular dealer, count only the amount of fee or commission charged for assistance in the procurement of the materials or supplies or fee or transportation charges for the delivery of materials or supplies required at the job site toward DBE participation. In order to be counted, the City of Flandreau must determine the fee to be reasonable and not excessive as compared to fees customarily allowed for similar services. The cost of the materials and supplies themselves will not count toward DBE goals.

The City of Flandreau will not count toward DBE participation materials or services provided by a DBE who is not currently certified.

No intended or actual subcontracting arrangement which is contrived to artificially inflate DBE participation is allowed. This includes, but is not limited to, DBE middlemen which serve no commercially useful function, or arrangements where a DBE is acting essentially as a broker of goods or services, but has been counted as a manufacturer, regular dealer, or subcontractor.

The City of Flandreau will review and monitor projects for compliance with the bidder's intended DBE participation. Failure by the Contractor to fulfill the contract commitment constitutes a breach of contract. The City of Flandreau may also investigate the form and substance of particular business arrangements between and among DBE and Contractors with regard to specific contracts. If, as a result of an investigation, the City of Flandreau determines a particular business arrangement is not allowable, the dollar amount of the unallowable DBE participation will be subtracted from the Contractor's DBE participation on that project. The Contractor will be notified if the apparent DBE participation is not adequate to meet the DBE participation stated on the form DOT-289R/C. The Contractor will be directed to seek additional participation from other DBEs to meet the unallowable portion on that contract.

All Contractors and DBEs shall cooperate fully and promptly with the City of Flandreau in compliance reviews, investigations, and other requests for information. If the City of Flandreau determines a Contractor was a knowing and willing participant in an unallowable business arrangement, or in the event of repeated violations, falsification, or misrepresentation, the City of Flandreau will impose sanctions. Sanctions may include, but are not limited to one or more of the following:

- Assessment of liquidated damages as stated in Section VII of this special provision
- Suspension of bidding privileges or debarment
- Withholding progress payments
- Securing additional DBE participation on future Federal-aid contracts sufficient to make up for the DBE participation found to be unallowable
- Referral of the matter for criminal prosecution

V. Liquidated Damages

A. If the Contractor does not meet its contract commitment documented on form DOT-289 R/C, the City of Flandreau will assess liquidated damages according to the following schedule:

1. For the first $1,000 DBE deficiency, 100% of the deficiency.
2. For the next $9,000 DBE deficiency, 50% of the deficiency.
3. For the next $10,000 DBE deficiency, 25% of the deficiency.
4. For any remaining DBE deficiency in excess of $20,000, 10% of the deficiency.

This liquidated damage provision will not be applicable where actual payment to a DBE is within 90% of the commitment or where there are good and sufficient reasons, properly documented, for the deficiency such as quantity under-runs, project changes, or other unexpected occurrences.

B. If a Contractor finds it impossible, for reasons beyond its control, to meet the contract commitment on form DOT-289R/C, the Contractor may, at any time prior to completion of the project, provide a written request to the DBE Compliance Officer for a complete or partial waiver of liquidated damages. No request for a waiver will be accepted after Acceptance of Field Work has been issued.

VI. Termination or Substitution of a DBE

The Contractor will not be allowed to terminate or substitute a DBE without the City of Flandreau's prior verbal consent followed by written approval. This includes, but is not limited to, instances in where the Contractor desires to perform work originally committed to a DBE with its own forces, with an affiliated company, with a non-DBE, or with another DBE. City of Flandreau approval is required when the contract contains a "specified goal" on form DOT-289R/C and the DBE to be terminated or substituted is listed as a commitment on the form DOT-289R/C.

The City of Flandreau will provide written consent only if the City of Flandreau agrees the Contractor has good cause to terminate the DBE listed on the form DOT-289R/C. Good cause includes the following:

- The DBE fails or refuses to execute a written contract • The DBE fails or refuses to perform the work of the DBE subcontract in a manner consistent with normal industry standards or City of Flandreau specifications unless the failure or refusal by the DBE is a result of unfair or discriminatory

actions by the Contractor

- The DBE fails or refuses to meet the Contractor's reasonable nondiscriminatory bond requirements
- The DBE becomes bankrupt, insolvent, or exhibits credit unworthiness
- The DBE in ineligible to work on public works projects because of suspension and debarment proceedings pursuant to 2 CFR Parts 180, 215, and 1,200 or applicable state law
- The City of Flandreau has determined that the DBE is not a responsible Contractor
- The DBE voluntarily withdraws from the project and provided the City of Flandreau with a written notice of withdrawal
- The DBE is found to be ineligible to receive DBE credit for the type of work required
- A DBE owner dies or becomes disabled with the result that the DBE is unable to complete its work on the contract
- Other documented good cause that the City of Flandreau determines to substantiate the termination of the DBE.

Good cause does not exist if the Contractor seeks to terminate a DBE so the Contractor can self-perform the work for which the DBE was committed, or so the Contractor can substitute another DBE or non-DBE Contractor after the contract award.

Before submitting a request to terminate or substitute a DBE to the City of Flandreau, the Contractor must first provide written notice to the DBE, with a copy of the notice to the DBE Compliance Officer, of the Contractor's intent to request to terminate or substitute, and the reason for the request.

The Contractor must give the DBE 5 calendar days to respond to the notice and advise the City of Flandreau and the Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the City of Flandreau should not approve the Contractor's action. If required in a particular case as a matter of public necessity (e.g. safety), the City of Flandreau may provide a response period shorter than 5 calendar days.

When a DBE is terminated or fails to complete its work on the contract for any reason, the Contractor must make good faith efforts to replace the committed DBE with another DBE. The Contractor must make efforts to find another DBE to perform the same amount of work under the contract as the DBE that was terminated. The letter to the City of Flandreau requesting termination or substitution must include the name of the DBE and dollar amount of the replacement DBE. If the Contractor is unable to find another DBE, the Contractor must provide the names of the DBEs it contacted and reason why they were unable to use those DBEs.

If the Contractor does not utilize or pay DBEs as required, liquidated damages will be assessed as specified in Section VII of this special provision. In addition, if the Contractor is found to have knowingly and willingly attempted to circumvent the DBE contract provisions, sanctions referred to in Section IV of this special provision may be

imposed.

The Contractor does not need City of Flandreau approval to terminate or substitute a DBE under the following circumstances:

- The DBE is being used on a contact with a "Specified Goal" however the DBE was not listed as a DBE commitment on form DOT-289R/C. • The DBE was listed as a commitment on a "Not Specified" DBE goal contract on form DOT-289R/N.

SC-15. SCHEDULE OF MINIMUM WAGE RATES.

MINIMUM WAGE RATES AND POSTER

The specifications for this project require that the current prevailing wage determination decision(s) incorporated in the specifications and the wage rate poster (U.S. Department of Labor Publication 1321) be posted by the contractor at the site of the work in a prominent place where they can be easily seen by the workers. They shall be covered so as to withstand the weather elements.

All "laborers and mechanics" must be classified according to the classifications in the wage determination decision(s). Any class of "laborers and mechanics", including apprentices and trainees, which is not listed in the wage determination(s) and which is employed under the contract must be classified or reclassified conformable to the wage determination.

"Apprentices" employed under the contract must be registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a state apprenticeship agency recognized by the Bureau. A copy of the apprenticeship registration certificate or certification by the contractor that his apprentices are properly registered must be furnished to the engineer for each apprentice employed on the job.

Notice to Bidders, Wage Rate Determination. The wage rate determination of the Department of Labor incorporated in the advertised specifications does not include rates for the requested classifications listed below. The bidder is responsible for ascertaining the rates payable for such classifications and whether area practice requires their use in accomplishing the work. No inference concerning area practice is to be drawn from their omission. Further, the omission does not, per se, establish any liability to the Government for increased labor costs resulting from the use of such classifications (list the classifications for which no wage rates are given).

Additional Classifications. If any employees cannot be reclassified, the sponsor and the contractor, with FAA approval, determine the proper rates to use. It is necessary to use prevailing area practice, bargaining agreements and experience in determining rates. Submit separate statements from each affected employee stating they concur and accept the established wage rate or if they do no concur, submit a statement explaining why they do not concur with the newly established wage rate. If the affected employees are not yet known, then a statement from the contractor testifying that the affected employees are not yet known, must be submitted by the contractor. The agreement on which rates to use should be in writing and provide for payment of

the rates agreed upon for work accomplished under the contract. A sponsor should send the agreement to the appropriate FAA Airports field office accompanied by two or more of the following types (Items No. 1 through No. 6) of information supporting the rate as prevailing in the area. The Department of Labor will approve, modify, or disapprove every additional classification action within 30 days of receipt or will notify the contracting officer that additional time is necessary.

1. Statements. Furnish statements from the appropriate local union, building trades council, or contractors' associations reflecting wage rates paid on project including names and addresses of contractors and subcontractors, locations, approximate costs, dates of construction, types of projects and number of workers employed in each classification on each project and the respective wage rates. Include statements of local contractors reflecting number of workers employed at the rate agreed upon for the particular classification;

2. Agreements. Signed collective bargaining agreements;

3. Public Construction. Wage rates determined for public construction by state and local officials based on prevailing wage legislation;

4. State Agencies. Information furnished by state agencies;

5. Payrolls. Copies of payrolls of similar projects in the same location;

6. Wage Determination. Copies of any wage determination incorporated in a recent public contract in the area containing a classification for similar work.

WAGE RATE DECISION
(See Part IV for Wage Rate Decisions)

SC-16 BID PROTEST PROCEDURES

1. Any bidder may protest the award of a contract. The protest must be submitted in writing to the Engineer responsible for the contract or solicitation within five calendar days after the bids are read.

2. If a contract has been awarded, the Engineer shall give notice of such protest within 24 hours to the awarded contractor. In the case of a pending award, a stay of award may be requested. A stay may be granted unless a written determination is made that the award of the contract without delay is necessary to protect the interests of the Owner.

3. The protest must contain the following:

- Name, address, phone number and email of the protestor.
- A concise statement of all the material facts alleged and of all of the rules, regulations, statutes, and legal provisions entitling the protestor relief.
- A statement indicating the relief to which the protestor deems they are entitled.

- All other information as the protestor deems to be material to the issue.

4. If the protest cannot be resolved by mutual agreement within seven calendar days after receipt, the Engineer responsible for the contract or solicitation shall within 24 hours, send by certified mail the final decision and the basis for the decision to the protestor.

5. Any bidder who is aggrieved in connection with the award of a contract may appeal the decision. Venue and jurisdiction for any appeals of the final decision are in the South Dakota Circuit Court in Moody County. Such protests and appeals regarding the request for bids and bid proposals are governed by and must be construed with South Dakota Law.

6. Failure to follow the bid protest procedures constitutes a waiver of protest and resulting claims.

PART IV – WAGE RATES

DAVIS-BACON WAGE DETERMINATIONS

"General Decision Number: SD20260001 07/30/2026

State: South Dakota

Construction Types: Heavy and Highway

Counties: South Dakota Counties of Aurora, Beadle, Bennett, Bon Homme, Brookings, Brown, Brule, Buffalo, Butte, Campbell, Charles Mix, Clark, Clay, Codington, Corson, Custer, Davison, Day, Deuel, Dewey, Douglas, Edmunds, Fall River, Faulk, Grant, Gregory, Haakon, Hamlin, Hand, Hanson, Harding, Hughes, Hutchinson, Hyde, Jackson, Jerauld, Jones, Kingsbury, Lake, Lawrence, Lincoln, Lyman, Marshall, McCook, McPherson, Meade, Mellette, Miner, Minnehaha, Moody, Pennington, Perkins, Potter, Roberts, Sanborn, Spink, Stanley, Sully, Todd, Tripp, Turner, Union, Walworth, Yankton, Ziebach and Oglala Lakota

Heavy Construction

Highway Construction

Modification Number	Publication Date
0	01/30/2026
1	05/18/2026
2	05/21/2026
3	07/30/2026
SASD2025-001	12/12/2024

	Rates	Fringes
ELECTRICIAN	$ 35.43	8.69
IRONWORKER: Group 1 - Position and secure steel bars or mesh in concrete for reinforcement, steel tyers, saw. Carrying, placing, tying, reinforcing steel under supervision, cutting. Placing steel or prefabricated reinforcement assembly for placement in concrete forms.	$ 26.93	0.00
IRONWORKER: Group 2 - Erect, place and join steel girders, columns, structural framework, air wrenches, spud bars, grinders, drills, sledgehammers, tag lines, plumb bobs, lasers, levels, bolts, wire, welds, shears, rod-bending machines	$ 28.97	0.00
LABORER: Group 1 - Air Tool Operator; Common Laborer; Landscape Worker, Flagger, Pilot Car Driver; Trucks under 26,000 GVW; Materials Checker; Special Surface Finish Applicator.	$ 26.93	0.00
LABORER: Group 2 - Mechanic Tender; Pipe Layer (except culvert); Form Builder Tender.	$ 26.96	0.00

LABORER: Group 3 - Asphalt Plant Tender; Pile Driver Leadsman; Form Setter, Oiler/Greaser. ..... .$ 28.97 0.00

LABORER: Group 5 - Carpenter; Form Builder ..... $ 31.94 0.00

LABORER: Group 6 - Concrete Finsher; Grade Checker.. $ 29.81 0.00

PAINTER: Group 1 - Line striping machine, paint trucks, epoxy trucks, thermoplastic trucks, cold applied plastic/and preformed thermoplastic pavement marking equipment. Operate pavement marking equipment to include epoxies, paints, primers, sealers, cold applied tapes, thermoplastics used for traffic marking purposes. $ 26.96 0.00

PAINTER: Group 2 - Painting or protective coating bridges, apply varnish, antirust materials, prepare steel or other surfaces with primer or sandblasting, paints structural framewor..... $ 29.81 0.00

POWER EQUIPMENT OPERATOR: Group 1 - Tractor (farm type with attachments, including loaders but excluding Backhoe); Self Propelled Broom; Concrete Routing Machine; Paver Feeder; Pugmill; Skid Steer $ 30.16 0.00

POWER EQUIPMENT OPERATOR: Group 2 - Concrete Paving Cure Machine; Concrete Paving Joint Sealer; Bull-Dozer 80 HP/less; Front End Loader 1.25 CY /less; Self-Propelled Roller (except Hot Mix); Sheepsfoot/Pneumatic Roller; Pneumatic Tired Tractor or Crawler (includes Water Wagon and Power Spray Units); Wagon Drill (Air Trac Drill); Truck Type Auger; Concrete Paving Saw; Concrete Grooving.. $ 31.73 0.00

POWER EQUIPMENT OPERATOR: Group 3 - Asphalt Distributor; Bulldozer over 80 HP; Backhoes/Excavators 20 tons or less; crusher (may include internal screening plant); Front End Loader over 1.25 CY; Rough Motor Grader; Self Propelled Hot Mix Roller; Push or Pull Tractor; Off-Highway Haul Trucks; Material Spreader or Palcer; Rumbler Strip Machine; Pavement Marking Grinding Equipment.. $ 31.56 0.00

POWER EQUIPMENT OPERATOR: Group 4 - Concrete Paving Fnishing Machine; Asphalt Paving Machine Screed; Asphalt Paving Machine; Cranes/Derricks/Draglines/Pile Drivers/Shovels-30 to 50 tons; Backhoes/Excavators-21 to 40 tons; Maintenance Mechanic; Scrapers (wheels or tracks); Concrete Pump Truck... $ 32.49 0.00

POWER EQUIPMENT OPERATOR: Group 5 - Asphalt Plant; Concrete Batch Plant; Backhoes/Excavators over 40 Tons; Cranes/Derricks/Draglines/Pile Drivers/Shovels over 50 tons; Heavy Duty Mechanic; Finsihg Motor Grader; Automatic Fine Grader; Milling Machine; Bridge Welder $ 34.96 8.36

TRUCK DRIVER: Group 1 - Tandem Truck without trailer or pup; Single Axle Truck over 26,000 GVW with or without Trailer .... $ 30.01 0.00

TRUCK DRIVER: Group 2 - Semi-Tractor and Trailer; Tandem Truck with Pup or Trailer..
$ 32.07 8.42

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

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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.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

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 classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than SU, UAVG, SA, or SC denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate 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. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The SU identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the 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. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

SU wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The SA identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007

01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the SA identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

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

a) a survey underlying a wage determination

b) an existing published wage determination

c) an initial WHD letter setting forth a position on a wage determination matter

d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

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

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail 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 an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail 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 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.

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END OF GENERAL DECISION"

PART V – GENERAL PROVISIONS

PART V - GENERAL PROVISIONS

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SECTION 10
DEFINITION OF TERMS

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

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

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

Paragraph Number	Term	Definition
10-19	**Contractor**	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	**Contractors Quality Control (QC) Facilities**	The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).
10-21	**Contractor Quality Control Program (CQCP)**	Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors.
10-22	**Control Strip**	A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.
10-23	**Construction Safety and Phasing Plan (CSPP)**	The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
10-24	**Drainage System**	The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
10-25	**Engineer**	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the contract work and acting directly or through an authorized representative.
10-26	**Equipment**	All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work.
10-27	**Extra Work**	An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or Resident Project Representative (RPR) to be necessary to complete the work within the intended scope of the contract as previously modified.
10-28	**FAA**	The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.

Paragraph Number	Term	Definition
10-29	**Federal Specifications**	The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.
10-30	**Force Account**	**a.** Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis. **b.** Owner Force Account - Work performed for the project by the Owner's employees.
10-31	**Intention of Terms**	Whenever, in these specifications or on the plans, the words “directed,” “required,” “permitted,” “ordered,” “designated,” “prescribed,” or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words “approved,” “acceptable,” “satisfactory,” or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner. Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.
10-32	**Lighting**	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
10-33	**Major and Minor Contract Items**	A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor contract items.
10-34	**Materials**	Any substance specified for use in the construction of the contract work.

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

Paragraph Number	Term	Definition
10-46	**Quality Assurance (QA)**	Owner's responsibility to assure that construction work completed complies with specifications for payment.
10-47	**Quality Control (QC)**	Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.
10-48	**Quality Assurance (QA) Inspector**	An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
10-49	**Quality Assurance (QA) Laboratory**	The official quality assurance testing laboratories of the Owner or such other laboratories as may be designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory.
10-50	**Resident Project Representative (RPR)**	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative.
10-51	**Runway**	The area on the airport prepared for the landing and takeoff of aircraft.
10-52	**Runway Safety Area (RSA)**	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the construction safety and phasing plan (CSPP) for limits of the RSA.
10-53	**Safety Plan Compliance Document (SPCD)**	Details how the Contractor will comply with the CSPP.
10-54	**Specifications**	A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.
10-55	**Sponsor**	A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.

Paragraph Number	Term	Definition
10-56	**Structures**	Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.
10-57	**Subgrade**	The soil that forms the pavement foundation.
10-58	**Superintendent**	The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction.
10-59	**Supplemental Agreement**	A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%: (2) in scope work would increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item.
10-60	**Surety**	The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.
10-61	**Taxilane**	A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas.
10-62	**Taxiway**	The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.
10-63	**Taxiway/Taxilane Safety Area (TSA)**	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See the construction safety and phasing plan (CSPP) for limits of the TSA.
10-64	**Work**	The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.

Paragraph Number	Term	Definition
10-65	**Working day**	A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.
10-66	**Owner Defined terms**	None

END OF SECTION 10

SECTION 20
PROPOSAL REQUIREMENTS AND CONDITIONS

20-01 Advertisement (Notice to Bidders). See "Notice To Bidders" section.

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.

A prebid conference will be held on this project to discuss as a minimum, the following items: material requirements; submittals; Quality Control/Quality Assurance requirements; the construction safety and phasing plan including airport access and staging areas; and unique airfield paving construction requirements. The prebid conference will be held at 11:00 a.m. (local time), on September 11, 2026 via GoToMeeting. All interested contractors, subcontractors, and suppliers are encouraged, but not required to attend. Below is the link and call-in information:

Microsoft Teams meeting
Join: https://teams.microsoft.com/meet/296586961259292?p=ykSHoptzZ7snWaeIHt
Meeting ID: 296 586 961 259 292
Passcode: KE7gs9Jw

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

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

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

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

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

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

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

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

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

The bidder shall correctly sign the proposal in ink. If the proposal is made by an individual, their name and post office address must be shown. If made by a partnership, the name and post office

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

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

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

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

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

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

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

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

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

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

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

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

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

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

City of Flandreau's Email Address: cohlturnquist@cityofflandreau.com

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 three (3) to five (5) 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 **60** calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

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

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

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

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

specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

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

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

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

END OF SECTION 30

SECTION 40
SCOPE OF WORK

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the

work, except where such excavation or removal is provided for in the contract, plans, or specifications.

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

END OF SECTION 40

SECTION 50
CONTROL OF WORK

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

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

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

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

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

The term "reasonably close conformity" is also intended to provide the RPR with the authority, after consultation with the Sponsor and FAA, to use sound engineering judgment in their determinations to accept work that is not in strict conformity, but will provide a finished product

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. Not used.

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

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

50-06 Cooperation between Contractors. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

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

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

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

50-07 Construction layout and stakes. The Engineer/RPR shall establish necessary horizontal and vertical control. The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor. Contractor is responsible for preserving integrity of horizontal and vertical controls established by Engineer/RPR. In case of negligence

on the part of the Contractor or their employees, resulting in the destruction of any horizontal and vertical control, the resulting costs will be deducted as a liquidated damage against the Contractor.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points necessary for the proper execution and control of the work on this project will be provided to the RPR. The Engineer/RPR shall 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): **pdf or csv**.

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

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

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

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

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

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

replacing of the covering or making good of the parts removed will be at the Contractor's expense.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

50-16 Claims for adjustment and disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the RPR in writing of their intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the RPR is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the RPR has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the

claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the RPR who will present it to the Owner for consideration in accordance with local laws or ordinances.

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

END OF SECTION 50

SECTION 60
CONTROL OF MATERIALS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

b. Suitability of the material or assembly for the use intended in the contract work.

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

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

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

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

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

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

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

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

60-05 Engineer/ Resident Project Representative (RPR) field office. 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 directed by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner's permission.

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

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

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

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

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

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

END OF SECTION 60

SECTION 70
LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

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

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

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

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

*******SEE PLAN NOTES FOR COORDINATION REQUIREMENTS*******

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

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

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

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

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

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

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

70-08 Construction Safety and Phasing Plan (CSPP). The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP is on sheet(s) three (3) through eight (8) of the project plans.

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.

*******SEE SECTION SC-6 OF THE SPECIAL CONDITIONS AND THE CONSTRUCTION SAFETY PHASING PLAN FOR SCHEDULED PHASING AND CONSTRUCTION LIMITATIONS*******

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

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

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

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

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

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

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

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

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and/or in the contract documents.

*******ALL UTILITIES SHALL BE NOTIFIED VIA THE SOUTH DAKOTA ONE CALL (1-800-781-7474)*******

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

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

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

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

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

70-18 No waiver of legal rights. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or

stopped from recovering from the Contractor or their surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill their obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

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

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

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

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

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

70-21 Insurance Requirements. Minimum Liability Limits shall be as follows:

Workmen's Compensation Statutory And Employer's Liability:

Each Accident	1,000,000
Disease Policy Limit	1,000,000
Disease Each Employee	1,000,000

Commercial General Liability:

General Aggregate	1,000,000
Products/Completed Operations Aggregate	1,000,000
Personal and Advertising Injury Limit	1,000,000
Each Occurrence Limit	1,000,000
Fire Damage (Any One Fire)	100,000
Medical Expense (Any One Person)	5,000

Automobile Liability:

Combined Single Limit	1,000,000
or	
Bodily Injury Per Person	1,000,000
Bodily Injury Per Accident	1,000,000
Property Damage Per Accident	1,000,000

Commercial General Liability coverage's shall include underground, explosion, and collapse insurance where applicable. Included in such insurance will be Contractual Liability coverage. A base policy with a lower limit and an umbrella policy to provide the above-required limits will be acceptable.

> **The Commercial General and Business Automobile Liability Insurance will include as Additional Insured: The OWNER, the ENGINEER, and his consultants; and each of their officers, agents, and employees. The Automobile portion of this coverage shall include non owned and hired vehicle insurance for the same limits of liability. In lieu of this "Additional Named Insured" provision, the Contractor may, at his option, provide an Owner's Protective Liability Insurance Policy in the name of the OWNER and will include as an "Additional Named Insured" or "Additional Interest" the ENGINEER and his consultants; and each of the above named and their officers, agents, and employees. The Automobile portion of this coverage shall include non owned and hired vehicle insurance for the same limits of Liability.**

Before commencement of the work, the Contractor shall submit written evidence in the form of Insurance Certificates showing that he and all of his Subcontractors have obtained for the period of the Contract, Commercial General and Business Automobile Liability Insurance.

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 15 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:

*******SEE CONSTRUCTION SAFETY PHASING PLAN REQUIREMENTS FOR LIMITATIONS OF OPERATIONS*******

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 completion date 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 specific completion date. When the contract time is a specified completion date, it shall be the date on which all contract work shall be substantially complete.

If the Contractor finds it impossible for reasons beyond their own control to complete the work within the contract time as specified, or as extended in accordance with the provisions of this paragraph, the Contractor may, at any time prior to the expiration of the contract time as extended, make a written request to the Owner for an extension of time setting forth the reasons which the Contractor believes will justify the granting of their own request. Requests for extension of time, caused by inclement weather, shall be supported with National Weather Bureau data showing the actual amount of inclement weather exceeded what could normally be expected during the contract period. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the supporting documentation justify the work was delayed because of conditions beyond the control and without the fault of the Contractor, the Owner may extend the time for completion by a change order that adjusts the contract time or completion date. The extended time for completion shall then be in full force and effect, the same as though it were the original time for completion.

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.

******SEE SPECIAL CONDITIONS (SC-1) FOR SCHEDULE OF LIQUIDATED DAMAGES******

******SEE SPECIAL CONDITIONS (SC-6) FOR ALLOWED CONSTRUCTION TIME, COMPLETION DATES, ETC.******

Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a wavier on the part of the Owner of any of its rights under the contract.

80-09 Default and termination of contract. The Contractor shall be considered in default of their contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons, if the Contractor:

a. Fails to begin the work under the contract within the time specified in the Notice to Proceed, or

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

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

d. Discontinues the execution of the work, or

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

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

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

h. Makes an assignment for the benefit of creditors, or

i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

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

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the RPR of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the RPR will be required for the completion of said contract in an acceptable manner.

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

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

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

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

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

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

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

END OF SECTION 80

SECTION 90
MEASUREMENT AND PAYMENT

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

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 (0.8 square meters) 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 (cubic meter) may be weighed, and such weights will be converted to cubic yards (cubic meters) for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the RPR and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Measurement and Payment Terms

Term	Description
Excavation and Embankment Volume	In computing volumes of excavation, the average end area method will be used unless otherwise specified.
Measurement and Proportion by Weight	The term "ton" will mean the short ton consisting of 2,000 pounds (907 km) 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.

Term	Description
Measurement by Volume	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 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.
Asphalt Material	Asphalt materials will be measured by the gallon (liter) or ton (kg). When measured by volume, such volumes will be measured at 60°F (16°C) or will be corrected to the volume at 60°F (16°C) 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.
Cement	Cement will be measured by the ton (kg) or hundredweight (km).
Structure	Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.
Timber	Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.
Plates and Sheets	The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch.
Miscellaneous Items	When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

Term	Description
Scales	Scales must be tested for accuracy and serviced before use. Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end. Scales shall be accurate within 0.5% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the RPR before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed 0.1% of the nominal rated capacity of the scale, but not less than one pound (454 grams). 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%. In the event inspection reveals the scales have been under-weighing (indicating less than correct weight), they shall be immediately adjusted. No additional payment to the Contractor will be allowed for materials previously weighed and recorded. Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them. Scale installations shall have available ten standard 50-pound (2.3 km) weights for testing the weighing equipment or suitable weights and devices for other approved equipment. All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.
Rental Equipment	Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered in connection with extra work will be measured as agreed in the change order or supplemental agreement authorizing such work as provided in paragraph 90-05 *Payment for Extra Work*.

Term	Description
Pay Quantities	When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the RPR. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

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

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

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

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

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

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

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

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

90-06 Partial payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, 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.

a. From the total of the amount determined to be payable on a partial payment, 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. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work. Light Emitting Diode emitting diode (LED) light fixtures with the exception of obstruction lighting, must be warranted by the manufacturer for a minimum of four (4) years after date of installation inclusive of all electronics.

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

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

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

f. If the Contractor fails to remedy any failure, defect, or damage within 30 days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

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

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

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

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

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

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

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

e. Provide complete release of all claims for labor and material arising out of the Contract.

f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.

g. When applicable per state requirements, return copies of sales tax completion forms.

h. Manufacturer's certifications for all items incorporated in the work.

i. All required record drawings, as-built drawings or as-constructed drawings.

j. Project Operation and Maintenance (O&M) Manual(s).

k. Security for Construction Warranty.

l. Equipment commissioning documentation submitted, if required.

END OF SECTION 90

ITEM C-100 CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)

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

The Contractor shall establish a CQCP that will:

a. Provide qualified personnel to develop and implement the CQCP.

b. Provide for the production of acceptable quality materials.

c. Provide sufficient information to assure that the specification requirements can be met.

d. Document the CQCP process.

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

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

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

a. Review of the CQCP including submittals, QC Testing, Action & Suspension Limits for Production, Corrective Action Plans, Distribution of QC reports, and Control Charts.

b. Discussion of the QA program.

c. Discussion of the QC and QA Organization and authority including coordination and information exchange between QC and QA.

d. Establish regular meetings to discuss control of materials, methods and testing.

e. Establishment of the overall QC culture.

100-2 Description of program.

a. General description. The Contractor shall establish a CQCP to perform QC inspection and testing of all items of work required by the technical specifications, including those

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

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

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

1. QC organization and resumes of key staff
2. Project progress schedule
3. Submittals schedule
4. Inspection requirements
5. QC testing plan
6. Documentation of QC activities and distribution of QC reports
7. Requirements for corrective action when QC and/or QA acceptance criteria are not met
8. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

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

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

The organizational chart shall identify all QC staff by name and function, and shall indicate the total staff required to implement all elements of the CQCP, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the CQCP, the personnel assigned shall be subject to the qualification requirements of paragraphs 100-03a and 100-03b. The organizational

chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

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

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

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

(1) Professional Engineer with one (1) year of airport paving experience.

(2) Engineer-in-training with two (2) years of airport paving experience.

(3) National Institute for Certification in Engineering Technologies (NICET) Civil Engineering Technology Level IV with three (3) years of airport paving experience.

(4) An individual with four (4) years of airport paving experience, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

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

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

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

(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by paragraph 100-6.

(2) Performance of all QC tests as required by the technical specifications and paragraph100-8.

(3) Performance of tests for the RPR when required by the technical specifications.

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

c. Staffing levels. The Contractor shall provide sufficient qualified QC personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field

placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The CQCP shall state where different technicians will be required for different work elements.

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

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

a. Specification item number

b. Item description

c. Description of submittal

d. Specification paragraph requiring submittal

e. Scheduled date of submittal

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

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

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

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

100-7 Contractor QC testing facility.

a. For projects that include Item P-401, Item P-403, and Item P-404, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM D3666, *Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials*:

8.1.3 Equipment Calibration and Checks;

8.1.9 Equipment Calibration, Standardization, and Check Records;

8.1.12 Test Methods and Procedures

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

7 Test Methods and Procedures

8 Facilities, Equipment, and Supplemental Procedures

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

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

a. Specification item number (e.g., P-401)

b. Item description (e.g., Hot Mix Asphalt Pavements)

c. Test type (e.g., gradation, grade, asphalt content)

d. Test standard (e.g., ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)

e. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)

f. Responsibility (e.g., plant technician)

g. Control requirements (e.g., target, permissible deviations)

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

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

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

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

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

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

(1) Technical specification item number and description

(2) Compliance with approved submittals

(3) Proper storage of materials and equipment

(4) Proper operation of all equipment

(5) Adherence to plans and technical specifications

(6) Summary of any necessary corrective actions

(7) Safety inspection.

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

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

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

(1) Technical specification item number and description

(2) Test designation

(3) Location

(4) Date of test

(5) Control requirements

(6) Test results

(7) Causes for rejection

(8) Recommended remedial actions

(9) Retests

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

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

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

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

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

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

100-12 Noncompliance.

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

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

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

(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

METHOD OF MEASUREMENT

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

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

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

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

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

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

BASIS OF PAYMENT

100-14 Payment will be made for each accepted bid schedule under:

Item C-100 Contractor Quality Control Program (CQCP)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

National Institute for Certification in Engineering Technologies (NICET)

ASTM International (ASTM)

ASTM C1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

ASTM D3665 Standard Practice for Random Sampling of Construction Materials

ASTM D3666 Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

END OF ITEM C-100

ITEM C-105 MOBILIZATION

105-1 Description. This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

105-2 Mobilization limit. Mobilization shall be limited to 10 percent of the total project cost.

105-3 Posted notices. Prior to commencement of construction activities, the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL "Notice to All Employees" Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

105-4 Engineer/RPR field office. 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 for each accepted bid schedule under:

Item C-105 Mobilization (Max of 10% of Total Project Cost)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Office of Federal Contract Compliance Programs (OFCCP)

Executive Order 11246, as amended

EEOC-P/E-1 – Equal Employment Opportunity is the Law Poster

United States Department of Labor, Wage and Hour Division (WHD)

WH 1321 – Employee Rights under the Davis-Bacon Act Poster

END OF ITEM C-105

ITEM C-110 METHOD OF ESTIMATING PERCENTAGE OF MATERIAL WITHIN SPECIFICATION LIMITS (PWL)

110-1 General. When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (X) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index, Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the Contractor that, in order to consistently offset the Contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the Contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

110-2 Method for computing PWL. The computational sequence for computing PWL is as follows:

a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.

b. Locate the random sampling position within the sublot in accordance with the requirements of the specification.

c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.

d. Find the sample average (X) for all sublot test values within the lot by using the following formula:

$$\mathbf{X = (x_1 + x_2 + x_3 + \ldots x_n) / n}$$

Where: X = Sample average of all sublot test values within a lot

$x_1, x_2, \ldots x_n$ = Individual sublot test values

n = Number of sublot test values

e. Find the sample standard deviation (S_n) by use of the following formula:

$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \ldots d_n^2)/(n-1)]^{1/2}$$

Where: S_n = Sample standard deviation of the number of sublot test values in the set

$d_1, d_2, \ldots d_n$ = Deviations of the individual sublot test values $x_1, x_2, \ldots$ from the average value X

that is: $d_1 = (x_1 - X)$, $d_2 = (x_2 - X) \ldots d_n = (x_n - X)$

n = Number of sublot test values

f. For single sided specification limits (i.e., L only), compute the Lower Quality Index Q_L by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L, using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (i.e., L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$Q_L = (X - L) / S_n$$

and

$$Q_U = (U - X) / S_n$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U, using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U. Determine the PWL by use of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where: P_L = percent within lower specification limit

P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project

Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

A-1 = 96.60

A-2 = 97.55

A-3 = 99.30

A-4 = 98.35

$n = 4$

2. Calculate average density for the lot.

$X = (x_1 + x_2 + x_3 + \ldots x_n) / n$

$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$

$X = 97.95\%$ density

3. Calculate the standard deviation for the lot.

$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)) / (4 - 1)]^{1/2}$

$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$

$S_n = 1.15$

4. Calculate the Lower Quality Index Q_L for the lot. (L=96.3)

$Q_L = (X - L) / S_n$

$Q_L = (97.95 - 96.30) / 1.15$

$Q_L = 1.4348$

5. Determine PWL by entering Table 1 with $Q_L = 1.44$ and $n = 4$.

PWL = 98

B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

A-1 = 5.00

A-2 = 3.74

A-3 = 2.30

A-4 = 3.25

2. Calculate the average air voids for the lot.

$X = (x_1 + x_2 + x_3 \ldots n) / n$

$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$

$X = 3.57\%$

3. Calculate the standard deviation S_n for the lot.

$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)]^{1/2}$

$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$

$S_n = 1.12$

4. Calculate the Lower Quality Index Q_L for the lot. (L= 2.0)

$Q_L = (X - L) / S_n$

$Q_L = (3.57 - 2.00) / 1.12$

$Q_L = 1.3992$

5. Determine P_L by entering Table 1 with $Q_L = 1.41$ and $n = 4$.

$P_L = 97$

6. Calculate the Upper Quality Index Q_U for the lot. (U= 5.0)

$Q_U = (U - X) / S_n$

$Q_U = (5.00 - 3.57) / 1.12$

$Q_U = 1.2702$

7. Determine P_U by entering Table 1 with $Q_U = 1.29$ and n = 4.

$P_U = 93$

8. Calculate Air Voids PWL

$PWL = (P_L + P_U) - 100$

$PWL = (97 + 93) - 100 = 90$

EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E178)

Project: Example Project

Test Item: Item P-401, Lot A.

A. Outlier Determination for Mat Density.

1. Density of four random cores taken from Lot A arranged in descending order.

A-3 = 99.30

A-4 = 98.35

A-2 = 97.55

A-1 = 96.60

2. From ASTM E178, Table 1, for n=4 an upper 5% significance level, the critical value for test criterion = 1.463.

3. Use average density, standard deviation, and test criterion value to evaluate density measurements.

a. For measurements greater than the average:

If (measurement - average)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-3, check if (99.30 - 97.95) / 1.15 is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

b. For measurements less than the average:

If (average - measurement)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-1, check if (97.95 - 96.60) / 1.15 is greater than 1.463.

Since 1.435 is less than 1.463, the value is not an outlier.

Note: In this example, a measurement would be considered an outlier if the density were:

Greater than (97.95 + 1.463 × 1.15) = 99.63%

OR

less than (97.95 - 1.463 × 1.15) = 96.27%.

Table 1. Table for Estimating Percent of Lot Within Limits (PWL)

Percent Within Limits (P_L and P_U)	Positive Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Percent Within Limits (P_L and P_U)	Negative Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
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

PART VI - TECHNICAL SPECIFICATIONS

PART VI – TECHNICAL SPECIFICATIONS

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ITEM S-100 CONSTRUCTION SAFETY PHASING PLAN

DESCRIPTION

100-1.1 This item shall consist of preparatory work and operations, including, but not limited to the necessary movement of personnel, equipment, and incidentals to the project site; for the establishment of all temporary pavement marking, lighting, and signing, necessary for the satisfactory completion of the requirements as set forth in the project drawings for construction safety on the project site.

BASIS OF PAYMENT

100-2.1 Payment will be made at the contract lump sum price, which price shall be considered full compensation for all costs incidental there to.

Based on the lump sum contract price for completion of the Construction Safety Phasing Plan, partial payments therefore will be made on the basis of the following schedule:

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%.

END OF ITEM S-100

ITEM P-101 PREPARATION/REMOVAL OF EXISTING PAVEMENT

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/base material to be removed shall be cut to the full depth of the asphalt pavement around the perimeter of the area to be removed. After removal, the material shall be processed and be incorporated into the subbase course. The processed material shall meet the material requirements set forth in Section P-154 (recycled pavement).

101-3.2 Cold milling. Milling shall be performed with a power-operated milling machine or grinder, capable of producing a uniform finished surface. The milling machine or grinder shall operate without tearing or gouging the underlaying surface. The milling machine or grinder shall be equipped with grade and slope controls, and a positive means of dust control. All millings shall be removed and disposed in areas designated on the plans. If the Contractor mills or grinds deeper or wider than the plans specify, the Contractor shall replace the material removed with new material at the Contractor's Expense.

a. Patching. The milling machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement and it shall have a positive method of controlling the depth of cut. The RPR shall layout the area to be milled with a straightedge in increments of 1-foot (30 cm) widths. The area to be milled shall cover only the failed area. Any excessive area that is milled because the Contractor doesn't have the appropriate milling machine, or areas that are damaged because of his negligence, shall be repaired by the Contractor at the Contractor's Expense.

b. Profiling, grade correction, or surface correction. The milling machine shall have a minimum width of 7 feet (2 m) and it shall be equipped with electronic grade control devices that will cut the surface to the grade specified. The tolerances shall be maintained within +0 inch and -1/4 inch (+0 mm and -6mm) of the specified grade. The machine must cut vertical

edges and have a positive method of dust control. The machine must have the ability to remove the millings or cuttings from the pavement and load them into a truck. All millings shall be removed and disposed of in areas designated on the plans.

c. Clean-up. The Contractor shall sweep the milled surface daily and immediately after the milling until all residual materials are removed from the pavement surface. Prior to paving, the Contractor shall wet down the milled pavement and thoroughly sweep and/or blow the surface to remove loose residual material. Waste materials shall be collected and removed from the pavement surface and adjacent areas by sweeping or vacuuming. Waste materials shall be removed and disposed in areas designated on the plans

101-3.3 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.

METHOD OF MEASUREMENT

101-4.1 Pavement removal. The unit of measurement for pavement removal shall be the number of square yards (square meters) removed by the Contractor. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for saw cutting. Saw cutting shall be incidental to pavement removal. Dowel bar installation shall be incidental to pavement removal.

101-4.2 Cold milling. The unit of measure for cold milling shall be 2 inches of milling per square yard (square meter). The location and average depth of the cold milling shall be as shown on the plans. If the initial cut does not correct the condition, the Contractor shall re-mill the area and will be paid for the total depth of milling.

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.

Alternate Bid 2

Item P 101-5.1	Asphalt Cold Milling (2.5" Nominal Depth) – per square yard (square meter)
Item P 101-5.2	Asphalt Pavement/Base Removal (10" Nominal Depth) - per square yard (square meter)

Alternate Bid 3

Item P 101-5.1	Asphalt Cold Milling (2.5” Nominal Depth) – per square yard (square meter)
Item P 101-5.2	Asphalt Pavement/Base Removal (10” Nominal Depth) - per square yard (square meter)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

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

ASTM International (ASTM)

ASTM D6690 Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

END OF ITEM P-101

ITEM P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

152-1.2 Classification. All material excavated shall be classified as defined below:

a. Unclassified excavation. Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature which is not otherwise classified and paid for under one of the following items.

b. Borrow excavation. Borrow excavation shall consist of approved material required for the construction of embankments or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas designated by the Resident Project Representative (RPR) within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport boundaries.

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 in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (100 mm), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 6 inches (150 mm) of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

a. Blasting. Blasting shall not be allowed.

152-2.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

Digital terrain model (DTM) files of the existing surfaces, finished surfaces and other various surfaces were used to develop the design plans.

OR

Volumetric quantities were calculated by comparing DTM files of the applicable design surfaces and generating Triangle Volume Reports. Electronic copies of DTM files and a paper copy of the original topographic map will be issued to the successful bidder.

OR

Volumetric quantities were calculated using design cross sections which were created for this project using the DTM files of the applicable design surfaces and generating End Area Volume Reports. Paper copies of design cross sections and a paper copy of the original topographic map will be issued to the successful bidder.

OR

Existing grades on the design cross sections or DTM's, where they do not match the locations of actual spot elevations shown on the topographic map, were developed by computer interpolation from those spot elevations. Prior to disturbing original grade, Contractor shall verify the accuracy of the existing ground surface by verifying spot elevations at the same locations where original field survey data was obtained as indicated on the topographic map. Contractor shall recognize that, due to the interpolation process, the actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. Contractor's verification of original ground surface, however, shall be limited to verification of spot elevations as indicated herein, and no adjustments will be made to the original ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot (30 mm) of the stated elevations for ground surfaces, or within 0.04 foot (12 mm) for hard surfaces (pavements, buildings, foundations, structures, etc.) shall be considered "no change". Only deviations in excess of these will be considered for adjustment of the original ground surface. If Contractor's verification identifies discrepancies in the topographic map, Contractor shall notify the RPR in writing at least two weeks before disturbance of existing grade to allow sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's.

Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes as shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

a. Selective grading. When selective grading is indicated on the plans, the more suitable material designated by the RPR shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches (300 mm) below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed of at locations shown on the plans. This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for unclassified excavation. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as unclassified excavation.

c. Over-break. Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as “Unclassified Excavation.”

d. Removal of utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet (60 cm) below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. All

foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

152-2.3 Borrow excavation. Borrow areas within the airport property are indicated on the plans. Borrow excavation shall be made only at these designated locations and within the horizontal and vertical limits as staked or as directed by the RPR. All unsuitable material shall be disposed of by the Contractor as shown on the plans. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

152-2.4 Drainage excavation. Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

152-2.5 Preparation of cut areas or areas where existing pavement has been removed. In those areas on which a subbase or base course is to be placed, the top 12 inches (300 mm) of subgrade shall be compacted to not less than 100 % of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM 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. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches (150 mm) and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches (300 mm) and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-2.7 Control Strip. The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

152-2.8 Formation of embankments. The material shall be constructed in lifts as established in the control strip, but not less than 6 inches (150 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within ±2% of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The RPR will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D698. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the RPR for every 1,200 square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

If the material has greater than 30% retained on the 3/4-inch (19.0 mm) sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted to not less than 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM 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.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches (100 mm) which shall be prepared for a seedbed in accordance with Item T-901.

The in-place field density shall be determined in accordance with ASTM D1556 or 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 RPR shall perform all density tests. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches (100 mm) in their greatest dimensions will not be allowed in the top 12 inches (300 mm) of the subgrade. Rockfill shall be brought up in lifts as specified or as directed by the RPR and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the RPR.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet (60 cm) in thickness. Each lift shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The lift shall not be constructed above an elevation 4 feet (1.2 m) below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

152-2.9 Proof rolling. The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. Before start of embankment, and after compaction is completed, the subgrade area shall be proof rolled with a 20 ton (18.1 metric ton) Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 80/100/150 psi (0.551 MPa/0.689 MPa/1.034 MPa), 20 ton Proof Roller with tires spaced not more than 32 inches (0.8 m) on-center with tires inflated to 100/125/150 psi (0.689 MPa/0.861 MPa/1.034 MPa) in the presence of the RPR. Apply a minimum of complete coverage, or as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch (25 mm) or show permanent deformation greater than 1 inch (25 mm) shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in

accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

152-2.10 Compaction requirements. The subgrade under areas to be paved shall be compacted to a depth of 12 inches (300 mm) and to a density of not less than 95 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 (300 mm) and to a density of not less than 95 percent of the maximum density as determined by ASTM D698.

The material to be compacted shall be within ±2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, follow the methods in ASTM D698 procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized particles. Tests for moisture content and compaction will be taken at a minimum of 1,200 S.Y. of subgrade. All quality assurance testing shall be done by the RPR.

The in-place field density shall be determined in accordance with ASTM D1556 or ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the RPR and the finished subgrade shall be maintained.

152-2.11 Finishing and protection of subgrade. Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

152-2.12 Haul. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

152-2.13 Surface Tolerances. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

a. **Smoothness.** The finished surface shall not vary more than +/- ½ inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. **Grade.** The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +/-0.05 feet (15 mm) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to placed, grade shall not vary more than 0.10 feet (30 mm) from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-2.14 Topsoil. When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905. No direct payment will be made for topsoil under Item P-152.

METHOD OF MEASUREMENT

152-3.1 Measurement for payment specified by the cubic yard (cubic meter) shall be computed by the average end areas of design cross sections or the comparison of digital terrain model (DTM) surfaces for computation of neat line design quantities. The end area is that bound by the original ground line established by field cross-sections and the final theoretical pay line established by cross-sections shown on the plans, subject to verification by the RPR.

152-3.1 The quantity of unclassified excavation to be paid for shall be the number of cubic yards (cubic meters) measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.

152-3.2 The quantity of borrow excavation to be paid for shall be the number of cubic yards (cubic meters) measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.

BASIS OF PAYMENT

152-4.1 Unclassified excavation payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.2 Borrow excavation payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Base Bid

Item P-152-4.1 Unclassified Excavation - per cubic yard (cubic meter)

Item P-152-4.2 On-Site Borrow Material - per cubic yard (cubic meter)

Alternate Bid 2

Item P-152-4.1 Unclassified Excavation - per cubic yard (cubic meter)

Item P-152-4.2 Disposal of Excess Material - per cubic yard (cubic meter)

Alternate Bid 3

Item P-152-4.1 Unclassified Excavation - per cubic yard (cubic meter)

Item P-152-4.2 Disposal of Excess Material - per cubic yard (cubic meter)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T-180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

ASTM International (ASTM)

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Advisory Circulars (AC)

AC 150/5370-2	Operational Safety on Airports During Construction Software

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

FAA RD-76-66	Design and Construction of Airport Pavements on Expansive Soils

END OF ITEM P-152

ITEM P-154 SUBBASE COURSE

DESCRIPTION

154-1.1 This item shall consist of a subbase course composed of granular materials constructed on a prepared subgrade or underlying course in accordance with these specifications, and in conformity with the dimensions and typical cross-section shown on the plans.

MATERIALS

154-2.1 Materials. The subbase material shall consist of hard durable particles or fragments of granular aggregates, and/or recycled asphalt pavement (RAP). The material may be obtained from gravel pits, stockpiles, or may be produced from a crushing and screening plant with proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. The material shall be free from vegetative matter, excessive amounts of clay, and other objectionable substances; uniformly blended; and be capable of being compacted into a dense, stable subbase.

The subbase material shall exhibit a California Bearing Ratio (CBR) value of at least 20 when tested in accordance with ASTM D1883. The subbase material shall meet the gradation specified in the table below.

Subbase Gradation Requirements

Sieve designation	Percentage by weight passing sieves		Contractor's Final Gradation	Job Control Grading Band Tolerances[1] (Percent)
	Subbase Aggregate	Recycled pavement (RAP or RCO)		
3 inch (75 mm)	100			0
1 1/2 inch (37.5 mm)		100		0
3/4 inch (19.0 mm)	70-100	70-100		±10
No. 10 (2.00 mm)	20-100	20-100		±10
No. 40 (425 µm)	5-60	5-60		±5
No. 200 (75 µm)	0-10	0-10		±5

[1]The "Job Control Grading Band Tolerances" shall be applied to "Contractor's Final Gradation" to establish the job control grading band.

The portion of the material passing the No. 40 (425 µm) sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than six (6) when tested in accordance with ASTM D4318.

154-2.2 Sampling and testing.

a. Aggregate base materials. Samples shall be taken by the Contractor per ASTM D75 for initial aggregate subbase requirements and gradation. Material shall meet the requirements in paragraphs 154-2.1. The Contractor shall submit to the Resident Project Representative (RPR) certified test results showing that the aggregate meets the Material requirements of this section. Tests shall be representative of the material to be used for the project.

b. Gradation requirements. The Contractor shall take at least one aggregate subbase sample per day in the presence of the RPR to check the final gradation. Samples shall be taken from the in-place, un-compacted material at sampling locations determined by the RPR on a random basis per ASTM D3665. Sampling shall be per ASTM D75 and tested per ASTM C136 and ASTM C117. Results shall be furnished to the RPR by the Contractor each day during construction. Material shall meet the requirements in paragraph 154-2.1.

154-2.3 Separation Geotextile. Separation geotextile shall be Class 2.

a. The geotextile fabric can be woven or non-woven and shall meet or exceed the following requirements as specified in the table below:

Fabric Property	Test Method	Separator Fabric	
		Woven	Non-Woven
AASHTO Class	AASHTO M 288	3 Woven	2 Non-Woven
PERFORMANCE CRITERIA DURING SERVICE LIFE			
AOS, US Standard Sieve	ASTM D4751	40-100	40-100
Permittivity, Sec-1	ASTM D4491	0.05 Min	0.1 Min
Thickness, Mils	ASTM D5199	- - -	- - -
STRENGTH REQUIREMENTS			
Grab Strength*4, Ibs	ASTM D4632	180	160
Grab Elongation*4, %	ASTM D4632	50 Max	50 Min
Trapezoid Tear Strength, lbs	ASTM D4533	70	55
Puncture Strength, lbs	ASTM D6241	370	310
UV Strength Retention, %	ASTM D4355 *3	50	50
Wide Width Strip Tensile Strength*4, lbs/inch	ASTM D4595 *2	- - -	- - -

*2 8 inch wide x 4 inch length specimen tested at a strain rate of 10% (0.4 inch) per minute.

*3 Non-stabilized or low susceptible geotextiles should not be exposed to ultraviolet radiation for more than 5 days.

*4 Grab strength, grab elongation, and wide width strip tensile strength are measured in machine and cross-machine directions.

b. The Contractor shall furnish materials with minimum roll values that meet or exceed project requirements.

c. Geotextiles shall be provided in rolls wrapped in relatively impermeable and opaque protective covers with the following clearly marked on each roll.

1. Manufacturer's name.
2. Product identification.
3. Lot and roll number.
4. Roll dimensions.

d. Geotextiles shall be stored in a dry location above the ground surface. Geotextiles shall not be stored directly on the ground.

e. Geotextiles shall be handled in accordance with the manufacturer's recommendations to prevent damage to material during unloading, handling, and installation.

f. A representative of the manufacturer shall be present, on-site, to monitor the first day of installation of the fabric to ensure that the proper methods are used for preparation of the subgrade and for handling, laying, and overlapping of the fabric. The manufacturer's representative shall certify, in writing, that the Contractor's above listed methods are acceptable.

154-2.4 Geogrid. The geogrid shall meet or exceed the following requirements as specified in the Table below:

Geogrid Requirements

Property	Test Method	Specifications (1)
Minimum opening size	N/A (2)	½ in (13 mm)
Maximum opening size	N/A (2)	3 in (75 mm)
Tensile strength at 2% strain	ASTM D6637	400 lb/ft (5.8 kN/m)
Tensile strength at 5% strain	ASTM D6637	800 lb/ft (11.7 kN/m)
Ultimate tensile strength	ASTM D6637	1300 lb/ft (19.0 kN/m)
Junction strength	GRI (3) GG2	25 lb (110 N)
Ultraviolet stability	ASTM D4355	50% retained strength after 500 hours of exposure

(1) Strength values are in the weaker principal direction.
(2) Direct measure with caliper.
(3) Geosynthetic Research Institute.

b. The Contractor shall furnish materials with minimum roll values that meet or exceed project requirements.

c. Geogrids shall be provided in rolls wrapped in relatively impermeable and opaque protective covers with the following clearly marked on each roll.

1. Manufacturer's name.
2. Product identification.
3. Lot and roll number.
4. Roll dimensions.

d. Geogrids shall be stored in a dry location above the ground surface. Geotextiles shall not be stored directly on the ground.

e. Geogrids shall be handled in accordance with the manufacturer's recommendations to prevent damage to material during unloading, handling, and installation.

f. A representative of the manufacturer shall be present, on-site, to monitor the first day of installation of the geogrid to ensure that the proper methods are used for preparation of the subgrade and for handling, laying, and overlapping of the geogrid. The manufacturer's representative shall certify, in writing, that the Contractor's above listed methods are acceptable.

CONSTRUCTION METHODS

154-3.1 General. The subbase course shall be placed where designated on the plans or as directed by the RPR. The material shall be shaped and thoroughly compacted within the tolerances specified.

Granular subbases which, due to grain sizes or shapes, are not sufficiently stable to support the construction equipment without movement, shall be mechanically modified to the depth necessary to provide stability as directed by the RPR. The mechanical modification shall include the addition of a fine-grained medium to bind the particles of the subbase material sufficiently to furnish a bearing strength, so the course will not deform under construction equipment traffic.

154-3.2 Preparing underlying course. Prior to constructing the subbase course, clean the underlying course or subgrade of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances in accordance with Item P-152. Correct ruts, soft yielding spots in the underlying courses, and subgrade areas having inadequate compaction and/or deviations of the surface from the specified requirements, by loosening and removing soft or unsatisfactory material, adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D2487, the surface shall be stabilized prior to placement of the overlying course by mixing the overlying course material into the underlying course, and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements for the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the overlying course is placed. The underlying course shall be checked and accepted by the RPR before placing and spreading operations are started.

To protect the subgrade and to ensure proper drainage, spreading of the subbase shall begin along the centerline of the pavement on a crowned section or on the high side of pavements with a one-way slope.

154-3.3 Control Strip. The first half-day of subbase construction shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

154-3.4 Placement. The material 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 material shall not be placed when the underlying course is soft or yielding.

The material shall meet gradation and moisture requirements prior to compaction. Material may be free-draining and the minimum moisture content shall be established for placement and compaction of the material.

The material shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

154-3.5 Compaction. The subbase material shall be compacted, adjusting moisture as necessary, to be within ±2% of optimum moisture. The field density of the compacted material shall be at least 100% of the maximum density as specified in paragraph 154-3.9a. If the specified density is not attained, the area of the lift represented by the test shall be reworked and/or re-compacted and 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.

154-3.6 Weather limitation. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on subbase course shall not be conducted when the subgrade is wet or frozen or the subbase material contains frozen material.

154-3.7 Maintenance. No base or surface course shall be placed on the subbase until the subbase has been accepted by the RPR. The Contractor shall maintain the completed course in

satisfactory condition throughout placement of subsequent layers. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, the Contractor shall verify that materials still meet all specification requirements before placement of additional material. Equipment may be routed over completed sections of subbase course, provided the equipment does not damage the subbase course and the equipment is routed over the full width of the completed subbase course. Any damage to the subbase course from routing equipment over the subbase course shall be repaired by the Contractor at their expense.

154-3.8 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 (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

a. Smoothness. The finished surface shall not vary more than +/- ½ inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +/-0.05 feet (15 mm) of the specified grade.

154-3.9 Acceptance sampling and testing. The aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each 2,400 square yards (2,000 square meters). Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. The RPR shall perform all density tests.

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 D1556 or 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 shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, use methods in ASTM D698 and the procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized particles.

b. Thickness. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where

depth tests have been taken. In lieu of depth tests the Contractor has the option to take survey measurements. The survey shall be taken at no more than 50 foot (15 meter) intervals before and after placement of subbase course.

154-3.10 Separation Geotextile Installation.

a. The Contractor shall install all geotextile fabrics according to manufacturer's recommendations and as specified herein.

b. The geotextile fabric shall be placed directly on the properly graded and exposed subgrade.

c. In the presence of wind, the Contractor shall weight the geotextile during placement with sufficient sandbags, or equivalent, to keep the fabric in place.

d. The geotextile fabric shall not be exposed to direct sunlight for more than 15 days, unless otherwise specified.

e. Longitudinal joints in the geotextile fabric shall be overlapped a minimum of 12 inches.

f. Transverse joints in the geotextile fabric shall be overlapped a minimum of 5 feet.

g. Construction equipment and/or vehicles will not be permitted on the geotextile fabric.

h. The Contractor shall repair all tears in the geotextile fabric prior to placement of aggregates. The repair procedures shall be as recommended by the manufacturer.

(1). Should any tear exceed 10% of the roll width, the fabric shall be cut and a transverse joint shall be formed.

i. Samples of all materials proposed for use shall be submitted by the Contractor to the Engineer. The material shall not be used until it has been approved by the Engineer.

154-3.11 Geogrid Installation

a. The Contractor shall install the geogrid material according to manufacturer's recommendations and as specified herein.

b. The geogrid material shall be placed directly on the properly installed geotextile fabric.

c. The Contractor shall pin the geogrid material with staples or granular subbase material to keep the geogrid in place.

d. The geogrid material shall not be exposed to direct sunlight for more than 10 days.

e. Longitudinal joints in the geogrid material shall be overlapped a minimum of 24 inches.

f. Transverse joints in the geogrid material shall be overlapped a minimum of 5 feet.

g. Construction equipment and/or vehicles will not be permitted directly on the geogrid material.

h. Samples of all materials proposed for use shall be submitted by the Contractor to the Engineer. The material shall not be used until it has been approved by the Engineer.

METHOD OF MEASUREMENT

154-4.1 Subbase course shall be measured by the number of cubic yards (cubic meters) of subbase course material placed and compacted to specified density and plan thickness requirements in the completed course. The quantity of subbase course material shall be measured in final position based upon depth tests or cores taken as directed by the RPR, at the rate of two test per each 2,400 square yards (2,000 square meters) of subbase course or survey of the completed work computed from elevations to the nearest 0.01 foot (3 mm). On individual depth measurements, thicknesses more than 1/2 inch (12 mm) in excess of that shown on the plans shall be considered as the specified thickness plus 1/2 inch (12 mm) in computing the yardage for payment. Subbase materials shall not be included in any other excavation quantities.

154-4.2 Geotextile fabric shall be measured by the number of square yards of materials placed and accepted by the RPR as complying with the plans and specifications excluding seam overlaps and edge anchoring.

154-4.3 Geogrid shall be measured by the number of square yards of materials placed and accepted by the RPR as complying with the plans and specifications excluding seam overlaps and edge anchoring.

BASIS OF PAYMENT

154-5.1 Payment shall be made at the contract unit price per cubic yard (cubic meter) for subbase course. This price shall be full compensation for furnishing all materials; for all preparation, hauling, and placing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

154-5.2 Payment shall be made at the contract unit price per square yard for separation geotextile-class 2. The price shall be full compensation for furnishing all labor, equipment, material, anchors, and necessary incidentals.

154-5.3 Payment shall be made at the contract unit price per square yard for geogrid. The price shall be full compensation for furnishing all labor, equipment, material, anchors, and necessary incidentals.

Payment will be made under:

Base Bid

Item P-154-5.1	Subbase Course (Furnished) - per cubic yard (cubic meter)
Item P-154-5.2	Subbase Course (Recycled) – per cubic yard (cubic meter)
Item P-154-5.3	Geotextile Separator Fabric – per square yard (square meter)
Item P-154-5.4	Geogrid – per square yard (square meter)

Alternate Bid 2

Item P-154-5.1	Subbase Course (Furnished) - per cubic yard (cubic meter)
Item P-154-5.2	Subbase Course (Recycled) – per cubic yard (cubic meter)
Item P-154-5.3	Geotextile Separator Fabric – per square yard (square meter)
Item P-154-5.4	Geogrid – per square yard (square meter)

Alternate Bid 3

Item P-154-5.1	Subbase Course (Furnished) - per cubic yard (cubic meter)
Item P-154-5.2	Subbase Course (Recycled) – per cubic yard (cubic meter)
Item P-154-5.3	Geotextile Separator Fabric – per square yard (square meter)
Item P-154-5.4	Geogrid – per square yard (square meter)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4759	Practice for Determining the Specification Conformance of Geosynthetics
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

American Association of State Highway and Transportation Officials (AASHTO)

M 288	Geotextile Specification for Highway Applications

END OF ITEM P-154

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 (4.75 mm) 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
Coarse Aggregate		
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Percentage of Fractured Particles	Minimum 30% by weight of particles with at least one fractured face	ASTM D5821
Fine Aggregate		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than six (6)	ASTM D4318

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[1] Percent
1 inch (25.0 mm)	100		±8
3/4 inch (19.0 mm)	80-100		±8
1/2 inch (12.5 mm)	68-91		±8
No. 4 (4.75 mm)	46-70		±8
No. 8 (2.36 mm_	34-58		±8
No. 40 (425 µm)	13-35		±5
No. 200 (75 µm)	3.0-12.0		±3

1 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.

b. Gradation requirements. The Contractor shall take at least one (1) aggregate base sample per day in the presence of the Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 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 (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment,

materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.

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 (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

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 subbase 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 ±2 percentage points of the optimum moisture content as determined by ASTM D698. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

208-3.6 Weather limitations. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

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 (75 mm), reshaped and recompacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

a. Smoothness. The finished surface shall not vary more than 3/8-inch (9 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +0 and -1/2 inch (12 mm) of the specified grade.

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 2,400 square yards (2,000 square meters). Sampling locations will be determined on a random basis per ASTM D3665.

a. **Density.** The RPR shall perform all density tests.

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 D1556 or ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the area represented by the failed test must be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Depth tests shall be made by test holes at least 3 inches (75 mm) in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken. In lieu of depth tests the Contractor has the option to take survey measurements. The survey shall be taken at no more than 50 foot (15 meter) intervals before and after placement of aggregate base course.

METHOD OF MEASUREMENT

208-4.1 The quantity of aggregate base course shall be measured by the number of cubic yards (cubic meters) 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 (cubic meter) 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:

Base Bid

Item P-208-5.1	Aggregate Base Course - per cubic yard (cubic meter)

Alternate Bid 2

Item P-208-5.1	Aggregate Base Course - per cubic yard (cubic meter)
Item P-208-5.2	Reshape and Recompact Base Prior to Overlay – per square yard (square meter)

Alternate Bid 3

Item P-208-5.1	Aggregate Base Course - per cubic yard (cubic meter)
Item P-208-5.2	Reshape and Recompact Base Prior to Overlay – per square yard (square meter)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates

ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))
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/ft3 (2700 kN-m/m3))
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

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, screenings, natural sand, and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. Coarse aggregate is the material retained on the No. 4 (4.75 mm) sieve. Fine aggregate is the material passing the No. 4 (4.75 mm) sieve.

a. Coarse aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Coarse aggregate material 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 **or** Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	0.3% maximum	ASTM C142
Percentage of Fractured Particles	Minimum 50% by weight of particles with at least two fractured faces and 65% with at least one fractured face[1]	ASTM D5821
Flat, Elongated, or Flat and Elongated Particles	8% maximum, by weight, of flat, elongated, or flat and elongated particles at 5:1 [2]	ASTM D4791

[1] 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.

[2] 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).

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: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	0.3% maximum	ASTM C142
Sand equivalent	45 minimum	ASTM D2419
Natural Sand	0% to 15% maximum by weight of total aggregate	ASTM D1073

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) (64-34).

Asphalt Binder PG Plus Test Requirements

Material Test	Requirement	Standard
Elastic Recovery	75% minimum	ASTM D6084[1]

[1] Follow procedure B on RTFO aged binder.

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 the gyratory compactor in accordance with ASTM D6925.

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)[1]	not less than 80 at a saturation of 70-80%	ASTM D4867
Asphalt Pavement Analyzer (APA)[2]	Less than 10 mm @ 4000 passes	AASHTO T340 at 250 psi hose pressure at 64°C test temperature

[1] Test specimens for TSR shall be compacted at 7 ± 1.0 % air voids. In areas subject to freeze-thaw, use freeze-thaw conditioning in lieu of moisture conditioning per ASTM D4867.

[2] AASHTO T340 at 100 psi hose pressure at 64°C test temperature may be used in the interim. If this method is used the required Value shall be less than 5 mm @ 8000 passes

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
3/4 inch (19.0 mm)	100
1/2 inch (12.5 mm)	90-100
3/8 inch (9.5 mm)	72-88
No. 4 (4.75 mm)	53-73
No. 8 (2.36 mm)	38-60
No. 16 (1.18 mm)	26-48
No. 30 (600 µm)	18-38
No. 50 (300 µm)	11-27
No. 100 (150 µm)	6-18
No. 200 (75 µm)	3-6
Minimum Voids in Mineral Aggregate (VMA)[1]	15.0
Asphalt Percent:	
Stone or gravel	5.0-7.5
Recommended Minimum Construction Lift Thickness	2 inch

[1]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 (227 metric tons) or 1/2 sublot, 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 (71°C). 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% +/- 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 of a 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.

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 (7.5 cm) or greater	40 [1]	4
Greater than 2 inches (50 mm) but less than 3 inches (7.5 cm)	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 (160°C) when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F (175°C) when added to the aggregate.

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 (175°C) when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

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 prime coat in accordance with Item P-602 shall be applied to aggregate base prior to placing the asphalt mixture.

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 12.5 feet (m) 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 (30 cm); however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet (3 m) from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m).On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt mixture. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet (3 m) long.

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 (80°C); or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches (75 mm) to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. 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.

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 (0.9 m) wide. The saw blades shall be 1/8-inch (3-mm) wide with a sufficient number of blades to create grooves between 0.090 and 0.130 inches (2 and 3.5 mm) wide; and peaks and ridges approximately 1/32 inch (1 mm) higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that 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.

The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than ¼ inch in 12 feet, identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues

The Contractor may use a 12-foot (3.7 m) "straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot 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 either 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 (15 m) or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

(2) Longitudinal measurements. Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests shall be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet (6 m); and at the third points of paving lanes when widths of paving lanes are 20 ft (6 m) or greater.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch (6 mm) shall be corrected with diamond grinding per paragraph 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 (12 mm) vertically and 0.1 feet (30 mm) laterally. The documentation will be provided by the Contractor to the RPR within 24 hours.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not

more than 1/2 inch (12 mm) less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 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 ½ inch and replacing with new material. Skin patching is not allowed.

401-5.4 Sampling. When directed by the RPR, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

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 (19.0 mm)	±6%	±9%
1/2 inch (12.5 mm)	±6%	±9%
3/8 inch (9.5 mm)	±6%	±9%
No. 4 (4.75 mm)	±6%	±9%
No. 16 (1.18 mm)	±5%	±7.5%
No. 50 (300 µm)	±3%	±4.5%
No. 200 (75 µm)	±2%	±3%
Asphalt Content	±0.45%	±0.70%
Minimum VMA	-0.5%	-1.0%

b. Range. Control charts 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

Sieve	Suspension Limit
1/2 inch (12.5 mm)	11%
3/8 inch (9.5 mm)	11%
No. 4 (4.75 mm)	11%
No. 16 (1.18 mm)	9%
No. 50 (300 µm)	6%
No. 200 (75 µm)	3.5%
Asphalt Content	0.8%

c. Corrective Action. The CQCP shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain 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 sublot basis.

(1) Sampling. Material from each sublot shall be sampled in accordance with ASTM D3665. Samples shall be taken from material deposited into trucks at the plant or at the job site in accordance with ASTM D979. The sample of asphalt may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to maintain the material at or above the compaction temperature as specified in the JMF.

(2) Testing. Air voids will be determined for each sublot in accordance with ASTM D3203 for a set of compacted specimens prepared in accordance with ASTM D6925.

d. In-place asphalt mat and joint density. Each sublot will be tested for in-place mat and joint density as a percentage of the theoretical maximum density (TMD).

(1) Sampling. The Contractor will cut minimum 5 inch (125 mm) diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

(2) Bond. Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as directed by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as directed by the RPR.

(3) Thickness. Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch (6 mm) less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the RPR to circumscribe the deficient area.

(4) Mat density. One core shall be taken from each sublot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot (30 cm) from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the TMD for that sublot.

(5) Joint density. One core centered over the longitudinal joint shall be taken for each sublot 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, and Profilograph roughness**.**

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 (12 mm) vertically or 0.1 feet (30 mm) laterally.

Cross-sections of the pavement shall be taken at a minimum 50-foot (15-m) longitudinal spacing and at all longitudinal grade breaks. Minimum cross-section grade points shall include grade at centerline, ± 10 feet of centerline, and edge of runway/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%.

e. Profilograph roughness for QA Acceptance. The final profilograph shall be the full length of the project to facilitate testing of roughness between lots. The Contractor, in the presence of the RPR shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within 48 hrs of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate “must grind” bumps and the Profile Index for the pavement using a 0.2-inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). Profilograph shall be performed one foot right and left of project centerline and 15 feet (4.5 m) right and left of project centerline. Any areas that indicate “must grind” shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing full depth of surface course. as directed by the RPR. Where

corrections are necessary, a second profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

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 (kg) 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 (kg) 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 sublot shall be reduced by 5%.

Table 6. Price adjustment schedule[1]

Percentage of material within specification limits (PWL)	Lot pay factor (percent of contract unit price)
96 – 100	106
90 – 95	PWL + 10
75 – 89	0.5 PWL + 55
55 – 74	1.4 PWL – 12
Below 55	Reject [2]

[1] 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.

[2] 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. The Contractor will receive full payment when the profilograph average profile index is in accordance with paragraph 401-6.2e. When the final average profile index for the entire length of pavement does not exceed 15 inches per mile per 1/10 mile, payment will be made at the contract unit price for the completed pavement.

401-8.1 Payment.

Payment will be made under:

Alternate Bid 1

Item P-401-8.1a Asphalt Base/Surface Course - per ton (kg)

Item P-401-8.1b Asphalt Binder (PG 64-34) - per ton (kg)

Alternate Bid 2

Item P-401-8.1a Asphalt Base/Surface Course - per ton (kg)

Item P-401-8.1b Asphalt Binder (PG 64-34) - per ton (kg)

Alternate Bid 3

Item P-401-8.1a Asphalt Base/Surface Course - per ton (kg)

Item P-401-8.1b Asphalt Binder (PG 64-34) - per ton (kg)

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 Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M156	Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
AASHTO T329	Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method
AASHTO 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

END OF ITEM P-401

ITEM P-602 EMULSIFIED ASPHALT PRIME COAT

DESCRIPTION

602-1.1 This item shall consist of an application of emulsified asphalt material on the prepared base course in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

602-2.1 Emulsified Asphalt material. The emulsified asphalt material shall be as specified in ASTM D3628 for use as a prime coat appropriate to local conditions. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the emulsified asphalt material. The COA shall be provided to and approved by the Resident Project Representative (RPR) before the emulsified asphalt material is applied. The furnishing of the COA for the emulsified asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

CONSTRUCTION METHODS

602-3.1 Weather limitations. The emulsified asphalt prime coat shall be applied only when the existing surface is dry; the atmospheric temperature is 50°F (10°C) or above, and the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

602-3.2 Equipment. The equipment shall include a self-powered pressure asphalt material distributor and equipment for heating asphalt material.

Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 65.0 psi (4.5 kg/sq cm) of tire width to prevent rutting, shoving or otherwise damaging the base, surface or other layers in the pavement structure. Design and equip the distributor to spray the asphalt material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 1.0 gallons per square yard (0.23 to 4.5 L/square meter), with a pressure range of 25 to 75 psi (172.4 to 517.1 kPa) and with an allowable variation from the specified rate of not more than ±5%, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying asphalt material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the asphalt material during the heating process. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.

A power broom and power blower suitable for cleaning the surfaces to which the asphalt coat is to be applied shall be provided.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

602-3.3 Application of emulsified asphalt material. Immediately before applying the prime coat, the full width of the surface to be primed shall be swept with a power broom to remove all loose dirt and other objectionable material.

The asphalt emulsion material shall be uniformly applied with an asphalt distributor at the rate of 0.15 to 0.30 gallons per square yard (0.68 to 1.36 liters per square meter) depending on the base course surface texture. The type of asphalt material and application rate shall be approved by the RPR prior to application.

Following application of the emulsified asphalt material and prior to application of the succeeding layer of pavement, allow the asphalt coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread sand to effectively blot up and cure excess asphalt material. The Contractor shall remove blotting sand prior to asphalt concrete lay down operations at no additional expense to the Owner. Keep traffic off surfaces freshly treated with asphalt material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

602-3.4 Trial application rates. The Contractor shall apply a minimum of three lengths of at least 100 feet (30 m) for the full width of the distributor bar to evaluate the amount of emulsified asphalt material that can be satisfactorily applied with the equipment. Apply three different application rates of emulsified asphalt materials within the application range specified in paragraph 602-3.3. Other trial applications can be made using various amounts of material as directed by the RPR. The trial application is to demonstrate the equipment can uniformly apply the emulsified asphalt material within the rates specified and determine the application rate for the project.

602-3.5 Freight and waybills. The Contractor shall submit waybills and delivery tickets during the progress of the work. Before the final estimate is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

METHOD OF MEASUREMENT

602-4.1 The emulsified asphalt material for prime coat shall be measured by the ton (kg). Volume shall be corrected to the volume at 60°F (16°C) in accordance with ASTM D4311. The emulsified asphalt material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of emulsified asphalt material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand

spraying of the emulsified asphalt material is necessary. Water added to emulsified asphalt will not be measured for payment.

BASIS OF PAYMENT

602-5.1 Payment shall be made at the contract unit price per ton (kg) for emulsified asphalt prime coat. This price shall be full compensation for furnishing all materials and for all preparation, delivering, and applying the materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Alternate Bid 1

Item P-602-5.1	Emulsified Asphalt Prime Coat - per ton (kg)

Alternate Bid 2

Item P-602-5.1	Emulsified Asphalt Prime Coat - per ton (kg)

Alternate Bid 3

Item P-602-5.1	Emulsified Asphalt Prime Coat - per ton (kg)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D2995	Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts

END OF ITEM P-602

ITEM P-603 EMULSIFIED ASPHALT TACK COAT

DESCRIPTION

603-1.1 This item shall consist of preparing and treating an asphalt or concrete surface with asphalt material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

603-2.1 Asphalt materials. The asphalt material shall be an emulsified asphalt as specified in ASTM D3628 as an asphalt application for tack coat appropriate to local conditions. The emulsified asphalt shall not be diluted. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the asphalt material to the Resident Project Representative (RPR) before the asphalt material is applied for review and acceptance. The furnishing of COA for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

CONSTRUCTION METHODS

603-3.1 Weather limitations. The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is 50°F (10°C) or above; the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

603-3.2 Equipment. The Contractor shall provide equipment for heating and applying the emulsified asphalt material. The emulsion shall be applied with a manufacturer-approved computer rate-controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spray bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the emulsion. Any type of tip or pressure source is suitable that will maintain predetermined flow rates and constant pressure during the application process with application speeds under eight (8) miles per hour (13 km per hour) or seven (700) feet per minute (213 m per minute).

The equipment will be tested under pressure for leaks and to ensure proper set-up before use to verify truck set-up (via a test-shot area), including but not limited to, nozzle tip size appropriate for application, spray-bar height and pressure and pump speed, evidence of triple-overlap spray pattern, lack of leaks, and any other factors relevant to ensure the truck is in good working order before use.

The distributor truck shall be equipped with a minimum 12-foot (3.7-m) spreader spray bar with individual nozzle control with computer-controlled application rates. The distributor truck shall have an easily accessible thermometer that constantly monitors the temperature of the emulsion, and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.

The distributor truck shall be equipped to effectively heat and mix the material to the required temperature prior to application as required. Heating and mixing shall be done in accordance with the manufacturer's recommendations. Do not overheat or over mix the material.

The distributor shall be equipped with a hand sprayer.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

A power broom and/or power blower suitable for cleaning the surfaces to which the asphalt tack coat is to be applied shall be provided.

603-3.3 Application of emulsified asphalt material. The emulsified asphalt shall not be diluted. Immediately before applying the emulsified asphalt tack coat, the full width of surface to be treated shall be swept with a power broom and/or power blower to remove all loose dirt and other objectionable material.

The emulsified asphalt material shall be uniformly applied with an asphalt distributor at the rates appropriate for the conditions and surface specified in the table below. The type of asphalt material and application rate shall be approved by the RPR prior to application.

Emulsified Asphalt

Surface Type	Residual Rate, gal/SY (L/square meter)	Emulsion Application Bar Rate, gal/SY (L/square meter)
New asphalt	0.02-0.05 (0.09-0.23)	0.03-0.07 (0.13-0.32)
Existing asphalt	0.04-0.07 (0.18-0.32)	0.06-0.11 (0.27-0.50)
Milled Surface	0.04-0.08 (0.18-0.36)	0.06-0.12 (0.27-0.54)
Concrete	0.03-0.05 (0.13-0.23)	0.05-0.08 (0.23-0.36)

After application of the tack coat, the surface shall be allowed to cure without being disturbed for the period of time necessary to permit drying and setting of the tack coat. This period shall be determined by the RPR. The Contractor shall protect the tack coat and maintain the surface until the next course has been placed. When the tack coat has been disturbed by the Contractor, tack coat shall be reapplied at the Contractor's expense.

603-3.4 Freight and waybills The Contractor shall submit waybills and delivery tickets, during progress of the work. Before the final statement is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

METHOD OF MEASUREMENT

603-4.1 The emulsified asphalt material for tack coat shall be measured by the ton (kg). Volume shall be corrected to the volume at 60°F (16°C) in accordance with ASTM D1250. The emulsified asphalt material paid for will be the measured quantities used in the accepted work,

provided that the measured quantities are not 10% over the specified application rate. Any amount of emulsified asphalt material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the emulsified asphalt material is necessary. Water added to emulsified asphalt will not be measured for payment.

BASIS OF PAYMENT

603.5-1 Payment shall be made at the contract unit price per ton (kg) of emulsified asphalt material. This price shall be full compensation for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Alternate Bid 1

Item P-603-5.1	Emulsified Asphalt Tack Coat - per ton (kg)

Alternate Bid 2

Item P-603-5.1	Emulsified Asphalt Tack Coat - per ton (kg)

Alternate Bid 3

Item P-603-5.1	Emulsified Asphalt Tack Coat - per ton (kg)

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

ITEM P-620 RUNWAY AND TAXIWAY MARKING

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Resident Project Representative (RPR). The terms "paint" and "marking material" as well as "painting" and "application of markings" are interchangeable throughout this specification.

MATERIALS

620-2.1 Materials acceptance. The Contractor shall furnish manufacturer's certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer's surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

620-2.2 Marking materials.

Table 1. Marking Materials

Paint[1]				Glass Beads[2]	
Type	**Color**	**Fed Std. 595 Number**	**Application Rate Maximum**	**Type**	**Application Rate Minimum**
Waterborne Type I or II	White	37925	115 ft^2/gal (2.8 m^2/l)	Type I, Gradation A[1] Minimum	7 lb/gal (0.85 kg/l)
Waterborne Type I or II	Yellow	33538 or 33655	115 ft^2/gal (2.8 m^2/l)	Type I, Gradation A[1] Minimum	7 lb/gal (0.85 kg/l)
Waterborne Type I or II	Black	37038	115 ft^2/gal (2.8 m^2/l)	No beads	No beads
Solvent-base	White	37925	115 ft^2/gal (2.8 m^2/l)	Type I, Gradation A[1] Minimum	7 lb/gal (0.85 kg/l)
Solvent-base	Yellow	33538 or 33655	115 ft^2/gal (2.8 m^2/l)	Type I, Gradation A[1] Minimum	7 lb/gal (0.85 kg/l)
Solvent-base	Black	37038	115 ft^2/gal (2.8 m^2/l)	No beads	No beads
Temporary Marking Waterborne Type I or II	Yellow, White	33538 or 33655, 37925	230 ft^2/gal (5.6 m^2/l)	No beads	No beads

[1] See paragraph 620-2.2a

[2] See paragraph 620-2.2b

a. Paint. Paint shall be waterborne or solvent-base in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595.

1) **Waterborne**. Paint shall meet the requirements of Federal Specification TT-P-1952F, Type I or 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.

2) **Epoxy.** Not used.

3) **Methacrylate.** Not used.

4) **Solvent-Base.** Paint shall meet the requirements of Commercial Item Description A-A-2886B Type I, Type II, and Type III**.**

5) **Preformed Thermoplastic Airport Pavement Markings**. Not used.

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 contaminates 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 manufactures application and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

620-3.4 Layout of markings. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans. The locations of markings to receive silica sand shall be shown on the plans.

620-3.5 Application. A period of 30 days shall elapse between placement of surface course or seal coat and application of the permanent paint markings. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m), and marking dimensions and spacing shall be within the following tolerances:

Marking Dimensions and Spacing Tolerance

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12 mm)
greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)
greater than 60 feet (18.3 m)	±3 inch (76 mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted.

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

620-3.6 Application--preformed thermoplastic airport pavement markings. Preformed thermoplastic pavement markings not used.

620-3.7 Control strip. Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the RPR. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads (per Table 1)

that are properly embedded and evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

620-3.8 Retro-reflectance. Reflectance shall be measured with a portable retro-reflectometer meeting ASTM E1710 (or equivalent). A total of 6 reading shall be taken over a 6 square foot area with 3 readings taken from each direction. The average shall be equal to or above the minimum levels of all readings which are within 30% of each other.

Minimum Retro-Reflectance Values

Material	Retro-reflectance mcd/m^2/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[1]	100	75	10

[1] 'Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance

620-3.9 Protection and cleanup. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

METHOD OF MEASUREMENT

620-4.1 The quantity of markings, including surface preparation, and reflective media shall be measured by the lump sum**.**

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.

620-5.2 Payment for markings, including surface preparation, and reflective media shall be made at the lump sum contract price for pavement markings.

Payment will be made under:

Alternate Bid 1

Item P-620-5.1 Runway and Taxiway Pavement Markings (White) – per square foot.

Item P-620-5.2	Runway and Taxiway Pavement Markings (Yellow) – per square foot.
Item P-620-5.3	Runway and Taxiway Pavement Markings (Black) – per square foot.
Item P-620-5.4	Temporary Runway and Taxiway Pavement Markings (White) – per square foot.
Item P-620-5.5	Temporary Runway and Taxiway Pavement Markings (Yellow) – per square foot.
Item P-620-5.6	Temporary Runway and Taxiway Pavement Markings (Black) – per square foot.

Alternate Bid 2

Item P-620-5.1	Runway and Taxiway Pavement Markings (Yellow) – per square foot.
Item P-620-5.2	Temporary Runway and Taxiway Pavement Markings (Yellow) – per square foot.

Alternate Bid 3

Item P-620-5.1	Runway and Taxiway Pavement Markings (Yellow) – per square foot.
Item P-620-5.2	Temporary Runway and Taxiway Pavement Markings (Yellow) – per square foot.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester

ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Code of Federal Regulations (CFR)

40 CFR Part 60, Appendix A-7, Method 24
Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings

29 CFR Part 1910.1200 Hazard Communication

Federal Specifications (FED SPEC)

FED SPEC TT-B-1325D	Beads (Glass Spheres) Retro-Reflective
FED SPEC TT-P-1952F	Paint, Traffic and Airfield Marking, Waterborne
FED STD 595	Colors used in Government Procurement

Commercial Item Description

A-A-2886B	Paint, Traffic, Solvent Based

Advisory Circulars (AC)

AC 150/5340-1	Standards for Airport Markings
AC 150/5320-12	Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces

END OF ITEM P-620

ITEM F-161 WIRE FENCE WITH STEEL POSTS (CLASS C AND D FENCE)

DESCRIPTION

161-1.1 This item covers the requirements for furnishing materials and constructing new wire fences and gates with steel posts in accordance with the details included herein and as shown on the plans. The class of fence to be erected shall be either Class C, woven wire fencing surmounted by two strands of barbed wire, or Class D, four strands of barbed wire, as indicated on the plans.

MATERIALS

161-2.1 Wire.

a. Woven wire (zinc-coated). The woven wire fencing shall be 7-bar, 26-inch (66 cm) field fence with top and bottom wires No. 10 gauge, and filler and stay wires No. 12-1/2 gauge. Stay wires shall be spaced 6 inches (150 mm) apart. All wire shall be smooth galvanized steel wire conforming to ASTM A116. All wires shall be twice-dipped and spaced as shown on the plans.

b. Barbed wire (zinc-coated). Zinc-coated barbed wire shall be 2-strand twisted No. 12-1/2 gauge galvanized steel wire with 4-point barbs of No. 14 gauge galvanized steel wire. All wire shall conform to ASTM A121, Type A. The barbs shall be spaced approximately 5 inches (125 mm) apart.

c. Barbed wire (copper-covered). Copper-covered steel barbed wire shall conform to ASTM A121, Type A.

d. Barbed wire (aluminum-coated). Aluminum-coated steel barbed wire shall be 2-strand twisted No. 12-1/2 gauge. The 4-point barbs of No. 14 gauge aluminum-coated steel wire shall be spaced approximately 5 inches (125 mm) apart. The steel wire shall have a tensile strength of between 60,000 and 80,000 pounds per square inch (413 400 and 551 200 kPa) and the aluminum coating shall have a minimum weight of 0.30 ounces per square foot (0.07 km/ m^2) of wire surface on the No. 12-1/2 gauge line wire and 0.25 ounces per square foot (0.06 kg/m^2) of wire surface on the No. 14 gauge barbs.

e. Bracing wire (zinc-coated). Wire used for cable bracing shall be No. 9 smooth galvanized soft wire.

161-2.2 Fence posts, gates, rails, braces, and accessories. These items, when specified, shall conform to the requirements of Federal Specification RR-F-191 and shall be zinc-coated.

161-2.3 Concrete. Concrete shall be of a commercial grade with a minimum 28-day compressive strength of 3000 psi (2670 kPa).

CONSTRUCTION METHODS

161-3.1 General. The fence shall be constructed in accordance with the details on the plans and as specified here using new materials. All work shall be performed in a workmanlike manner

satisfactory to the RPR. The RPR shall establish and mark the property line or fence line for the work. The Contractor shall span the opening below the fence with barbed wire at all locations where it is not practical to conform the fence to the general contour of the ground surface because of natural or manmade features such as drainage ditches. The new fence shall be permanently tied to the terminals of existing fences whenever required by the RPR. The finished fence shall be plumb, taut, true to line and ground contour, and complete in every detail. When directed, the Contractor shall stake down the woven wire fence at several points between posts.

The Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet (90 m). The work shall progress in this manner and at the close of the working day the newly constructed fence shall be tied to the existing fence.

161-3.2 Clearing fence line. The site of the fence shall be sufficiently cleared of obstructions, and surface irregularities. The fence line shall be graded so that the fence will conform to the general contour of the ground. The fence line shall be cleared on each side of the centerline of the fence. This clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions that will interfere with proper construction of the fence. Stumps within the cleared area of the fence shall be grubbed or excavated. The bottom of the fence shall be placed a uniform distance above ground, as specified in the plans. When shown on the plans or as directed by the RPR, the existing fences which interfere with the new fence location shall be removed by the Contractor as a part of the construction work unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal shall be refilled with suitable soil, gravel, or other suitable material and compacted with tampers.

The work shall include the handling and disposal of all material cleared, excavated or removed, regardless of the type, character, composition, or condition of such material encountered.

161-3.3 Installing posts. All posts shall be spaced as shown on the plans. Corner, brace, anchor, end, and gate posts shall be set in concrete as shown on the plans. The top of the concrete shall be slightly above the ground surface, trowel finished, and sloped to drain. Post holes of full depth and size for the concrete shall be provided. All line posts may be either driven or set in dug holes to a depth of 3 feet (1 m). All post setting shall be done carefully and to true alignment. Dirt removed for placing posts, anchor bars, flanges, etc., shall be replaced, tamped, and leveled. When posts are driven, care shall be exercised to prevent marring or buckling of the posts. Damaged posts shall be replaced at the Contractor's expense. No extra compensation will be made for rock excavation.

161-3.4 Bracing. All corner, anchor, end, and gate posts shall be braced as shown on the plans. Anchor posts shall be set at approximately 500 feet (150 meters) intervals and braced to the adjacent posts.

161-3.5 Installing wire. All barbed wire and woven wire shall be placed on the side of the post away from the airport, or as directed by the RPR, at the height indicated on the plans. The woven wire shall be carefully stretched and hung without sag and with true alignment. Care shall be taken not to stretch the wire so tightly that it will break in cold weather or pull up corner and brace posts. All horizontal wires shall be fastened securely to each post by fasteners or clips designed for use with the posts furnished. The woven wire shall be wrapped around end, corner, and gate posts, and the ends of all horizontal wires shall be tied with snug, tight twists. The wire shall be secured to prevent slipping up and down the post. Barbed wire strands shall be stretched

and each strand secured to each post to prevent slipping out of line or becoming loose. At end, corner, and gate posts the barbed wire shall be securely wrapped and anchored once about the post from outside and secured against slipping by tying the ends with snug, tight twists. However, on spans of less than 100 feet (30 m) both ends of the span need not be wrapped around the posts. The bottom wire of the woven wire fencing shall clear the ground by not more than 4 inches (100 mm) or less than one inch (25 mm) at any place.

161-3.6 Splicing wire. Splices in barbed and woven wire will be permitted if made with an approved galvanized bolt-clamp splice or a wire splice made as follows: The ends of each wire shall be carried 3 inches (75 mm) past the splice tool and wrapped around the other wire for at least six turns in opposite directions. After the tool is removed, the space occupied by it shall be closed by pulling the ends together. The unused ends of the wire shall be cut close to make a neat, workmanlike job.

161-3.7 Installing gates. The gates shall be hung on gate fittings as shown on the plans. They shall be attached in such a manner that the gate cannot be lifted off the hinges. Gates shall be erected to swing in the direction indicated and shall be provided with gate stops, as specified or as shown on the plans. Gates shall be erected at locations shown on the plans.

161-3.8 Existing fence connections. Wherever the new fence joins an existing fence, either at a corner or at the intersection of straight fence lines, a corner or anchor post shall be set at the junction and braced and anchored the same as herein described for corner posts.

If the connection is made at other than the corner of the new fence, the last span of the old fence shall contain a brace span.

161-3.9 Electrical grounds. Electrical grounds shall be constructed where a power line passes over the fence**.** The ground shall be accomplished with a copper clad rod 8 feet (2.4 m) long and a minimum of 5/8 inches (16 mm) in diameter driven vertically until the top is 6 inches (150 mm) below the ground surface. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction. The Contractor shall comply with FAA-STD-019, Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment, paragraph 4.2.3.8, Lightning Protection for Fences and Gates, when fencing is adjacent to FAA facilities.

161-3.10 Cleaning up. The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction. All disturbed areas shall be seeded per Item T-901.

METHOD OF MEASUREMENT

161-4.1 Fences, Class C (Steel Posts), or Class D (Steel Posts), shall be measured in place from outside to outside of end posts or corner posts and shall be the length of fence actually constructed, except for the space occupied by the gates.

161-4.2 Vehicle gates and pedestrian gates shall be measured in units for each gate installed and accepted.

BASIS OF PAYMENT

161-5.1 Payment shall be made at the contract unit price per linear foot (meter) for Class C or Class D wire fence. This price shall be full compensation for furnishing all materials and for all preparation, erection, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

161-5.2 Payment will be made at the contract unit price per each for vehicle or for pedestrian gates. This price shall be full compensation for furnishing all materials and for all preparation, erection, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Base Bid

Item F-161	Furnish and Install Barbed Wire Fence - per linear foot (m)
Item F-161-5.1b	Furnish and Install 20’ Tubular Swing Gate

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 A116	Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric
ASTM A121	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire

FAA Standard

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

Federal Specification (FED SPEC)

FED SPEC RR-F-191/Gen	Fencing, Wire, and Post Metal (and Gates, Chain-link Fence Fabric, and Accessories) (General Specification)

FAA Orders

5300.38	AIP Handbook

END OF ITEM F-161

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:

ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Class III)
ASTM C1479	Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations
ASTM C1840	Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe

701-2.3 Concrete. Not used.

701-2.4 Rubber gaskets. Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C443. Rubber gaskets for PVC pipe, polyethylene, and polypropylene pipe shall conform to the requirements of ASTM F477. 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. Rubber gaskets for steel reinforced thermoplastic ribbed pipe shall conform to the requirements of ASTM F477.

701-2.5 Joint mortar. Pipe joint mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

701-2.6 Joint fillers. Not used.

701-2.7 Plastic gaskets. Not used.

701-2.8. Controlled low-strength material (CLSM). Not used.

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 (300 mm) 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 (200 mm) or 1/2 inch (12 mm) 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 (19 mm). For pipes installed under paved areas, no more than 12% of the material shall pass the No. 200 (0.075 mm) sieve. For all other areas, no more than 50% of the material shall pass the No. 200 (0.075 mm) sieve. The bedding shall have a thickness of at least 6 inches (150 mm) 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. Concrete pipe joints shall be sealed with rubber gaskets meeting ASTM C443 when leak resistant joints are required.

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 manufacturers recommendations. Joints shall meet the requirements of ASTM D4161 for flexible elastomeric seals.

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 (150 mm) on each side of the pipe and shall be brought up one foot (30 cm) 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 (150 mm) and shall be brought up evenly on each side of the pipe to one foot (30 cm) 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 place 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 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.

For pipe sizes larger than 48 inches, a walk-through visual inspection shall be performed.

Incorporate specific inspection requirements for the various types of pipes beneath the general inspection requirements.

Reinforced concrete pipe shall be inspected, evaluated, and reported on in accordance with ASTM C1840, "Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe." Any issues reported shall include still photo and video documentation. The zoom ratio shall be provided for all still or video images that document any issues of concern by the inspection firm.

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 (m) of pipe in place, completed, and accepted. 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. The 18", 24" and 48"

Storm Sewer Piping shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

BASIS OF PAYMENT

701-5.0 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.

701-5.1 Payment will be made at the contract unit price per linear foot (meter) for 12" Storm Sewer Piping.

Payment will be made under:

Base Bid

Item 701-5.1b	24" RCP – per linear foot
Item 701-5.1c	48" RCP – per linear foot
Item 701-5.1e	24" RCP Flared End – per each
Item 701-5.1f	48" RCP Flared End – per each

Alternate Bid 2

Item 701-5.1b	24" RCP – per linear foot
Item 701-5.1e	24" RCP Flared End – per each

Alternate Bid 3

Item 701-5.1b	18" RCP – per linear foot
Item 701-5.1e	18" RCP Flared End – per each

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American 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, 300- to 1500-mm (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, 300- to 900-mm (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. (152 to 762 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe

National Fire Protection Association (NFPA)

NFPA 415	Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways

END ITEM D-701

ITEM D-705 PIPE UNDERDRAINS FOR AIRPORTS

DESCRIPTION

705-1.1 This item shall consist of the construction of pipe drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

705-2.1 General. Materials shall meet the requirements shown on the plans and specified below.
705-2.2 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) M196	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
ASTM F758	Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

705-2.3 Joint mortar. Pipe joint mortar shall consist of one part by volume of Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

705-2.4 Elastomeric seals. Elastomeric seals shall conform to the requirements of ASTM F477.

705-2.5 Porous backfill. Porous backfill shall be free of clay, humus, or other objectionable matter, and shall conform to the gradation in Table 1 when tested in accordance with ASTM C136.

Table 1. Gradation of Porous Backfill

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
	Porous Material No. 2
1-1/2 inch (37.5 mm)	100
1 inch (25.0 mm)	90-100
3/8 inch (9.5 mm)	25-60
No. 4 (4.75 mm)	5-40
No. 8 (2.36 mm)	0-20

When two courses of porous backfill are specified in the plans, the finer of the materials shall conform to particle size tabulated herein for porous material No. 1. The coarser granular material shall meet the gradation given in the tabulation for porous material No. 2.

705-2.6 Granular material. Granular material used for backfilling shall conform to the requirements of ASTM D2321 for Class IA, IB, or II materials.

705-2.7 Filter fabric. The filter fabric shall conform to the requirements of AASHTO M288 Class 2 or equivalent.

705-2.8 Controlled low-strength material (CLSM). CLSM is not used.

CONSTRUCTION METHODS

705-3.1 Equipment. All equipment required for the construction of pipe underdrains shall be on the project, in good working condition, and approved by the RPR before construction is permitted to start.

705-3.2 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 shall not be less than the external diameter of the pipe plus 6 inches (150 mm) on each side of the pipe. The trench walls shall be approximately vertical.
Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 4 inches (100 mm). The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 6 inches (150 mm) in uncompacted depth to form a uniform but yielding 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.

Excavated material not required or acceptable for backfill shall be disposed of by the Contractor

as directed by the RPR. The excavation shall not be carried below the required depth; if this occurs, the trench shall be backfilled at the Contractor's expense with material approved by the RPR and compacted to the density of the surrounding material.

The pipe bedding shall be constructed uniformly over the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 inch when the bedding thickness is less than 6 inches, and 1-1/2 inch 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.

The Contractor shall do trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to federal, state and local laws. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the backfill has reached at least 12 inches (300 mm) over the top of the pipe. The sheathing or shoring shall be pulled as the granular backfill is placed and compacted to avoid any unfilled spaces between the trench wall and the backfill material. The cost of bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price bid per foot (meter) for the pipe.

705-3.3 Laying and installing pipe.

a. Concrete pipe. Not used.

b. Metal pipe. Not used.

c. PVC, fiberglass, or polyethylene pipe. PVC or polyethylene pipe shall be installed in accordance with the requirements of ASTM D2321. Perforations shall meet the requirements of AASHTO M252 or AASHTO M294 Class 2, unless otherwise indicated on the plans. The pipe shall be laid accurately to line and grade. Fiberglass per ASTM D3839 Standard Guide for Underground Installation of "Fiberglass" (Glass-Fiber Reinforced Thermosetting-Resin) Pipe.

d. All types of pipe. The upgrade end of pipelines, not terminating in a structure, shall be plugged or capped as approved by the RPR.

Unless otherwise shown on the plans, a 4-inch (100 mm) bed of granular backfill material shall be spread in the bottom of the trench throughout the entire length under all perforated pipe underdrains.

Pipe outlets for the underdrains shall be constructed when required or shown on the plans. The pipe shall be laid with tight-fitting joints. Porous backfill is not required around or over pipe outlets for underdrains. All connections to other drainage pipes or structures shall be made as required and in a satisfactory manner. If connections are not made to other pipes or structures, the outlets shall be protected and constructed as shown on the plans.

e. Filter fabric. The filter fabric shall be installed in accordance with the manufacturer's recommendations, or in accordance with the AASHTO M288 Appendix, unless otherwise shown on the plans.

705-3.4 Mortar. The mortar shall be of the desired consistency for caulking and filling the joints of the pipe and for making connections to other pipes or to structures. Mortar that is not used

within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted.

705-3.5 Joints in concrete pipe. Not used.

705-3.6 Embedment and Backfill

a. Earth. All trenches and excavations shall be backfilled soon after the pipes are installed, unless additional protection of the pipe is directed. The embedment material shall be select material from excavation or borrow and shall be approved by the RPR. The select material shall be placed on each side of the pipe out to a distance of the nominal pipe diameter and one foot (30 cm) over the top of the pipe and shall be readily compacted. It shall not contain stones 3 inches (75 mm) or larger in size, frozen lumps, chunks of highly plastic clay, or any other material that is objectionable to the RPR. The material shall be moistened or dried, as required to aid compaction. Placement of the embedment material shall not cause displacement of the pipe. Thorough compaction under the haunches and along the sides to the top of the pipe shall be obtained.

The embedment material shall be placed in loose layers not exceeding 6 inches (150 mm) in depth under and around the pipe. Backfill material over the pipe shall be placed in lifts not exceeding 8 inches (200 mm). Successive layers shall be added and thoroughly compacted by hand and pneumatic tampers, approved by the RPR, until the trench is completely filled and brought to the planned elevation. Embedment and backfilling shall be done to avoid damaging top or side of the pipe.

In embankments and other unpaved areas, the backfill shall be compacted per Item P-152 to the density required for embankments in unpaved areas. Under paved areas, the subgrade and any backfill shall be compacted per Item P-152 to the density required for embankments for paved areas.

b. Granular backfill. When granular backfill is required, placement in the trench and about the pipe shall be as shown on the plans. The granular backfill shall not contain an excessive amount of foreign matter, nor shall soil from the sides of the trench or from the soil excavated from the trench be allowed to filter into the granular backfill. When required by the RPR, a template shall be used to properly place and separate the two sizes of backfill. The backfill shall be placed in loose layers not exceeding 6 inches (150 mm) in depth. The granular backfill shall be compacted by hand and pneumatic tampers to the requirements as given for embankment. Backfilling shall be done to avoid damaging top or side pressure on the pipe. The granular backfill shall extend to the elevation of the trench or as shown on the plans.

When perforated pipe is specified, granular backfill material shall be placed along the full length of the pipe. The position of the granular material shall be as shown on the plans. If the original material excavated from the trench is pervious and suitable, it shall be used in lieu of porous backfill No. 1.

If porous backfill is placed in paved or adjacent to paved areas before grading or subgrade operations is completed, the backfill material shall be placed immediately after laying the pipe. The depth of the granular backfill shall be not less than 12 inches (300 mm), measured from the top of the underdrain. During subsequent construction operations, a minimum depth

of 12 inches (300 mm) of backfill shall be maintained over the underdrains. When the underdrains are to be completed, any unsuitable material shall be removed exposing the porous backfill. Porous backfill containing objectionable material shall be removed and replaced with suitable material. The cost of removing and replacing any unsuitable material shall be at the Contractor's expense.

If a granular subbase blanket course is used which extends several feet beyond the edge of paving to the outside edge of the underdrain trench, the granular backfill material over the underdrains shall be placed in the trench up to an elevation of 2 inches (50 mm) above the bottom surface of the granular subbase blanket course. Immediately prior to the placing of the granular subbase blanket course, the Contractor shall blade this excess trench backfill from the top of the trench onto the adjacent subgrade where it can be incorporated into the granular subbase blanket course. Any unsuitable material that remains over the underdrain trench shall be removed and replaced. The subbase material shall be placed to provide clean contact between the subbase material and the underdrain granular backfill material for the full width of the underdrain trench.

c. Controlled low-strength material (CLSM). CLSM is not used.

705-3.7 Flexible Pipe Ring Deflection. Not used.

705-3.8 Connections. When the plans call for connections to existing or proposed pipe or structures, these connections shall be watertight and made to obtain a smooth uniform flow line throughout the drainage system.

705-3.9 Cleaning and restoration of site. After the backfill is completed, the Contractor shall dispose of all surplus material, soil, and rubbish from the site. Surplus soil may be deposited in embankments, shoulders, or as directed by the RPR. Except for paved areas of the airport, the Contractor shall restore all disturbed areas to their original condition.

METHOD OF MEASUREMENT

705-4.1 The length of pipe shall be the number of linear feet (meters) of pipe underdrains in place, completed, and approved; 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. The several classes, types, and sizes shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipeline being measured.

705-4.2 The quantity of pipe underdrains shall be made at the contract unit price per linear foot complete, including porous backfill and filter fabric sock.

BASIS OF PAYMENT

705-5.1 Payment will be made at the contract unit price per linear foot (meter) for pipe underdrains of the type, class, and size designated.

705-5.2 Pipe underdrains, Complete. Pipe underdrains, complete (including porous backfill and filter fabric) shall be made at the contract unit price per linear foot (meter) complete (including porous backfill and filter fabric)

These prices shall be full compensation 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.

Payment will be made under:

Base Bid

Item D-705-5.1a	4" Perforated Underdrain pipe complete, including porous backfill and filter fabric sock - per linear foot (meter)
Item D-705-5.1b	4" Solid Underdrain pipe - per linear foot (meter)
Item D-705-5.1c	Underdrain Cleanout – per each
Item D-705-5.1d	Connect Underdrain to RCP Storm Sewer – per each
Item D-705-5.1e	Underdrain Tee
Item D-705-5.1f	Underdrain Cross

Alternate Bid 2

Item D-705-5.1a	4" Perforated Underdrain pipe complete, including porous backfill and filter fabric sock - per linear foot (meter)
Item D-705-5.1c	Underdrain Cleanout – per each
Item D-705-5.1d	Connect Underdrain to RCP Storm Sewer – per each
Item D-705-5.1e	Underdrain Tee
Item D-705-5.1f	Underdrain Bend

Alternate Bid 3

Item D-705-5.1a	4" Perforated Underdrain pipe complete, including porous backfill and filter fabric sock - per linear foot (meter)
Item D-705-5.1b	4" Solid Underdrain pipe - per linear foot (meter)
Item D-705-5.1c	Underdrain Cleanout – per each
Item D-705-5.1d	Connect Underdrain to RCP Storm Sewer – per each
Item D-705-5.1e	Underdrain Tee

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 A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains

ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C444	Standard Specification for Perforated Concrete Pipe
ASTM C654	Standard Specification for Porous Concrete Pipe
ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D3262	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe
ASTM D4161	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F758	Standard Specification for Smooth Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F2562	Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage

American Association of State Highway and Transportation Officials (AASHTO)

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 M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M288	Standard Specification for Geotextile Specification for Highway Applications
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (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, 300- to 900-mm (12- to 36-in.) diameter
AASHTO	Standard Specifications for Highway Bridges

END OF ITEM D-705

ITEM T-901 SEEDING

DESCRIPTION

901-1.1 This item shall consist of soil preparation, seeding, fertilizing the areas shown on the plans or as directed by the RPR in accordance with these specifications.

MATERIALS

901-2.1 Seed. The species and application rates of grass, legume, and cover-crop seed furnished shall be those stipulated herein. Seed shall conform to the requirements of Federal Specification JJJ-S-181, Federal Specification, Seeds, Agricultural.

Seed shall be furnished separately or in mixtures in standard containers labeled in conformance with the Agricultural Marketing Service (AMS) Seed Act and applicable state seed laws with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the RPR duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within six (6) months of date of delivery. This statement shall include: name and address of laboratory, date of test, lot number for each kind of seed, and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for each kind of seed furnished, and, in case of a mixture, the proportions of each kind of seed. Wet, moldy, or otherwise damaged seed will be rejected.

Seeds shall be applied as follows:

Seed Properties and Rate of Application

Seed	Minimum Seed Purity (Percent)	Minimum Germination (Percent)	Rate of Application lb/acre
Oahe Intermediate Wheat Grass	90	85	20
Fairway Crested Wheat	90	85	20
Kentucky Blue Grass	90	85	20
Annual Rye (Cover Crop)	90	85	20
		Total	**80**

All seed shall comply with the requirements of the South Dakota Seed Law.

Origin Limitations: Seed furnished shall have been grown in South Dakota, North Dakota, Montana, Wyoming, Nebraska, Iowa or Minnesota. Seed grown outside of this area may be approved after the Contractor has furnished written certification from three separate seed suppliers confirming that seed grown within this area is not readily available.

Seeding shall not be performed during the period between **July 1** and **September 1** inclusive, unless otherwise approved by the RPR. The Contractor will be responsible for providing for an adequate catch of the seed. If an adequate catch does not occur, the Contractor shall re-seed the area(s) at no additional cost to the owner.

901-2.2 Lime. Not required.

901-2.3 Fertilizer. Fertilizer shall be standard commercial fertilizers supplied separately or in mixtures containing the percentages of total nitrogen, available phosphoric acid, and water-soluble potash. They shall be applied at the rate and to the depth specified, and shall meet the requirements of applicable state laws. They shall be furnished in standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon. No cyanamide compounds or hydrated lime shall be permitted in mixed fertilizers.

The fertilizers may be supplied in one of the following forms:

a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;

b. A finely-ground fertilizer soluble in water, suitable for application by power sprayers; or

c. A granular or pellet form suitable for application by blower equipment.

Fertilizers shall be 13-13-13 commercial fertilizer and shall be spread at the rate of 100lbs/acre.

901-2.4 Soil for repairs. The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the RPR before being placed.

CONSTRUCTION METHODS

901-3.1 Advance preparation and cleanup. After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be seeded shall be raked or otherwise cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris that might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be seeded shall be considered a satisfactory seedbed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches (125 mm) as a result of grading operations and, if immediately prior to seeding, the top 3 inches (75 mm) of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and if shaped to the required grade.

When the area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, any grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches (125 mm). Clods shall be broken and the top 3 inches (75 mm) of soil shall be worked into a satisfactory seedbed by discing, or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

901-3.2 Dry application method.

a. Liming. Not required.

b. Fertilizing. Following advance preparations and cleanup fertilizer shall be uniformly spread at the rate that will provide not less than the minimum quantity stated in paragraph 901-2.3.

c. Seeding. Grass seed shall be sown at the rate specified in paragraph 901-2.1 immediately after fertilizing. The fertilizer and seed shall be raked within the depth range stated in the special provisions. Seeds of legumes, either alone or in mixtures, shall be inoculated before mixing or sowing, in accordance with the instructions of the manufacturer of the inoculant. When seeding is required at other than the seasons shown on the plans or in the special provisions, a cover crop shall be sown by the same methods required for grass and legume seeding.

d. Rolling. After the seed has been properly covered, the seedbed shall be immediately compacted by means of an approved lawn roller, weighing 40 to 65 pounds per foot (60 to 97 kg per meter) of width for clay soil (or any soil having a tendency to pack), and weighing 150 to 200 pounds per foot (223 to 298 kg per meter) of width for sandy or light soils.

901-3.3 Wet application method.

a. General. The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in the special provisions.

b. Spraying equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons (190 liters) over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The unit shall also be equipped with a pressure pump capable of delivering 100 gallons (380 liters) per minute at a pressure of 100 lb / sq inches (690 kPa). The pump shall be mounted in a line that will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for 5/8 inch (16 mm) solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture delivered to the nozzle. At least three different types of nozzles shall be supplied so that mixtures may be properly sprayed over distance varying from 20 to 100 feet (6 to 30 m). One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For

case of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet (15 m) in length shall be provided to which the nozzles may be connected.

c. Mixtures. Lime, if required, shall be applied separately, in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds (100 kg) of lime shall be added to and mixed with each 100 gallons (380 liters) of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds (100 kg) of these combined solids shall be added to and mixed with each 100 gallons (380 liters) of water.

All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. The Contractor shall identify to the RPR all sources of water at least two (2) weeks prior to use. The RPR may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the RPR following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within two (2) hours from the time they were mixed or they shall be wasted and disposed of at approved locations.

d. Spraying. Lime, if required, shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches (75 mm), after which the seedbed shall again be properly graded and dressed to a smooth finish.

Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray that shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

Particular care shall be exercised to ensure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area.

Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

On surfaces that are to be mulched as indicated by the plans or designated by the RPR, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

901-3.4 Maintenance of seeded areas. The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the RPR. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed.

The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

When either the dry or wet application method outlined above is used for work done out of season, it will be required that the Contractor establish a good stand of grass of uniform color and density to the satisfaction of the RPR. A grass stand shall be considered adequate when bare spots are one square foot (0.01 sq m) or less, randomly dispersed, and do not exceed 3% of the area seeded.

METHOD OF MEASUREMENT

901-4.1 The quantity of seeding to be paid for shall be the number of acres (sq m) measured on the ground surface, completed and accepted.

BASIS OF PAYMENT

901-5.1 Payment shall be made at the contract unit price per acre (sq m) or fraction thereof, which price and payment shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Base Bid

Item 901-5.1 Seeding and Fertilizing- per acre (sq m)

Alternate Bid 2

Item 901-5.1 Seeding and Fertilizing- per acre (sq m)

Alternate Bid 3

Item 901-5.1 Seeding and Fertilizing- per acre (sq m)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C602 Standard Specification for Agricultural Liming Materials

Federal Specifications (FED SPEC)

FED SPEC JJJ-S-181, Federal Specification, Seeds, Agricultural

Advisory Circulars (AC)

AC 150/5200-33 Hazardous Wildlife Attractants on or Near Airports

END OF ITEM T-901

ITEM T-905 TOPSOIL

DESCRIPTION

905-1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from designated stockpiles or areas to be stripped on the site or from approved sources off the site, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the RPR.

MATERIALS

905-2.1 Topsoil. Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth, and it shall be reasonably free from subsoil and stumps, roots, brush, stones (2 inches (50 mm) or more in diameter), and clay lumps or similar objects. Brush and other vegetation that will not be incorporated with the soil during handling operations shall be cut and removed. Ordinary sod and herbaceous growth such as grass and weeds are not to be removed, but shall be thoroughly broken up and intermixed with the soil during handling operations. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means, shall be removed. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the Association of Official Agricultural Chemists in effect on the date of invitation of bids. The organic content shall be not less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). There shall be not less than 20% nor more than 80% of the material passing the 200 mesh (75 µm) sieve as determined by the wash test in accordance with ASTM C117.

Natural topsoil may be amended by the Contractor with approved materials and methods to meet the above specifications.

905-2.2 Inspection and tests. Within 10 days following acceptance of the bid, the RPR shall be notified of the source of topsoil to be furnished by the Contractor. The topsoil shall be inspected to determine if the selected soil meets the requirements specified and to determine the depth to which stripping will be permitted. At this time, the Contractor may be required to take representative soil samples from several locations within the area under consideration and to the proposed stripping depths, for testing purposes as specified in paragraph 905-2.1.

CONSTRUCTION METHODS

905-3.1 General. Areas to be topsoiled shall be shown on the plans. If topsoil is available on the site, the location of the stockpiles or areas to be stripped of topsoil and the stripping depths shall be shown on the plans.

Suitable equipment necessary for proper preparation and treatment of the ground surface, stripping of topsoil, and for the handling and placing of all required materials shall be on hand, in good condition, and approved by the RPR before the various operations are started.

905-3.2 Preparing the ground surface. Immediately prior to dumping and spreading the topsoil on any area, the surface shall be loosened by discs or spike-tooth harrows, or by other means

approved by the RPR, to a minimum depth of 2 inches (50 mm) to facilitate bonding of the topsoil to the covered subgrade soil. The surface of the area to be topsoiled shall be cleared of all stones larger than 2 inches (50 mm) in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting. Limited areas, as shown on the plans, which are too compact to respond to these operations shall receive special scarification.

Grades on the area to be topsoiled, which have been established by others as shown on the plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at the prescribed grades in an even and compacted condition to prevent the formation of low places or pockets where water will stand.

905-3.3 Obtaining topsoil. Prior to the stripping of topsoil from designated areas, any vegetation, briars, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, shall be removed using methods approved by the RPR. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means shall be removed.

When suitable topsoil is available on the site, the Contractor shall remove this material from the designated areas and to the depth as directed by the RPR. The topsoil shall be spread on areas already tilled and smooth-graded, or stockpiled in areas approved by the RPR. Any topsoil stockpiled by the Contractor shall be rehandled and placed without additional compensation. Any topsoil that has been stockpiled on the site by others, and is required for topsoil purposes, shall be removed and placed by the Contractor. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded if required and put into a condition acceptable for seeding.

When suitable topsoil is secured off the airport site, the Contractor shall locate and obtain the supply, subject to the approval of the RPR. The Contractor shall notify the RPR sufficiently in advance of operations in order that necessary measurements and tests can be made. The Contractor shall remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of the work and placed for spreading, or spread as required. Any topsoil hauled to the site of the work and stockpiled shall be rehandled and placed without additional compensation.

905-3.4 Placing topsoil. The topsoil shall be evenly spread on the prepared areas to a uniform depth of 2 inches (50 mm) after compaction, unless otherwise shown on the plans or stated in the special provisions. Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be carried on so that turfing operations can proceed with a minimum of soil preparation or tilling.

After spreading, any large, stiff clods and hard lumps shall be broken with a pulverizer or by other effective means, and all stones or rocks (2 inches (50 mm) or more in diameter), roots, litter, or any foreign matter shall be raked up and disposed of by the Contractor. After spreading is completed, the topsoil shall be satisfactorily compacted by rolling with a cultipacker or by other means approved by the RPR. The compacted topsoil surface shall conform to the required lines, grades, and cross-sections. Any topsoil or other dirt falling upon pavements as a result of hauling or handling of topsoil shall be promptly removed.

METHOD OF MEASUREMENT

905-4.1 Topsoil obtained on the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil stockpiled by others and removed for topsoil by the Contractor shall be measured by the number of cubic yards (cubic meters) of topsoil measured in the stockpile. Topsoil shall be measured by volume in cubic yards (cubic meters) computed by the method of end areas.

905-4.2 Topsoil obtained off the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil shall be measured by volume in cubic yards (meters) computed by the method of end areas.

BASIS OF PAYMENT

905-5.1 Payment will be made at the contract unit price per cubic yard (cubic meter) for topsoil (obtained on the site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

905-5.2 Payment will be made at the contract unit price per cubic yard (cubic meter) for topsoil (obtained off the site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Base Bid

Item T-905-5.1	Topsoil (Obtained on Site or Removed from Stockpile) - per cubic yard (cubic meter)

Alternate Bid 2

Item T-905-5.1	Topsoil (Obtained on Site or Removed from Stockpile) - per cubic yard (cubic meter)

Alternate Bid 3

Item T-905-5.1	Topsoil (Obtained on Site or Removed from Stockpile) - per cubic yard (cubic meter)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C117	Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing

Advisory Circulars (AC)

AC 150/5200-33	Hazardous Wildlife Attractants on or Near Airports

END OF ITEM T-905

ITEM T-908 MULCHING

DESCRIPTION

908-1.1 This item shall consist of furnishing, hauling, placing, and securing mulch on surfaces indicated on the plans or designated by the RPR.

MATERIALS

908-2.1 Mulch material. Acceptable mulch shall be the materials listed below or any approved locally available material that is similar to those specified. Mulch shall be free from noxious weeds, mold, and other deleterious materials. Mulch materials, which contain matured seed of species that would volunteer and be detrimental to the proposed overseeding, or to surrounding farm land, will not be acceptable. Straw or other mulch material which is fresh and/or excessively brittle, or which is in such an advanced stage of decomposition as to smother or retard the planted grass, will not be acceptable.

a. Manufactured mulch. Cellulose-fiber or wood-pulp mulch shall be products commercially available for use in spray applications.

b. Asphalt binder. Asphalt binder material shall conform to the requirements of ASTM D977, Type SS-1 or RS-1.

908-2.2 Inspection. The RPR shall be notified of sources and quantities of mulch materials available and the Contractor shall furnish him with representative samples of the materials to be used 30 days before delivery to the project. These samples may be used as standards with the approval of the RPR and any materials brought on the site that do not meet these standards shall be rejected.

CONSTRUCTION METHODS

908-3.1 Mulching. Before spreading mulch, all large clods, stumps, stones, brush, roots, and other foreign material shall be removed from the area to be mulched. Mulch shall be applied immediately after seeding. The spreading of the mulch may be by hand methods, blower, or other mechanical methods, provided a uniform covering is obtained.

Mulch material shall be furnished, hauled, and evenly applied on the area shown on the plans or designated by the RPR. Straw or hay shall be spread over the surface to a uniform thickness at the rate of 2 to 3 tons per acre (1800 - 2700 kg per acre) to provide a loose depth of not less than 1-1/2 inches (38 cm) nor more than 3 inches (75 mm). Other organic material shall be spread at the rate directed by the RPR. Mulch may be blown on the slopes and the use of cutters in the equipment for this purpose will be permitted to the extent that at least 95% of the mulch in place on the slope shall be 6 inches (150 mm) or more in length. When mulches applied by the blowing method are cut, the loose depth in place shall be not less than one inch (25 mm) nor more than 2 inches (50 mm).

908-3.2 Securing mulch. The mulch shall be held in place by light discing, a very thin covering of topsoil, pins, stakes, wire mesh, asphalt binder, or other adhesive material approved by the

RPR. Where mulches have been secured by either of the asphalt binder methods, it will not be permissible to walk on the slopes after the binder has been applied. When an application of asphalt binder material is used to secure the mulch, the Contractor must take every precaution to guard against damaging or disfiguring structures or property on or adjacent to the areas worked and will be held responsible for any such damage resulting from the operation.

If the "peg and string" method is used, the mulch shall be secured by the use of stakes or wire pins driven into the ground on 5-foot (1.5-m) centers or less. Binder twine shall be strung between adjacent stakes in straight lines and crisscrossed diagonally over the mulch, after which the stakes shall be firmly driven nearly flush to the ground to draw the twine down tight onto the mulch.

908-3.3 Care and repair.

a. The Contractor shall care for the mulched areas until final acceptance of the project. Care shall consist of providing protection against traffic or other use by placing warning signs, as approved by the RPR, and erecting any barricades that may be shown on the plans before or immediately after mulching has been completed on the designated areas.

b. The Contractor shall be required to repair or replace any mulch that is defective or becomes damaged until the project is finally accepted. When, in the judgment of the RPR, such defects or damages are the result of poor workmanship or failure to meet the requirements of the specifications, the cost of the necessary repairs or replacement shall be borne by the Contractor.

c. If the "asphalt spray" method is used, all mulched surfaces shall be sprayed with asphalt binder material so that the surface has a uniform appearance. The binder shall be uniformly applied to the mulch at the rate of approximately 8 gallons (32 liters) per 1,000 square feet (100 sq m), or as directed by the RPR, with a minimum of 6 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 sq m) depending on the type of mulch and the effectiveness of the binder securing it. Asphalt binder material may be sprayed on the mulched slope areas from either the top or the bottom of the slope. An approved spray nozzle shall be used. The nozzle shall be operated at a distance of not less than 4 feet (1.2 m) from the surface of the mulch and uniform distribution of the asphalt material shall be required. A pump or an air compressor of adequate capacity shall be used to ensure uniform distribution of the asphalt material.

d. If the "asphalt mix" method is used, the mulch shall be applied by blowing, and the asphalt binder material shall be sprayed into the mulch as it leaves the blower. The binder shall be uniformly applied to the mulch at the rate of approximately 8 gallons (32 liters) per 1,000 square feet (100 sq m) or as directed by the RPR, with a minimum of 6 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 sq m) depending on the type of mulch and the effectiveness of the binder securing it.

METHOD OF MEASUREMENT

908-4.1 Mulching shall be measured in square yards (square meters) on the basis of the actual surface area acceptably mulched.

BASIS OF PAYMENT

908-5.1 Payment will be made at the contract unit price per square yard (square meter) for mulching. The price shall be full compensation for furnishing all materials and for placing and anchoring the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Base Bid

Item T-908-5.1 Mulching - per square yard (square meter)

Alternate Bid 2

Item T-908-5.1 Mulching - per square yard (square meter)

Alternate Bid 3

Item T-908-5.1 Mulching - per square yard (square meter)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D977 Standard Specification for Emulsified Asphalt

Advisory Circulars (AC)

AC 150/5200-33 Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-908

ITEM TL-100 FIELD LABORATORY

DESCRIPTION

100.1.1 This work consists of furnishing, placing, and maintaining field laboratories.

MATERIALS

100.2.1 Field laboratories shall be Type I, Type II, or Type III as specified. All field laboratories shall conform to the following general requirements and to the specific requirements for each laboratory type, which are defined below. The Engineer may permit minor deviations provided the deviations do not impair the usefulness of the laboratory.

a. General Requirements: The field laboratory shall consist of a weatherproof and thermal resistant structure, which has been modified or originally constructed to meet these specifications.

The field laboratory shall be neat, clean, in good repair, and shall be placed at a location satisfactory to the Engineer. The field laboratory shall be adequately anchored to the ground, leveled, and rigidly supported to eliminate floor and workbench vibrations to allow for accurate weighing on a bench supported scale.

The Contractor shall provide a set of steps and hand railings at each of the exterior doors. If the floor of the laboratory is 18 inches or more above the ground, the Contractor shall construct a landing at all exterior doors. The minimum dimensions for the landing shall be 4 feet by 5 feet. The top of the landing shall be level with the threshold of the doorway.

The Contractor shall furnish continuous electrical power and fuel supply for the heating and cooling systems, range, and lighting. The electrical power supply shall be protected from power surges that may damage electrical equipment in the field laboratory. The Contractor will be responsible for damage to electrical equipment due to power surges caused by the Contractor's operations. The electrical system shall include one exterior wall outlet with protective cover and one fuse or circuit breaker box. Each laboratory shall have an outside power disconnect.

Each laboratory shall contain at least one opening type clear glass window with screen in each sidewall of each room and one in each exterior end wall to provide equal and adequate light and ventilation for each room. If a door is located on the end wall of the lab, a window is not required on that wall. There shall be one exterior door in each room, except for the office room, one of which shall be at least 36 inches wide. Exterior doors and windows shall be provided with locks. The Contractor shall furnish the Engineer with keys for the doors.

The Lab shall be a no smoking facility. The Contractor shall post "No Smoking" signs on each lab door.

Each laboratory shall contain the following equipment:

1. A heating and cooling system capable of maintaining 75°F ± 5°F in the testing rooms and office room.

2. A pressure water system or gravity fed water system with at least a 100 gallon capacity capable of maintaining a minimum pressure at the faucet of 5 psi.

3. A sink and faucet with a hose bib connector. The faucet shall be a minimum of 12 inches above the sink. The sink shall drain to the exterior of the lab. The sink shall be located in testing room II for the Type I & Type III laboratories and in testing room I for the Type II laboratory.

4. Artificial lighting system with fixtures providing adequate illumination over all work areas and each desk.

5. A minimum of two four-gang outlets per each sidewall, per each room. There shall be a minimum of one four-gang outlet per each exterior end wall of each room. There shall be one four-gang outlet under each desk area. All electrical outlets shall be ground fault protected.

6. One storage closet, 24 inches deep and 7.0 feet high, with a minimum door width of 24 inches. The cabinet shall include shelves and garment storage space.

7. An exhaust fan capable of circulating and exhausting the air in rooms containing range/oven and sieve equipment with a minimum air exchange rate of 1000 cubic feet per minute.

8. One 30 inch electric range with four burners and a thermostatically controlled oven in testing room I for the Type I and II laboratories and testing room II for the Type III laboratory.

9. A one cubic foot 1000-watt microwave oven in testing room II.

10. An activated hardwired touch-tone telephone with integrated answering machine and plain paper fax/copier machine in testing room II for the Type I and II laboratories and office room for the Type III laboratory.

11. One 2A:10B:C minimum rated fire extinguisher. The fire extinguisher shall be mounted in a prominent location and shall be current with all required inspections as evidenced by an inspection tag.

12. A 15 unit first aid and eyewash kit. The kits shall be mounted in a readily available location.

13. Broom, dustpan, garbage can, and garbage bags.

14. Two chairs and two stools.

15. A portable sanitary facility shall be set up adjacent to the field laboratory.

16. On projects requiring concrete test specimens, a metal or polyethylene tank 7.0 feet long, 29 inches wide and 2 feet deep shall be installed beneath the worktable. The surface of the worktable above the tank shall be hinged to allow the tabletop and support to be lifted out of the way to provide access to the tank. A gate valve shall be installed to drain the tank. When heating is required, the tank shall be equipped with a thermostatically controlled water heater to maintain the water temperature between 70°F and 77°F.

17. If the laboratory is to be used as a QA Laboratory, the Contractor shall furnish two mechanical convection ovens in the laboratory in addition to the oven required. The ovens shall have a minimum chamber volume of 5.0 cubic feet and be equipped with thermometer readout through the top. The ovens shall be capable of heating to a

temperature of 350°F. The oven shall have a thermostatic controller and be able to maintain a uniform material temperature ±5°F.

b. TYPE I FIELD LABORATORY:

1. Size: The floor area based on exterior dimensions shall not be less than 200 square feet. The exterior width shall be a minimum of 8 feet and maximum of 10 feet. The interior floor to ceiling height shall not be less than 7.0 feet high. The laboratory shall be floored and shall have a transverse center partition with a 32 inch width door. The partition shall divide the laboratory into two sections with approximately equal floor space.

2. Testing Room I: The testing room shall contain the following:

a. One movable worktable 30 inches high with surface dimensions of 24 inches by 48 inches.
b. One movable worktable 36 inches high with surface dimensions of 24 inches by 48 inches.
c. A minimum of 16 feet of open shelving not less than 12 inches wide mounted at convenient locations.

3. Testing Room II: The testing room shall contain the following:

a. One worktable 36 inches high, 10 feet long and 36 inches wide, attached to the wall opposite the exterior door with one end adjacent to the exterior end wall.
b. One movable desk with one center drawer and file drawers.
c. A minimum of 16 feet of open shelving not less than 12 inches wide mounted at convenient locations.

C. TYPE II FIELD LABORATORY

1. Size: The floor area based on exterior dimensions shall not be less than 280 square feet. The exterior width shall be a minimum of 8 feet and a maximum of 10 feet. The interior floor to ceiling height shall not be less than 7.0 feet high. The laboratory shall be floored and shall have a transverse center partition with a 32 inch width door. The partition shall divide the laboratory into two sections with approximately equal floor space.

2. Testing Room I: The testing room shall contain the following:

a. One worktable 36 inches high, 10 feet long and 36 inches, wide attached to the wall opposite the exterior door with one end adjacent to the partition wall.
b. One movable worktable 30 inches high with surface dimensions of 24 inches by 48 inches.
c. One movable worktable 36 inches high with surface dimensions of 24 inches by 48 inches.
d. A minimum of 16 foot of open shelving not less than 12 inches wide mounted at convenient locations.

3. Testing Room II: The testing room shall contain the following:

a. One worktable 36 inches high, full length of the room, and 36 inches wide attached to the wall opposite the exterior door.
b. Cupboard(s) one 32 inches long, 12 inches deep, and 24 inches high. The cupboard(s) shall be a minimum of 18 inches above the top of the worktable.

c. A minimum of 16 foot of open shelving not less than 12 inches wide mounted at convenient locations.
d. Two movable desks with one center drawer and file drawers.
e. One moveable filing cabinet with at least two drawers.

D. TYPE III FIELD LABORATORY

1. Size: The floor area based on exterior dimensions shall not be less than 360 square feet. The exterior width shall be a minimum of 8 feet and a maximum of 10 feet. The interior floor to ceiling height shall not be less than 7.0 feet high. The laboratory shall be floored. The lab will be separated into three rooms. The Office Room shall have approximately 80 square feet, Testing Room I shall have approximately 120 square feet and Testing Room II shall have approximately 160 square feet. The transverse partitions shall have a 32 inch width door.

2. Testing Room I: Testing Room I shall contain the following:

a. One worktable 36 inches high, 10 foot long, and 36 inches wide attached to the wall opposite the exterior door with one end adjacent to the partition wall.
b. One worktable 30 inches high with surface dimensions of 30 inches by 8 feet.
c. Cupboard(s) one 32 inches long, 12 inches deep, and 24 inches high. The cupboard(s) shall be a minimum of 18 inches above the top of the worktable.
d. A minimum of 16 feet of open shelving not less than 12 inches wide mounted at convenient locations.

3. Testing Room II: Testing room II shall have the following:

a. One worktable 36 inches high, 8 feet long, and 30 inches wide.
b. One worktable 36 inches high with surface dimensions of 24 inches long by 36 inches wide and one shelf 18 inches above the table. Place the stove (oven with cooktop) adjacent to this worktable and a fixed worktable 36 inches high with surface dimension 10 feet long and 36 inches wide.
c. Cupboard(s) one 32 inches long, 12 inches deep, and 24 inches high. The cupboard(s) shall be a minimum of 18 inches above the top of the worktable.
d. A minimum of 16 feet of open shelving not less than 12 inches wide mounted at convenient locations.

4. Office Room: The office room shall contain the following:

a. A solid mounted desk in an L-shaped pattern, 30 inches wide. Two seating areas, each with a center drawer and file drawers. The seating areas shall be situated such that both workspaces can be occupied at the same time.
b. Cupboard(s), one 32 inches long, 12 inches deep, and 24 inches high. The cupboard(s) shall be a minimum of 18 inches above the top of the worktable.
c. One moveable filing cabinet with at least two drawers.

CONSTRUCTION METHODS

100.3.1 The laboratory shall be for the exclusive use of the Engineer. The location of the laboratory will be as directed by the Engineer and shall be relocated by the Contractor, at the Contractor's expense, as required by the Engineer. The laboratory will be required to be furnished when requested by the Engineer. On projects that a Type III lab is required, the

Engineer may allow a Type I or II lab to be supplied until such a time the Engineer determines the Type III lab is required. If the Engineer allows a temporary Type I or II lab to be furnished, no additional payment for that lab will be made. The laboratory shall not be removed from the project until released by the Engineer.

METHOD OF MEASUREMENT

100.4.1 Field laboratories will be measured on a per each basis.

BASIS OF PAYMENT

100-5.1 The accepted quantity of field laboratories shall be incidental in the cost for the Contractor's Quality Control Program.

The field laboratory will remain the property of the Contractor.

The item of Field Laboratory will not be subject to unit price negotiation regardless of any underrun or overrun of the contract quantity or in the event the entire item is eliminated.

END OF ITEM TL-100

ITEM 01 51 26 TEMPORARY PHASING WORK, ELECTRICAL

DESCRIPTION

01 51 26-1.1 Scope. In accordance with the Construction Safety and Phasing Plan (CSPP) as shown in the plans. The airport CSPP, general notes, and safety requirements are included in the specifications and shown on the plans.

MATERIALS

01 51 26-2.1 Products.

A. Cable, Wire, Splices, Ground Rods, Counterpoise per L-108

B. Vault Power Equipment and Airfield Controls per L-109

C. Conduit per L-110

D. Electrical Manholes and Junction Structures per L-115

E. Lighting per L-125

CONSTRUCTION METHODS

01 51 26-3.1 Installation.

A. Refer to phasing plan for additional information.

B. Coordinate any downtime of any airfield circuit with the Owner and RPR with an advanced notice of 72 hours (minimum). No switching over of circuits shall be allowed without prior approval from both the Owner and RPR.

C. See temporary lighting details. Not all temporary lighting is listed within this section or shown on the plans. Coordinate with the RPR prior to each phase of construction to verify which lights and circuits are to remain operational and the means to provide temporary lighting or de-energizing equipment.

D. Electrical cable associated with temporary lighting shall be maintained in secured 2" conduit. The cable and conduit shall be provided by the contractor. Conduit laid on the ground shall be adequately anchored from movement by wire tied to barricades or sandbags in off pavement areas. Conduit and cable used for temporary lighting may not be reused for permanent circuits.

E. Contractor shall provide sufficient slack to allow for cable expansion and contraction to reduce the potential for splices in the temporary jumper to pull apart and arc.

F. All cable splices shall be L-823 connectors as shown on the details.

G. De-energizing edge lights, signs, NAVAIDs, etc. shall be done by either bypassing the isolation transformer within each base can or by providing approved shorting caps by the lighting manufacturer. The removal of bulbs shall have prior approval from both the Owner and the RPR. Hooding or covering lighting equipment shall have prior approval from both the Owner and the RPR. The Contractor shall be responsible for any damage

to the hooded or covered equipment for any reason. Lighting equipment may not be unplugged from its associated equipment.

Signs shall be covered with a non-transparent cover to 100% blackout the sign message or swap the existing panel/message with a blackout panel.

H. Contractor shall coordinate with airport maintenance and operations prior to installation jumpers and reduce the amount of time this circuit is out of operation as much as is feasibly possible.

I. Contractor shall make temporary connection at the nearest light base outside of construction limits.

J. Contractor shall maintain connectivity of all airfield lighting circuits outside the construction area.

K. Contractor shall follow all lockout/tagout safety procedures when working with airfield lighting circuits.

L. Airfield signs providing directions to closed areas shall be covered with an approved non-transparent material to completely block out the sign from view. Black plastic shall not be used to cover the signs. No duct tape or adhesive shall contact the sign or sign panels. All areas closed to aircraft shall not be lighted. Location of jumpers may change to accommodate the phasing. No additional compensation will be allowed for these changes.

M. Upon completion of each phase, the contractor shall uncover, reconnect, and energize all airfield lighting fixtures and signs to their original condition as required by the Owner, RPR, and the plans.

N. All equipment, labor and tools required to keep the existing airfield lighting operational and modified as indicated shall be included in the cost for the pay item Temporary Phasing Work, Electrical. No additional compensation will be allowed.

METHOD OF MEASUREMENT

01 51 26-4.1 Based upon the contract lump sum price per item, as required, for each item completed as described in the plans and this section completed, accepted by the RPR, and ready for operation.

BASIS OF PAYMENT

01 51 26-5.1 Payment will be made at the contract lump sum price for each item completed and accepted. The price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Alternate 2:

Item 01 51 26-5.01a Temporary Phasing Work, Electrical – per Lump Sum

END OF ITEM 01 51 26

ITEM 26 01 00 GENERAL PROVISIONS

DESCRIPTION

26 01 00-1.1 Scope. This Section describes the general provisions for electrical work associated with completing the work as shown on the Drawings and specified, herein, including but not limited to:

A. Lighting Control Devices – 26 09 23

B. Dry-Type, Low Voltage-Transformers – 26 12 19

C. Fused and Non-Fused Disconnects – 26 18 00

D. Panel Boards – 26 24 16

E. Metering – 26 27 13

F. Wire Devices – 26 27 26

G. Surge Protection Devices for Low Voltage Electrical Power Circuit – 26 43 13

H. Airfield Lighting Control Equipment – 34 43 26.13

I. Airfield Lighting PLC Control Equipment – 34 43 26.16

J. Airfield Lighting Regulator Assembly – 34 43 26.19

Work to be Performed:

A. Furnish and install motor controls, safety switches, conduit, wiring, lighting, instrumentation, generators, hazardous location and convenience equipment as specified and shown on the Drawings.
B. Install and make connections to electrical equipment furnished by Others including, but not limited to motor control center, remote-mounted flow meter amplifiers, floats, analyzers, transducers, and all control panels.
C. Make connections to electrical equipment furnished and installed by others including, but not limited to, mixers, pump motors, classifier and bar screen conveyer spray wash solenoids, supply and exhaust fans, valve actuators, and motors.

Absence of reference to incidental parts, equipment and services necessary to the complete installation shall not be taken as a release of the Contractor from furnishing such parts.

26 01 00-1.2 Drawings. The Drawings are not intended to be scaled for roughing-in measurements nor to serve as Shop Drawings.

The extent of the system of equipment, materials, panels, conduits, wire, fixtures, and connections, as shown, are in general diagrammatic and not for exact location.

The Contractor shall review the Drawings for any discrepancies with the electrical work shown and shall report any discrepancy to the Engineer for adjustment.

The installation details, instructions, and recommendations of the manufacturer of the product used, or modified to obtain the best end results, shall be the basis of attaining installation of the

products for usage on this project except where definite and specific instructions are set forth herein or details are shown on the Drawings.

26 01 00-1.3 Submittals. A complete list of proposed equipment and materials within thirty (30) days of Contract award and before ordering designating the following:

A. Manufacturer's name.

B. Model number, catalog number, or type.

Shop Drawings of all equipment and material as requested by the Engineer.

In completing the submittal requirements, the Contractor shall be responsible for product uniformity.

A. Electrical equipment, panels, switches, or devices shall not be of more than one manufacturer for any one particular type of electrical equipment.

B. For example, all disconnects shall be of the same manufacturer.

26 01 00-1.4 Power Supply Characteristics. Electric service will be provided by the local utility company, SVE (Sioux Valley Energy), from the utility transformer to the meter. Meter provided by SVE. Meter socket to be provided by the contractor. Coordinate installation with SVE.

It will be the Contractor's responsibility to provide, obtain, and pay for temporary construction power as required to meet construction requirements. Arrangements for temporary power may be made with the local utility company or portable/mobile generators may be used.

MATERIALS

26 01 00-2.1 Products. Not Used.

CONSTRUCTION METHODS

26 01 00-3.1 Workmanship. The installation of work included in this specification shall be performed in a neat workmanlike manner by people experienced and skilled in the electrical trade.

A. All exposed parts of the electrical wiring system such as exposed conduits, flush plates, cabinet trim, fixtures, etc. shall be square and true with the building construction.

All work shall be executed in accordance with the current codes, standards, statutes, or recommendations of the following technical societies, trade organizations and governing agencies and be subject to the inspection of these departments:

1. State Electrical Laws and Statutes.
2. *National Electrical Code* (NEC) - Current Edition.
3. Institute of Electrical and Electronic Engineers (IEEE).
4. National Board of Fire Underwriters (NBFU).
5. National Electrical Manufacturer's Association (NEMA).

6. Underwriter's Laboratories (UL).
7. Electrical Testing Laboratory (ETL).
8. Illuminating Engineering Society (IES).
9. Americans with Disabilities Act (ADA).

Where work required by the Drawings and Specifications is above the standards required by these organizations or agencies, it shall be done as shown and/or specified.

Carefully lay out and schedule conduit runs and equipment installation to avoid unnecessary interferences with other work.

A. Do not install equipment in areas where condensation from overhead piping could cause damage.
B. Contractor shall make minor changes in conduit and equipment locations where space conflicts occur, at no additional cost to the Owner.

26 01 00-3.2 Equipment Identification and Labeling. All electrical equipment furnished by this Contractor shall be provided with identification indicating its use or function. Equipment to be identified shall include, but not be limited to, switchboards, panelboards, distribution panels, automatic transfer switch, special system control panels, motors, and motor starters, pushbutton stations, pilot light, special lighting or control switches, emergency receptacles, special receptacles, communication system pull boxes and junction boxes, and empty conduits provided for future use. Normal use lighting switches, receptacles and conduit will not require identification unless specifically noted otherwise.

Identification labels shall be with white laminated plastic plates with black engraved letters. Letters shall be minimum 1/4-inch height and centered on the plates. Attach plates with self-tapping screws. Flush panelboards occurring in corridors shall have identification plate on interior, attached with adhesive. Labels for the emergency distribution equipment shall be red laminated plastic plates with white letters. Distribution sections, motor control center, etc. shall have individual identification labels for each breaker, switch, or cubicle with identification directly adjacent to the device and not in a typed directory.

For communication systems pull or junction boxes and blank outlet boxes, plastic engraved adhesive backed labels, black color, such as Dymo, may be used for identification (attach to inside of cover plate in finished areas).

Each panelboard shall be provided with a neatly typed directory with plastic protector of circuits describing loads and areas served. Room names or Owner’s room number shall be used; do not use plan room numbers. Spare positions shall be left blank on directory.

Hand lettering of identification will not be acceptable. Temporary labels used during construction shall be completely removed and surface repainted if required.

Devices using standard wall plates and requiring identification shall be provided with engraved plates. Plates shall be machine engraved and the letter filled in with black enamel, with minimum 1/4-inch-high letters. All receptacles that are GFCI protected shall have the text "GFCI Protected Outlet" engraved on the cover plate.

26 01 00-3.3 Tests.

Construction Period Tests:

A. All work, which is required to be placed within the construction or concealed, shall be carefully tested and inspected before being permanently covered up.

B. All tests shall be made in the presence of the Engineer and/or the Resident Project Representative and shall meet with their approval.

Final Test and Adjustment:

A. The entire system shall be subject to a test at full operating and/or under normal usage conditions. This shall include voltage and current checks, resistance measurements and equipment operation.

B. All defects in the work or workmanship which appear during these tests shall be properly remedied, a test again applied, and continued to a satisfactory conclusion.

Guarantee:

A. This Contractor shall assume responsibility for any defects which may develop in any part of this work caused by faulty workmanship, material or equipment, and agrees to replace, repair, or alter, at his expense, any such faulty workmanship, materials, or equipment that has been brought to his attention during a period as outlined in the Project Manual. Acceptance of the work shall not waive this guarantee.

26 01 00-3.4 Definitions of Terms Used in Division 26 Specifications and Drawings.

Provide: Under this contract, Contractor shall furnish and install item or items specified. Contractor shall perform all labor and furnish all materials and equipment necessary so that specified item or system will be completed and operational in every respect.

Furnish: Under this contract, Contractor shall deliver to the site item or items specified, as well as additional specialized materials and/or accessories necessary for the use and operation of item or items specified.

Install: Under this contract, Contractor shall set in position, connect (including sub-assemblies furnished), and adjust for use. Contractor shall provide miscellaneous specialty items such as hangers, supports, connectors, disconnects, electrical connections, etc. as obviously necessary for a complete and operating installation.

26 01 00-3.5 Maintenance and Operating Instructions. The Owner shall be furnished by or through the Contractor two (2) complete sets of maintenance and operating instruction manuals covering all the various pieces of electrical equipment, devices, and fixtures furnished and installed under this Contract. These shall be made up and bound in 8½” x 11" hard cover, indexed, three ring type, loose-leaf binder. In addition, one complete set of maintenance and operating instruction manuals in PDF format.

METHOD OF MEASUREMENT

26 01 00-4.1 Method of Measurement. Requirements of this Section are included in the respective bid items with no separate measurement or payment to be made.

BASIS OF PAYMENT

26 01 00-5.1 Basis of Payment. Requirements of this Section are included in the respective bid items with no separate measurement or payment to be made.

END OF SECTION 26 01 00

ITEM 26 09 23 LIGHTING CONTROL DEVICES

DESCRIPTION

26 09 23-1.1 Scope. This Section includes all labor, materials, equipment and related services to furnish and install the conduit as shown on the Drawings and herein specified.

26 09 23-1.2 Submittals.

Shop Drawings:

A. Material cut sheets.

MATERIALS

26 09 23-2.1 Lighting Controls.

A. Photocell

1. Provide UL Listed photo control module with turn-lock sensor. Provide photocell with a normally open contact, UV stabilized high-impact polypropylene, ½" cadmium sulfide light sensitive element. Single pole, single throw thermal switch.
2. 1 to 3 foot-candles Turn On with 1:3 Turn On/Turn Off Ratio, contact position at night normally closed. Minimum 15 second time delay. Shall Turn On at 35 foot-candles and shall Turn Off at 58 foot-candles.
3. Temperature range -40° to 170°F.
4. Power consumption at 1.1 watts average at 120VAC operation. Rated lift of 5,000 operations minimum at rated load. MOV (Metal Oxide Varistor) surge protection
5. Photocell shall have a 6-year warranty minimum.
6. Photocell shall be all-weather locking type receptacles.
7. Shall conform to FAA requirements for airway lighting.
8. Provide Intermatic EK43365, Tork model 5403A, or equal.

CONSTRUCTION METHODS

26 09 23-3.1 Installation.

Photocell shall be able to be mounted to vault building as indicated on the plans.

Include any incidental work necessary to make the system operational.

METHOD OF MEASUREMENT

26 09 23-4.1 Method of Measurement. Lighting Control Devices shall be considered incidental to the electrical vault work, complete bid item and separate measurement shall not be made.

BASIS OF PAYMENT

26 09 23-5.1 Basis of Payment. Lighting Control Devices shall be considered incidental, and separate payment shall not be made. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

END OF ITEM 26 09 23

ITEM 26 12 16 DRY-TYPE LOW-VOLTAGE TRANSFORMERS

DESCRIPTION

26 12 16-1.1 Scope. This section includes all labor, materials, equipment and related services to furnish and install the items and as herein specified and as shown on the Drawings.

MATERIALS

26 12 16-2.1 Dry Type Transformer.

A. Airfield Electrical, Lighting, and Control Vault
   a. Beacon
   b. Primary Wind Cone.

B. Two winding type with Class H insulation.

C. Rated capacity shall be as indicated on drawings.

D. Transformers shall have six universal voltage taps - four 2½ percent below normal, and two 2½ percent above normal.

E. All transformer shall have a maximum sound rating not to exceed decided ratings listed in NEMA standards for specified KVA sizes.

F. Transformers per NEC, UL-Standard UL 506, and CSA Standard C22.2 No. 47.

G. Provide nameplate listing.

CONSTRUCTION METHODS

26 12 16-3.1 Installation. Furnish and install transformers where shown on the Drawings.

Conduit connections to transformers shall be made with liquid tight, flexible conduit not to exceed 36 inches in length.

Provide proper supporting and mounting brackets to support the transformer.

Size breakers properly for each transformer.

METHOD OF MEASUREMENT

26 12 16-4.1 Method of Measurement. Transformers shall be considered incidental to the electrical vault bid item, and separate measurement shall not be made.

BASIS OF PAYMENT

26 12 16-5.1 Basis of Payment. Transformers shall be considered incidental to their respective electrical equipment Bid Items, and separate payment shall not be made. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

END OF SECTION 26 12 16

ITEM 26 18 00 FUSED AND NON-FUSED DISCONNECTS

DESCRIPTION

26 18 00-1.1 Scope. This Section includes all labor, materials, equipment and related services to furnish and install the disconnects as shown on the Drawings and herein specified.

MATERIALS

26 18 00-2.1 Safety Switches.

A. Provide, where not integral to the equipment specified, a disconnecting means for all non-cord-and-plug connected devices including, but not limited to, HVAC equipment, ventilation equipment, pumps, water heaters, etc.

B. Disconnects shall be rated for the electrical parameters of the device being disconnected.

C. Shall be heavy duty, fusible, or non-fusible as shown in the plans

D. , 3-Pole, rated at system voltage and amperage of the circuit being switched.

E. Interlocked door containing a window to allow visual confirmation of switch position

F. Where fused. Type R fuses.

G. Shall be single throw, quick-make, quick-break operation mechanism with positive mechanical interlock.

H. Safety switches shall be UL Listed for use as service equipment where required.

I. All safety switches used for this project shall be by the same manufacturer.

J. Safety switches shall be Square D, Class 3110, or equal, with number of poles required by the application.

K. Provide NEMA 12 enclosures for indoor use, and NEMA 3R enclosures for outdoor use or where located indoors, unprotected, within the same room as pressurized process piping larger than 1” nominal diameter.

CONSTRUCTION METHODS

26 18 00-3.1 Installation. Furnish and install disconnects switches where shown on the Drawings or otherwise required by the specifications or code.

Support panels using fiberglass channels with stainless steel anchors and clamps.

METHOD OF MEASUREMENT

26 18 00-4.1 Method of Measurement. Fused and Non-Fused Disconnects shall be considered incidental to their respective electrical equipment bid items, and separate measurement shall not be made.

BASIS OF PAYMENT

26 18 00-5.1 Basis of Payment. Fused and Non-Fused Disconnects shall be considered incidental to their respective electrical equipment bid items, and separate payment shall not be made. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

END OF SECTION 26 18 00

ITEM 26 24 16 PANELBOARDS

DESCRIPTION

26 24 16-1.01 Scope. This section includes all labor, materials, equipment and related services to furnish and install the items and as herein specified and as shown on the Drawings.

MATERIALS

26 24 16-2.01 120/240V Panels.

A. Panelboard shall be wall mounted as shown in the Drawings with sub-breakers as shown on the panel schedules, hinged lockable door, index card holders, engraved nameplate and proper bussing.

B. Panelboard shall be finished in hammer tone gray with breaker spaces as shown on the Drawings.

C. Panelboard shall be fabricated of sheet steel of the following minimum gauges: door and trim - #12; enclosure per U.L. specifications. Enclosure shall be NEMA1.

D. Circuit breakers in panelboard shall have a minimum short-circuit interrupting capacity of 10,000 amperes symmetrical unless indicated otherwise on the Drawings.

E. Circuit breakers shall be full-size ambient compensated, thermal magnetic type, with common trip mechanism for multi-pole type, bolted connectors and with the number of poles, voltage, type, and interrupting rating indicated, if greater than 10,000 AIC.

26 24 16-2.03 Busses.

A. Bussing shall be rectangular cross section, copper, with full capacity neutral and ground.

26 24 16-2.04 Approved Manufacturers.

A. Panelboards shall be manufactured by Eaton, General Electric, Square D, Siemens, or approved equal.

CONSTRUCTION METHODS

26 24 16-3.01 Installation. Where non-metallic conduit is used or where required, a bare or green insulated copper ground wire, size in accordance with Section 250 of the NEC shall be installed. When installed at Contractor's option, conduit size shall be increased as necessary to conform to code.

Panel shall be surface mounted and equipped with the size of feeder breakers indicated on the plans.

26 24 16-3.02 Circuit Breakers. Circuit breakers shall be arranged in the panels so that the breakers of the proper trip settings and numbers correspond to the numbering in the panel schedules on the Drawings. Circuit number tabs shall not be attached to or be a part of the breaker.

Where indicated on the Drawings and panel schedules, branch circuit breakers which supply the power to motors and signal systems shall be furnished with lockout clips, mounted in the "on" position. The breakers shall be able to trip automatically with the lockout clips in place.

26 24 16-3.03 Wirng. Wiring for branch circuits shall be color coded and shall be so noted on the directory of the panels. The same color-coding system shall be used throughout the entire job and shall be in accordance with schedule in Section 26 05 19.

26 24 16-3.04 Lugs. Furnish and install proper lugs in all panelboards, switchboards, gutter, etc., required to properly terminate every cable. Where paralleled conductors or conductors of size larger than the capacity of the breakers are to terminate on a breaker, a short length of copper cable (of capacity of the breaker) shall be connected to the breaker, and the proper bolt or compression type lug installed to connect this cable to the feeder cable. The cutting of cable strands to fit the breaker will not be permitted.

METHOD OF MEASUREMENT

26 24 16-4.01 Method of Measurement. Panelboards shall be considered incidental to the electrical vault bid item and separate measurement shall not be made.

BASIS OF PAYMENT

26 24 16-5.01 Basis of Payment. Panelboards shall be considered incidental, and separate payment shall not be made. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

END OF ITEM 26 24 16

ITEM 26 27 13 METERING

DESCRIPTION

26 27 13-1.01 Scope. The GENERAL, SUPPLEMENTAL, SPECIAL, and other PROVISIONS/CONDITIONS of the Contract are hereby made part of this Section.

This section includes all labor, materials, equipment and related services to furnish and install the items and as herein specified and as shown on the Drawings.

Metering shall be executed in accordance with all applicable codes and regulations, both of the state in which the project is constructed, and local authorities having jurisdiction.

MATERIALS

26 27 13-2.01 Meters. Sioux Valley Energy (SVE) is the lead electrical utility service provider. SVE will provide the meter.

Provide meter socket along with the current transformers, current test switches and CT junction.

CONSTRUCTION METHODS

26 27 13-3.01 Installation. Connections between the transformer and the meter are shown elsewhere in the plans.

METHOD OF MEASUREMENT

26 27 13-4.01 Method of Measurement. Metering and utility coordination shall be considered incidental to the electrical vault bid item and separate measurement shall not be made.

BASIS OF PAYMENT

26 27 13-5.01 Basis of Payment. Metering shall be considered incidental to the electrical vault bid item, and separate payment shall not be made. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

END OF ITEM 26 27 13

ITEM 26 27 26 WIRING DEVICES

DESCRIPTION

26 27 26-1.01 Scope. This Section includes all labor, materials, equipment and related services to furnish and install the wiring devices as shown on the Drawings and herein specified.

MATERIALS

26 27 26-2.01 Receptacles. Receptacles shall be installed with a bonding jumper for ground between the grounded light pole and the receptacle ground terminal.

26 27 26-2.02 Duplex Convenience Receptacles.

A. Duplex convenience receptacles shall be grounding type, 125 volt, 20 amperes and shall have two current-carrying contacts and one grounding contact which is internally connected to the frame with U.L. approved self-grounding straps.

B. Terminals shall have break-off straps to accommodate two-circuit wiring.

C. Outlets shall accommodate standard parallel blade cap and may be back or side wired. Back wiring terminals must require running the screw down to clamp the wire.

D. Approved types are Hubbell #5252 series or the equivalent as manufactured by General Electric, Arrow Hart, Leviton or P & S. Color shall be gray.

E. GFCI receptacles shall be grounding type, 120 volt, 15 amperes. These receptacles may be back or side wired. Back wiring terminals must require running the screw down to clamp the wire. Color shall be gray.

F. A GFCI will be allowed to provide ground fault protection to standard duplex receptacles wired to the load side of this GFCI receptacle, provided that these duplex receptacles are located within the same room as the GFCI receptacle.

G. In any case, where a standard 120 VAC duplex receptacle is protected by an upstream GFCI receptacle or GFCI circuit breaker, its cover plate shall be engraved with the following text, "GFCI PROTECTED OUTLET".

H. Receptacles shown installed in a hazardous location shall be Listed for use in the location as classified and installed using appropriate wiring methods.

26 27 26-2.03 Circuit Switches.

A. Circuit switches shall be totally enclosed, bakelite or composition base, toggle type, rated 20 amperes, 277 volts, AC for incandescent or fluorescent lamp loads. Provide single pole, 2-pole, 3-way, or momentary contact as shown on the Drawings. Pilot type shall be of lighted toggle type. Approved types are Hubbell #1221 series or the equivalent as manufactured by General Electric, Arrow Hart, Leviton or P & S. Color shall be gray.

B. Switches shown installed in a hazardous location shall be Listed for use in the location as classified and installed using appropriate wiring methods.

26 27 26-2.04 Receptacles or Switches. All receptacles or switches shall be as specified above with weatherproof cover. Covers for pilot type switches shall allow light to be seen through cover. Switches or receptacles of greater capacity when shown on the Drawings shall be by the above manufacturers unless specified otherwise.

26 27 26-2.05 Outlet Boxes.

A. Outlet boxes for use with intermediate metal conduit (IMC) and rigid aluminum conduit (RAC) shall be cast iron with drilled, tapped and plugged holes.

B. Outlet boxes for use with PVC conduit shall be heavy weight PVC with solvent weld connections.

C. All boxes shall be of proper size for the number of wires on conduit passing through or terminated therein, but in no case shall any box be less than 2 inches by 4 inches unless specifically noted on the Drawings. Cover shall be of the type most suitable for the outlets and gray in color. Boxes in concrete shall be a type which will allow the placing of conduit without displacing the reinforcing bars.

CONSTRUCTION METHODS

26 27 26-3.01 Installation.

A. Unless specified otherwise on the Drawings the following mounting heights shall be used:

   1. Convenience outlets and switches: 16 inches.
   2. Thermostat: 54 inches.

B. Outlet boxes shall be accurately placed, independently and securely fastened to the structure. All unused openings shall be closed with factory made seals.

C. Unless otherwise specified or noted on the Drawings, boxes for the various outlets shall be as follows:

   1. For light outlet boxes use minimum of 4 inches round, nominal 1-1/2 inches deep, equipped with fixture supporting device as required by the unit installed.
   2. For wall switch outlet boxes use nominal 2 inch by 4-inch boxes with solid gang boxes for more than one switch, unless noted otherwise on the Drawings.
   3. For convenience outlets, use nominal 2-inch by 4-inch boxes.
   4. For telephone outlets, use nominal 2-inch by 4-inch boxes.
   5. For thermostats use nominal 2-inch by 4-inch boxes or size required by thermostat.

METHOD OF MEASUREMENT

26 27 26-4.01 Method of Measurement. Wiring Devices shall be considered incidental to the electrical vault bid item, and separate measurement shall not be made.

BASIS OF PAYMENT

26 27 26-5.01 Basis of Payment. Wiring Devices shall be considered incidental to the electrical vault bid item, and separate payment shall not be made. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

END OF ITEM 26 27 26

ITEM 34 43 26.13 AIRFIELD LIGHTING CONTROL EQUIPMENT

DESCRIPTION

34 43 26.13-1.01 Scope. This item shall consist of furnishing and installing the L-821, Airport Lighting Control Panel in accordance with these specifications and as indicated in the plans.

This item shall also include all circuit breakers, wire and cable connections, the furnishing and installing of all necessary conduits and fittings and all necessary mounting structures. It shall also include the testing of the installation and all incidentals necessary to place the Airport Lighting Control Panel in operation as completed units to the satisfaction of the Engineer.

34 43 26.13-1.02 Submittals.

A. Product Data Sheet.

B. FAA 150-5345-53 (current version) certification.

C. Provide manuals in PDF format. In addition, provide three (3) hard copy manuals.

MATERIALS

34 43 26.13-2.01 Airport Lighting Control Equipment.

A. The airport lighting control panel shall conform to FAA AC 150/5345-3 (current version) "*Specification for L-821, Panels for the Control of Airport Lighting*".

B. Provide Type I, Conventional Panels, Class W, Wall Mounted, Style 1, Unlighted, Mode 1, Generic Panel.

CONSTRUCTION METHODS

34 43 26.13-3.01 Installation. Contractor to furnish and install airport lighting control equipment, power and control wiring, conduit and antenna as required for complete lighting control operation.

The Airport Lighting Control Equipment shall be installed in the Airfield Electrical, Lighting, and Control Vault Building. Panel shall be wall mounted.

The relays and controls shall be wired such that the airport can control the equipment from one location.

34 43 26.13-3.02 Tests. The Airport Lighting Control Panel shall be tested in conjunction with all airfield lighting and control test procedures.

METHOD OF MEASUREMENT:

34 43 26.13-4.01 Method of Measurement. Airport Lighting Control Panels shall be measured per each unit completed in place, ready for operation, and accepted by the RPR.

BASIS OF PAYMENT:

34 43 26.13-5.01 Basis of Payment. Payment will be made at the contract unit price for each type of L-821 Airport Lighting Control Panel. This price shall be full compensation for furnishing all materials 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:

Bid Alternate 2:

Item 34 43 26.13-5.01a	**L-821 Airport Lighting Control Panel, Type I (Conventional), Class W (Wall-Mounted), Style 1 (Unlighted), Mode 1 (Generic) – per Each**

END OF ITEM 34 43 26.13

ITEM 34 43 26.16 AIRFIELD LIGHTING PLC CONTROL EQUIPMENT

DESCRIPTION

34 43 26.16-1.01 Scope. This item shall consist of furnishing and installing the L-854, Radio Control Equipment in accordance with these specifications and as indicated on the plans.

This item shall also include all circuit breakers, wire and cable connections, the furnishing and installing of all necessary conduits and fittings and all necessary mounting structures. It shall also include the testing of the installation and all incidentals necessary to place the Radio Control Equipment in operation as completed units to the satisfaction of the Engineer.

34 43 26.16-1.02 Submittals.

A. Product Data Sheet

B. FAA 150-5345-53 (current version) certification

C. Provide manuals in PDF format. In addition, provide three (3) hard copy manuals.

MATERIALS

34 43 26.16-2.01 Type I, Air-to-Ground Radio Control Equipment. The receiver, antenna and interface control to the constant current regulator shall conform to FAA AC 150/5345-49 (current version) *"Specification L-854, Radio Control Equipment"*.

The radio receiver shall be Type L-854, Type I, Air-to-Ground, Amplitude Modulated (AM) receiver and a Style A decoder with heavy duty antenna as manufactured by Rural Electric, ADB Safegate, or equal.

Receiver shall incorporate circuitry decoders and relays for 3, 5 and 7 step operation. A solid-state timer will allow continued operation at each step for 15 minutes and then automatically turn off and reset. The controller shall have additional settings of 1, 30, 45 and 60 minutes.

Frequency capability shall be 118 to 136 MHz. The Contractor shall match the existing frequency at the airport of 122.9 MHz.

A. Shall have the capability to adjust the frequency sensitivity to filter out unwanted radio noise that may inadvertently trigger the radio-controlled equipment to turn on.

Input power shall be 120 volts. Unit shall incorporate solid state circuitry.

CONSTRUCTION METHODS

34 43 26.16-3.01 Installation. Contractor to furnish and install radio interface control equipment, power and control wiring, conduit and antenna as required for complete lighting control operation.

A. A radio receiver for air-to-ground control of the lighting system shall be installed in the electrical vault building.

   1. Receiver shall be wall mounted.

2. Mount the antenna per the manufacturer's instructions, but in no case less than 6 feet above the roof line of the electrical vault building.

B. Radio shall be equipped with regulator interface.

C. Radio receiver shall be furnished with coaxial cable, connectors, remote antenna an antenna heavy duty mounting support and hardware.

34 43 26.16-3.02 Tests. The Radio Control Equipment shall be tested in conjunction with all airfield lighting and control test procedures.

METHOD OF MEASUREMENT

34 43 26.16-4.01 Method of Measurement. Radio Control Equipment shall be measured per each unit completed in place, ready for operation, and accepted by the RPR.

BASIS OF PAYMENT

34 43 26.16-5.01 Basis of Payment. Payment will be made at the contract unit price for each type of L-854 Radio Control Equipment. 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.

Payment will be made under:

Bid Alternate 2:

Item 34 43 26.16-5.01a	**L-854 Type I Air-to-Ground Radio Control Equipment, w/Heavy Duty Antenna & Mounting Brackets – per Each**

END OF ITEM 34 43 26.16

ITEM 34 43 26.19 AIRFIELD LIGHTING REGULATOR ASSEMBLY

DESCRIPTION

34 43 26.19-1.01 Scope. This item shall consist of furnishing and installing the constant current regulator (CCR), Type L-829 – Regulator with monitoring, in accordance with these specifications and as indicated in the plans.

This item shall also include all circuit breakers, wire and cable connections, the furnishing and installing of all necessary conduits and fittings and all necessary mounting structures. It shall also include the testing of the installation and all incidentals necessary to place the CCR(s) in operation as completed units to the satisfaction of the Engineer.

34 43 26.19-1.02 Submittals.

A. Product Data Sheet

B. FAA 150-5345-53 (current version) certification

C. Provide manuals in PDF format. In addition, provide three (3) hard copy manuals.

MATERIALS

34 43 26.19-2.01 Ferroresonant Constant Current Regulator.

A. The L-829 CCRs shall be ETL certified according to the requirements of FAA Advisory Circular 150/5345-10 (current version) "Specification for Constant Current Regulators and Regulator Monitors".

B. The L-829 shall be Ferroresonant and shall be 6.6A, 3-step, size(s) as indicated, installed in the Airfield Electrical, Lighting, and Control Building. Shall include insulation resistance monitoring (automatic megger), input power monitoring (current, voltage, volt amps (VA), power factor), output monitoring (current, voltage, volt amps (VA), power factor, watts), an interlock switch that cuts power when the door is opened, Output Current Sensing Relay that provides a dedicated dry contract closure if the CCR output is present, door documentation pocket on the inside of the front door, and a thermal input circuit breaker..

   The CCR shall use a Ferroresonant design that produces minimal electromagnetic interference (EMI), high efficiency and near unity power factor for AC 150/5345-10 test conditions. The CCR shall exceed the EMI testing requirements specified in FAA AC 150/5345-10 (current edition).

C. Input voltage of 240 Vac.

D. The remote-control voltage shall be 120 Vac.

E. The L-829 CCRs shall be manufactured by ADB Safegate, Airport Lighting Company, Eaton Crouse Hinds, Hughey and Phillips, or approved equal.

F. The CCR shall supply three (6.6 A only) precision output levels to power the airfield lighting circuit.

Output current levels shall be maintained within ±3% at any intensity step. Nominal output current levels shall be maintained even when 30% of the isolation transformers have open secondaries.

If input power loss occurs, operation shall resume within five seconds after restoration of input power. The input power factor shall be 0.99 minimum for 5 kW to 30 kW CCRs. The efficiency shall be 90% minimum for 5 kW to 25 kW CCRs, and 92% efficiency for 30 kW CCRs.

The CCR shall use an air-cooled design to eliminate the need for oil containment reservoirs. Constant current regulation shall be obtained by using Ferroresonants to switch the supply power (varying the ON duration of the AC cycle) to the power transformer and by using feedback circuitry to monitor the transformer's output. When the load varies, the feedback circuit shall change the control voltage level, which changes the conduction angle of the AC voltage to the Ferroresonants to allow power to efficiently flow into the power transformer.

Each Ferroresonant CCR shall contain components that limit high frequency harmonic content in either input or output circuits. The input power factor shall be 0.90 minimum for 4 kW to 10KkW CCRs and 0.95 minimum for 15 kW to 30 kW CCRs. The efficiency shall be 90% for 4 kW to 20 kW CCRs and 92% for 30KW CCRs. To maximize efficiency and primary power factor, power taps shall be present on the output winding of the main transformer. These manually adjustable power taps shall be present in 10% increments from 10% to 100% on all CCR sizes. Provide Multi-Functional Digital display.

G. A single control board shall be used for all versions of the Ferroresonant CCR to make troubleshooting easier and to minimize spare parts.

The CCR shall have output current surge limitation and soft start to provide maximum airfield lamp protection.

The CCR shall include overcurrent and open-circuit protection. No tools shall be needed to open a hinged front access door.

To improve safety, no high voltage shall be present inside the front door area. Lightning protection on both the input and output of the CCR shall be provided. An integral CCR output series circuit cutout shall be provided.

It shall be possible to directly stack two equal CCRs using a manufacturer supplied stacking kit. In addition, it shall be possible to stack different combinations of CCRs assuming the larger CCR is on the bottom. The height of the CCR shall be 40 inches maximum to allow controls on top of a stacked regulator to be easily reached. Stacking kit not provided with this project.

H. **Spare Parts.** Provide the following:

1. 1 master control board for each size of CCR.
2. 1 fuse for each type of fuse in each CCR unit.
3. 1 Silicone Controlled Rectifier (SCR) assembly for each size of CCR.

CONSTRUCTION METHODS

34 43 26.19-3.01 Placing the CCR. The contractor shall furnish and install each L-829 CCR as specified in the proposal and shown in the plans.

The L-829 shall be installed in the Airfield Electrical, Lighting, and Control Vault Building at the location shown on the plans.

34 43 26.19-3.02 Tests.

A. The CCR shall be calibrated according to the manufacturer's instructions using a True RMS meter.

B. An open-circuit test, conducted according to the manufacturer's instructions, shall also be performed.

C. The CCR shall then be fully tested by continuous operation for not less than 24 hours prior to acceptance.

D. The test shall include operating the constant current regulator in each step (Local and Remote) not less than 10 times at the beginning and end of the 24-hour test

METHOD OF MEASUREMENT

34 43 26.19-4.01 Method of Measurement. CCRs shall be measured per each unit completed in place, ready for operation, and accepted by the RPR. Spare parts for the CCR(s) shall be considered incidental to the respective bid item, and separate measurement shall not be made.

BASIS OF PAYMENT

34 43 26.19-5.01 Basis of Payment. Payment will be made at the contract unit price for each size and type of CCR. 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.

Payment will be made under:

<u>Bid Alternate 2:</u>

Item 34 43 26.19-5.01a	**L-829 Constant Current Regulator (CCR w/Monitoring Options, Class 1 (6 A), Style 1 (3-Step), Size 5 kW, Including Spare Parts – per Each**

END OF ITEM 34 43 26.19

ITEM L-107 AIRPORT WIND CONES

DESCRIPTION

107-1.1 This item shall consist of removal of existing airport wind cone including the footing, concrete, asphalt, or granular surfacing, associated equipment and furnishing and installing an airport wind cone per these specifications and per the dimensions, design, and details shown in the plans.

The work shall include the furnishing and installation of a support for mounting the wind cone, the specified interconnecting wire, and a concrete footing. The item shall also include all cable connections, conduit and conduit fittings, the furnishing and installation of all lamps, ground rod and ground connection, the testing of the installation, and all incidentals necessary to place the wind cone in operation (as a completed unit) to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

107-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (ACs) shall be certified in AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications, at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). 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 in electronic pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures, that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for 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.

107-2.2 Wind cones. The primary wind cone assembly shall be Type L-807, Style 1B, Size 2. The steady burn obstruction per Section L-119 for each wind cone.

The illuminated wind cone must present a constant brightness to the pilot. The source of power for the wind cone circuit must be identified. Where a constant voltage is available, the wind cone may be connected directly to the constant voltage circuit. Where the series lighting circuit is used as a power source to the wind cone, a 6.6 amp constant current input power must be specified. The wind cone illumination must remain at a constant intensity regardless of the current step selected for other lighting systems on the circuit. See "Appendix F Application Notes" of AC 150/5340-30 for further concepts for maintaining component lighting intensity independent of current step.

107-2.3 Electrical wire and cable. Cable rated up to 5,000 volts in conduit shall conform to AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits. For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item Description A-A-59544A Type THWN-2 shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal.

107-2.4 Conduit. Rigid steel conduit and fittings shall conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242.

107-2.5 Plastic conduit (for use below grade only). Plastic conduit and fittings shall be per the following:

- 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 (polyvinyl chloride (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 Standard UL-651 shall be one of the following, as shown in the plans:

a. Type I–Schedule 40 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.

Plastic conduit adhesive shall be a solvent cement manufactured specifically for the purpose of gluing the type of plastic conduit and fitting.

107-2.6 Concrete. Concrete shall be proportioned, placed, and cured per SDDOT Specification Section 462, Miscellaneous Concrete, Class M.

107-2.7 Paint.

a. Priming paint for non-galvanized metal surfaces shall be a high solids alkyd primer compatible with the manufacturer's recommendations for the intermediate or topcoat.

b. Priming paint for galvanized metal surfaces shall be zinc dust-zinc oxide primer paint conforming to MIL-DTL-24441C/19B. Use MIL-24441 thinner per paint manufacturer's recommendations.

c. Orange paint for the body and the finish coats on metal and wood surfaces shall consist of a ready-mixed non-fading paint per Master Painter's Institute (MPI) Reference #9 (gloss). The color shall be per Federal Standards 595, International Orange, Number 12197.

d. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to the MPI, Reference #9, Exterior Alkyd, Gloss.

e. Priming paint for wood surfaces shall be mixed on the job by thinning the above specified aviation-orange or white paint by adding 1/2 pint (0.24 liter) of raw linseed oil to each gallon (liter).

CONSTRUCTION METHODS

107-3.1 Installation. The hinged support or hinged pole shall be installed on a concrete foundation per the plans.

107-3.2 Support pole erection. The Contractor shall erect the pole on the foundation following the manufacturer's requirements and erection details. The pole shall be level and secure.

107-3.3 Electrical connection. The Contractor shall furnish all labor and materials and shall make complete electrical connections per the wiring diagram furnished with the project plans. The electrical installation shall conform to the requirements of the latest edition of National Fire Protection Association, NFPA-70, National Electric Code (NEC).

Underground cable and duct for cable installation shall be installed in accordance with Item L-108, Underground Power Cables for Airports, and Item L-110, Airport Underground Electrical Duct Banks and Conduits in locations as shown on the plans.

107-3.4 Booster transformer. Not used.

107-3.5 Ground connection and ground rod. The Contractor shall furnish and install a ground rod, grounding cable, and ground clamps for grounding the "A" frame of the 12-foot (3.7-m) assembly or pipe support of the 8-foot (2.4-m) support near the base. The ground rod shall be of the type, diameter and length specified in Item L-108, Underground Power Cable for Airports. The ground rod shall be driven into the ground adjacent to the concrete foundation (minimum distance from foundation of 2 feet (60 cm)) so that the top is at least 6 inches (150 mm) below grade. The grounding cable shall consist of No. **6** American wire gauge (AWG) minimum stranded copper wire or larger and shall be firmly attached to the ground rod by exothermic welding. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. The other end of the grounding cable shall be securely attached to a leg of the frame or to the base of the pipe support with non-corrosive metal and shall be of substantial construction. The resistance to ground shall not exceed 25 ohms. If a single rod grounding electrode has a resistance to earth of over 25 ohms, then install one supplemental rod not less than 10 feet from the first rod. If desired

resistance to ground levels are still not achieved, see FAA-STD-019 for guidance on the application of coke breeze.

107-3.6 Painting. Three coats of paint shall be applied (one prime, one body, and one finish) to all exposed material installed under this item except the fabric cone, obstruction light globe, and lamp reflectors. The wind cone assembly, if already painted upon receipt, shall be given one finish coat of paint in lieu of the three coats specified above. The paint shall be per MPI Reference #9 (gloss). The color shall be per Federal Standard 595, International Orange, Number 12197.

107-3.7 Light sources. The Contractor shall furnish and install lamps per the manufacturer's instruction book.

107-3.8 Chain and padlock. The Contractor shall furnish and install a suitable operating chain for lowering and raising the hinged top section. The chain shall be attached to the pole support in a manner to prevent the light fixture assembly from striking the ground in the lowered position.

A padlock shall also be furnished by the Contractor on the 8-foot (2.4-m) wind cone for securing the hinged top section to the fixed lower section. Keys for the padlock shall be delivered to the RPR.

107-3.9 Segmented circle. Not used.

METHOD OF MEASUREMENT

107-4.1 The quantity to be paid shall be the number of wind cones removed.

107-4.2 The quantity to be paid shall be the number of wind cones installed as completed units in place, accepted, and ready for operation.

BASIS OF PAYMENT

107-5.1 Payment will be made at the contract unit price for each wind cone removed. This price shall be full compensation for removal of existing airport wind cone, segmented circle cones footings, concrete, asphalt, or granular surfacing and for all backfilling, and for all labor, equipment, tools, and incidentals necessary to complete this item.

107-5.2 Payment will be made at the contract unit price for each completely installed and accepted primary wind cone. This price shall be full compensation for furnishing all materials, obstruction lights, 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:

<u>Bid Alternate 2:</u>

Item L-107-5.1a	**Remove & Salvage Existing Primary Wind Cone; Remove & Dispose of Concrete Footing & Junction Box - per Each**

Item L-107-5.2a **L-807, LED, Style 1B (Internally Lit), Size 2 (12 Feet), Primary Wind Cone w/Single L-810 LED Steady Burn Red Obstruction Light, Including Concrete Footing, Concrete Site Pad, & Electrical Equipment Rack – 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 150/5340-5	Segmented Circle Airport Marker System
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 150/5345-27	Specification for Wind Cone Assemblies
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description

A-A-59544	Cable and Wire, Electrical (Power, Fixed Installation)

Master Painter's Institute (MPI)

MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)

Mil Standard

MIL-DTL-24441C/19B	Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III

SAE International

ASTM STD 595	Colors Used in Government Procurement

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit
UL Standard 1242	Electrical Intermediate Metal Conduit - Steel

National Fire Protection Association (NFPA)

NFPA-70	National Electric Code (NEC)

END OF ITEM L-107

ITEM L-108 UNDERGROUND POWER CABLE FOR AIRPORTS

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

EQUIPMENT AND MATERIALS

108-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the *Airport Lighting Equipment Certification Program* per AC 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format. The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

108-2.2 Cable. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, *Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits* latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C, 5,000 volts, non-shielded, with 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 solid bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be one-piece, pointed, copper bonded with minimum 10 mil. plated thickness copper. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet long and 3/4 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 be proportioned, placed, and cured per SDDOT Specification Section 462, Miscellaneous Concrete, Class M

108-2.7 Flowable backfill. Not permitted.

108-2.8 Cable identification tags. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 Tape. Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

108-2.10 Electrical coating. Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

108-2.11 Existing circuits. Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

108-2.12 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

CONSTRUCTION METHODS

108-3.1 General. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet (1 m) of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

108-3.2 Installation in duct banks or conduits. This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's

recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 Installation of direct-buried cable in trenches. Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches (75 mm) vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

a. Trenching. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches (150 mm). Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill material may not alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

b. Backfilling. After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables ; be 3 inches (75 mm) deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. This layer shall not be compacted. The second layer shall be 5 inches (125 mm) deep, loose measurement, and shall contain no particles that would be retained on a one inch (25.0 mm) sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches (20 cm) of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches (100 mm) maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be per P-152.

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not shown on the plans, the warning tape shall be located 6 inches (150 mm) above the direct-buried cable or the counterpoise wire if present. A 3-6 inch (75 - 150 mm) wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a

continuous legend as indicated on the plans. The tape shall be installed 8 inches (200 mm) minimum below finished grade.

c. Restoration. Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the topsoiling, fertilizing, seeding, and mulching as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall per P-152. Restoration shall be considered incidental to the pay item of which it is a component part.

108-3.4 Cable markers for direct-buried cable. The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPLICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR.

108-3.5 Splicing. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the RPR.

b. Field-attached plug-in splices. These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

c. Factory-molded plug-in splices. These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

d. Taped or heat-shrink splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer’s instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminates prior to application.

e. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer’s recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

108-3.6 Bare counterpoise wire installation for lightning protection and grounding. If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise

wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

a. Equipotential. Not used.

b. Isolation – used in areas where lightning strikes are not common. Counterpoise size is selected by the RPR. The isolation method is an alternate method for use only with edge lights installed in turf and stabilized soils and raceways installed parallel to and adjacent to the edge of the pavement. NFPA 780 uses 15 feet to define "adjacent to".

The counterpoise conductor shall be installed halfway between the pavement edge and the light base, mounting stake, raceway, or cable being protected.

The counterpoise conductor shall be installed 8 inches (203 mm) minimum below grade. The counterpoise is not connected to the light base or mounting stake. An additional grounding electrode is required at each light base or mounting stake. The grounding electrode is bonded to the light base or mounting stake with a 6 AWG solid copper conductor.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Isolation Method of lightning protection.

c. Common Installation requirements. When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

d. Parallel Voltage Systems. Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

108-3.7 Counterpoise installation above multiple conduits and duct banks. Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number

and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

108-3.8 Counterpoise installation at existing duct banks. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.9 Exothermic bonding. Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.10 Testing. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

A. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

B. That all affected circuits (existing and new) are free from unspecified grounds.

C. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

D. **Insulation Resistance**:

1. The insulation resistance of the entire lighting circuit shall be taken before any light fixtures are raised or new cable and temporary fixtures installed (pre-construction testing). The insulation resistance shall be recorded by the Engineer. At the completion of all activities required by Item L-125 and Item L-108, the entire circuit shall be retested and the insulation resistance recorded and compared to the pre-construction installation resistance measurement. The cause of any decrease in insulation resistance shall be investigated and corrected by the Contractor at no additional cost to the Authority.
2. Cables installed in conduit shall be tested before and after backfilling the cable trench. New circuits shall be tested separately from existing circuits. Upon connection of the new circuit to the existing circuit (if applicable), the entire combined circuit shall be tested and results provided to maintenance personnel for future use.
3. The tests must be performed with a suitable high voltage tester which has a steady, filtered DC output voltage. The high voltage tester must contain an accurate voltmeter and microammeter for reading the voltage applied to the circuit and the insulation leakage current
4. Insulation resistance testing methods shall be submitted to the RPR for approval. Insulation resistance testing results shall be recorded on the form provided or 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.
5. Each circuit shall be tested immediately after installation, in accordance with "First Test for New Circuits." Any circuit which has been installed for 60 days or more, even if it has not been operated, shall be tested in accordance with "Succeeding Tests and Old Circuits."
6. When additions are made to old circuits, only the new sections shall be tested in accordance with "First Test on New Circuits." The complete circuit shall be checked at the reduced voltages to insure reliable operation.
7. The insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than the values indicated in the table below. Whenever possible, these tests shall be performed when the ground is thoroughly wet. Experience has shown that circuits which pass insulation resistance tests during dry weather may fail after a heavy rain. Each circuit, including transformers, shall be tested as follows:

    i. All high (5 kV) and low (600 V) voltage tests on airfield lighting circuits shall be carefully supervised by qualified personnel to ascertain that excessive voltages are not applied to circuits.

    ii. Support both leads so that air gaps of several inches (six inches min.) exist between bare conductors and ground. Make sure that the cable sheath is clean and dry for a distance of at least 1 foot from the end of the cable. Also make sure that exposed insulation at end of cable is clean and dry.

iii. Connect both conductors and apply the test voltage indicated below between conductors and ground until the readings are stable and consistent.

	First Test on New Circuits	**Minimum Megohm (mΩ) Reading**
Light Circuits		
600 V Circuits	500 V, DC	100 mΩ
5,000 V Circuits	*1,000 V, DC*	200 mΩ

	Tests on New Circuits Older Than (> 60 days)	**Minimum Megohm (mΩ) Reading**
Light Circuits		
600 V Circuits	500 V, DC	100 mΩ
5,000 V Circuits	1,000 V DC	100 mΩ

E. Continuity:

1. Each series circuit (existing and new) shall be tested for continuity by ohmmeter or equivalent method. The circuit should then be checked with a megger test set, to make sure it is free of grounds. Any faults indicated by these tests should be located and repaired before proceeding with high voltage tests. Each underground circuit shall be subjected to the following tests.

   i. Verify all circuits are properly connected.

   ii. Verify all lighting power and control circuits are continuous and free from short circuits.

   iii. Confirm all circuits are free from unspecified grounds.

2. 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.

F. Earth Resistance:

1. Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on the form provided or 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.

2. That the impedance to ground of each ground rod does not exceed 10 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.

G. Testing on New CCR & Circuit Testing:

1. The contractor shall provide the following tests and record the data prior to the installation of the new CCR:

   i. Input Voltage: _____

   ii. Input Current (amps):_____

   iii. Output Voltage:_____

   iv. Output Current (amps):_____

   v. Voltage and Current (amps) on Secondary Side of Transformer at a minimum of five (lights):

   1. Light _____

   a. Volts:_____

   b. Current (amps):_____

   2. Light _____

   a. Volts:_____

   b. Current (amps):_____

   3. Light _____

   a. Volts:_____

   b. Current (amps):_____

   4. Light _____

   a. Volts:_____

   b. Current (amps):_____

   5. Light _____

   a. Volts:_____

   b. Current (amps):_____

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 Cable or counterpoise wire installed in trench plowed, duct bank or conduit shall be measured by the number of linear feet installed and grounding connectors, trench marking tape, and circuit insulation resistance testing ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, plowed, duct bank or conduit. The measurement for this item shall not include additional quantities required for slack.

108-4.2 Separate measurement will not be made for ground rods. Ground rods shall be considered incidental to their respective bid item.

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 for all preparation and installation of these materials, and for all labor, equipment, circuit testing prior to and post construction, tools, and incidentals, including ground rods, ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

Bid Alternate 2:

Item L-108-5.1a	**1/C No. 8 AWG, 5 kV XLPE, L-824, Type C Cable, Installed in Conduit - per Linear Foot**
Item L-108-5.1b	**1/C No. AWG, Cu 600 V, THWN-2, Installed in Conduit – per Linear Foot**
Item L-108-5.1c	**1/C No. 8 AWG, Cu 600 V (GND), THWN-2, Installed in Conduit – per Linear Foot**
Item L-105-5.1d	**1/C No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Including Trenching or Plowing, Including Ground Rods, Exothermic Welded Bonds, & 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-109 AIRPORT TRANSFORMER VAULT AND VAULT EQUIPMENT

DESCRIPTION

109-1.1 This item shall consist of constructing an airport transformer vault or a prefabricated metal housing per these specifications and per the design and dimensions shown in the plans. This work shall also include the installation of conduits in the floor and foundation, painting and lighting of the vault or metal housing, and the furnishing of all incidentals that are necessary to produce a completed unit. Included as a separate part under this item or as a separate item where an existing vault is to be used shall be the furnishing of all vault equipment, wiring, electrical buses, cable, conduit, potheads, and grounding systems. This work shall also include the painting of equipment and conduit; the marking and labeling of equipment and the labeling or tagging of wires; the testing of the installation; and the furnishing of all incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

109-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be certified in AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be provided in electronic pdf format, tabbed by specification section. The RPR reserves the right to reject any and all

equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

CONSTRUCTION OF VAULT AND PREFABRICATED METAL HOUSING

109-3.1 Electrical vault building. The electrical vault building must comply with NEC Article 110.31, Enclosure for Electrical Installations, Item (A) Electrical Vaults. Construct the building of materials having adequate structural strength for the conditions and installed location, has a minimum fire rating of two or three hours as determined by the authority having jurisdiction (AHJ), and is bullet resistant to minimum UL 752 Level 4.

109-3.2 Concrete. Concrete shall be proportioned, placed, and cured per SDDOT Specification Section 462, Miscellaneous Concrete, Class M.

109-3.3 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

109-3.4 Reinforcing steel. Reinforcing steel bars shall be intermediate or structural grade deformed-type bars and shall be per ASTM A615.

109-3.5 Brick. Brick shall be per ASTM C62, Grade SW.

109-3.6 Rigid steel conduit. Rigid steel conduit and fittings shall be per Underwriters Laboratories Standards 6 and 514B.

109-3.7 Plastic Conduit and Fittings. Plastic Conduit and fittings shall conform to the requirements of UL-651 and UL-654 schedule 40 polyvinyl chloride (PVC) suitable for use above or below ground.

109-3.8 Lighting. Vault or metal-housing light fixtures shall be of a vapor-proof type.

109-3.9 Outlets. Convenience outlets shall be heavy-duty duplex units designed for industrial service.

109-3.10 Switches. Vault or metal-housing light switches shall be single-pole switches.

109-3.11 Paint.

a. Priming paint for non-galvanized metal surfaces shall be a high solids alkyd primer compatible with the manufacturer's recommendations for the intermediate or topcoat.

b. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to the Master Painter's Institute (MPI), Reference #9, Exterior Alkyd, Gloss.

c. Priming paint for wood surfaces shall be mixed on the job by thinning the specified white paint by adding 1/2 pint (0.24 liter) of raw linseed oil to each gallon (liter).

d. Paint for the floor, ceiling, and inside walls shall be per Porter Paint Company 69, 71, and 79 or equivalent. Walls and ceiling shall be light gray and the floor shall be medium gray.

e. The roof coating shall be hot asphalt material per ASTM D2823. Asbestos-free roof coating per ASTM D4479 may be substituted if required by local codes.

109-3.12 Ground bus. Ground bus shall be as indicated on the plans.

109-3.13 Square duct. Duct shall be square similar to that manufactured by the Square D Company (or equivalent), or the Trumbull Electric Manufacturing Company (or equivalent). The entire front of the duct on each section shall consist of hinged or removable cover for ready access to the interior. The cross-section of the duct shall be not less than 4 × 4 inch (100 × 100 mm) except where otherwise shown in the plans.

109-3.14 Ground rods. Ground rods shall be in accordance with Item L-108.

109-3.15 Vault prefabricated metal housing. Not used.

109-3.16 FAA-approved equipment. Certain items of airport lighting equipment installed in vaults are covered by individual ACs listed below:

AC 150/5345-3	Specification for L-821, Panels for Remote Control of Airport Lighting
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors
AC 150/5345-13	Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits.
AC 150/5345-49	Specification for L-854, Radio Control Equipment
AC 150/5345-56	Specification for L-890 Airport Lighting Control and Monitoring System (ALCMS)

109-3.17 Other electrical equipment. Distribution transformers, oil switches, cutouts, relays, terminal blocks, transfer relays, circuit breakers, and all other regularly used commercial items of electrical equipment not covered by FAA equipment specifications and ACs shall conform to the applicable rulings and standards of the Institute of Electrical and Electronic Engineers (IEEE) or the National Electrical Manufacturers Association (NEMA). When specified, test reports from a testing laboratory indicating that the equipment meets the specifications shall be supplied. In all cases, equipment shall be new and a first-grade product. This equipment shall be supplied in the quantities required for the specific project and shall incorporate the electrical and mechanical characteristics specified in the proposal and plans. Equipment selected and installed by the Contractor shall maintain the interrupting current rating of the existing systems or specified rating whichever is greater.

109-3.18 Wire. Wire (in conduit) rated up to 5,000 volts shall be per AC 150/5345-7, Specification for L-824 Underground Electrical Cables for Airport Lighting Circuits. For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item

Description A-A-59544A Type THWN-2 shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal.

a. Control circuits. Unless otherwise indicated on the plans, wire shall be not less than No. 12 American wire gauge (AWG) and shall be insulated for 600 volts. If telephone control cable is specified, No. 19 AWG telephone cable per ANSI/Insulated Cable Engineers Association (ICEA) S-85-625 specifications shall be used.

b. Power circuits.

(1) 600 volts maximum – Wire shall be No. 6 AWG or larger and insulated for at least 600 volts.

(2) 3,000 volts maximum – Wire shall be No. 6 AWG or larger and insulated for at least 3,000 volts.

(3) Over 3,000 volts-Wire shall be No. 6 AWG or larger and insulated for at least the circuit voltage.

109-3.19 Short circuit / coordination / device evaluation / arc flash analysis. The Contractor shall, based upon the equipment provided, include as a part of the submittal process the electrical system "Short Circuit / Coordination / Device evaluation / Arc Flash Analysis". The analysis shall be performed by the equipment manufacturer and submitted in a written report. The analysis shall be signed and sealed by a registered professional Engineer from the state in which the project is located. The analysis shall comply with NFPA-70E and IEEE 1584.

The analysis will include: one line diagrams, short circuit analysis, coordination analysis, equipment evaluation, arc flash analysis and arc flash labels containing at a minimum, equipment name, voltage/current rating, available incident energy and flash protection boundary.

The selected firms field service Engineer shall perform data gathering for analysis completion and device settings, perform device setting as recommended by the analysis and will furnish and install the arc flash labels. The components worst case incident energy will be considered the available arc flash energy at that specific point in the system. Submit three written copies and one electronic copy of the report.

CONSTRUCTION METHODS
CONSTRUCTION OF VAULT AND PREFABRICATED METAL HOUSING

109-4.1 General. The Contractor shall construct the transformer vault or prefabricated metal housing at the location indicated in the plans. Vault construction shall be reinforced concrete, concrete masonry, or brick wall as specified. The metal housing shall be prefabricated equipment enclosure to be supplied in the size specified. The mounting pad or floor details, installation methods, and equipment placement are shown in the plans. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another engineer approved third party certification program.

The Contractor shall clear, grade, and seed the area around the vault or metal housing for a minimum distance of 10 feet (3 m) on all sides. The slope shall be not less than 1/2 inch per foot (12 mm per 0.3 m) away from the vault or metal housing in all directions.

The vault shall provide adequate protection against weather elements, including rain, wind-driven dust, snow, ice and excessive heat. The vault shall have sufficient filtered ventilation, to assure that the interior room temperatures and conditions do not exceed the recommended limits of the electrical equipment to be installed in the vault. The Contractor is responsible for

contacting the manufacturer of the equipment to be installed to obtain environmental limitations of the equipment to be installed. Refer to the electrical vault detail plan sheets for construction requirements. The prefabricated vault building shall include roof, walls and floor in accordance with the details and these specifications.

109-4.2 Foundation and walls.

a. Reinforced concrete construction. The Contractor shall construct the foundation and walls per the details shown in the plans. Unless otherwise specified, internal ties shall be of the mechanical type so that when the forms are removed the ends of the ties shall be at least one inch (25 mm) beneath the concrete surface; the holes shall be plugged and finished to prevent discoloration. Reinforcing steel shall be placed, as shown in the drawings, and secured in position to prevent displacement during the concrete placement.

The external surfaces of the concrete shall be thoroughly worked during the placing operation to force all coarse aggregate from the surface. Thoroughly work the mortar against the forms to produce a smooth finish free from air pockets and honeycomb.

The surface film of all pointed surfaces shall be removed before setting occurs. As soon as the pointing has set sufficiently, the entire surface inside and outside of the vault shall be thoroughly wet with water and rubbed with a No. 16 carborundum stone, or equivalent quality abrasive, bringing the surface to a paste. All form marks and projections shall be removed. The surface produced shall be smooth and dense without pits or irregularities. The materials which have been ground into a paste during the rubbing process shall be spread or brushed uniformly over the entire surface (except the interior surfaces that are to be painted shall have all paste removed by washing before painting) and permitted to reset. Final exterior finish shall be obtained by rubbing with No. 30 carborundum stone, or an equivalent quality abrasive. The surface shall be rubbed until the entire surface is smooth and uniform in color.

b. Brick and concrete construction. When this type of construction is specified, the foundation shall be concrete conforming to the details shown in the plans. The outer edge of the foundation at the floor level shall be beveled 1-1/2 inches (38 mm) at 45 degrees. Brick walls shall be 8 inches (200 mm) thick, laid in running bond with every sixth course a header course. Brick shall be laid in cement mortar (one part masonry cement and 3 parts sand) with full mortar bed and shoved joints. All joints shall be completely filled with mortar, and facing brick shall be back-parged with mortar as work progresses. All joints shall be 3/8 inch (9 mm) thick, exterior joints tooled concave, and interior joints struck flush. Both interior and exterior brick surfaces shall be cleaned and nail holes, cracks and other defects filled with mortar. When specified, a nonfading mineral pigment mortar coloring shall be added to the mortar. Steel reinforcing bars, 3/8 inch (9 mm) in diameter and 12 inches (300 mm) long, shall be set vertically in the center of the brick wall on not more than 2 feet (60 cm) centers to project 2-1/2 inches (60 mm) into the concrete roof slab. Lintels for supporting the brickwork over doors, windows, and louvers shall consist of two 4 × 3 × 3/8 inch (100 × 75 × 9 mm) steel angles. Lintels shall be painted with one coat of corrosion-inhibiting primer before installation, and all exposed parts shall be painted similar to doors and window sash after installation.

Window sills may be concrete poured in place or precast concrete as indicated in the plans. All exposed surfaces shall have a rubbed finish as specified under reinforced concrete

construction. After completion, all interior and exterior faces of walls shall be scrubbed with a solution of muriatic acid and water in the proportions of not less than one part acid to 10 parts of water. All traces of efflorescence, loose mortar, and mortar stain shall be removed, and the walls washed down with clear water.

c. Concrete masonry construction. When this type of construction is specified, the foundation shall be concrete conforming to the details shown in the plans. The concrete masonry units shall be standard sizes and shapes and shall conform to ASTM C90 and shall include the closures, jambs, and other shapes required by the construction as shown in the plans. Standard construction practice shall be followed for this type of work including mortar, joints, reinforcing steel for extensions into roof slab, etc. Plaster for interior walls, if specified, shall be Portland cement plaster.

109-4.3 Roof. The roof shall be reinforced concrete as shown in the plans. Reinforcing steel shall be placed as shown in the drawing and secured in position to prevent displacement during the pouring of the concrete. The concrete shall be poured monolithically and shall be free of honeycombs and voids. The surface shall have a steel-troweled finish and shall be sloped as shown in the drawing. The underside of the roof slab shall be finished in the same manner as specified for walls.

One brush or mop coat of hot asphalt roof coating shall be applied to the top surface of the roof slab. The asphalt material shall be heated to within the range specified by the manufacturer and immediately applied to the roof. The finished coat shall be continuous over the roof surface and free from holidays and blisters. Smears and dribbles of asphalt on the roof edges and building walls shall be removed.

109-4.4 Floor. Construct building foundation in accordance with the details shown in the plans. The floor shall be reinforced concrete as shown in the drawings. When present, all sod, roots, refuse, and other perishable material shall be removed from the area under the floor to a depth of 8 inches (200 mm), unless a greater depth is specified in the invitation for bids. This area shall be backfilled with materials consisting of sand, cinders, gravel, or stone. Fill shall be placed in layers not to exceed 4 inches (100 mm) and shall be thoroughly compacted by tamping or rolling. A layer of building paper shall be placed over the fill prior to placing concrete. The floor surfaces shall have a steel-troweled finish. The floor shall be level unless a drain is specified, in which case the floor shall be pitched 1/4 inch (6 mm) per foot downward toward the drain. A 1/4-inch (6-mm) asphalt felt expansion joint shall be placed between floor and foundation walls. The floor shall be poured monolithically and shall be free of honeycombs and voids.

109-4.5 Floor drain. If shown in the plans, a floor drain and dry well shall be installed in the center of the floor of the equipment room. The dry well shall be excavated 4 × 4 feet (1.2 × 1.2 m) square and to a depth of 4 feet (1.2 m) below the finished floor elevation and shall be backfilled to the elevation of the underside of the floor with gravel - which shall all pass a 2-inch (50 mm) mesh sieve and shall all be retained on a 1/4-inch (6.3 mm) mesh sieve. The gravel backfill shall be placed in 6 inch (150 mm) maximum layers, and the entire surface of each layer shall be tamped either with a mechanical tamper or with a hand tamper weighing not less than 25 pounds (11 kg) and having a face area of not more than 36 square inches (232 square cm) nor less than 16 square inches (103 square cm). The drain inlet shall be set flush in the concrete floor. The drain shall have a clear opening of not less than 8 inches (200 mm) in diameter.

109-4.6 Conduits in floor and foundation. Conduits shall be installed in the floor and through the foundation walls per the details shown in the plans. All underground conduit shall be painted with an asphalt compound. Conduit shall be installed with a coupling or metal conduit adapter flush with the top of the floor. All incoming conduit shall be closed with a pipe plug to prevent the entrance of foreign material during construction. Space conduit entrances shall be left closed.

109-4.7 Doors. Doors shall be metal-clad fireproof Class A (three (3) hour rated) doors conforming to requirements of the National Electrical Code (NEC) and local electrical codes. Panic bar exit hardware shall be installed per NEC requirements. Refer to the new electrical vault detail plan sheets for construction requirements.

109-4.8 Painting. The floor, ceiling, and inside walls of concrete construction shall first be given a hardening treatment, after which the Contractor shall apply two coats of paint as specified below, except that interior face brick walls need not be painted. The hardening treatment shall consist of applying two coats of either a commercial floor hardener or a solution made by dissolving 2 pounds (0.9 kg) of magnesium fluorosilicate or zinc sulfate crystals in one gallon (liter) of water. Each coat shall be allowed to dry at least 48 hours before the next application. After the second treating coat has dried, the surfaces shall be brushed clean of all crystals and thoroughly washed with clear water. Paint for walls and ceiling shall be a light gray color approved by the RPR. The floor paint shall be a medium gray color approved by the RPR. Before painting, the surfaces shall be dry and clean. The first coat shall be thinned by adding 2/3-quart (0.63 liters) of spar varnish and 1/3-quart (0.31 liters) of turpentine to each gallon (liter) of paint. The second coat shall be applied without thinning. All doors, lintels, and windows shall be cleaned to remove any rust or foreign material and shall be given one body and one finish coat of white paint. Bare metal surfaces shall be given a prime coat of corrosion-inhibiting primer prior to the body and finish coats.

109-4.9 Lights and switches. The Contractor shall furnish and install a minimum of two duplex convenience outlets in the vault room. Where a control room is specified, at least two duplex outlets shall be installed.

INSTALLATION OF EQUIPMENT IN VAULT OR PREFABRICATED METAL HOUSING

109-5.1 General. The Contractor shall furnish, install, and connect all equipment, equipment accessories, conduit, cables, wires, buses, grounds, and support necessary to ensure a complete and operable electrical distribution center for the airport lighting system as specified herein and shown in the plans. When specified, an emergency power supply and transfer switch shall be provided and installed.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and local code agency having jurisdiction. All electrical work shall comply with the NEC and local code agency having jurisdiction including the separation of under 600V work from 5,000V work."

109-5.2 Power supply equipment. Transformers, regulators, booster transformers, and other power supply equipment items shall be furnished and installed at the location shown in the plans or as directed by the RPR. The power supply equipment shall be set on steel "H" sections, "I" beams, channels, or concrete blocks to provide a minimum space of 1-1/2 inch (38 mm) between

the equipment and the floor. The equipment shall be placed so as not to obstruct the oil-sampling plugs of the oil-filled units; and name-plates shall, so far as possible, not be obscured.

If specified in the plans and specifications, equipment for an alternate power source or an emergency power generator shall be furnished and installed. The alternate power supply installation shall include all equipment, accessories, an automatic changeover switch, and all necessary wiring and connections. The emergency power generator set shall be the size and type specified.

109-5.3 Switchgear and panels. Oil switches, fused cutouts, relays, transfer switches, panels, panel boards, and other similar items shall be furnished and installed at the location shown in the plans or as directed by the RPR. Wall or ceiling mounted items shall be attached to the wall or ceiling with galvanized bolts of not less than 3/8-inch (9 mm) diameter engaging metal expansion shields or anchors in masonry or concrete vaults.

109-5.4 Duct and conduit. The Contractor shall furnish and install square-type exposed metallic ducts with hinged covers for the control circuits in the vault. These shall be mounted along the walls behind all floor-mounted equipment and immediately below all wall-mounted equipment. The hinged covers shall be placed to open from the front side with the hinges at the front bottom.

Wall brackets for square ducts shall be installed at all joints 2 feet (60 cm) or more apart with intermediate brackets as specified. Conduit shall be used between square ducts and equipment or between different items of equipment when the equipment is designed for conduit connection. When the equipment is not designed for conduit connection, conductors shall enter the square-type control duct through insulating bushings in the duct or on the conduit risers.

109-5.5 Wiring and connections. The Contractor shall make all necessary electrical connections in the vault per the wiring diagrams furnished and as directed by the RPR. In wiring to the terminal blocks, the Contractor shall leave sufficient extra length on each control lead to make future changes in connections at the terminal block. This shall be accomplished by running each control lead the longest way around the box to the proper terminal. Leads shall be neatly laced in place.

109-5.6 Marking and labeling. All equipment, control wires, terminal blocks, etc., shall be tagged, marked, or labeled as specified below:

a. Wire identification. The Contractor shall furnish and install self-sticking wire labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks. Wire labels, if used, shall be of the self-sticking preprinted type and of the manufacturer's recommended size for the wire involved. Identification -markings designated in the plans shall be followed. Tags, if used, shall be of fiber not less than 3/4 inch (19 mm) in diameter and not less than 1/32 inch (1 mm) thick. Identification markings designated in the plans shall be stamped on tags by means of small tool dies. Each tag shall be securely tied to the proper wire by a nonmetallic cord.

b. Labels. The Contractor shall stencil identifying labels on the cases of regulators, breakers, and distribution and control relay cases with white oil paint as designated by the RPR. The letters and numerals shall be not less than one inch (25 mm) in height and shall be of proportionate width. The Contractor shall also mark the correct circuit designations per the wiring diagram on the terminal marking strips, which are a part of each terminal block.

METHOD OF MEASUREMENT

109-6.1 The quantity of vaults to be paid for under this item shall consist of the number of vaults constructed in place and accepted as a complete unit.

109-6.2 The quantity of equipment to be paid for under this item shall consist of all equipment installed, connected and accepted as a complete unit ready for operation within a prefabricated vault building.

BASIS OF PAYMENT

109-7.1 Payment will be made at the contract unit price for each completed and accepted vault or prefabricated metal housing equipment installation. This price shall be full compensation for furnishing all materials for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Alternate 2:

Item L-109-7.1	**Electrical Vault Work, Complete – per Lump Sum**
Item L-109-7.2	**10' x 12' Pre-Fabricated, Airfield Electrical, Lighting & Control Vault Building, Including Footings, Floor, Site Preparation & Restoration – per Each**

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-3	Specification for L-821, Panels for Remote Control of Airport Lighting
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors
AC 150/5345-13	Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits
AC 150/5345-49	Specification L-854, Radio Control Equipment;
AC 150/5345-53	Airport Lighting Equipment Certification Program

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/ICEA S-85-625	Standard for Telecommunications Cable Aircore, Polyolefin Insulated, Copper Conductor Technical Requirements

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C62	Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C90	Standard Specification for Loadbearing Concrete Masonry Units
ASTM D2823	Standard Specification for Asphalt Roof Coatings, Asbestos Containing
ASTM D4479	Standard Specification for Asphalt Roof Coatings – Asbestos-Free

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation) Institute of Electrical and Electronic Engineers (IEEE)
IEEE 1584	Guide for Performing Arc-Flash Hazard Calculations

Master Painter's Institute (MPI)

MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-70E	Standard for Electrical Safety in the Workplace
NFPA-780	Standard for the Installation of Lightning Protection Systems

END OF ITEM L-109

ITEML-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 and removal of existing conduits, cables, and duct banks. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, that comply with these specifications, at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall 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 (or HDPE SDR 13.5) and Schedule 80 PVC (or HDPE SDR 11) suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC (or HDPE SDR 13.5) suitable for either above ground or underground use.

c. Type III – Schedule 80 PVC (or HDPE SDR 11) suitable for either above ground or underground use either direct-buried or encased in concrete.

d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

110-2.4 Split conduit. Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

110-2.5 Conduit spacers. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high

grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

110-2.6 Concrete. Concrete shall be proportioned, placed, and cured per SDDOT Specification Section 462, Miscellaneous Concrete, Class M.

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. Not permitted.

110-2.9 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item.

CONSTRUCTION METHODS

110-3.1 General. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may not alternatively be used

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed 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 (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the RPR shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the RPR.

110-3.3 Conduits without concrete encasement. Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may not alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

110-3.4 Markers. The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word “DUCT” or “CONDUIT” on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits.

110-3.5 Backfilling for conduits. For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152, except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may not alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.6 Backfilling for duct banks. After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152, except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet (76 m) of duct bank or one work period’s construction, whichever is less.

Flowable backfill may not alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.7 Restoration. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include topsoiling, fertilizing, seeding, and mulching shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

110-3.8 Ownership of removed cable. All lights (including accessories) and signs shall be salvaged and stockpiled in a clear and organized manner at a location determined by the Airport on Airport Property. All other removals shall be the contractor's responsibility to properly dispose of off airport property.

METHOD OF MEASUREMENT

110-4.1 The unit of measurement for removals shall per the unit as identified on the concrete proposal.

110-4.2 Trenching and backfilling or plowing for conduits shall be measured by the linear foot of trenching and backfilling or plowing for conduits installed, including locator tape, backfill designated material, and restoration, all measured in place, completed, and accepted. Separate measurement shall be made for the various widths.

110-4.3 Underground conduits and duct banks shall each be measured by the linear foot of conduits and duct banks installed, including encasement, drain lines, and the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

110-4.4 Cable markers will be measured by the number of each installed as completed units in place and accepted by the RPR.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each conduit and cable, concrete duct bank, and cable removed. This price shall be full compensation for removal and disposal of existing duct banks, conduits, and cables as shown on the plans, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

110-5.2 Payment will be made at the contract unit price per linear foot for each width of trenching and backfilling or plowing for conduit completed and accepted, including locator tape, backfill designated material, and restoration. 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 per the provisions and intent of the plans and specifications.

110-5.3 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 drain lines and the termination at the drainage structure. 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 per the provisions and intent of the plans and specifications.

110-5.4 Payment will be made at the contract unit price per each cable marker completed and accepted. This price shall be full compensation for furnishing all materials 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:

Base Bid:

Item L-110-5.3a	**Sand Encased, Electrical Conduit, (2) 2-Inch, Type III, Sch. 80 PVC in Trench – per linear foot**
Item L-110-5.3b	**Sand-Encased, Electrical Conduit, (3) 2-Inch, Type III< Sch. 80 PVC in Trench – per linear foot**

Bid Alternate 2:

Item L-110-5.1a	**Abandon Existing DEB Cable – per Lump Sum**
Item L-110-5.1b	**Abandon Existing DEB Counterpoise – per Lump Sum**
Item L-110-5.2a	**Trenching & Backfilling or Plowing for Conduit – per Linear Foot**
Item L-110-5.3c	**Non-Encased, Electrical Conduit, (1-)2-Inch, Type I, Sch. 40 PVC in Trench or SDR 13 HDPE Plowed – per Linear Foot**
Item L-110-5.3d	**Sand-Encased, Electrical Conduit, (2) 2-Inch, Type III, Sch. 80 PVC in Trench – per Linear Foot**
Item L-110-5.4a	**Cable Markers – 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 Circular (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids

AC 150/5345-53	Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

ITEM L-115 ELECTRICAL MANHOLES AND JUNCTION STRUCTURES

DESCRIPTION

115-1.1 This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the RPR. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the RPR including removal of existing manholes and junction structures as shown on the plans.

EQUIPMENT AND MATERIALS

115-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications**.** The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

115-2.2 Concrete structures. Concrete shall be proportioned, placed, and cured per SDDOT Specification Section 462, Miscellaneous Concrete, Class M.

115-2.3 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another engineer approved third party certification program. Provide precast concrete structures where shown on the plans.

Precast concrete structures shall be an approved standard design of the manufacturer. Precast units shall have mortar or bitumastic sealer placed between all joints to make them watertight. The structure shall be designed to withstand 30,000 lb. aircraft loads, unless otherwise shown on the plans. Openings or knockouts shall be provided in the structure as detailed on the plans.

Threaded inserts and pulling eyes shall be cast in as shown on the plans.

If the Contractor chooses to propose a different structural design, signed and sealed shop drawings, design calculations, and other information requested by the RPR shall be submitted by the Contractor to allow for a full evaluation by the RPR. The RPR shall review per the process defined in the General Provisions.

115-2.4 Junction boxes. Junction boxes shall be L-867 Class 1A (non-load bearing) or L-868 Class 1A (load bearing) airport light bases that are encased in concrete. The light bases shall have a L-894 blank cover, gasket, and stainless steel hardware. All bolts, studs, nuts, lock washers, and other similar fasteners used for the light fixture assemblies must be fabricated from 316L (equivalent to EN 1.4404), 304, 304L, 410, or 416 stainless steel. If 304, 410, or 416 stainless steel is utilized it shall be passivated and be free from any discoloration. Covers shall be 3/8-inch (9-mm) thickness for L-867 and 3/4-inch (19-mm) thickness for L-868. All junction boxes shall be provided with both internal and external ground lugs.

115-2.5 Mortar. The mortar shall be composed of one part of cement and two parts of mortar sand, by volume. The cement shall be per the requirements in ASTM C150, Type I. The sand shall be per the requirements in ASTM C144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C206. Water shall be potable, reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product.

115-2.6 Concrete. Concrete shall be proportioned, placed, and cured per SDDOT Specification Section 462, Miscellaneous Concrete, Class M.

115-2.7 Frames and covers. The frames shall conform to one of the following requirements:

a. ASTM A48 Gray iron castings

b. ASTM A47 Malleable iron castings

c. ASTM A27 Steel castings

d. ASTM A283, Grade D Structural steel for grates and frames

e. ASTM A536 Ductile iron castings

f. ASTM A897 Austempered ductile iron castings

All castings specified shall withstand a maximum tire pressure of 200 psi and maximum load of 30,000 lbs.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings specified.

Each frame and cover unit shall be provided with fastening members to prevent it from being dislodged by traffic, but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

Each cover shall have the word "ELECTRIC" or other approved designation cast on it. Each frame and cover shall be as shown on the plans or approved equivalent. No cable notches are required.

Each manhole shall be provided with a "DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" safety warning sign as detailed in the Contract Documents and in accordance with OSHA 1910.146 (c)(2).

115-2.8 Ladders. Ladders, if specified, shall be galvanized steel or as shown on the plans.

115-2.9 Reinforcing steel. All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

115-2.10 Bedding/special backfill. Bedding or special backfill shall be as shown on the plans.

115-2.11 Flowable backfill. Not permitted**.**

115-2.12 Cable trays. Cable trays shall be of galvanized steel, plastic, or aluminum. Cable trays shall be located as shown on the plans.

115-2.13 Plastic conduit. Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

115-2.14 Conduit terminators. Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

115-2.15 Pulling-in irons. Pulling-in irons shall be manufactured with 7/8-inch (22 mm) diameter hot-dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2-inch (12 mm) diameter with an ultimate strength of 270,000 psi (1862 MPa)). Where stress-relieved carbon steel roping is used, a rustproof sleeve shall be installed at the hooking point and all exposed surfaces shall be encapsulated with a polyester coating to prevent corrosion.

115-2.16 Ground rods. Ground rods shall be one-piece, pointed, copper bonded with minimum 10 mil. plated thickness copper**.** The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 10 feet long and 3/4 inch in diameter.

CONSTRUCTION METHODS

115-3.1 Unclassified excavation. It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in

excavating, shall be repaired or replaced to the satisfaction of the RPR without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the RPR. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the RPR. Structures shall be placed after the RPR has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches (150 mm) of sand or a material approved by the RPR as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

115-3.2 Concrete structures. Concrete structures shall be built on prepared foundations conforming to the dimensions and form indicated on the plans. The concrete and construction methods shall conform to the requirements specified in *SDDOT Specification Section 462 Miscellaneous Concrete, Class M.* Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

115-3.3 Precast unit installations. Precast units shall be installed plumb and true. Joints shall be made watertight by use of sealant at each tongue-and-groove joint and at roof of manhole. Excess sealant shall be removed and severe surface projections on exterior of neck shall be removed.

115-3.4 Placement and treatment of castings, frames and fittings. All castings, frames and fittings shall be placed in the positions indicated on the Plans or as directed by the RPR and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement

mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

Field connections shall be made with bolts, unless indicated otherwise. Welding will not be permitted unless shown otherwise on the approved shop drawings and written approval is granted by the casting manufacturer. Erection equipment shall be suitable and safe for the workman. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and fitting of parts shall be reported immediately to the RPR and approval of the method of correction shall be obtained. Approved corrections shall be made at Contractor's expense.

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

115-3.5 Installation of ladders. Ladders shall be installed such that they may be removed if necessary. Mounting brackets shall be supplied top and bottom and shall be cast in place during fabrication of the structure or drilled and grouted in place after erection of the structure.

115-3.6 Removal of sheeting and bracing. In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than 6 inches of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The RPR may direct the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

115-3.7 Backfilling. After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches (150 mm) in thickness measured after compaction to the density requirements per Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

Backfill shall not be placed against any structure until approval is given by the RPR. In the case of concrete, such approval shall not be given until tests made by the laboratory under supervision of the RPR establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the RPR may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

115-3.8 Connection of duct banks. To relieve stress of joint between concrete-encased duct banks and structure walls, reinforcement rods shall be placed in the structure wall and shall be formed and tied into duct bank reinforcement at the time the duct bank is installed.

115-3.9 Grounding. A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches (150 mm) above the floor. The ground rod shall be installed within one foot (30 cm) of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch (100 mm) diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot (30 cm) above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtails shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

115-3.10 Cleanup and repair. After erection of all galvanized items, damaged areas shall be repaired by applying a liquid cold-galvanizing compound per MIL-P-21035. Surfaces shall be prepared and compound applied per the manufacturer's recommendations.

Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

115-3.11 Restoration. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective Item L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

115-3.12 Inspection. Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in

materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

115-3.13 Manhole elevation adjustments. The Contractor shall adjust the tops of existing manholes in areas designated in the Contract Documents to the new elevations shown. The Contractor shall be responsible for determining the exact height adjustment required to raise or lower the top of each manhole to the new elevations. The existing top elevation of each manhole to be adjusted shall be determined in the field and subtracted/added from the proposed top elevation.

The Contractor shall remove/extend the existing top section or ring and cover on the manhole structure or manhole access. The Contractor shall install precast concrete sections or grade rings of the required dimensions to adjust the manhole top to the new proposed elevation or shall cut the existing manhole walls to shorten the existing structure, as required by final grades. The Contractor shall reinstall the manhole top section or ring and cover on top and check the new top elevation.

The Contractor shall construct a concrete slab around the top of adjusted structures located in graded areas that are not to be paved. The concrete slab shall conform to the dimensions shown on the plans.

115-3.14 Duct extension to existing ducts. Where existing concrete encased ducts are to be extended, the duct extension shall be concrete encased plastic conduit. The fittings to connect the ducts together shall be standard manufactured connectors designed and approved for the purpose. The duct extensions shall be installed according to the concrete encased duct detail and as shown on the plans.

METHOD OF MEASUREMENT

115-4.1 Electrical manholes and junction structures shall be measured by each completed in place and accepted. The following items shall be included in the price of each unit: All required excavation and dewatering; sheeting and bracing; all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; temporary cables and connections; and ground rod testing

115-4.2 Manhole elevation adjustments Not used.

115-4.3 Lighting, signs, and all NAVAID junction structures shall be considered incidental to the associated equipment and no separate measurement shall be made.

BASIS OF PAYMENT

115-5.1 The accepted quantity of electrical manholes and junction structures installed will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials for all preparation, excavation, backfilling and placing of the materials, for furnishing and installation of appurtenances and connections to duct banks

and other structures as may be required to complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

Payment will be made under:

Bid Alternate 2:

Item L-115-5.1a	**L-867B (12"), Class 1A, Junction Box w/Flat Etched Steel Cover – per Each**
Item L-115-5.1b	**L-867E (24"), Class 1A, Junction Box w/Flat Etched Steel Cover – per Each**

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Advisory Circular (AC)

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation)

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C206	Standard Specification for Finishing Hydrated Lime

FAA Engineering Brief (EB)

EB #83	In Pavement Light Fixture Bolts

Mil Spec

MIL-P-21035	Paint High Zinc Dust Content, Galvanizing Repair

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

END OF ITEM L-115

ITEM L-119 AIRPORT OBSTRUCTION LIGHTS

DESCRIPTION

119-1.1 This item shall consist of furnishing and installing obstruction lights per these specifications. Included in this item shall be the furnishing and installing of wood poles, steel or iron pipes, or other supports as required in the plans or specifications and in accordance with the requirements in advisory circular (AC) 70/7460-1, Obstruction Marking and Lighting

This item shall also include all wire and cable connections, the furnishing and installing of all necessary conduits and fittings, insulators, pole steps, pole cross arms, and the painting of poles and pipes. In addition, it includes the furnishing and installing of all lamps and, if required, the furnishing and installing of insulating transformers, the servicing and testing of the installation and all incidentals necessary to place the lights in operation as completed units to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

119-2.1 General.

a. Airport lighting equipment and materials covered by specifications shall be certified under AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in the project that 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 submitted electronically 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.

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 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.

119-2.2 Obstruction lights. The obstruction lighting assembly shall be Type L-810 LED Steady Burning Red Obstruction Light, single or dual as indicated on the plans, meeting the requirements of AC 150/5345-43, Specification for Obstruction Lighting Equipment.

Dual Lights. One light shall be illuminated and the other used as a spare/backup. Provide a transfer relay to switch to the spare/backup unit should the one light fail or malfunction.

119-2.3 Isolation transformers. Where required for series circuits, the isolation transformers shall conform to the requirements of AC 150/5345-47, Specification for Series to Series Isolation Transformers for Airport Lighting Systems.

119-2.4 Transformer housing. Transformer housings, if specified, shall be per AC 150/5345-42, Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories.

119-2.5 Conduit. Steel conduit and fittings shall be per Underwriters Laboratories Standards 6, 514B, and 1242.

119-2.6 Plastic conduit (for use below grade only). Plastic conduit and fittings shall be per:

- UL 514B covers W-C-1094 - Conduit fittings all types, classes 1 through 3 and 6 through 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

and must be one of the following, as shown on the plans:

a. Type I–Schedule 40 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.

119-2.7 Electrical wire and cable. For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item Description A-A-59544A, Type THWN-2, shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal. Overhead line wire from pole to pole, where specified, shall be per American National Standards Institute/Insulated Cable Engineers Association (ANSI/ICEA) S-70-547-2007.

119-2.8 Miscellaneous. Paint, poles, pole steps, insulators, and all other miscellaneous materials necessary for the completion of this item shall be new and first-grade commercial products. These products shall be as specified in the plans or specifications.

CONSTRUCTION METHODS

119-3.1 Placing the obstruction lights. The Contractor shall furnish and install single-or double-obstruction lights as specified and shown in the plans. The obstruction lights shall be mounted on poles, buildings, or towers at approximately the location shown in the plans. The exact location shall be approved by the RPR in accordance with AC 70/7460-1, Obstruction Marking and Lighting.

119-3.2 Installation on poles. Where obstruction lights are to be mounted on poles, each obstruction light shall be installed with its hub at least as high as the top of the pole. All wiring shall be run in not less than one inch (25 mm) galvanized rigid steel conduit. If specified, pole steps shall be furnished and installed, the lowest step being 5 feet (1.5 m) above ground level. Steps shall be installed alternately on diametrically opposite sides of the pole to give a rise of 18 inches (0.5 m) for each step. Conduit shall be fastened to the pole with galvanized steel pipe straps and shall be secured by galvanized lag screws. Poles shall be painted as shown in the plans and specifications.

When obstruction lights are installed on existing telephone or power poles, a large fiber insulating sleeve of adequate diameter and not less than 4 feet (1.2 m) long, shall be installed to extend 6 inches (150 mm) above the conductors on the upper cross arm. In addition, the sleeve shall be at least 18 inches (0.5 m) below the conductors on the lower cross arm. The details of this installation shall be per the plans.

119-3.3 Installation on beacon tower. Where obstruction lights are installed on a beacon tower, two obstruction lights shall be mounted on top of the beacon tower using one inch (25 mm) conduit. The conduit shall screw directly into the obstruction light fixtures and shall support them at a height of not less than 4 inches (100 mm) above the top of the rotating beacon. If obstruction lights are specified at lower levels, the Contractor shall install not less than one inch (25 mm) galvanized rigid steel conduit with standard conduit fittings for mounting the fixtures. The fixtures shall be mounted in an upright position in all cases. The conduit shall be fastened to the tower members with Wraplock® straps (or equivalent), clamps, or approved fasteners spaced approximately 5 feet (1.5 m) apart. Three coats of international orange paint per Federal Specification 595, Number 12197 shall be applied (one prime, one body, and one finish coat) to all exposed material installed.

119 3.4 Installation on buildings, towers, smokestacks, etc. Where obstruction lights are to be installed on buildings or similar structures, the installation shall be made per the details shown in the plans. The hub of the obstruction light shall be not less than one foot (30 cm) above the highest point of the obstruction except in the case of smokestacks where the uppermost units shall be mounted not less than 5 feet (1.5 m), nor more than 10 feet (3 m) below the top of the stack. Conduit supporting the obstruction light units shall be fastened to wooden structures with galvanized steel pipe straps and shall be secured by 1-1/2 inch (38 mm) No. 10 galvanized wood screws. Conduit shall be fastened to masonry structures by the use of expansion shields, screw anchors, or toggle bolts using No. 10, or larger, galvanized wood or machine screws. Conduit fastened to structural steel shall have the straps held with not less than No. 10 roundhead machine screws in drilled and tapped holes. Fastenings shall be approximately 5 feet (1.5 m) apart. Three coats of paint shall be applied (one prime, one body, and one finish coat) with color per Federal Specification 595, international orange, number 12197 paint to all exposed material installed.

119-3.5 Series isolation transformers. If it is designed for use in a series lighting circuit, the L-810 series obstruction light does not include a film cutout. Therefore, an isolation transformer is required with each series lamp. Double series units of this type require two isolation transformers. The transformer shall be housed in a light base per paragraph 119-2.4 or buried directly in the earth per the details shown in the plans.

119-3.6 Wiring. The Contractor shall furnish all necessary labor and materials. The Contractor shall make complete electrical connections from the underground cable or other source of power per the wiring diagram furnished with the project plans. If underground cable is required for the power feed and if duct is required under paved areas, the cable and duct shall be installed per and paid for as described in Item L-108, Underground Power Cable for Airports, and Item L-110, Airport Underground Electrical Duct Banks and Conduit.

119-3.7 Lamps. The Contractor shall furnish and install in each unit one or two lamps that are per the manufacturer's requirements. Provide two lamp sets as spares.

119-3.8 Tests. The installation shall be fully tested by continuous operation for not less than 1/2 hour as a completed unit prior to acceptance. These tests shall include the functioning of each control not less than 10 times.

METHOD OF MEASUREMENT

119-4.1 Obstruction lights shall be considered incidental to the unit it is mounted to and separate measurement shall not be made.

BASIS OF PAYMENT

119-5.1 Obstruction lights shall be considered incidental to the unit it is mounted to and separate payment shall not be made. This price shall be full compensation for furnishing all materials for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

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 70/7460-1	Obstruction Marking and Lighting
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 150/5345-42	Specification for Airport Light Bases, Transformer Housing, Junction Boxes, and Accessories
AC 150/5345-43	Specification for Obstruction Lighting Equipment

AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-53	Airport Lighting Equipment Certification Program

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/ICEA S-70-547	Standards for Weather-Resistant Polyolefin Covered Connectors Commercial Item Description (CID)
A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

SAE International

AMS-STD-595	Colors Used in Government Procurement

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit
UL Standard 1242	Electrical Intermediate Metal Conduit - Steel

END OF ITEM L-119

ITEM L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS

DESCRIPTION

125-1.1 This item shall consist of airport lighting systems removed and furnished and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

125-2.1 General.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not performs as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

b. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in electronic PDF format, tabbed by specification section. The RPR reserves the right to reject any or all equipment, materials or procedures, which, in the RPR's opinion, does not meet the system design and the standards and codes, specified herein. Submit the following items, but not limited to for each item:

1. circle and provide the item on the FAA certification list, 5345-53, current version, appendix 1 addendum list.

2. Provide where the item is being used on the project
3. Provide the specification item number from the plans and specs

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

All LED light fixtures, with the exception of obstruction lighting (AC 150/5345-43) must be warranted by the manufacturer for a minimum of 4 years after date of installation inclusive of all electronics." Obstruction lighting warranty is set by the individual manufacturer.

f. Airport lighting equipment and materials covered by FAA specifications shall have prior approval of the Engineer, and shall be listed in the current edition of FAA Advisory Circular (AC) 150/5345-53D Appendix 1 Addendum of the *Airport Lighting Equipment Certification Program*".

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 required by the Engineer.

EQUIPMENT AND MATERIALS

125-2.2 Conduit/Duct. Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.

125-2.3 Cable and Counterpoise. Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.

125-2.4 Tape. Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.

125-2.5 Cable Connections. Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.

125-2.6 Retroreflective Markers. Retroreflective markers shall be L-853, Type II, Style I, and shall conform to the requirements of AC 150/5345-39. Markers may be either lens retroreflectors or sheet retroreflectors as outlined in the Advisory Circular

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.

a. All existing electrical equipment and lighting systems not included in this phase of work being performed must be kept in operation to the fullest extent possible, unless prior approval of the Owner has been received and as otherwise specified below and on the Plans. The Contractor may use salvaged materials for temporary construction where required. The permission for temporary work and using salvaged materials shall be obtained from the Engineer

b. All lamp wattage and VA as required and shall be used in conjunction with an L-830 isolation transformer, on a 5 kV, 6.6 A constant current circuit.

c. Mounting heights for fixtures shall be 30" to the top of the fixture. Support structures shall be painted yellow.

d. All L-894 elevated light covers shall be equipped with an earth ground lug to permit the connection of an AWG #6 earth ground wire to the light and connected to the internal lug of the light base can.

e. Lights shall be LED.

Lights

Type	Class	Mode	Style	Option	Base	Filter	Transform	Notes
L-861(L)	N/A	1	N/A	4 (30”	L-867B (12”)	W/Y	L-830	MIRL
L-861(L)	N/A	1	N/A	4 (30”	L-867B (12”)	Y/R	L-830	MIRL
L-861(L)	N/A	1	N/A	4 (30”	L-867B (12”)	G/Y	L-830	MIRL
L-861E(L)	N/A	1	N/A	4 (30”	L-867B (12”)	R/R	L-830	MIRL
L-861E(L)	N/A	1	N/A	4 (30”	L-867B (12”)	G	L-830	MIRL
L-861T(L)	N/A	1	N/A	4 (30”	L-867B (12”)	B/B	L-830	MIRL

NOTES: R/R = RED-RED (bidirectional)
G = GREEN (unidirectional)
Y/R = YELLOW-RED
G/Y = GREEN-YELLOW
W/Y = WHITE-YELLOW
B = BLUE (omnidirectional)
MITL = MEDIUM INTENSITY TAXIWAY LIGHT
MIRL = MEDIUM INTENSITY RUNWAY LIGHT
OAH = OVERALL HEIGHT
(L) = LED TYPE
OPTION 4 = INCLUDE MOUNTING HARDWARE FOR ELEVATED LIGHTS

125-2.8 Runway and Taxiway Signs. Runway and Taxiway Guidance Signs should conform to the requirements of AC 150/5345-44.

a. All existing electrical equipment and lighting systems not included in this phase of work being performed must be kept in operation to the fullest extent possible, unless prior approval of the Owner has been received and as otherwise specified below and on the Plans. The Contractor may use salvaged materials for temporary construction where required. The permission for temporary work and using salvaged materials shall be obtained from the Engineer

b. All lamp wattage and VA as required and shall be used in conjunction with an L-830 isolation transformer, on a 5 kV, 6.6 A constant current circuit.

c. Mounting heights, offset distances from usable pavement edge to near side of sign, and sign clearance shall be as indicated on the plans and shall be per FAA AC 150/5340-18 Standards for Airport Sign Systems.

d. Signs must be equipped with an earth ground lug on the interior or exterior of the sign to permit connection of an AWG #6 earth ground wire to the sign.

e. Signs shall be LED if lighted.

Signs

Type	Size	Style	Class	Mode	Notes
L-858R/L	1	4	N/A	1	Unlighted
L-858R	1	4	N/A	1	Unlighted

125-2.9 Runway End Identifier Light (REIL). Not required.

125-2.10 Precision Approach Path Indicator (PAPI). The light units for the PAPI shall meet the requirements of AC 150/5345-28, Type L-881, Style B, Class II. PAPIs shall have a three (3) leg mounting system. PAPIs shall be equipped with factory installed, field adjustable baffles.

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 (non-load bearing) or Type L-868 (load bearing), Class 1A or 1B, Size B (12") and 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.

Each Type L-867 base shall be supplied with conduit hubs. All bases shall meet the concrete design as called out in section L-115.

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. Ratings shall be 10/15, 20/25, 30/45, 65, 100, 150, 200, 300, and 500 Watt for use on 6.6 amp series system. The Contractor shall verify the wattage, which shall be appropriate for the wattage of lamps served.

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.

a. **Light Base and Transformer Housing Installation.** All light bases shall be installed using an approved installation and alignment tool. Light bases shall be properly oriented and leveled at the proper elevation and shall be held securely in place so that during the placement of concrete the base does not become misaligned. All concrete shall be thoroughly consolidated around the base using mechanical vibrating equipment.

b. **Light Fixture Installation**. The elevated light fixtures shall be installed in accordance with the requirements specified in AC 150/5345-46 (current edition) Specifications for Runway and Taxiway Fixtures, as recommended by the manufacturer and as specified herein.

c. **Spare Parts**. The contractor shall deliver the following spare parts to the Owner:

1. All L-894 covers, columns (match height shown on electrical details) cord sets, frangible couplings, gaskets, glassware, glassware assemblies, lens, lens assemblies, housings, terminals, drivers, control boards, and associated equipment and hardware:

   i. L-861T(L) complete light fixtures

      1. 2 blue/blue

         a. 2 L-830 Isolation transformer

   ii. L-861(L)/L-861E(L) complete light fixtures

      1. 3 white/yellow

         a. 3 L-830 isolation transformer

      2. 2 red/red

         a. 2 L-830 isolation transformer

      3. 1 red/yellow

         a. 1 L-830 isolation transformer

      4. 1 green

         a. 1 L-830 isolation transformer

      5. 1 green/yellow

         a. 1 L-830 isolation transformer

   iii. 12 L-853 retroreflective markers, soil anchored

   iv. 10 L-894 yellow elevated cover plate

   v. 10 columns

   vi. 10 frangible couplings

   vii. 10 L-823 cable connectors

2. Also refer to Section 34 43 26.19 for additional L-829 CCR spare parts.

125-3.2 Testing, Inspection, and Warranty. Contractor shall furnish all equipment and appliances for testing all circuits.

a. **Visual inspections** shall be made frequently during installation, at completion of installation and before energizing the circuits. A careful visual inspection shall reveal defects that can be corrected prior to acceptance tests and energization. Serious damage may occur if defects are subjected to electrical tests or energization. Visual inspections shall include inspection appraisal of:

1. Correctness of external connections
2. Good work performance
3. Cleanliness
4. Safety hazards
5. Specific requirements listed herein for individual items
6. Proper height, in line with the other fixtures, level and properly oriented

All equipment manufactured under Specifications pass strict factory tests prior to shipment, but they shall be inspected for shipping damage immediately upon receipt.

b. **Cable Connector and Isolating Transformer Inspection.** The primary and secondary cable leads of the transformers are supplied with factory installed molded connectors. Visual inspection of these items during installation is especially important, as minor cuts, bruises, or mishandling may result in a progressive deterioration, which will eventually cause complete failure, but not until sometime during acceptance tests. During installation, these items shall be inspected to determine the following:

1. The mating surfaces of molded connectors are clean and dry when plugged together. If clean and dry inside, these high voltage connectors with taping, form a connection equal to, or superior to, a conventional high voltage splice. Conversely, if they are wet or dirty inside, no amount of taping can produce a satisfactory connection. Two or three turns of tape are recommended to hold the connector together and keep the parting line clean.

   Cleanliness of mating surfaces can best be insured by keeping the factory installed caps in place until the final connection is made. The mating surfaces of uncapped connectors should not be laid down, touched, or breathed upon. If it is necessary to break a connection, the connectors should be immediately capped.

2. The connectors are completely plugged together. After initial plugging, trapped air pressure may partially disengage the plug and receptacle. If this happens, wait a few seconds and push them together again. Apply two or three turns of tape to hold them in place.
3. The cables must not be cut by shovels, kinked, crushed by vehicle wheels, bruised by rocks, or damaged in any way during handling and installation.
4. The cables must be buried to the specified depth below finished grade and all other detailed requirements of the installation specification must be accomplished.

5. The cables must not directly cross each other and must be separated by the specified distance.
6. Screened material must be placed under and over the cables, and rocks or pebbles must not contact the cables.
7. The cables must not be bent sharply where they enter (or leave) a conduit, and must be supported properly by tamped ground, so future settling cannot cause sharp bends.

c. Lighting Fixtures. An inspection shall be made to determine that the color, quantity, and locations of light are in accordance with the Plans. Each light shall be inspected to determine that it is operable, glass is not broken or cracked, correct lamps are installed, and it has been properly leveled and aimed, in accordance with technical orders and manufacturer's instructions, where applicable.

d. Miscellaneous Components. Components such as extension rings, collars, hardware, etc., shall be visually inspected for damage, correct connections, proper fuse and circuit breaker ratings, and compliance with the Plans.

e. Final Acceptance Tests. After components and circuits have been inspected, as specified in the preceding paragraphs, the entire system shall be inspected as follows:

1. 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.
2. In addition to the cable tests after installation as specified in this section of the Specifications, the runway lighting system shall be operated continuously for ½ hour at its maximum intensity. After ½ hour of continuous operation, each control shall be operated not less than 10 times. In addition to the above, all equipment shall be subjected to the performance tests specified in the manufacturer's instructions.
3. Test proper operation of photocells (if applicable).
4. If the system contains a monitoring system, test its operation by sequentially removing light fixtures from the circuit until the monitor indicates an error.
5. Ensure the monitor indicates an error when the appropriate number of lights are removed from the circuit.

f. Warranty. All equipment furnished, and work performed under these Specifications shall be warrantied against defects in materials or workmanship for a period of one (1) year from the date of <u>final acceptance</u>. This warranty does not replace any responsibility for errors or omissions as set forth in local law. Any long-term warranties issued or offered by manufacturer's for items of equipment shall be turned over to the Airport authorities.

1. Any failure of equipment or work due to defects in materials or workmanship shall be corrected by the Contractor at no cost to the Authority.

2. The Contractor shall ascertain that all lighting system components furnished by him (including FAA approved equipment) are compatible in all respects with each other and the remainder of the new/existing system. Any incompatible components furnished by this Contractor shall be replaced by him at no additional cost to the Authority with a similar unit approved by the Engineer (different model or manufacturer) that is compatible with the remainder of the airport lighting system.
3. In case the Contractor selects to furnish airport lighting equipment requiring additional wiring, transformers, adapter mountings, etc. to those shown on the Plans and/or listed in the Specifications, any cost for those items shall be incidental to the equipment cost. All substitutions shall be approved by the Engineer.
4. The Contractor-installed equipment (including FAA approved) shall not generate any electromagnetic interference in the existing and/or new communications, weather and air traffic control equipment. Any equipment generating such interference shall be replaced by the Contractor at no additional cost with the equipment meeting applicable Specifications and not generating any interference.
5. The services of a qualified manufacturer's representative or technician experienced in the installation and operation of the type of the in-pavement lights, regulators and elevated runway lights to be installed shall be furnished at no cost to the Authority with the Engineer to supervise the assembling and the testing of those components. No separate payment shall be made for this item.

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 The unit of measurement for removals shall per the unit as identified on the proposal.

125-4.2 Reflective markers will be measured by the number installed as completed units in place, ready for operation, and accepted by the RPR. Runway and taxiway lights will be measured by the number of each type installed as completed units in place, ready for operation, and accepted

by the RPR. Guidance signs will be measured by the number of each type and size installed as completed units, in place, ready for operation, and accepted by the RPR.

Abbreviated Precision Approach Path Indicators shall be measured by each system installed as a completed unit, in place, ready for operation, and accepted by the RPR.

125-4.3 Spare parts shall be based upon the contract lump sum price per item, as required, for each item completed as described in the plans and this section completed, accepted by the RPR, and ready for operation.

BASIS OF PAYMENT

125-5.1 Payment will be made at the contract unit price per each item removed and salvaged. This price shall be full compensation for removal and disposal of associated equipment and concrete or asphalt as shown on the plans, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

125-5.2 Payment will be made at the Contract unit price for each complete runway or taxiway light, guidance sign, reflective marker, or abbreviated precision approach path indicator system 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.

125-5.3 Payment will be made at the contract lump sum price for spare parts, completed and accepted. The price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

<u>Bid Alternate 2</u>

Item L-125-5.1a	**Remove & Salvage Existing Runway Stake-Mounted Threshold Lights; Abandon Existing Transformers – per Each**
Item L-125-5.1b	**Remove & Salvage Existing Runway Stake-Mounted Edge Lights; Abandon Existing Transformers – per Each**
Item L-125-5.1c	**Remove & Salvage Existing Taxiway Stake-Mounted Edge Lights, Abandon Existing Transformers – per Each**
Item L-125-5.1d	**Remove & Salvage Existing Precision Approach Path Indicators (PAPI), Power Control Units, & Transformers; Remove & Dispose of Concrete Footings and Site Pads (2 per SET) – per Set**
Item L-125-5.1e	**Remove & Salvage Existing Sign; Remove & Dispose of Concrete Sign Pad – per Each**

Item L-125-5.2a **L-853, Retroreflective Marker, Type II (Elevated), Style I (Plowable), Soil Anchored – per Each**

Item L-125-5.2b **L-861, 30-Inch Elevated, Mode 1, LED, Medium Intensity Runway Light (MIRL), White/Yellow, Including Base Can & Concrete – per Each**

Item L-125-5.2c **L-861T, 30-Inch Elevated, Mode 1, LED, Medium Intensity Taxiway Light (MITL), Blue, Including Light Base Can & Concrete – per Each**

Item L-125-5.2d **L-858R, Mandatory, Airfield Sign, Size 1, Style 4, (Unlighted,) Mode 1, 2-Module Including Concrete Sign Pad – per Each**

Item L-125-5.2e **L-858R/L, Mandatory/Location Airfield Sign, Size 1, Style 4, (Unlighted) Mode 1, 2 Module, Including Concrete Sign Pad – per Each**

Item L-125-5.2f **L-R858 R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 3-Module, Including Concrete Sign Pad – per Each**

Item L-125-5.2g **L-881 Abbreviated Precision Approach Path Indicator (PAPI), Style B (Current), Class 2, LED, w/Baffles, Including Concrete Footings, Junction Boxes, & Concrete Site Pads – per Set**

Item L-125-5.3a **Lighting and Signage Spare Parts – per Lump Sum**

Bid Alternate 3:

Item L-125-5.2h **L-853, Retroreflective Marker, Type II (Elevated), Style I (Plowable), Soil Anchored – per Each**

Item L-125-5.2i **L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 3-Module Including Concrete Sign Pad – per Each**

Item L-125-5.2j **L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 4-Module Including Concrete Sign Pad – 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

ITEM L-190 GENERAL ELECTRICAL NOTES

The following notes are general requirements as outlined in FAA AC 150/5340-30J. The plans and specifications supersede this section.

E.1.1 General.

1. The electrical installation, at a minimum, must meet the NEC and local regulations.
2. The contractor must ascertain that all lighting system components furnished (including FAA approved equipment) are compatible in all respects with each other and the remainder of the new/existing system. Any non-compatible components furnished by the contractor must be replaced at no additional cost to the airport sponsor with a similar unit that is approved by the engineer and compatible with the remainder of the airport lighting system.
3. In case the contractor elects to furnish and install airport lighting equipment requiring additional wiring, transformers, adapters, mountings, etc., to those shown on the drawings and/or listed in the specifications, any cost for these items must be incidental to the equipment cost.
4. The contractor-installed equipment (including FAA approved) must not generate any EMI in the existing and/or new communications, weather, air navigation, and ATC equipment. Any equipment generating such interference must be replaced by the contractor at no additional cost with equipment meeting the applicable specifications.
5. When a specific type, style, class, etc., of FAA approved equipment is specified only that type, style, class, etc., will be acceptable, though equipment of other types, style, class, etc., may be FAA approved.
6. All instructions from the engineer to the contractor regarding changes in, or deviations from, the plans and specifications must be in writing with copies sent to the airport sponsor and the FAA field office (Airports District Office (ADO)/Airports Field Office (AFO)). The contractor must not accept any verbal instructions from the engineer regarding any changes from the plans and specifications.
7. A minimum of three copies of instruction books must be supplied with each type of equipment. For more sophisticated types of equipment, such as regulators, PAPI, REIL, etc., the instruction book must contain the following:
    a. A detailed description of the overall equipment and its individual components.
    b. Theory of operation including the function of each component.
    c. Installation instructions.
    d. Start-up instructions.
    e. Preventative maintenance requirements.
    f. Chart for troubleshooting.

g. Complete power and control detailed wiring diagram(s), showing each conductor/connection/component; "black" boxes are not acceptable. The diagram or the narrative must show voltages/currents/wave shapes at strategic locations to be used when checking and/or troubleshooting the equipment. When the equipment has several brightness steps, these parameters must be indicated for all the different modes.

h. Parts list will include all major and minor components, such as resistors, diodes, etc. It must include a complete nomenclature of each component and, if applicable, the name of its manufacturer and the catalog number.

i. Safety instructions.

E.1.2 <u>Power and Control.</u>

1. Stencil all electrical equipment to identify function, circuit voltage and phase. Where the equipment contains fuses, also stencil the fuse or fuse link ampere rating. Where the equipment does not have sufficient stenciling area, the stenciling must be done on the wall next to the unit. The letters must be one inch (25 mm) high and painted in white or black paint to provide the highest contrast with the background. Engraved plastic nameplates may also be used with one inch (25 mm) white (black background) or black (white background) characters. All markings must be of sufficient durability to withstand the environment.

   Color code all phase wiring using colored wire insulation and/or colored tape. Where tape is used, the wire insulation must be black. Black and red must be used for single-phase, three wire systems and black, red and blue must be used for three-phase systems. Neutral conductors, size No. 6 AWG or smaller, must be identified by a continuous white or natural outer finish. Conductors larger than No. 6 AWG must be identified either by a continuous white or natural gray outer.

2. finishing along its entire length or using white tape at its terminations and inside accessible wireways.

3. All branch circuit conductors connected to a particular phase must be identified with the same color. The color coding must extend to the point of utilization.

4. In control wiring, the same color must be used throughout the system for the same function, such as 10%, 30%, 100% brightness control, etc.

5. All power and control circuit conductors must be copper; aluminum must not be accepted. This includes wire, cable, busses, terminals, switch/panel components, etc.

6. Low voltage (600 V) and high voltage (5,000 V) conductors must be installed in separate wireways.

7. Neatly lace wiring in distribution panels, wireways, switches and pull/junction boxes.

8. The minimum size of pull/junction boxes, regardless of the quantity and the size of the conductors shown, must be as follows:
   a. In straight pulls, the length of the box must not be less than eight times the

trade diameter of the larger conduit. The total area (including the conduit cross- sectional area) of a box end must be at least three times greater than the total trade cross-sectional area of the conduits terminating at the end.

b. In angle or u-pulls, the distance between each conduit entry inside the box and the opposite wall of the box must not be less than six times the trade diameter of the largest conduit. This distance must be increased for additional entries by the amount of the sum of the diameters of all other conduit entries on the same wall of the box. The distance between conduit entries enclosing the same conductor must of not be less than six times the trade diameter of the largest conduit.

9. A run of conduit between terminations at equipment enclosures, square ducts and pull/junction boxes, must not contain more than the equivalent of four quarter bends (360 degrees total), including bends located immediately at the terminations. Cast, conduit type outlets must not be treated as pull/junction boxes.

10. Equipment cabinets must not be used as pull/junction boxes. Only wiring terminating at the equipment must be brought into these enclosures.

11. Splices and junction points must be permitted only in junction boxes, ducts equipped with removable covers, and at easily accessible locations.

12. Circuit breakers in power distribution panel(s) must be thermal-magnetic, molded case, permanent trip with 100-ampere, minimum, frame.

13. Dual lugs must be used where two wires, size No. 6 or larger, are to be connected to the same terminal.

14. All wall mounted equipment enclosures must be mounted on wooden mounting boards.

15. Wooden equipment mounting boards must be plywood, exterior type, 3/4 inch (19 mm) minimum thickness, both sides painted with one coat of primer and two coats of gray, oil-based paint.

16. Rigid steel conduits must be used throughout the installation unless otherwise specified. The minimum trade size must be 3/4 inch (19 mm).

17. All rigid conduits must be terminated at CCRs with a section (10 inch (254 mm) minimum) of flexible conduit.

18. Unless otherwise shown all exposed conduits must be run parallel to, or at right angles with, the lines of the structure.

19. All steel conduits, fittings, nuts, bolts, etc., must be galvanized.

20. Use conduit bushings at each conduit termination. Where No. 4 AWG or larger ungrounded wire is installed, use insulated bushings.

21. Use double lock nuts at each conduit termination. Use weather tight hubs in damp and wet locations. Sealing locknuts must not be used.

22. Wrap all primary and secondary power transformer connections with sufficient layers of insulating tape and cover with insulating varnish for full value of cable

insulation voltage.

23. Unless otherwise noted, all indoor single conductor control wiring must be No. 12 AWG.

24. Both ends of each control conductor must be terminated at a terminal block. The terminal block must be of proper rating and size for the function intended and must be in equipment enclosures or special terminal cabinets.

25. All control conductor terminators must be of the open-eye connector/screw type. Soldered, closed-eyed terminators, or terminators without connectors are not acceptable.

26. In terminal block cabinets, the minimum spacing between parallel terminal blocks must be 6 inches (152 mm). The minimum spacing between terminal block sides/ends and cabinet sides/bottom/top must be 5 inches (127 mm). The minimum spacing will be increased as required by the number of conductors. Additional spacing must be provided at conductor entrances.

27. Both ends of all control conductors must be identified as to the circuit, terminal, block, and terminal number. Only stick-on labels must be used.

28. A separate and continuous neutral conductor must be installed and connected for each breaker circuit in the power panel(s) from the neutral bar to each power/control circuit.

29. The following must apply to relay/contactor panel/enclosures:

    a. All components must be mounted in dust proof enclosures with vertically hinged covers.

    b. The enclosures must have ample space for the circuit components, terminal blocks, and incoming internal wiring.

    c. All incoming/outgoing wiring must be terminated at terminal blocks.

    d. Each terminal on terminal blocks and on circuit components must be clearly identified.

    e. All control conductor terminations must be of the open-eye connector/screw type. Soldered, closed-eye connectors, or terminations without connectors are not acceptable.

    f. When the enclosure cover is opened, all circuit components, wiring, and terminals must be exposed and accessible without any removal of any panels, covers, etc., except those covering high voltage components.

    g. Access to, or removal of, a circuit component or terminal block will not require the removal of any other circuit component or terminal block.

    h. Each circuit component must be clearly identified indicating its corresponding number shown on the drawing and its function.

    i. A complete wiring diagram (not a block or schematic diagram) must be mounted on the inside of the cover. The diagram must represent each conductor by a separate line.

j. The diagram must identify each circuit component and the number and color of each internal conductor and terminal.

k. All wiring must be neatly trained and laced.

l. Minimum wire size must be No. 12 AWG.

E.1.3 <u>Field Lighting.</u>

1. Unless otherwise stated, all underground field power multiple and series circuit conductors (whether direct earth burial (DEB) or in duct/conduit) must be FAA approved Type L-824. Insulation voltage and size must be as specified.

2. No components of the primary circuit such as cable, connectors and transformers must be brought above ground at edge lights, signs, REIL, etc.

3. There must be no exposed power/control cables between the point where they leave the underground (DEB or L-867/L-868 bases) and where they enter the equipment (such as taxiway signs, PAPI, REIL, etc.). Enclosures. These cables must be enclosed in rigid conduit or in flexible water-tight conduit with frangible coupling(s) at the grade or the housing cover, as shown in applicable details.

4. The joints of the L-823 primary connectors must be wrapped with one layer of rubber or synthetic rubber tape and one layer of plastic tape, one half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint.

5. The cable entrance into the field attached L-823 connectors must be enclosed by heat-shrinkable tubing with continuous internal adhesive.

6. The ID of the primary L-823 field attached connectors must match the cable OD to provide a watertight cable entrance. The entrance must be encapsulated in heat shrinkable tubing with continuous factory applied internal adhesive.

7. L-823 Type 11, two-conductor secondary connector must be class “A” (factory molded).

8. There must be no splices in the secondary cable(s) within the stems of a runway/taxiway edge/threshold lighting fixtures and the wireways leading to taxiway signs and PAPI/REIL equipment.

9. Electrical insulating grease must be applied within the L-823, secondary, two conductor connectors to prevent water entrance. The connectors must not be taped.

10. DEB isolation transformers must be buried at a depth of 10 inches (254 mm) on a line crossing the light and perpendicular to the runway/taxiway centerline at a location 12 inches (305 mm) from the light opposite from the runway/taxiway.

11. DEB primary connectors must be buried at a depth of 10 inches (254 mm) near the isolation transformer. They must be orientated parallel with the runway/taxiway centerline. There must be no bends in the primary cable 6 inches (152 mm), minimum, from the entrance into the field-attached primary connection.

12. A slack of 3 feet (0.9 m), minimum, must be provided in the primary cable at each transformer/connector termination. At stake-mounted lights, the slack must be loosely coiled immediately below the isolation transformer.

13. Direction of primary cables must be identified by color coding as follows when facing light with back facing pavement: cable to the left is coded red and cable to the right is coded blue, this applies to the stake-mounted lights and base-mounted lights where the base has only one entrance.

14. L-867/L-868 bases must be size B, 24" (610 mm) deep Class 1A unless otherwise noted.

15. Base-mounted frangible couplings must not have weep holes to the outside. Plugged holes are not acceptable. The coupling must have a 1/4" (6 mm) diameter minimum or equivalent opening for drainage from the space around the secondary connector into the L-867/L-868 base.

16. The elevation of the frangible coupling groove must not exceed 1-1/2" (38 mm) above the edge of the cover for base-mounted couplings or the top of the stake for stake-mounted couplings.

17. Where the frangible coupling is not an integral part of the light fixture stem or mounting leg, a bead of silicone rubber seal must be applied completely around the light stem or wireway at the frangible coupling to provide a watertight seal.

18. Tops of the stakes supporting light fixtures must be flush with the surrounding grade.

19. Plastic lighting fixture components, such as lamp heads, stems, frangible couplings, base covers, brackets, stakes, are not acceptable. L-867/L-868 plastic transformer housings are acceptable. A metal threaded fitting must be set in flange during casting process. Base cover bolts must be fabricated from 18-8 stainless steel.

20. The tolerance for the height of runway/taxiway edge lights must be ±1 inch (25 mm). For stake-mounted lights, the specified lighting fixture height must be measured between the top of the stake and the top of the lens. For base-mounted lights, the specified lighting fixture height must be measured between the top of the base flange and the top of the lens, and includes the base cover, the frangible coupling, the stem, the lamp housing and the lens.

21. The tolerance for the lateral spacing (light lane to runway/taxiway centerline) of runway/taxiway edge lights must be ±1 inch (25.4 mm). This also applies at intersections to lateral spacing between lights of a runway/taxiway and the intersecting runway/taxiway.

22. L-867/L-868 bases may be precast. Entrances into L-867/L-868 bases must be plugged from the inside with duct seal.

23. Galvanized/painted equipment/component surfaces must not be damaged by drilling, filing, etc. – this includes drain holes in metal transformer housings.

24. Edge light numbering tags must be facing the pavement.

25. Cable/splice/duct markers must be pre-cast concrete of the size shown. Letters/numbers/arrows for the legend to be impressed into the tops of the markers must be pre-assembled and secured in the mold before the concrete is poured. Legends inscribed by hand in wet concrete are not acceptable.

26. All underground cable runs must be identified by cable markers at 200 ft (61 m) maximum spacing with an additional marker at each change of direction of the cable run. Cable markers must be installed above the cable.

27. Locations of all DEB underground cable splice/connections, except those at isolation transformers, must be identified by splice markers. Splice markers must be placed above the splice/connections.

28. The cable and splice markers must identify the circuits to which the cables belong. For example: RWY 4-22, PAPI-4, PAPI-22.

29. Locations of ends of all underground ducts must be identified by duct markers.

30. The preferred mounting method of runway and taxiway signs using single row of legs. However, two rows will be acceptable.

31. Lighted sign installation:

    a. Power to the sign must be provided through breakaway cable connectors installed within the frangible point portion of the sign's mounting legs.

    b. There must be no above ground electrical connection between signs in a sign array.

32. Stencil horizontal and vertical aiming angles on each REIL flash head or equipment enclosure. The numerals must be black and one inch (25 mm) minimum height.

33. Stencil vertical aiming angles on the outside of each PAPI lamp housing. The numerals must be black and one inch (25 mm) minimum height.

34. All power and control cables in man/hand holes must be tagged. Use embossed stainless steel strips or tags attached at both ends to the cable using UV resistant plastic straps. A minimum of two tags must be provided on each cable in a man/hand hole - one at the cable entrance, and one at the cable exit.

35. Apply a corrosion inhibiting, anti-seize compound to all screws, nuts and frangible coupling threads. If coated bolts are used per EB #83, do not apply anti-seize compound.

36. There must be no splices between the isolation transformers. L-823 connectors are allowed at transformer connections only, unless shown otherwise.

37. DEB splices in home runs must be of the cast type, unless shown otherwise.

38. Where a parallel, constant voltage PAPI system is provided, the “T” splices must be of the cast type.

39. Concrete used for slabs, footing, backfill around transformer housings, markers, etc., must be 4000 PSI, min., air entrained.

E.1.4 <u>Equipment Grounding.</u>

1. Ground all non-current-carrying metal parts of electrical equipment by using conductors sized and routed per NEC Handbook, Article 250.
2. All ground connections to ground rods, busses, panels, etc., must be made via exothermic welds. Soldered or bolt and washer type connections are not acceptable. Clean all metal surfaces before making ground connections. Exothermic welds are the preferred method of connection to a ground rod
3. Tops of ground rods must be 6 inches (152 mm) below grade.
4. The resistance to ground of the vault grounding system with the commercial power line neutral disconnected must not exceed 10 ohms.
5. The resistance to ground of the counterpoise system, or at isolation locations, such as airport beacon must not exceed 10 ohms.

END OF ITEM L-190

ITEM 462 CONCRETE FOR INCIDENTAL CONSTRUCTION – CLASS M

DESCRIPTION

462-1.1 This work consists of site preparation, form construction, and the furnishing, handling, placing, curing, and finishing of concrete for minor structures and incidental construction.

MATERIALS

462-2.1 The following Sections are incorporated by reference and shall be incorporated into this Section. Refer to https://dot.sd.gov/doing-business/contractors/standard-specifications/2015-standard-specifications or current version for all complete Sections. Material shall conform to the following Sections:

1. **Cement:** Section 750. Type II cement shall be used, unless otherwise specified.
2. **Fine Aggregate:** Section 800.
3. **Coarse Aggregate:** Section 820.
4. **Water:** Section 790.
5. **Admixtures:** Sections 751 and 752.
6. **Reinforcing Steel:** Section 1010.
7. **Curing Materials:** Section 821.
8. **Preformed Expansion Joint Filler:** Section 860.
9. **Joint Sealer:** Section 870.
10. **Fly Ash:** Section753.
11. **Grout:** Section 460.2 K
12. **Geotextile Fabric:** Section 83
13. **Granular Bases and Surfacing:** Section 260

CONSTRUCTION REQUIREMENTS

462-3.1 The supplier of Class M concrete will be required to furnish a written statement certifying the concrete furnished meets the applicable requirements of Section 462 for Class M concrete.

462-3.2 With the exception of Section 462.3 A, the requirements of Section 462.3 shall not apply to Class M concrete produced at a commercial precast facility regularly producing other precast items under Section 560. Class M concrete produced at a commercial precast facility shall conform to Section 560 and Section 462.3 A.

Concrete Quality and Proportion: The concrete specified in this section will be designated as Class M6 concrete.

The following requirements shall apply for Class M6 concrete:

1. The concrete aggregate mixture shall contain a minimum of 50% coarse aggregate by weight.
2. The mixture shall contain at least 600 pounds of cement per cubic yard.
3. The minimum 28-day compressive strength shall be 4000 psi.

When Class M6 concrete is specified, the design mix for Class A40 concrete may be substituted when approved.

Class M6 concrete shall conform to the following slump and entrained air requirements:

1. The slump at time of placement shall be maintained between 1 inch and 4½ inches. When high range water reducing admixtures (HRWRA) are used at a commercial precast facility regularly producing other precast items under Section 560, the slump at time of precast concrete placements shall be maintained between 4 inches and 8 inches.
2. The entrained air content for cast in place concrete shall be 6.5% plus 1.0% minus 1.5%. The entrained air content for precast concrete, cast at a commercial precast facility regularly producing other precast items under Section 560, shall be 6.0% plus or minus 1.5%.

Forms: Wood and metal forms shall conform to 460.3 C.4.

Mixing Concrete: Concrete mixing shall conform to Section 460.3 E.

Limitations of Mixing: Limitations of mixing shall conform to Section 460.3 F.

Delivery Requirements: Concrete delivery shall conform to Section 460.3 G.

Placing Concrete: Concrete placing shall conform to Section 460.3 J.

Underwater Concrete Placement: Depositing concrete in water shall conform to Section 465.3 M.

Surface Finish: Surface finish shall conform to Section 460.3 L.

Curing Concrete: Curing concrete shall conform to Section 460.3 M.

Protection of Concrete: Concrete shall be protected in accordance with Section 460.3N. Concrete shall be maintained above 32°F until it has attained a compressive strength of 1500 psi.

Subsequent Construction: Removal of formwork, construction of superimposed elements, backfilling, and application of live loads shall conform to Section 460.3 O. and Section 460.3 P.

Joints: Joints shall conform to Section 460.3 Q.

METHOD OF MEASUREMENT

462-4.1 Class M concrete will be measured in accordance with neat line dimensions sown on the plans, unless changes are ordered during construction. Areas will be computed to the nearest 0.1 square yard.

462-4.2 Class M concrete shall be considered incidental to all lights, junction boxes, manholes, signs, and NAVAIDs and shall not be measured separately.

BASIS OF PAYMENT

462-5.1 The accepted quantity of Class M concrete will be paid for at the contract unit price per square yard.

462-5.2 Payment shall be full compensation for labor, equipment, tools, materials, and incidentals required for placing, finishing, protecting, and curing the concrete.

END OF ITEM 462

ITEM 1010 CONCRETE REINFORCEMENT

MATERIALS

1010-1.1 Bar Reinforcement – Structures and Paving (excluding dowel and tie bars): Bar reinforcement for structures and concrete pavement, shall conform to the requirements of AASHTO M 31 (ASTM A615) Grade 60. Bar reinforcement shall be deformed, unless otherwise noted.

1010-1.2 Welded Wire Reinforcement: Welded wire reinforcement shall conform to ASTM A1064 including the optional yield strength measurement.

1010-1.3 Tie Bars: Tie bars for concrete pavement shall conform to the requirements of AASHTO M 31, Grade 40, except rail steel shall not be used for tie bars that are to be bent and re-straightened. Tie bars shall be deformed. Tie bars shall be epoxy coated conforming to Section 1010.1 E.

Sawing or shearing of the tie bars to obtain the specified length will be permitted provided the coating is not damaged and the resulting bar is free from burring and other deformations. The cut ends shall be coated.

1010-1.4 PCC Paving Dowel Bars and Dowel Bar Assemblies: The steel cores of dowel bars and plain round bars shall be plain round bars conforming to AASHTO M 31 (ASTM A615) Grade 40 or 60, M 227 (ASTM A663) Grade 70 minimum, or M 255 (ASTM A675) Grade 75 minimum. The bars shall be the diameter shown in the plans, free from burring or other deformation restricting slippage in the concrete. Dowel bars shall be epoxy coated conforming to Section 1010.1 E.

Sawing or shearing of the dowel bars will be permitted provided the coating is not damaged and the resulting bar is within the permissible deformations. The cut ends are not required to be coated. Any deformation larger than true shape shall not exceed a 0.04 inch increase in diameter or thickness and shall not extend more than0.40 inch from the dowel end.

Bond breakers used to pre-coat dowel bar assemblies shall be one of the products from the Department's Approved Products List.

1010-1.5 Epoxy Coated Reinforcement: A Certificate of Compliance and a copy of all quality control test results for the epoxy coating shall be furnished for each shipment supplied for use on a project.

Dowel bars for concrete pavements shall be epoxy coated and shall conform to AASHTO M 254 Type B except the film thickness shall be from 5 to 13 mils after cure.

All other epoxy coated reinforcement shall comply with ASTM A775.

1010-1.6 Pretensioning Reinforcement: Pretensioning Reinforcement shall conform to AASHTO M 203 (ASTM A416) and shall be low-relaxation strands unless otherwise specified.

METHOD OF MEASUREMENT

Concrete reinforcement shall be considered incidental to concrete structures and shall not be measured separately.

BASIS OF PAYMENT

Concrete reinforcement shall be considered incidental and separate payment shall not be made.

Payment shall be full compensation for labor, equipment, tools, materials, and incidentals required for installation.

END OF ITEM 1010

AIRPORT LIGHTING CIRCUIT INSULATION RESISTANCE FORM

AIRPORT LIGHTING CIRCUIT INSULATION RESISTANCE TEST RECORD

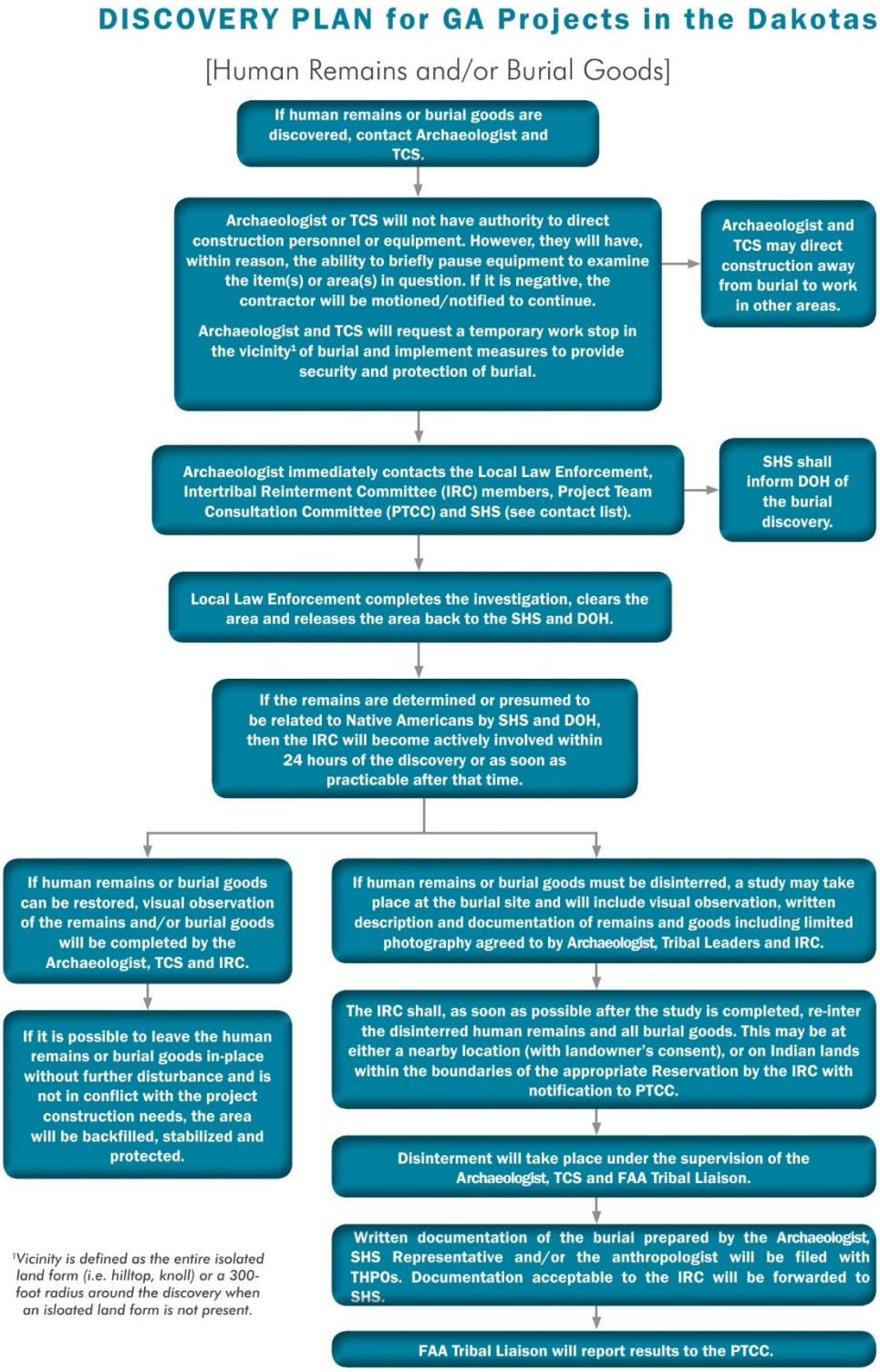
VAULT OR SUBSTATION # _____

CIRCUIT IDENTIFICATION _____

DATE	OHMS	WEATHER CONDITIONS AND COMMENTS	INITIALS

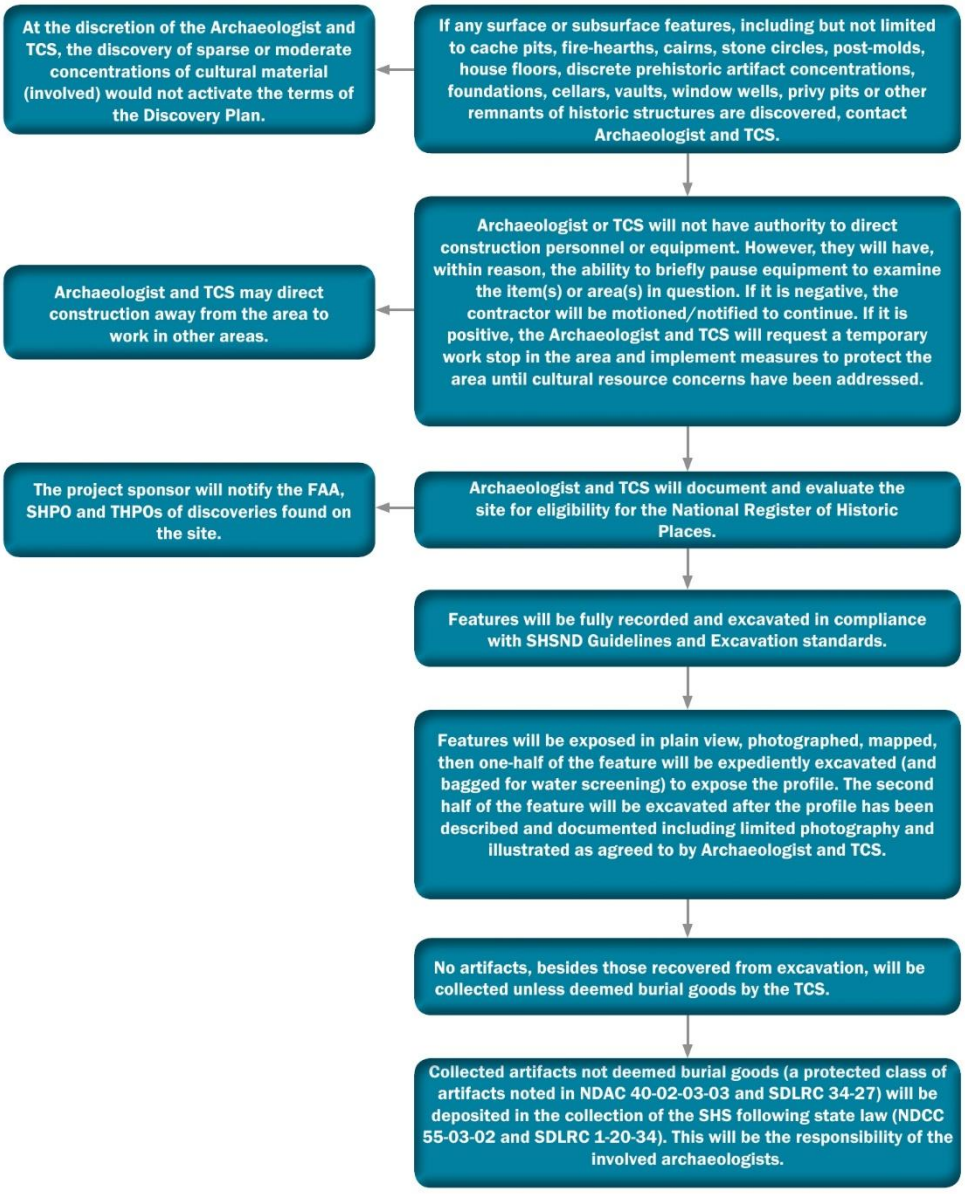
END OF INSULATION RESISTANCE FORM

ITEM SP-2 DISCOVERY PLAN



DISCOVERY PLAN for GA Projects in the Dakotas

[Other Cultural Features]



COMMUNICATIONS PLAN

[1] *TCS communicate to their THPO at their discretion.*

END OF ITEM SP-2

ITEM SP-03 30 00 SUBSURFACE INVESTIGATION

GENERAL

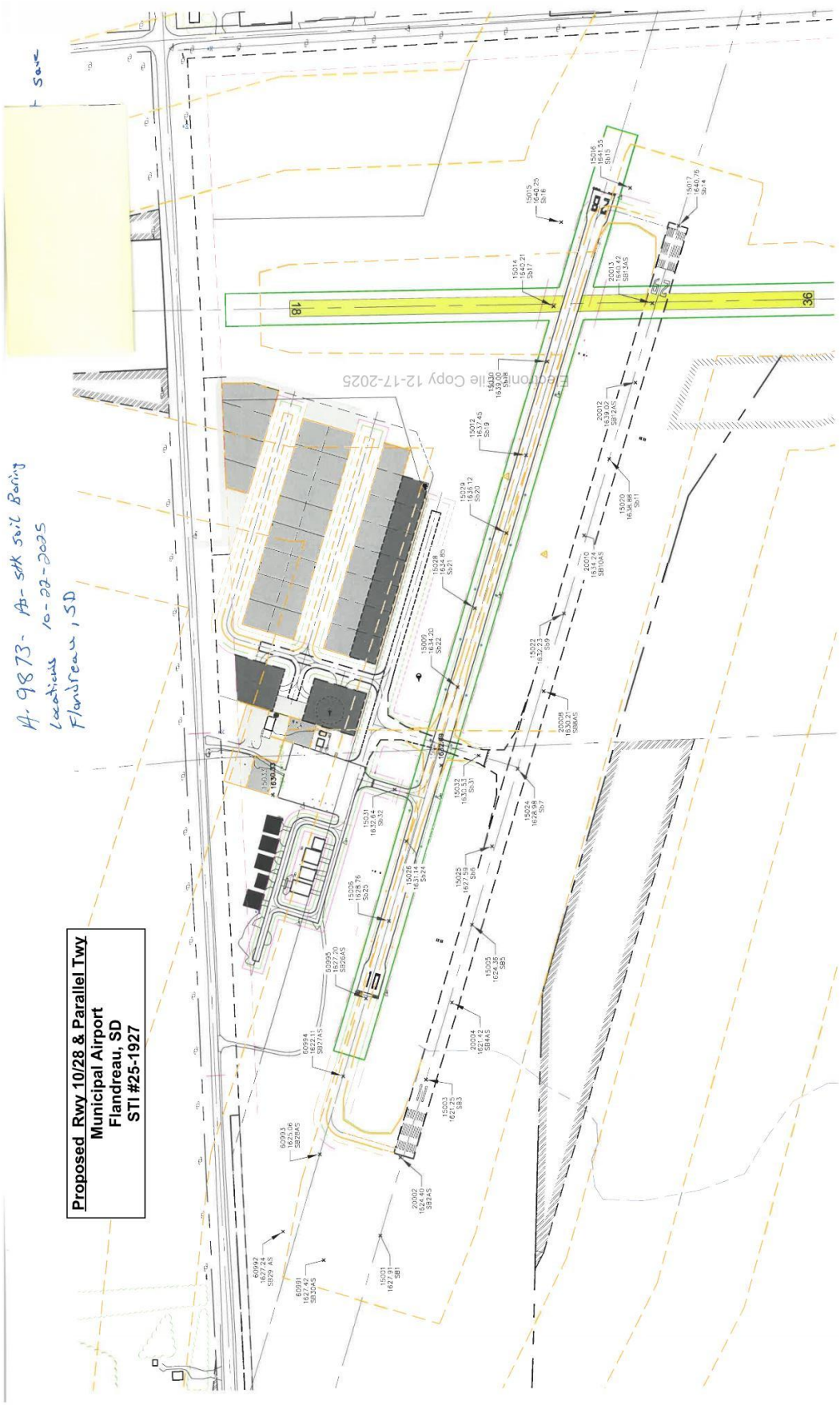
SP-03 30-00-1.1 SOIL INFORMATION

A. A soils investigation was completed by Soil Technologies, Inc. of Mobridge, South Dakota. The report and any test results are available at the office of Helms & Associates, 416 Production St. North, Aberdeen, S.D., for informational purposes only. The Geotechnical Exploration and Review of the soils boring logs have been provided for informational purposes only at the end of this section.

B. The samples tested are not guaranteed to be indicative of any ground except at the particular and exact location of the sample. No claim shall be made or be considered resulting from any deviations from the sample test data. This information is made available to the Contractor for his own use and is in no event considered as a part of the contract.

C. It shall be the Contractor's responsibility to determine to his own satisfaction the location and nature of all surface and sub-surface obstacles and the soils and water conditions which will be encountered during the construction of the runway and taxiways.

D. Additional test borings and other exploratory operations as may be desired may be made by the Contractor at no cost to the Owner.


Proposed Rwy 10/28 & Parallel Twy
Municipal Airport
Flandreau, SD
STI #25-1927
Electronic Copy 12-17-2025
18
36
10
28

BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 1
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1627.9

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.67	1627.2	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		5	1	SPT							
2	1625.9	**Lean Clay**, light brown, moist (CL)	FINE ALLUVIUM											
4.5	1623.4	**Silty Sand**, fine grained, light brown, moist, very loose (SM)	MIXED ALLUVIUM		4	2	SPT							
7.3	1620.6	**Silty Sand**, fine to medium grained, a little Gravel, brown, moist, medium dense (SM)			19	3	SPT	4						14
11	1616.9	**Sandy Lean Clay**, a little Gravel, brown motttled, lenses of waterbearing Sand at 9.8' - 10.8', stiff (CL)	TILL	▼	13	4	SPT							
					10	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	12:01	11'	11'	9.5'	9'

Boring Started: 10/27/2025 *at* 11:40
Boring Completed: 10/27/2025 *at* 12:00
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

SOIL TECHNOLOGIES, INC 28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

Electronic File Copy 12-17-2025

BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 2
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1624.4

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.2	1623.2	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		5	1	SPT							
2	1622.4	**Lean Clay**, dark brown, moist (CL)	FINE ALLUVIUM											
4	1620.4	**Sandy Lean Clay**, light brown, moist, soft (CL)	MIXED ALLUVIUM		3	2	SPT	16	111	1.9				67
6	1618.4	**Sandy Lean Clay**, brown mottled and gray, moist, stiff (CL)			12	3	SPT	17						57
11	1613.4	**Sandy Lean Clay**, a little Gravel, brown mottled, moist, stifff (CL)	TILL		12	4	SPT							
					10	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	11:30	11'	11'	9.5'	NONE

Boring Started: 10/27/2025 *at* 11:12
Boring Completed: 10/27/2025 *at* 11:34
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

SOIL TECHNOLOGIES, INC
28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

Electronic File Copy 12-17-2025

BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 3
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1621.3

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.2	1620.1	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		7	1	SPT							
3	1618.3	**Lean Clay**, light brown, moist, firm (CL)	FINE ALLUVIUM		6	2	SPT							
8.5	1612.8	**Sandy Lean Clay**, brown mottled, moist, a layer of Sand at 3.5', lenses of Sand, firm (CL)	MIXED ALLUVIUM		6	3	SPT							
					7	4	SPT							
11	1610.3	**Sandy Lean Clay**, a little Gravel, brown, moist, stifff (CL)	TILL		9	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	11:02	11'	11'	9.5'	NONE

Boring Started: 10/27/2025 *at* 10:41
Boring Completed: 10/27/2025 *at* 11:08
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

SOIL TECHNOLOGIES, INC
28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

Electronic File Copy 12-17-2025

BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 4
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1621.4

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	TELEPHONE: (605) 762-3406	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.3	1620.1	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		5	1	SPT							
		Lean Clay with Sand, dark brown to light brown, firm (CL)	FINE ALLUVIUM											
3	1618.4				6	2	SPT	28	103	0.7				
		Lean Clay, light gray and reddish brown, moist, firm (CL)												
					5	3	SPT							
6	1615.4													
		Sandy Lean Clay, brown, moist, a lens of waterbearing coarse Sand at 7', firm to stiff (CL)	TILL	▼										
					6	4	SPT							
					9	5	SPT							
11	1610.4													
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025		8.5'	8.5'	7'	7'
10/27/2025	9:58	11'	11'	9.5'	9'

Boring Started: 10/27/2025 *at* 9:36
Boring Completed: 10/27/2025 *at* 10:00
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

SOIL TECHNOLOGIES, INC 28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

Electronic File Copy 12-17-2025

BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 5
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1624.4

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.2	1623.2	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		6	1	SPT							
1.9	1622.5	**Lean Clay**, dark brown, moist (CL)	FINE ALLUVIUM											
4.5	1619.9	**Lean Clay**, gray and brown mottled to light gray, moist, firm (CL)			6	2	SPT							
8	1616.4	**Lean Clay**, gray and brown mottled, moist, lenses of waterbearing Sand, stiff (CL)	MIXED ALLUVIUM		9	3	SPT							
11	1613.4	**Sandy Lean Clay**, a little Gravel, brown and gray, moist, a layer of Gravel at 8.3' a Cobble at 9.5', stiff (CL)	TILL	▼	13	4	SPT							
					12	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	10:19	11'	11'	9.5'	9'

Boring Started: 10/27/2025 *at* 10:04
Boring Completed: 10/27/2025 *at* 10:22
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

SOIL TECHNOLOGIES, INC 28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

Electronic File Copy 12-17-2025

BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 6
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1627.6

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.67	1626.9	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL											
		Lean Clay, dark brown, moist, soft (CL)	FINE ALLUVIUM		4	1	SPT							
2	1625.6													
		Lean Clay, grayish brown, moist, soft to firm (CL)			4	2	SPT	20	102	1.4				
					6	3	SPT							
7	1620.6													
		Lean Clay, brown mottled and gray, moist, lenses of waterbearing Sand, soft to firm (CL)	TILL		3	4	SPT							
					7	5	SPT							
11	1616.6													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	9:25	11'	11'	9.5'	NONE

Boring Started: 10/27/2025 *at* 9:08
Boring Completed: 10/27/2025 *at* 9:27
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

SOIL TECHNOLOGIES, INC
28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 7
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1629.0

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.1	1627.9	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		4	1	SPT							
		Lean Clay, light brown, moist, soft (CL)	FINE ALLUVIUM		4	2	SPT	23	102	1.6				
4.5	1624.5													
		Clayey Sand, fine grained, brown, wet, very loose (SC)	MIXED ALLUVIUM		4	3	SPT	11						42
6.5	1622.5													
		Lean Clay, a little Gravel, brown mottled and gray, moist, firm to stiff (CL)	TILL		7	4	SPT							
					11	5	SPT							
11	1618.0													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	16:47	11'	11'	9.5'	NONE

Boring Started: 10/23/2025 *at* 16:28
Boring Completed: 10/23/2025 *at* 16:51
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 8
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1630.2

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
		Organic Lean Clay, black, moist (CL-OL)	TOPSOIL		4	1	SPT							
1.8	1628.4													
		Lean Clay, brown, moist, soft (CL)	FINE ALLUVIUM		4	2	SPT	23	102	1.0		39	19	
4	1626.2													
		Lean Clay, brown mottled and gray, moist to 5' then wet, lenses of waterbearing Sand at 7.5', soft (CL)	MIXED ALLUVIUM		4	3	SPT							
				▼										
					4	4	SPT							
9	1621.2													
		Sandy Lean Clay, a little Gravel, brown mottled, moist, firm (CL)	TILL		8	5	SPT							
11	1619.2													
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	16:19	11'	11'	9.5'	NONE
10/23/2025			7.5'		6.5'

Boring Started: 10/23/2025 *at* 16:03
Boring Completed: 10/23/2025 *at* 16:23
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 9
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1632.2

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
		Organic Lean Clay, black, moist (CL-OL)	TOPSOIL		5	1	SPT							
1.8	1630.4													
		Lean Clay, light brown, moist, soft to firm (CL)	FINE ALLUVIUM		4	2	SPT							
					8	3	SPT	13	115	3.1				
6	1626.2													
		Sandy Lean Clay, a little Gravel, brown, moist, firm (CL)	TILL		5	4	SPT							
9	1623.2			▼										
		Sandy Lean Clay, a little Gravel, grayish brown, moist, stiff (CL)			9	5	SPT							
11	1621.2													
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	15:52	11'	11'	9.5'	NONE
10/24/2025	9:41		9.5'		9'

Boring Started: 10/23/2025 *at* 15:35
Boring Completed: 10/24/2025 *at* 9:30
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 10
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1634.2

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1633.2	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		6	1	SPT							
2	1632.2	**Lean Clay**, dark brown, moist (CL)	FINE ALLUVIUM											
		Lean Clay with Sand, light brown, moist, soft (CL)			4	2	SPT							
4	1630.2													
		Clayey Sand, brown, moist, very loose (SC)	MIXED ALLUVIUM		4	3	SPT	15	115					
6	1628.2													
		Sandy Lean Clay, a little Gravel, brown mottled to brown mottled and gray, moist, firm (CL)	TILL		7	4	SPT							
					8	5	SPT							
11	1623.2													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	15:33	11'	11'	9.5'	NONE

Boring Started: 10/23/2025 *at* 15:07
Boring Completed: 10/23/2025 *at* 15:31
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 11
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1638.9

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.58	1638.3	**Organic Lean Clay**, dark brown, moist (CL-OL)	TOPSOIL											
		Lean Clay, light brown to brown, moist, a layer of Silty Clay at 3.5'-4', firm (CL)	FINE ALLUVIUM		6	1	SPT							
					6	2	SPT							
4	1634.9													
		Sandy Lean Clay, brown, moist, firm (CL)	MIXED ALLUVIUM											
					6	3	SPT	17						68
7.5	1631.4													
		Lean Clay with Sand, a little Gravel, brown mottled, moist, firm to stiff (CL)	TILL		7	4	SPT							
					9	5	SPT							
11	1627.9													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	15:35	11'	11'	9.5'	NONE

Boring Started: 10/23/2025 *at* 14:17
Boring Completed: 10/23/2025 *at* 15:40
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 12
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1639.0

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.67	1638.3	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL											
		Lean Clay, brown, moist, firm (CL)	FINE ALLUVIUM		6	1	SPT							
2.5	1636.5													
		Lean Clay, light brown, moist, firm (CL/ML)			5	2	SPT							
4	1635.0													
		Lean Clay with Sand, a little Gravel, brown mottled and gray, moist, firm to stiff (CL)	TILL											
					7	3	SPT							
					9	4	SPT							
					14	5	SPT							
11	1628.0													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	14:05	11'	11'	9.5'	NONE

Boring Started: 10/23/2025 *at* 13:40
Boring Completed: 10/23/2025 *at* 14:08
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 13
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1640.4

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.75	1639.7	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		6	1	SPT							
2	1638.4	**Lean Clay**, dark brown to brown, moist (CL)	FINE ALLUVIUM											
		Lean Clay with Sand, brown, moist, stiff (CL)			9	2	SPT	15	116	4.5+				
4	1636.4	**Lean Clay with Sand**, a little Gravel, brown mottled and gray, moist, stiff (CL)	TILL											
					12	3	SPT							
					14	4	SPT							
11	1629.4				15	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	13:38	11'	11'	9.5'	NONE

Boring Started: 10/23/2025 *at* 13:21
Boring Completed: 10/23/2025 *at* 13:41
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 14
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1640.8

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
		Organic Lean Clay, black, moist (CL-OL)	TOPSOIL		4	1	SPT							
1.3	1639.5													
		Lean Clay, brown, moist (CL)	FINE ALLUVIUM											
2.5	1638.3													
		Lean Clay with Sand, a little Gravel, brown, moist, lenses of Clayey Sand at 3.5 and from 5'-6', firm to stiff (CL)	TILL		6	2	SPT	13	115	3.2		39	14	
					8	3	SPT	21	110	0.8				
					8	4	SPT							
					14	5	SPT							
11	1629.8													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	13:14	11'	11'	9.5'	NONE

Boring Started: 10/23/2025 *at* 12:51
Boring Completed: 10/23/2025 *at* 13:18
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 15
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1641.5

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.58	1641.0	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		8	1	SPT							
2	1639.5	**Lean Clay**, brown, moist (CL)	FINE ALLUVIUM											
		Lean Clay with Sand, a little Gravel, moist, firm to stiff (CL)	TILL		8	2	SPT							
					9	3	SPT							
					15	4	SPT							
					15	5	SPT							
11	1630.5	**END OF BORING**												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	10:35	11'	11'	9.5'	NONE

Boring Started: 10/23/2025 *at* 10:20
Boring Completed: 10/23/2025 *at* 10:42
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 16
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1640.3

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.66	1639.6	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		9	1	SPT							
		Lean Clay, brown, moist, firm (CL)	FINE ALLUVIUM		8	2	SPT							
3.5	1636.8	**Lean Clay with Sand**, a little Gravel, brown to brown mottled and gray, moist, firm to stiff (CL)	TILL		7	3	SPT	17	113	3				
					11	4	SPT							
11	1629.3				14	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	11:40	11'	11'	9.5'	NONE

Boring Started: 10/23/2025 *at* 10:52
Boring Completed: 10/23/2025 *at* 11:45
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 17
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1640.2

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.58	1639.6	**Fill**, Organic Lean Clay, brown mottled, moist	FILL		9	1	SPT							
2	1638.2	**Fill**, Lean Clay, light brown, moist												
3	1637.2	**Fill**, Lean Clay, black and brown, moist			9	2	SPT							
4.8	1635.4	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL											
6.5	1633.7	**Lean Clay**, brown, moist, firm (CL)	FINE ALLUVIUM		8	3	SPT							
11	1629.2	**Lean Clay with Sand**, a trace of Gravel, brown mottled and gray, moist, stiff (CL)	TILL		10	4	SPT							
					12	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/23/2025	12:09	11'	11'	9.5'	NONE

Boring Started: 10/23/2025 *at* 11:52
Boring Completed: 10/23/2025 *at* 12:15
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 18

Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1639.0

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.83	1638.2	**Fill**, Sand with Gravel (base) 2" of Asphalt over 1" of recycled Asphalt	FILL		6	1	SPT							
		Fill, Lean Clay, black, brown, and gray, moist												
3	1636.0				8	2	SPT							
		Organic Lean Clay, black, moist (CL-OL)	TOPSOIL											
4.3	1634.7													
		Lean Clay, grayish brown, moist, firm (CL)	FINE ALLUVIUM		8	3	SPT	21	109	1.9		38	17	
7	1632.0													
		Lean Clay with Sand, a little Gravel, brown mottled, moist at 3", lense of waterbearing Sand at 10.7', stiff (CL)	TILL		12	4	SPT							
				▼	10	5	SPT							
11	1628.0													
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/24/2025	11:07	11'	11'	9.5'	10.7'

Boring Started: 10/24/2025 *at* 10:10

Boring Completed: 10/24/2025 *at* 11:12

Drilling Method: *to*

Drilling Method: 3 1/4" HSA 0 *to* 9.5'

Jet with Drilling Mud: *to*

Hammer Type: Auto Hammer (140 lb.)

Crew Chief: M.H. R.H

Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 19
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1637.5

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.88	1636.6	**Fill**, Sand with Gravel (base) 2" of Asphalt over 1" of recycled Asphalt	FILL		8	1	SPT							
		Fill, Organic Lean Clay, black, moist												
3	1634.5				9	2	SPT							
		Organic Lean Clay, black, moist (CL-OL)	TOPSOIL											
4.3	1633.2													
		Lean Clay, light gray, moist, firm (CL)	FINE ALLUVIUM		7	3	SPT	24	102	1.1				
7.2	1630.3													
		Lean Clay with Sand, a little Gravel, brown mottled, moist, a 2" lense of Sandy Clay at 7.2', stiff (CL)	TILL		9	4	SPT							
11	1626.5				11	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/24/2025	11:37	11'	11'	9.5'	NONE

Boring Started: 10/24/2025 *at* 11:17
Boring Completed: 10/24/2025 *at* 11:47
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 20
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1636.1

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.92	1635.2	**Fill**, Sand with Gravel (base) 2" of Asphalt over 1" of recycled Asphalt	FILL		10	1	SPT							
		Fill, Lean Clay, black and gray, moist												
3.2	1632.9				11	2	SPT							
4	1632.1	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL											
		Lean Clay, light gray, moist, firm (CL)	FINE ALLUVIUM		7	3	SPT	18	113	2.4				
8.3	1627.8				6	4	SPT							
9	1627.1	**Sandy Lean Clay**, brown, moist to 8' then wet, (CL)	MIXED ALLUVIUM											
		Sandy Lean Clay, a little Gravel, brown mottled, moist, a 2" lense of moist Sand at 10.8' stiff (CL)	TILL		12	5	SPT							
11	1625.1	**END OF BORING**												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/24/2025	12:24	11'	11'	9.5'	NONE

Boring Started: 10/24/2025 *at* 11:52
Boring Completed: 10/24/2025 *at* 12:32
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 21
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1634.8

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.1	1633.7	**Fill**, Sand with Gravel (base) 2" of Asphalt over 1" of recycled Asphalt at the surface	FILL		8	1	SPT							
2	1632.8	**Fill**, Sandy Lean Clay, black, brown, and gray, moist												
2.8	1632.0	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		14	2	SPT							
4	1630.8	**Lean Clay**, brown mottled and gray, moist (CL)	FINE ALLUVIUM											
		Sandy Lean Clay, brown, moist, firm (CL)	MIXED ALLUVIUM		6	3	SPT							
6.5	1628.3													
		Clayey Sand, fine grained, brown, wet, loose (SC)			6	4	SPT							
				▼										
11	1623.8				7	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/24/2025	13:45	11'	11'	9.5'	9.5'

Boring Started: 10/24/2025 *at* 13:22
Boring Completed: 10/24/2025 *at* 13:56
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 22
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1634.2

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.92	1633.3	**Fill**, Sand with Gravel (Base) 3" of Asphalt at the surface	FILL		8	1	SPT							
2	1632.2	**Fill**, Lean Clay, black, moist												
3.8	1630.4	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		14	2	SPT							
4.5	1629.7	**Lean Clay**, brown, moist (CL)	FINE ALLUVIUM											
6.5	1627.7	**Lean Clay**, gray, moist, firm (CL)			7	3	SPT							
11	1623.2	**Silty Clay with Sand**, gray and brown mottled, wet, firm (CL-ML)			7	4	SPT							
					5	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/24/2025	14:32	11'	11'	9.5'	NONE

Boring Started: 10/24/2025 *at* 14:03
Boring Completed: 10/24/2025 *at* 14:44
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 23
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1632.7

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1631.7	**Fill**, Sand with Gravel (Base) 3" of Asphalt at the suface	FILL		10	1	SPT							
2.8	1629.9	**Fill**, Lean Clay, black and gray, moist												
3.9	1628.8	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		12	2	SPT							
6.5	1626.2	**Lean Clay with Sand**, gray, moist, stiff (CL)	FINE ALLUVIUM		10	3	SPT	19	106	3				
9	1623.7	**Clayey Sand**, fine grained, brown mottled, waterbearing, very loose (SC)	MIXED ALLUVIUM		4	4	SPT							
11	1621.7	**Sandy Lean Clay**, light brown, moist, stiff (CL)			10	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/24/2025	15:52	11'	11'	9.5'	NONE

Boring Started: 10/24/2025 *at* 15:35
Boring Completed: 10/24/2025 *at* 16:02
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 24

Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1631.1

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1630.1	**Fill**, Sand with Gravel (Base) 2 1/4" of Asphalt at the surface	FILL		11	1	SPT							
		Organic Lean Clay, black, moist (CL-OL)	TOPSOIL											
2.8	1628.3				13	2	SPT	20	104	3.8				
		Lean Clay with Sand, gray, moist (CL)	FINE ALLUVIUM											
4.5	1626.6													
		Sandy Lean Clay, light brown, moist, firm (CL)	MIXED ALLUVIUM		7	3	SPT							
7	1624.1													
		Sandy Lean Clay, a trace of Gravel, brown mottled and gray, moist, stiff (CL)	TILL		12	4	SPT							
				▼	14	5	SPT							
11	1620.1													
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/24/2025	16:08	11'	11'	9.5'	11'

Boring Started: 10/27/2025 *at* 15:40

Boring Completed: 10/27/2025 *at*

Drilling Method: *to*

Drilling Method: 3 1/4" HSA 0 *to* 9.5'

Jet with Drilling Mud: *to*

Hammer Type: Auto Hammer (140 lb.)

Crew Chief: M.H. R.H

Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 25
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1628.8

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1627.8	**Fill**, Sand with Gravel (Base) 2.5" of Asphalt at the surface	FILL		12	1	SPT							
		Fill, Lean Clay, black, brown, and gray, moist												
3	1625.8				14	2	SPT							
4	1624.8	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL											
		Lean Clay with Sand, gray, moist, firm (CL)	FINE ALLUVIUM		6	3	SPT					36	17	
6.5	1622.3													
		Lean Clay with Sand, a trace of Gravel, brown mottled, moist, stiff (CL)	TILL		11	4	SPT							
11	1617.8				12	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	15:25	11'	11'	9.5'	NONE

Boring Started: 10/27/2025 *at* 15:07
Boring Completed: 10/27/2025 *at* 15:30
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 26
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1627.2

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.92	1626.3	**Fill**, Sand with Gravel (Base) 4" of Asphalt at the surface	FILL		9	1	SPT							
2	1625.2	**Fill**, Lean Clay, black, and brown, moist												
4.3	1622.9	**Lean Clay**, black/dark brown, moist, some Organics, (possible slough deposit, stiff (CL)	FINE ALLUVIUM		10	2	SPT							
6.5	1620.7	**Lean Clay**, light brown, moist, firm (CL)			7	3	SPT							
11	1616.2	**Lean Clay with Sand**, a trace of Gravel, brown mottled, moist, a lens of waterbearing Sand at 10.5', stiff (CL)	TILL		11	4	SPT							
				▼	9	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	14:58	11'	11'	9.5'	10.5'

Boring Started: 10/27/2025 *at* 14:36
Boring Completed: 10/27/2025 *at*
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 27
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1622.1

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1621.1	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		5	1	SPT							
2	1620.1	**Lean Clay**, dark brown, moist (CL)	FINE ALLUVIUM											
3	1619.1	**Lean Clay**, brown, moist, firm (CL)			6	2	SPT							
		Sandy Lean Clay, a trace of Gravel, brown mottled and gray, a lense of Sand at 3.5', moist, soft (CL)	TILL		4	3	SPT							
6.5	1615.6	**Clayey Sand**, fine grained, a trace of Gravel, brown mottled and gray, waterbearing, medium dense (SC)	MIXED ALLUVIUM	▼	13	4	SPT							
9.5	1612.6	**Lean Clay**, a little Gravel, brown mottled and gray, moist, firm (CL)	TILL		7	5	SPT							
11	1611.1	**END OF BORING**												

WATER LEVEL MEASUREMENTS ▼

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	14:22	11'	11'	9.5'	9'
10/27/2025	14:26		8'		6.9'

Boring Started: 10/27/2025 *at* 14:07
Boring Completed: 10/27/2025 *at* 14:28
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 28
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1625.1

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.66	1624.4	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL											
		Lean Clay with Sand, brown, moist, firm (CL)	FINE ALLUVIUM		5	1	SPT							
2	1623.1													
		Lean Clay, brown, moist, soft (CL)			4	2	SPT							
4	1621.1													
		Sandy Lean Clay, brown, moist, firm (CL)	MIXED ALLUVIUM		7	3	SPT							
7.1	1618.0													
		Silty Sand, fine grained, brown, wet, medium dnese (SM)			17	4	SPT							
9.6	1615.5													
		Lean Clay, a little Gravel, brown mottled and gray, moist, stiff (CL)	TILL		9	5	SPT							
11	1614.1													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	13:55	11'	11'	9.5'	NONE

Boring Started: 10/27/2025 *at* 13:37
Boring Completed: 10/27/2025 *at* 14:00
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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28822 124TH ST., MOBRIDGE, SD
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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 29
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1627.2

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
		Organic Lean Clay, black, moist (CL-OL)	TOPSOIL		4	1	SPT							
1.5	1625.7													
		Lean Clay, dark brown, moist (CL)	FINE ALLUVIUM											
2.5	1624.7													
		Lean Clay, gray, moist, firm (CL)			5	2	SPT							
4.5	1622.7													
		Lean Clay with Sand, a trace of Gravel, brown mottled, moist, firm to stiff (CL)	TILL		6	3	SPT							
					9	4	SPT							
					14	5	SPT							
11	1616.2													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	13:22	11'	11'	9.5'	NONE

Boring Started: 10/27/2025 *at* 13:14
Boring Completed: 10/27/2025 *at* 13:25
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 30
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1627.4

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.58	1626.8	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL											
		Lean Clay, dark brown, moist, firm to soft (CL)	FINE ALLUVIUM		8	1	SPT							
3	1624.4				4	2	SPT							
		Lean Clay, gray, moist (CL)												
4	1623.4													
		Sandy Lean Clay, gray, moist, firm (CL)	MIXED ALLUVIUM		8	3	SPT							
6.5	1620.9													
		Lean Clay with Sand, brown mottled, moist, stiff (CL)	TILL		11	4	SPT							
					11	5	SPT							
11	1616.4													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	13:05	11'	11'	9.5'	NONE

Boring Started: 10/27/2025 *at* 12:49
Boring Completed: 10/27/2025 *at* 13:08
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 31
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1630.5

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1629.5	**Organic Lean Clay**, black, moist (CL-OL)	TOPSOIL		4	1	SPT							
2	1628.5	**Lean Clay**, dark brown, moist, some Organics (CL)	FINE ALLUVIUM											
3	1627.5	**Lean Clay**, dark brown, moist, soft (CL)			4	2	SPT							
4.3	1626.2	**Lean Clay**, brown, moist (CL)												
		Lean Clay, brown mottled and gray, moist, soft (CL)			2	3	SPT							
6.5	1624.0	**Clayey Sand**, fine grained, brown, waterbearing, very loose (SC)	MIXED ALLUVIUM		3	4	SPT							
10	1620.5													
11	1619.5	**Lean Clay with Sand**, a trace of Gravel, brown mottled and gray, moist, firm (CL)	TILL		6	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/24/2025	15:22	11'	11'	9.5'	NONE

Boring Started: 10/24/2025 *at* 14:57
Boring Completed: 10/24/2025 *at* 15:29
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

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28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

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BORING LOG

STI JOB #: 25-1927 **Project:** Rwy 10/28 & Parallel Taxiway **BORING #:** 32
Location: Flandreau, SD Sheet 1 of 1

Latitude (North)= *Longitude (West)=* ***SURFACE ELEVATION =*** 1632.6

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE Sample No.	SAMPLE Sample Type	LABORATORY TESTS Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.2	1631.4	**Fill**, Sand with Gravel, 3.5" of Asphalt at the surface	FILL		23	1	SPT							
		Fill, Lean Clay with Sand, brown and gray, moist												
3	1629.6				10	2	SPT							
		Lean Clay with Sand, grayish brown, moist, (possible slough deposit (CL)	FINE ALLUVIUM											
4.2	1628.4													
		Sandy Lean Clay, brown, moist, stiff (CL)	MIXED ALLUVIUM		11	3	SPT							
7	1625.6													
		Lean Clay with Sand, a trace of Gravel, brown mottled and gray, moist, stiff (CL)	TILL		11	4	SPT							
					12	5	SPT							
11	1621.6													
		END OF BORING												

WATER LEVEL MEASUREMENTS

DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:
10/27/2025	16:44	11'	11'	9.5'	NONE

Boring Started: 10/27/2025 *at* 16:25
Boring Completed: 10/27/2025 *at* 16:50
Drilling Method: *to*
Drilling Method: 3 1/4" HSA 0 *to* 9.5'
Jet with Drilling Mud: *to*
Hammer Type: Auto Hammer (140 lb.)
Crew Chief: M.H. R.H
Backfill Method:

SOIL TECHNOLOGIES, INC
28822 124TH ST., MOBRIDGE, SD
TELEPHONE: (605) 762-3406

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Sioux Falls
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California Bearing Ratio Test Report

Report No: CBR:AET-252839-S3
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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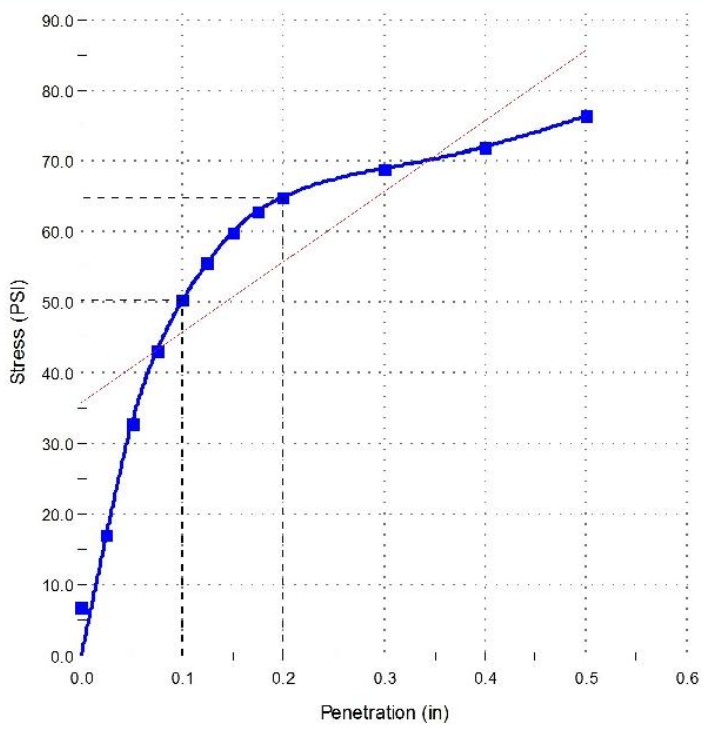
Date of Issue: 12/5/2025
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S3	**Field ID:**	Borings #1 & #2 (2.5'-5')
Date Sampled:	10/27/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Sandy Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	5.0	**CBR At 0.2in (%):**	4.3

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%):	5.0
CBR At 0.2in (%):	4.3
Compactive Effort:	ASTM D 698
Number of Blows:	18
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	102.7
Dry Density After Soaking (lb/ft³):	104.1
MC Before Compaction (%):	17.2
MC After Compaction (%):	17.2
Moisture Content of Top 1in (%):	21.8
Average Moisture Content (%):	18.5
Maximum Dry Density (lb/ft³):	108.1
Optimum Moisture Content (%):	17.2
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	0.1
Surcharge Mass (lb):	9.99
Date Tested:	11/20/2025

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Comments

@ Optimum

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California Bearing Ratio Test Report

Report No: CBR:AET-252839-S5
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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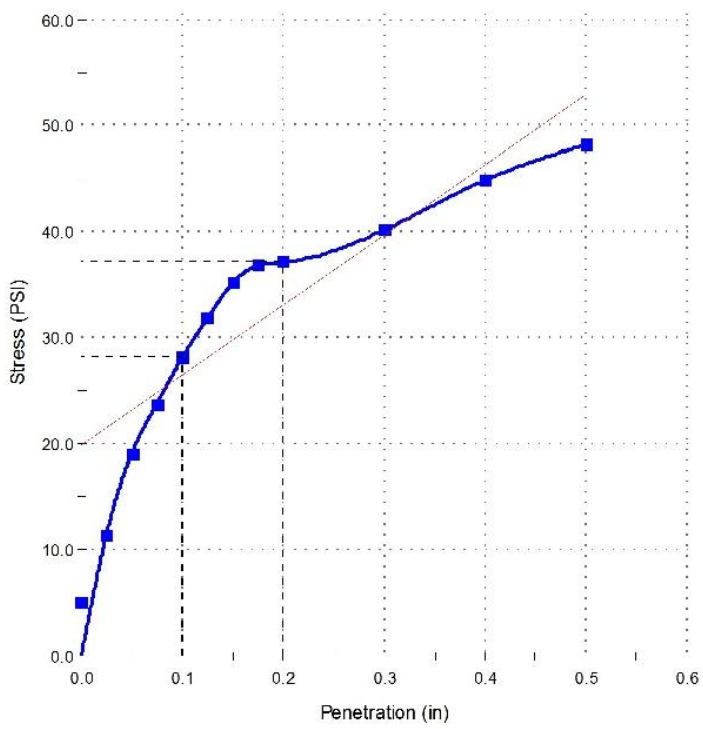
Date of Issue: 12/5/2025
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S5	**Field ID:**	Boring #7 & #8 (2.5'-5')
Date Sampled:	10/28/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	2.8	**CBR At 0.2in (%):**	2.5

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%):	2.8
CBR At 0.2in (%):	2.5
Compactive Effort:	ASTM D 698
Number of Blows:	10
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	99.6
Dry Density After Soaking (lb/ft³):	99.4
MC Before Compaction (%):	18.9
MC After Compaction (%):	18.9
Moisture Content of Top 1in (%):	25.6
Average Moisture Content (%):	21.8
Maximum Dry Density (lb/ft³):	104.8
Optimum Moisture Content (%):	21.9
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	1.6
Surcharge Mass (lb):	10.00
Date Tested:	11/20/2025

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Comments

-3% of Optimum

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California Bearing Ratio Test Report

Report No: CBR:AET-252839-S5
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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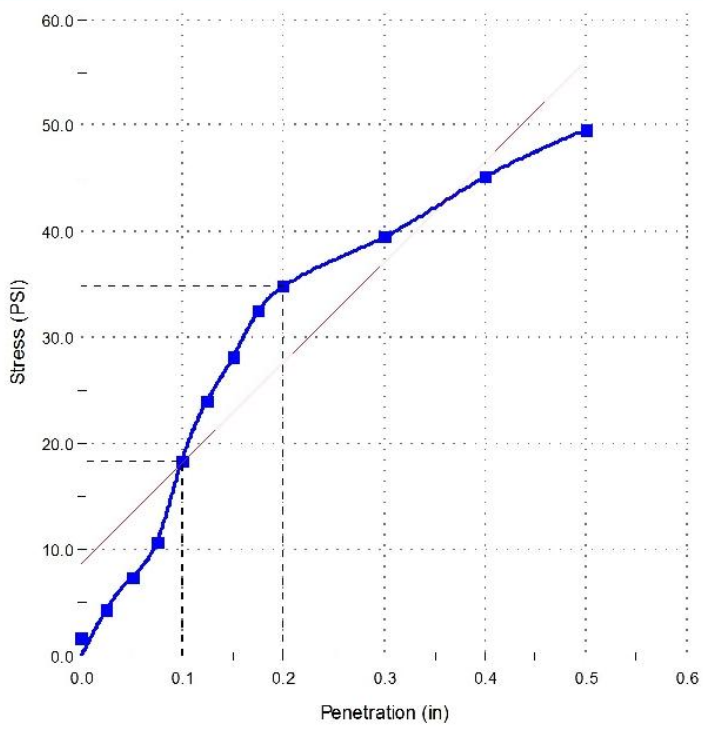
Date of Issue: 12/9/2025
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S5	**Field ID:**	Boring #7 & #8 (2.5'-5')
Date Sampled:	10/28/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	1.8	**CBR At 0.2in (%):**	2.3

Stress vs Penetration



Test Results

ASTM D 1883	
CBR At 0.1in (%):	1.8
CBR At 0.2in (%):	2.3
Compactive Effort:	ASTM D 1557
Number of Blows:	13
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	99.6
Dry Density After Soaking (lb/ft³):	99.9
MC Before Compaction (%):	21.9
MC After Compaction (%):	21.9
Moisture Content of Top 1in (%):	24.4
Average Moisture Content (%):	22.7
Maximum Dry Density (lb/ft³):	104.8
Optimum Moisture Content (%):	21.9
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	0.2
Surcharge Mass (lb):	10.04
Date Tested:	11/20/2025

Comments

@ optimum = 21.9%

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California Bearing Ratio Test Report

Report No: CBR:AET-252839-S5
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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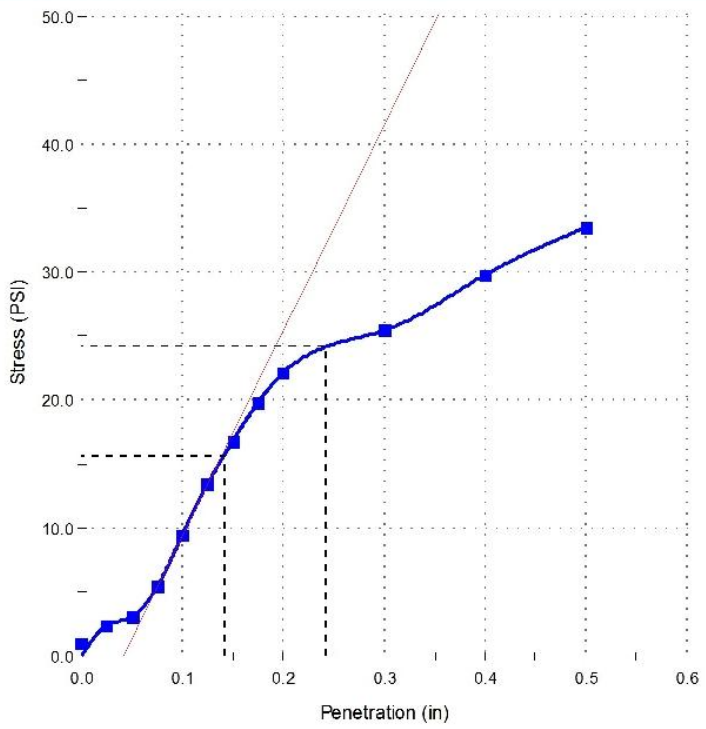
Date of Issue: 12/9/2025
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S5	**Field ID:**	Boring #7 & #8 (2.5'-5')
Date Sampled:	10/28/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	1.6	**CBR At 0.2in (%):**	1.6

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%):	1.6
CBR At 0.2in (%):	1.6
Compactive Effort:	ASTM D 1557
Number of Blows:	18
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	99.6
Dry Density After Soaking (lb/ft³):	101.5
MC Before Compaction (%):	24.9
MC After Compaction (%):	24.9
Moisture Content of Top 1in (%):	25.7
Average Moisture Content (%):	23.3
Maximum Dry Density (lb/ft³):	104.8
Optimum Moisture Content (%):	21.9
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	0.0
Surcharge Mass (lb):	9.99
Date Tested:	11/20/2025

Comments

@ +3% = 24.9%

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California Bearing Ratio Test Report

Report No: CBR:AET-252839-S2
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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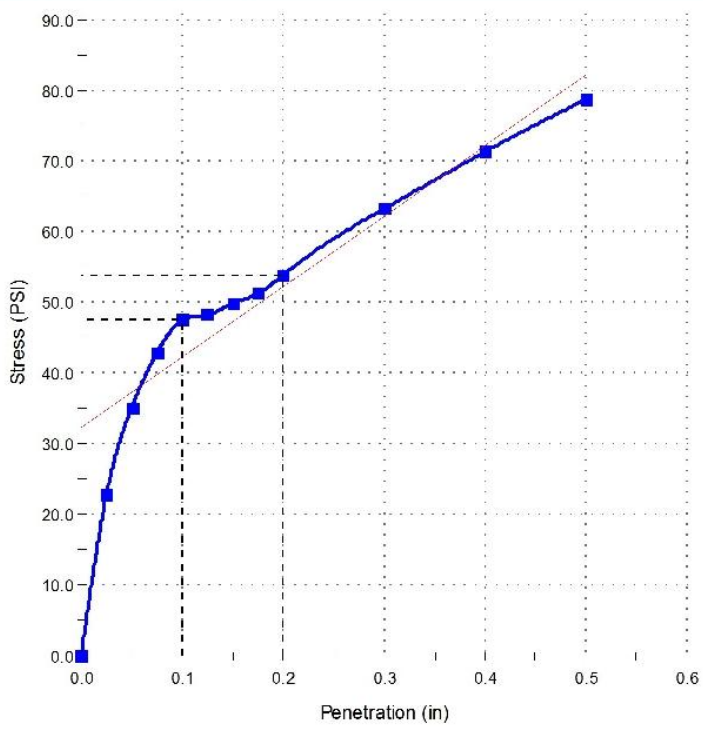
Date of Issue: 12/5/2025
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S2	**Field ID:**	Borings # 13 & #14 (2'-5')
Date Sampled:	10/23/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Sandy Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	4.8	**CBR At 0.2in (%):**	3.6

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%):	4.8
CBR At 0.2in (%):	3.6
Compactive Effort:	ASTM D 698
Number of Blows:	20
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	103.9
Dry Density After Soaking (lb/ft³):	105.7
MC Before Compaction (%):	18.1
MC After Compaction (%):	18.1
Moisture Content of Top 1in (%):	22.9
Average Moisture Content (%):	19.3
Maximum Dry Density (lb/ft³):	109.4
Optimum Moisture Content (%):	18.1
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	1.7
Surcharge Mass (lb):	10.01
Date Tested:	11/20/2025

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Comments

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California Bearing Ratio Test Report

Report No: CBR:AET-252839-S4
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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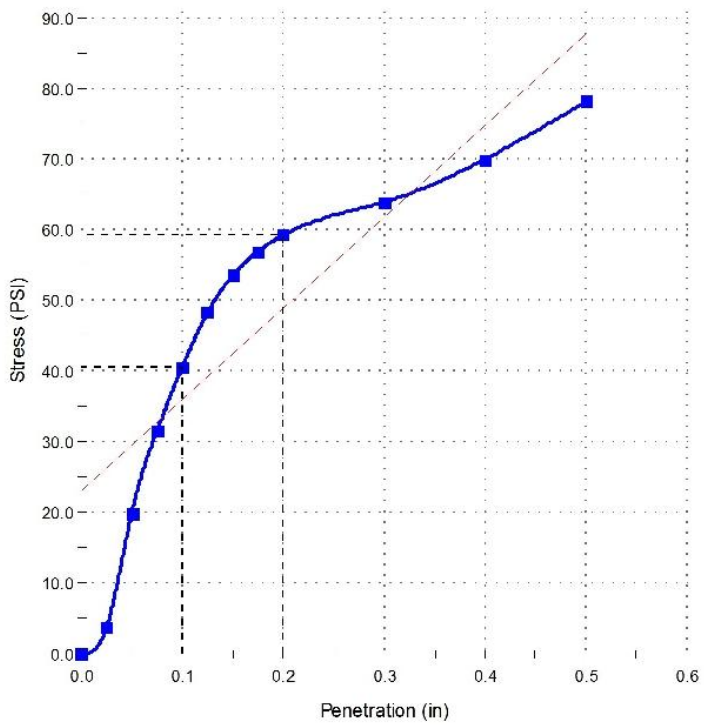
Date of Issue: 12/5/2025
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S4	**Field ID:**	Borings #18 & #19 (2.5'-5')
Date Sampled:	10/24/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Sandy Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	4.1	**CBR At 0.2in (%):**	4.0

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%):	4.1
CBR At 0.2in (%):	4.0
Compactive Effort:	ASTM D 698
Number of Blows:	32
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	105.9
Dry Density After Soaking (lb/ft³):	106.3
MC Before Compaction (%):	15.0
MC After Compaction (%):	15.0
Moisture Content of Top 1in (%):	20.5
Average Moisture Content (%):	18.1
Maximum Dry Density (lb/ft³):	111.5
Optimum Moisture Content (%):	15.0
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	1.0
Surcharge Mass (lb):	9.99
Date Tested:	11/20/2025

Comments

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California Bearing Ratio Test Report

Report No: CBR:AET-252839-S1
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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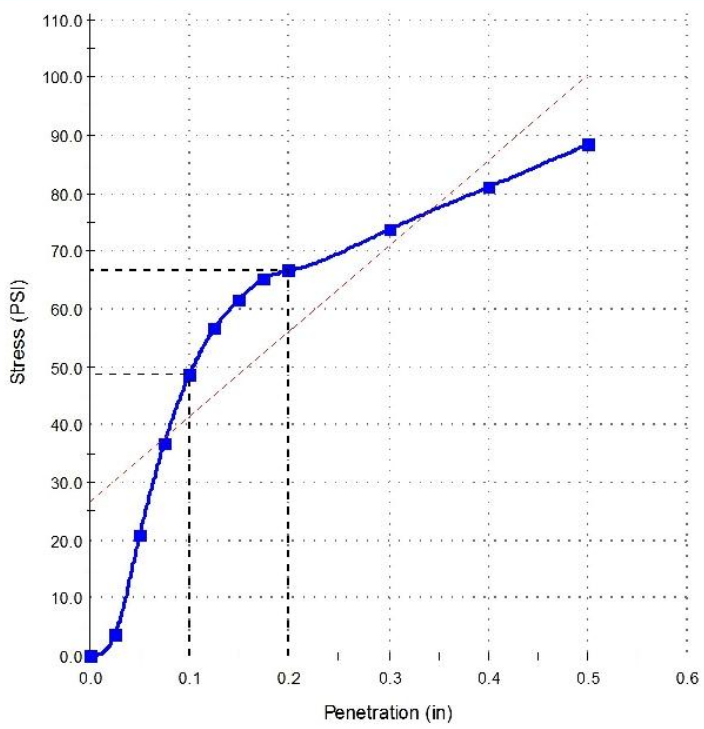
Date of Issue: 12/5/2025
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S1	**Field ID:**	Borings # 22 & #23 (2'-4.5')
Date Sampled:	10/24/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Sandy Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	4.9	**CBR At 0.2in (%):**	4.4

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%):	4.9
CBR At 0.2in (%):	4.4
Compactive Effort:	ASTM D 698
Number of Blows:	22
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	106.0
Dry Density After Soaking (lb/ft³):	106.4
MC Before Compaction (%):	16.0
MC After Compaction (%):	16.0
Moisture Content of Top 1in (%):	20.7
Average Moisture Content (%):	18.4
Maximum Dry Density (lb/ft³):	111.6
Optimum Moisture Content (%):	16.0
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	1.1
Surcharge Mass (lb):	10.10
Date Tested:	11/20/2025

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Comments

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California Bearing Ratio Test Report

Report No: CBR:AET-252839-S6
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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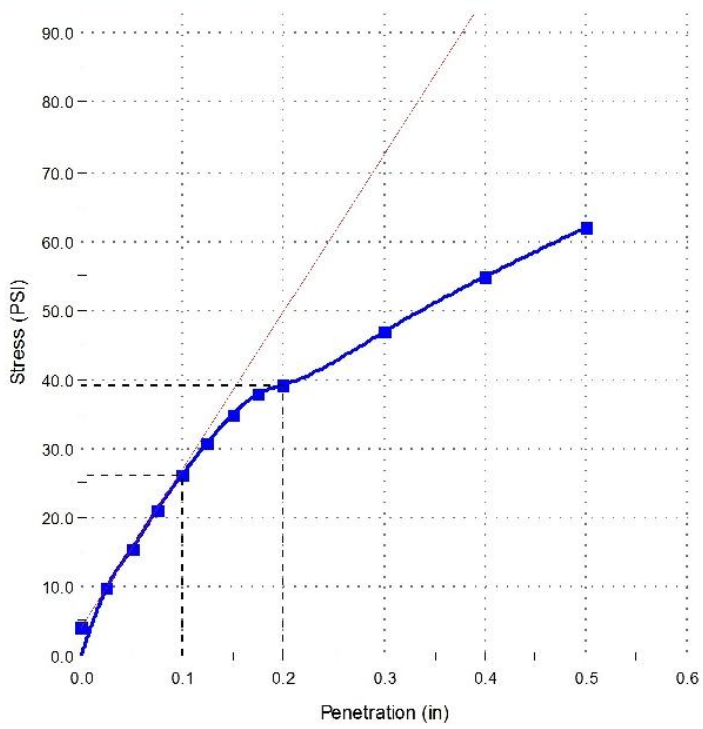
Date of Issue: 12/9/2025
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S6	**Field ID:**	Borings #24 & #25 (2.5'-5')
Date Sampled:	10/27/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Sandy Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	2.6	**CBR At 0.2in (%):**	2.6

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%):	2.6
CBR At 0.2in (%):	2.6
Compactive Effort:	ASTM D 1557
Number of Blows:	19
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	105.8
Dry Density After Soaking (lb/ft³):	108.8
MC Before Compaction (%):	13.5
MC After Compaction (%):	13.5
Moisture Content of Top 1in (%):	19.8
Average Moisture Content (%):	15.6
Maximum Dry Density (lb/ft³):	111.4
Optimum Moisture Content (%):	16.5
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	1.4
Surcharge Mass (lb):	10.08
Date Tested:	11/20/2025

Comments

@ -3% = 13.5%

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California Bearing Ratio Test Report

Report No: CBR:AET-252839-S6
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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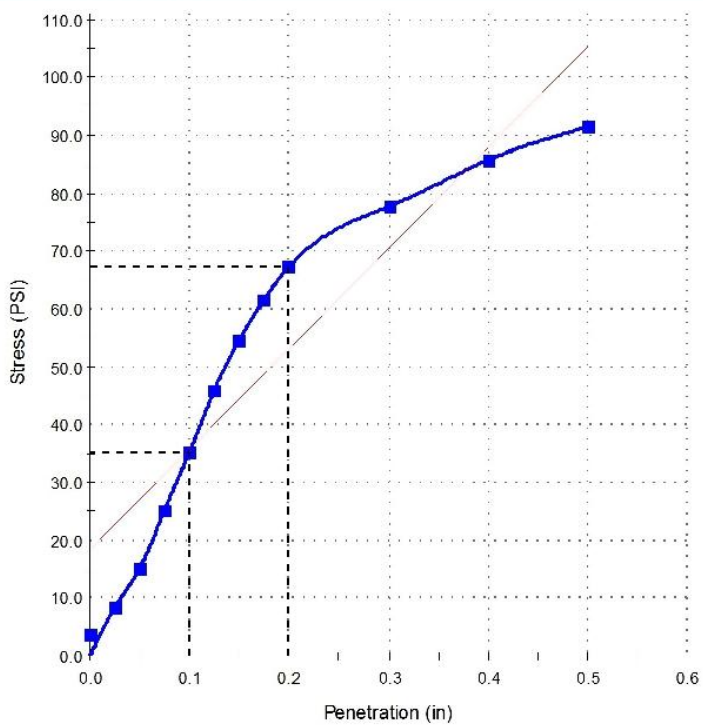
Date of Issue: 12/9/2025
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S6	**Field ID:**	Borings #24 & #25 (2.5'-5')
Date Sampled:	10/27/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Sandy Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	3.5	**CBR At 0.2in (%):**	4.5

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%):	3.5
CBR At 0.2in (%):	4.5
Compactive Effort:	ASTM D 1557
Number of Blows:	18
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	105.8
Dry Density After Soaking (lb/ft³):	108.2
MC Before Compaction (%):	16.5
MC After Compaction (%):	16.5
Moisture Content of Top 1in (%):	18.1
Average Moisture Content (%):	16.5
Maximum Dry Density (lb/ft³):	111.4
Optimum Moisture Content (%):	16.5
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	0.1
Surcharge Mass (lb):	10.04
Date Tested:	11/20/2025

Comments

@ Optimum = 16.5%

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Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

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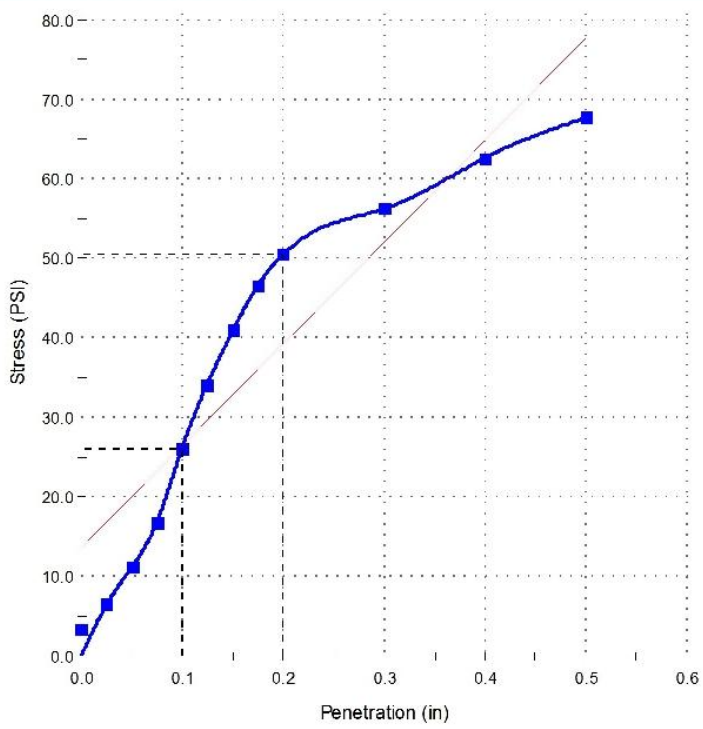
Reviewed By: Paul DeWeese
CMT Supervisor

Sample Details

Sample ID:	AET-252839-S6	**Field ID:**	Borings #24 & #25 (2.5'-5')
Date Sampled:	10/27/2025	**Sampled By:**	Matt Hanson
Sampling Method:	Auger		
Source:	In-Place Material	**Material:**	Sandy Lean Clay, Brown (CL)
Specification:		**Location:**	Flandreau Airport
Tested By:	Damion Paradise	**Date Tested:**	11/20/2025
CBR At 0.1in (%):	2.6	**CBR At 0.2in (%):**	3.4

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%):	2.6
CBR At 0.2in (%):	3.4
Compactive Effort:	ASTM D 1557
Number of Blows:	11
% of Maximum Dry Density:	95.0
Dry Density Before Soaking (lb/ft³):	105.8
Dry Density After Soaking (lb/ft³):	107.0
MC Before Compaction (%):	19.5
MC After Compaction (%):	19.5
Moisture Content of Top 1in (%):	20.9
Average Moisture Content (%):	19.2
Maximum Dry Density (lb/ft³):	111.4
Optimum Moisture Content (%):	16.5
Sample Condition:	Soaked
Immersion Period (h):	96
Swell (%):	0.2
Surcharge Mass (lb):	9.95
Date Tested:	11/20/2025

Comments

@ +3% = 19.5%

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Sioux Falls, SD 57104
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www.teamAET.com

Proctor Report

Report No: PTR:AET-252839-S3
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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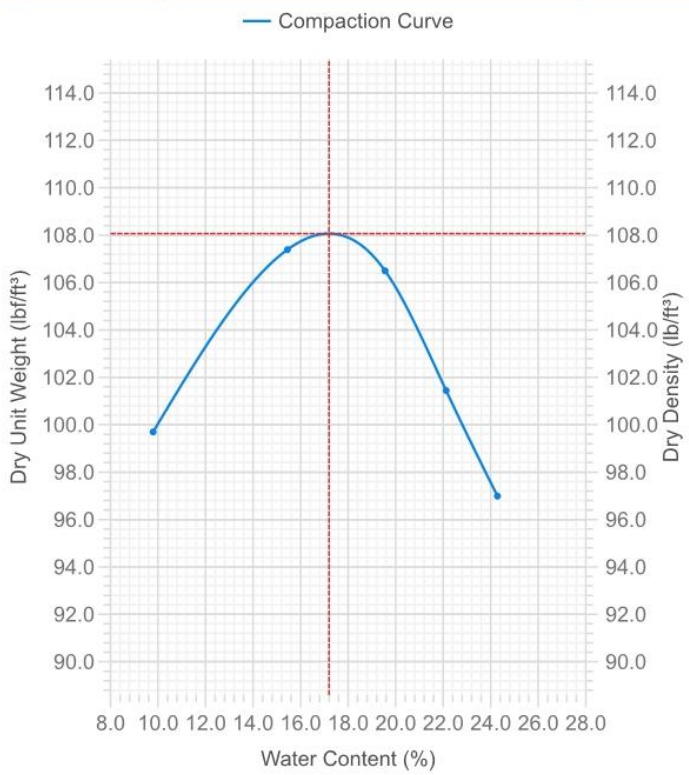
Date of Issue: 11/13/2025
Reviewed By: Adam Johnson
Project Manager

Sample Details

Sample ID: AET-252839-S3
Field ID: Borings #1 & #2 (2.5'-5')
Date Sampled: 10/27/2025
Date Received: 10/27/2025
Sampling Method: Auger
Source: In-Place Material
Material: Sandy Lean Clay, Brown (CL)
General Location: Runway 10/28 & Parallel Taxiway
Location: Flandreau Airport
Sampled By: Matt Hanson

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D698

Std. Maximum Dry Unit Weight (lbf/ft³):	**108.1**
Std. Optimum Water Content (%):	**17.2**
Method:	A
Preparation Method:	Moist
Determined By:	Estimated
Tested By:	Cully Nelson
Date Tested:	11/12/2025

Comments

Passing #200 = 66%

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Proctor Report

Report No: PTR:AET-252839-S5
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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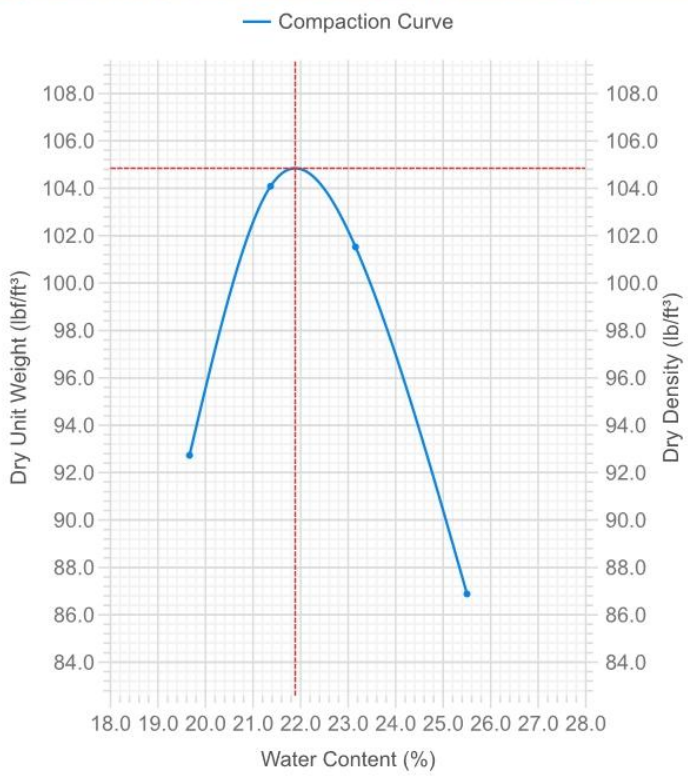
Date of Issue: 11/13/2025
Reviewed By: Adam Johnson
Project Manager

Sample Details

Sample ID: AET-252839-S5
Field ID: Boring #7 & #8 (2.5'-5')
Date Sampled: 10/28/2025
Sampling Method: Auger
Source: In-Place Material
Material: Lean Clay, Brown (CL)
General Location: Runway 10/28 & Parallel Taxiway
Location: Flandreau Airport
Sampled By: Matt Hanson

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D698

Std. Maximum Dry Unit Weight (lbf/ft³):	**104.8**
Std. Optimum Water Content (%):	**21.9**
Method:	A
Preparation Method:	Moist
Determined By:	Estimated
Tested By:	Nadine Menning
Date Tested:	11/12/2025

Comments

Passing #200 = 75%

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Proctor Report

Report No: PTR:AET-252839-S2
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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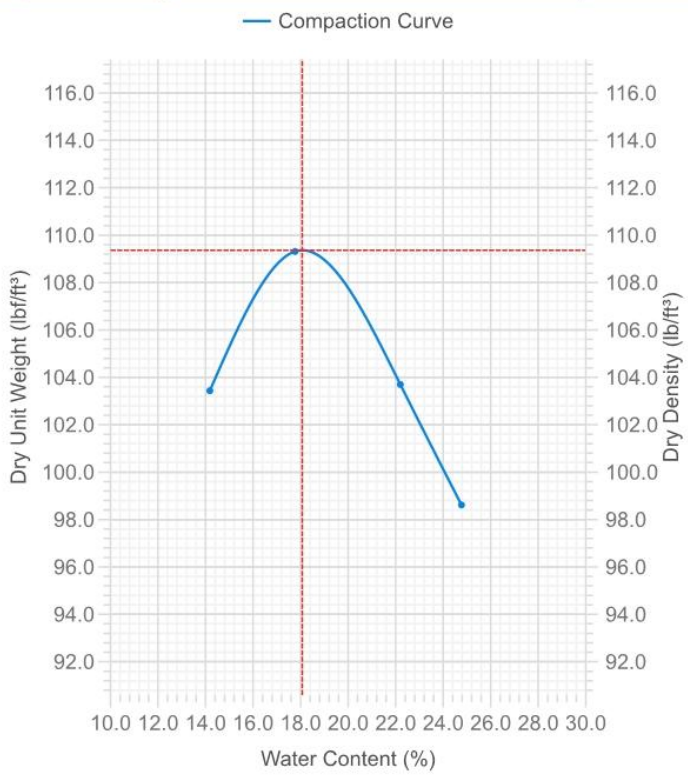
Date of Issue: 11/13/2025
Reviewed By: Adam Johnson
Project Manager

Sample Details

Sample ID: AET-252839-S2
Field ID: Borings # 13 & #14 (2'-5')
Date Sampled: 10/23/2025
Date Received: 10/23/2025
Sampling Method: Auger
Source: In-Place Material
Material: Sandy Lean Clay, Brown (CL)
General Location: Runway 10/28 & Parallel Taxiway
Location: Flandreau Airport
Sampled By: Matt Hanson

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D698

Std. Maximum Dry Unit Weight (lbf/ft³):	**109.4**
Std. Optimum Water Content (%):	**18.1**
Method:	A
Preparation Method:	Moist
Determined By:	Estimated
Tested By:	Cully Nelson
Date Tested:	11/11/2025

Comments

Passing #200 = 62%

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Proctor Report

Report No: PTR:AET-252839-S4
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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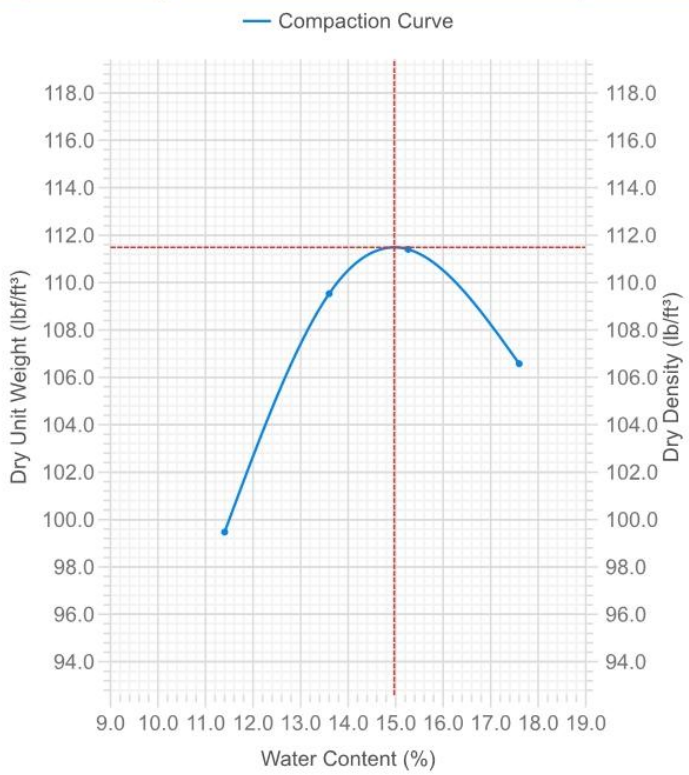
Date of Issue: 11/17/2025
Reviewed By: Adam Johnson
Project Manager

Sample Details

Sample ID: AET-252839-S4
Field ID: Borings #18 & #19 (2.5'-5')
Date Sampled: 10/24/2025
Date Received: 10/24/2025
Sampling Method: Auger
Source: In-Place Material
Material: Sandy Lean Clay, Brown (CL)
General Location: Runway 10/28 & Parallel Taxiway
Location: Flandreau Airport
Sampled By: Matt Hanson

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D698

Std. Maximum Dry Unit Weight (lbf/ft³):	**111.5**
Std. Optimum Water Content (%):	**15.0**
Method:	A
Preparation Method:	Moist
Determined By:	Estimated
Tested By:	Nadine Menning
Date Tested:	11/11/2025

Comments

Passing #200 = 64%

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Proctor Report

Report No: PTR:AET-252839-S1
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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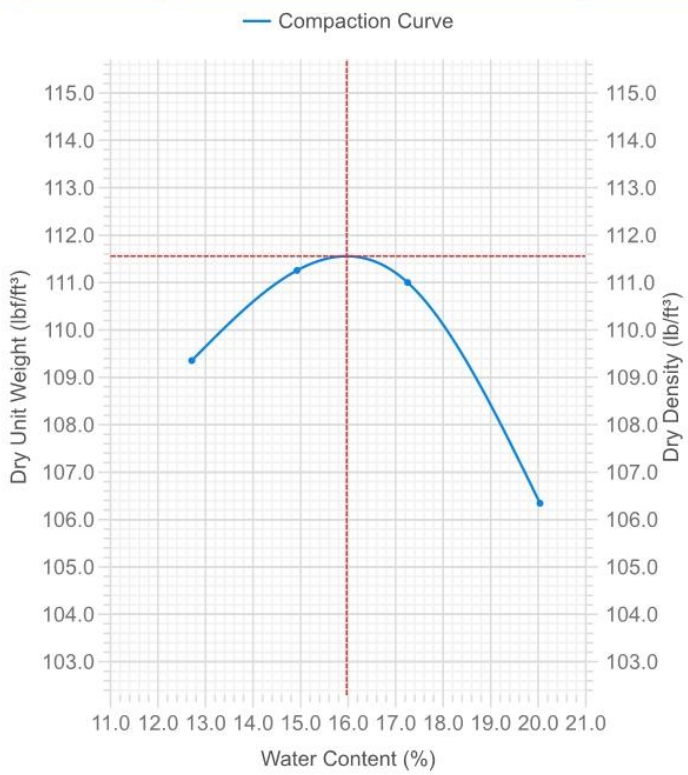
Date of Issue: 11/13/2025
Reviewed By: Adam Johnson
Project Manager

Sample Details

Sample ID: AET-252839-S1
Field ID: Borings # 22 & #23 (2'-4.5')
Date Sampled: 10/24/2025
Date Received: 10/24/2025
Sampling Method: Auger
Source: In-Place Material
Material: Sandy Lean Clay, Brown (CL)
General Location: Runway 10/28 & Parallel Taxiway
Location: Flandreau Airport
Sampled By: Matt Hanson

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D698

Std. Maximum Dry Unit Weight (lbf/ft³):	**111.6**
Std. Optimum Water Content (%):	**16.0**
Method:	A
Preparation Method:	Moist
Determined By:	Estimated
Tested By:	Damion Paradise
Date Tested:	11/11/2025

Comments

Passing #200 = 62%

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Proctor Report

Report No: PTR:AET-252839-S6
Issue No: 1

Client: Soil Technologies, Inc. **CC:**

Project: STI Production Checks

Mobridge SD
Job No: P-0043829

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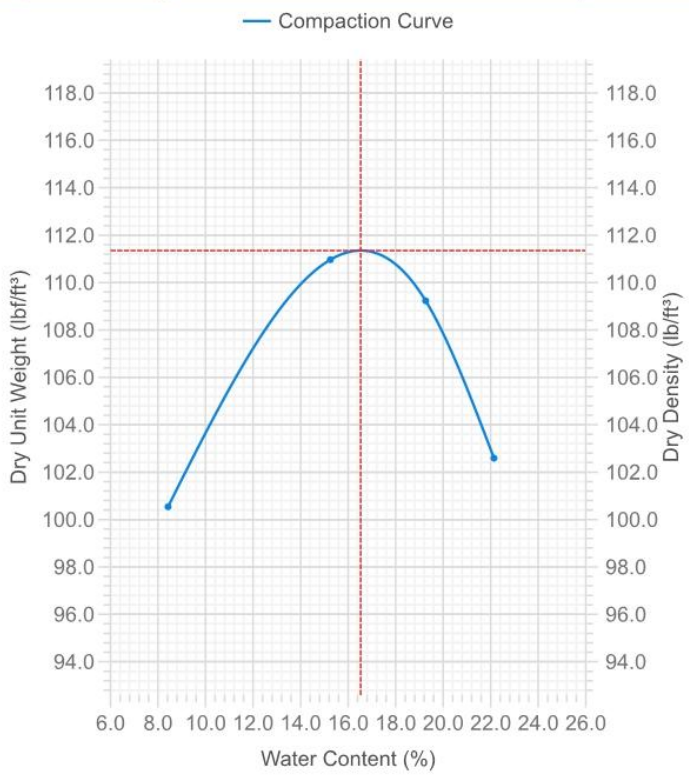
Date of Issue: 11/14/2025
Reviewed By: Adam Johnson
Project Manager

Sample Details

Sample ID: AET-252839-S6
Field ID: Borings #24 & #25 (2.5'-5')
Date Sampled: 10/27/2025
Date Received: 10/27/2025
Sampling Method: Auger
Source: In-Place Material
Material: Sandy Lean Clay, Brown (CL)
General Location: Runway 10/28 & Parallel Taxiway
Location: Flandreau Airport
Sampled By: Matt Hanson

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D698

Std. Maximum Dry Unit Weight (lbf/ft³):	**111.4**
Std. Optimum Water Content (%):	**16.5**
Method:	A
Preparation Method:	Moist
Determined By:	Estimated
Tested By:	Cully Nelson
Date Tested:	11/12/2025

Comments

Passing #200 = 64%

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FOERSTER TESTING SIEVE ANALYSIS

Invoice/Report _____

CUSTOMER	STI	**PROJECT**	Flandreau Airport	**Project #**	25-1927
SAMPLE NO.		**DATE SAMPLED**	10-23-2025	**DATE TESTED**	12-04-2025
SAMPLED BY	FB Drilling	**TESTED BY**	Taylor T	**CHECKED BY**	Tim F
MATERIAL TYPE	Base Material (SD DOT Base Course Specs)	**SOURCE**	Boring #18, 0-1'		
WEIGHT TICKET NUMBER OR STATION				**LIFT**	

% moist. = (wet wt. 5372.0 - dry wt.) / dry wt. x 100 = 6.2%

ORIGINAL DRY SAMPLE WT. (0.1 g) 5057.1

sieve size mm	in	Retained (0.1g)	% total ret. (0.1%)	Acc.% pass. (0.1%)	Acc.% pass. (rounded)	SPEC REQ.
50	2					
37.52	1 1/2					
31.5	1 1/4					
25	1	0.0		100.0	**100**	100
19	3/4	152.7	3.0	97.0	**97**	80-100
16	5/8	148.5	2.9	94.1	**94**	
12.5	1/2	246.8	4.9	89.2	**89**	68-91
9.5	3/8	362.8	7.2	82.0	**82**	
6.3	1/4	570.8	11.3	70.7	**71**	
4.75	#4	447.5	8.8	61.9	**62**	46-70
PAN		3127.5	61.8			
TOTAL		5056.6	100.0			

+#4 Gradation check within 0.3 % of the original dry wt. 0.01%

L. L., P. L., and P. I.		**L.L.**	**P.L.**
a. can number		1	2
b. wt. can + wet soil	(.01 g)	33.91	27.34
c. wt. can + dry soil	(.01 g)	31.58	25.94
d. wt. of water (b - c)	(.01 g)	2.33	1.40
e. wt. of can	(.01 g)	20.25	18.99
f. wt. of dry soil (c - e)	(.01 g)	11.33	6.95
g. Liquid Limit(d/f x j x 100)	(0.1)	20.8	N.A.
h. Plastic Limit (d/f x 100)	(0.1)	N.A.	20.1
i. P. I. (g - h)	(0.1)	0.7	
Liquid Limit (g rounded)		**21**	N.A.
Plasticity Index (i rounded)		**1**	

j. corr. # blows 28 22 = 0.9846, 23 = 0.9899, 24 0.9952 25 = 1.0000, 26 = 1.0050, 27 = 1.0100, 28 = 1.0138

wt. - #40 220.5 ÷ **wt. - #4** 524.4 x % pass.#4 = 26.0%

(± 3.0% VARIABLE of Acc. % pass. (0.1%) on the #40)

SPECIFICATION L.L. max. 25
SPECIFICATION P.I. max. 6

sieve size mm	#	Retained (0.1g)	% total ret. (0.1%)	% total x % pa.#4(0.1%)	Acc.% pass. (0.1%)	Acc.% pass. (rounded)	SPEC. REQ.
2.36	8	101.9	18.7	11.6	50.3	**50**	34-58
2.00	10	19.9	3.6	2.2	48.1	**48**	
1.18	16	82.2	15.1	9.3	38.8	**39**	
0.85	20						
0.60	30	105.5	19.3	11.9	26.9	**27**	
0.43	40	52.3	9.6	5.9	21.0	**21**	13-35
0.30	50	40.2	7.4	4.6	16.4	**16**	
0.18	80	34.1	6.3	3.9	12.5	**13**	
0.150	100	23.4	4.3	2.7	9.8	**10**	
0.075	200	22.1	4.1	2.5	7.3	**7.3**	**3.0-12.0**
PAN	dry	3.0	62.8	7.1	**wt. before washing(0.1 g)**		545.3
PAN	wash	59.8	11.5		**wt. after washing (0.1 g)**		485.5
	TOTAL	544.4	0		**loss from washing (- #200)**		59.8

+ #4 % PARTICLES LESS THAN 1.95 SP.GR.

Specific gravity of solution (1.95 ± 0.01)		
wt. of lightweight particles	(0.1 g)	
weight of + #4 material	(0.1 g)	
% lightweight particles		
SPECIFICATION maximum		

- #4 % PARTICLES LESS THAN 1.95 SP.GR.

Specific gravity of solution (1.95 ± 0.01)		
wt. of lightweight particles	(0.1 g)	
weight of - #4 material	(0.1 g)	
% lightweight particles		
SPECIFICATION maximum		

Tester Signature _____

- #4 Gradation check within 0.3 % of the wt. before washing 0.17%

CRUSHED PARTICLES TEST

weight of crushed pieces	(0.1 g)	407.2
weight of total + #4 sample	(0.1 g)	1035.4
percent of crushed pieces	(%Whole)	**39%**
SPECIFICATION 1	**or more FF, min.**	30%

Na.Rock		Na.Fines		Cr.Fines	
Cr.Rock		Na. Sand		Ma.Sand	
Filler					

COMMENTS:

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FOERSTER TESTING SIEVE ANALYSIS

Invoice/Report _____

CUSTOMER	STI	**PROJECT**	Flandreau Airport	**Project #**	25-1927
SAMPLE NO.		**DATE SAMPLED**	10-23-2025	**DATE TESTED**	12-04-2025
SAMPLED BY	FB Drilling	**TESTED BY**	Taylor T	**CHECKED BY**	Tim F
MATERIAL TYPE	Base Material (SD DOT Base Course Specs)	**SOURCE**	Boring #22, 0-1'		
WEIGHT TICKET NUMBER OR STATION				**LIFT**	

% moist. = (wet wt. 5110.0 - dry wt.) / dry wt. x 100 = 4.2%

ORIGINAL DRY SAMPLE WT. (0.1 g) 4905.2

sieve size mm	in	Retained (0.1g)	% total ret. (0.1%)	Acc.% pass. (0.1%)	Acc.% pass. (rounded)	SPEC REQ.
50	2					
37.52	1 1/2					
31.5	1 1/4					
25	1	0.0		100.0	**100**	100
19	3/4	74.0	1.5	98.5	**99**	80-100
16	5/8	193.2	3.9	94.6	**95**	
12.5	1/2	321.1	6.5	88.1	**88**	68-91
9.5	3/8	329.7	6.7	81.4	**81**	
6.3	1/4	492.7	10.0	71.4	**71**	
4.75	#4	334.2	6.8	64.6	**65**	46-70
PAN		3160.3	64.4			
TOTAL		4905.2	100.0			

+#4 Gradation check within 0.3 % of the original dry wt. 0.00%

L. L., P. L., and P. I.

		L.L.	P.L.
a. can number		1	2
b. wt. can + wet soil	(.01 g)	36.25	26.95
c. wt. can + dry soil	(.01 g)	33.49	25.69
d. wt. of water (b - c)	(.01 g)	2.76	1.26
e. wt. of can	(.01 g)	20.27	19.02
f. wt. of dry soil (c - e)	(.01 g)	13.22	6.67
g. Liquid Limit(d/f x j x 100)	(0.1)	20.6	N.A.
h. Plastic Limit (d/f x 100)	(0.1)	N.A.	18.9
i. P. I. (g - h)	(0.1)	1.7	
Liquid Limit (g rounded)		**21**	N.A.
Plasticity Index (i rounded)		**2**	

j. corr. # blows 22 22 = 0.9846, 23 = 0.9899, 24 0.9952 25 = 1.0000, 26 = 1.0050, 27 = 1.0100, 28 = 1.0138

wt. - #40 173.9 ÷ **wt. - #4** 503.6 x % pass.#4 = 22.3%

(± 3.0% VARIABLE of Acc. % pass. (0.1%) on the #40)

SPECIFICATION L.L. max. 25
SPECIFICATION P.I. max. 6

sieve size mm	#	Retained (0.1g)	% total ret. (0.1%)	% total x % pa.#4(0.1%)	Acc.% pass. (0.1%)	Acc.% pass. (rounded)	SPEC. REQ.
2.36	8	109.8	20.5	13.2	51.4	**51**	34-58
2.00	10	16.7	3.1	2.0	49.4	**49**	
1.18	16	69.0	12.9	8.3	41.1	**41**	
0.85	20						
0.60	30	99.9	18.7	12.1	29.0	**29**	
0.43	40	54.6	10.2	6.6	22.4	**22**	13-35
0.30	50	42.7	8.0	5.2	17.2	**17**	
0.18	80	34.2	6.4	4.1	13.1	**13**	
0.150	100	26.3	4.9	3.2	9.9	**10**	
0.075	200	24.1	4.5	2.9	7.0	**7.0**	**3.0-12.0**
PAN	dry	13.0	57.4	6.9	**wt. before washing(0.1 g)**	535.5	
PAN	wash	44.4	10.7		**wt. after washing (0.1 g)**	491.1	
	TOTAL	534.7	0		**loss from washing (- #200)**	44.4	

+ #4 % PARTICLES LESS THAN 1.95 SP.GR.

Specific gravity of solution (1.95 ± 0.01)		
wt. of lightweight particles	(0.1 g)	
weight of + #4 material	(0.1 g)	
% lightweight particles		
SPECIFICATION maximum		

- #4 % PARTICLES LESS THAN 1.95 SP.GR.

Specific gravity of solution (1.95 ± 0.01)		
wt. of lightweight particles	(0.1 g)	
weight of - #4 material	(0.1 g)	
% lightweight particles		
SPECIFICATION maximum		

Tester Signature Cory Foerster

- #4 Gradation check within 0.3 % of the wt. before washing 0.15%

CRUSHED PARTICLES TEST

weight of crushed pieces	(0.1 g)	448.9
weight of total + #4 sample	(0.1 g)	1058.1
percent of crushed pieces	(%Whole)	**42%**
SPECIFICATION 1	**or more FF, min.**	30%

Na.Rock		Na.Fines		Cr.Fines	
Cr.Rock		Na. Sand		Ma.Sand	
Filler					

COMMENTS:

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FOERSTER TESTING SIEVE ANALYSIS

Invoice/Report _____

CUSTOMER	STI	**PROJECT**	Flandreau Airport	**Project #**	25-1927
SAMPLE NO.		**DATE SAMPLED**	10-23-2025	**DATE TESTED**	12-04-2025
SAMPLED BY	FB Drilling	**TESTED BY**	Taylor T	**CHECKED BY**	Tim F
MATERIAL TYPE	Base Material (SD DOT Base Course Specs)	**SOURCE**	Boring #25, 0-1'		
WEIGHT TICKET NUMBER OR STATION				**LIFT**	

% moist. = (wet wt. 5667.0 - dry wt.) / dry wt. x 100 = 4.2%

ORIGINAL DRY SAMPLE WT. (0.1 g) 5439.7

sieve size mm	in	Retained (0.1g)	% total ret. (0.1%)	Acc.% pass. (0.1%)	Acc.% pass. (rounded)	SPEC REQ.
50	2					
37.52	1 1/2					
31.5	1 1/4					
25	1	0.0		100.0	**100**	100
19	3/4	115.8	2.1	97.9	**98**	80-100
16	5/8	116.7	2.1	95.8	**96**	
12.5	1/2	310.9	5.7	90.1	**90**	68-91
9.5	3/8	341.9	6.3	83.8	**84**	
6.3	1/4	560.3	10.3	73.5	**74**	
4.75	#4	371.6	6.8	66.7	**67**	46-70
PAN		3622.8	66.6			
TOTAL		5440.0	100.0			

+#4 Gradation check within 0.3 % of the original dry wt. -0.01%

L. L., P. L., and P. I.		**L.L.**	**P.L.**
a. can number		1	2
b. wt. can + wet soil	(.01 g)	35.30	29.22
c. wt. can + dry soil	(.01 g)	32.79	27.90
d. wt. of water (b - c)	(.01 g)	2.51	1.32
e. wt. of can	(.01 g)	20.66	21.16
f. wt. of dry soil (c - e)	(.01 g)	12.13	6.74
g. Liquid Limit(d/f x j x 100)	(0.1)	20.7	N.A.
h. Plastic Limit (d/f x 100)	(0.1)	N.A.	19.6
i. P. I. (g - h)	(0.1)	1.1	
Liquid Limit (g rounded)		**21**	N.A.
Plasticity Index (i rounded)		**1**	

j. corr. # blows 25 22 = 0.9846, 23 = 0.9899, 24 0.9952 25 = 1.0000, 26 = 1.0050, 27 = 1.0100, 28 = 1.0138

wt. - #40 190.8 ÷ **wt. - #4** 568.7 x % pass.#4 = 22.4%

(± 3.0% VARIABLE of Acc. % pass. (0.1%) on the #40)

SPECIFICATION L.L. max. 25
SPECIFICATION P.I. max. 6

sieve size mm	#	Retained (0.1g)	% total ret. (0.1%)	% total x % pa.#4(0.1%)	Acc.% pass. (0.1%)	Acc.% pass. (rounded)	SPEC. REQ.
2.36	8	109.4	20.4	13.6	53.1	**53**	34-58
2.00	10	16.9	3.2	2.1	51.0	**51**	
1.18	16	72.7	13.6	9.1	41.9	**42**	
0.85	20						
0.60	30	100.3	18.7	12.5	29.4	**29**	
0.43	40	53.1	9.9	6.6	22.8	**23**	13-35
0.30	50	39.4	7.4	4.9	17.9	**18**	
0.18	80	34.1	6.4	4.3	13.6	**14**	
0.150	100	23.1	4.3	2.9	10.7	**11**	
0.075	200	25.5	4.8	3.2	7.5	**7.5**	**3.0-12.0**
PAN	dry	16.8	60.7	7.5	**wt. before washing(0.1 g)**		536.0
PAN	wash	43.9	11.3		**wt. after washing (0.1 g)**		492.1
	TOTAL	535.2	0		**loss from washing (- #200)**		43.9

+ #4 % PARTICLES LESS THAN 1.95 SP.GR.

Specific gravity of solution (1.95 ± 0.01)		____
wt. of lightweight particles	(0.1 g)	
weight of + #4 material	(0.1 g)	
% lightweight particles		
SPECIFICATION maximum		

- #4 % PARTICLES LESS THAN 1.95 SP.GR.

Specific gravity of solution (1.95 ± 0.01)		____
wt. of lightweight particles	(0.1 g)	
weight of - #4 material	(0.1 g)	
% lightweight particles		
SPECIFICATION maximum		

Tester Signature _____

- #4 Gradation check within 0.3 % of the wt. before washing 0.15%

CRUSHED PARTICLES TEST

weight of crushed pieces	(0.1 g)	410.5
weight of total + #4 sample	(0.1 g)	1054.6
percent of crushed pieces	(%Whole)	**39%**
SPECIFICATION 1	**or more FF, min.**	30%

Na.Rock	____	Na.Fines	____	Cr.Fines	____
Cr.Rock	____	Na. Sand	____	Ma.Sand	____
Filler	____		____		____

COMMENTS: _____

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FOERSTER TESTING SIEVE ANALYSIS

Invoice/Report _____

CUSTOMER	STI	**PROJECT**	Flandreau Airport	**Project #**	25-1927
SAMPLE NO.		**DATE SAMPLED**	10-23-2025	**DATE TESTED**	12-04-2025
SAMPLED BY	FB Drilling	**TESTED BY**	Taylor T	**CHECKED BY**	Tim F
MATERIAL TYPE	Base Material (SD DOT Base Course Specs)	**SOURCE**	Boring #32, 0-1'		
WEIGHT TICKET NUMBER OR STATION				**LIFT**	

% moist. = (wet wt. 5050.0 - dry wt.) / dry wt. x 100 = 3.9%

ORIGINAL DRY SAMPLE WT. (0.1 g) 4859.6

sieve size mm	in	Retained (0.1g)	% total ret. (0.1%)	Acc.% pass. (0.1%)	Acc.% pass. (rounded)	SPEC REQ.
50	2					
37.52	1 1/2					
31.5	1 1/4					
25	1	0.0		100.0	**100**	100
19	3/4	19.2	0.4	99.6	**100**	80-100
16	5/8	84.4	1.7	97.9	**98**	
12.5	1/2	134.7	2.8	95.1	**95**	68-91
9.5	3/8	215.1	4.4	90.7	**91**	
6.3	1/4	417.7	8.6	82.1	**82**	
4.75	#4	296.4	6.1	76.0	**76**	46-70
PAN		3688.0	75.9			
TOTAL		4855.5	99.9			

+#4 Gradation check within 0.3 % of the original dry wt. 0.08%

L. L., P. L., and P. I.		L.L.	P.L.
a. can number		1	2
b. wt. can + wet soil	(.01 g)	36.47	29.42
c. wt. can + dry soil	(.01 g)	34.10	27.98
d. wt. of water (b - c)	(.01 g)	2.37	1.44
e. wt. of can	(.01 g)	22.59	20.86
f. wt. of dry soil (c - e)	(.01 g)	11.51	7.12
g. Liquid Limit(d/f x j x 100)	(0.1)	20.9	N.A.
h. Plastic Limit (d/f x 100)	(0.1)	N.A.	20.2
i. P. I. (g - h)	(0.1)	0.7	
Liquid Limit (g rounded)		**21**	N.A.
Plasticity Index (i rounded)		**1**	

j. corr. # blows 28 22 = 0.9846, 23 = 0.9899, 24 0.9952 25 = 1.0000, 26 = 1.0050, 27 = 1.0100, 28 = 1.0138

wt. - #40 238.7 ÷ **wt. - #4** 537.0 x % pass.#4 = 33.8%

(± 3.0% VARIABLE of Acc. % pass. (0.1%) on the #40)

SPECIFICATION L.L. max. 25
SPECIFICATION P.I. max. 6

sieve size mm	#	Retained (0.1g)	% total ret. (0.1%)	% total x % pa.#4(0.1%)	Acc.% pass. (0.1%)	Acc.% pass. (rounded)	SPEC. REQ.
2.36	8	85.2	16.2	12.3	63.7	**64**	34-58
2.00	10	16.3	3.1	2.4	61.3	**61**	
1.18	16	64.5	12.2	9.3	52.0	**52**	
0.85	20						
0.60	30	88.5	16.8	12.8	39.2	**39**	
0.43	40	48.7	9.2	7.0	32.2	**32**	13-35
0.30	50	41.3	7.8	5.9	26.3	**26**	
0.18	80	39.1	7.4	5.6	20.7	**21**	
0.150	100	32.5	6.2	4.7	16.0	**16**	
0.075	200	42.8	8.1	6.2	9.8	**9.8**	**3.0-12.0**
PAN	dry	5.1	67.0	9.7	wt. before washing(0.1 g)		526.9
PAN	wash	61.9	12.7		wt. after washing (0.1 g)		465.0
	TOTAL	525.9	0		loss from washing (- #200)		61.9

+ #4 % PARTICLES LESS THAN 1.95 SP.GR.

Specific gravity of solution (1.95 ± 0.01)		____
wt. of lightweight particles	(0.1 g)	
weight of + #4 material	(0.1 g)	
% lightweight particles		
SPECIFICATION maximum		

- #4 % PARTICLES LESS THAN 1.95 SP.GR.

Specific gravity of solution (1.95 ± 0.01)		____
wt. of lightweight particles	(0.1 g)	
weight of - #4 material	(0.1 g)	
% lightweight particles		
SPECIFICATION maximum		

Tester Signature _____

- #4 Gradation check within 0.3 % of the wt. before washing 0.19%

CRUSHED PARTICLES TEST

weight of crushed pieces	(0.1 g)	387.9
weight of total + #4 sample	(0.1 g)	1027.7
percent of crushed pieces	(%Whole)	**38%**
SPECIFICATION 1	**or more FF, min.**	30%

Na.Rock	____	Na.Fines	____	Cr.Fines	____
Cr.Rock	____	Na. Sand	____	Ma.Sand	____
Filler	____		____		____

COMMENTS: _____

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END OF ITEM SP 03

AIRPORT SAFETY PLAN–REFERENCE MANUAL

U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Operational Safety on Airports During Construction	**Date:** 12/13/2017 **Initiated By:** AAS-100	**AC No:** 150/5370-2G **Change:**

1 **Purpose.**

This AC sets forth guidelines for operational safety on airports during construction.

2 **Cancellation.**

This AC cancels AC 150/5370-2F, *Operational Safety on Airports during Construction,* dated September 29, 2011.

3 **Application.**

This AC assists airport operators in complying with Title 14 Code of Federal Regulations (CFR) Part 139, *Certification of Airports*. For those certificated airports, this AC provides one way, but not the only way, of meeting those requirements. The use of this AC is mandatory for those airport construction projects receiving funds under the Airport Improvement Program (AIP). See Grant Assurance No. 34, *Policies, Standards, and Specifications*. While we do not require non-certificated airports without grant agreements or airports using Passenger Facility Charge (PFC) Program funds for construction projects to adhere to these guidelines, we recommend that they do so to help these airports maintain operational safety during construction.

4 **Related Documents.**

ACs and Orders referenced in the text of this AC do not include a revision letter, as they refer to the latest version. Appendix A contains a list of reading material on airport construction, design, and potential safety hazards during construction, as well as instructions for obtaining these documents.

5 **Principal Changes.**

The AC incorporates the following principal changes:

1. Notification about impacts to both airport owned and FAA-owned NAVAIDs was added. See paragraph 2.13.5.3, NAVAIDs.

2. Guidance for the use of orange construction signs was added. See paragraph 2.18.4.2, Temporary Signs.
3. Open trenches or excavations may be permitted in the taxiway safety area while the taxiway is open to aircraft operations, subject to restrictions. See paragraph 2.22.3.4, Excavations.
4. Guidance for temporary shortened runways and displaced thresholds has been enhanced. See Figure 2-1 and Figure 2-2.
5. Figures have been improved and a new Appendix F on the placement of orange construction signs has been added.

Hyperlinks (allowing the reader to access documents located on the internet and to maneuver within this document) are provided throughout this document and are identified with underlined text. When navigating within this document, return to the previously viewed page by pressing the "ALT" and " ←" keys simultaneously.

Figures in this document are schematic representations and are not to scale.

6 **Use of Metrics.**

Throughout this AC, U.S. customary units are used followed with "soft" (rounded) conversion to metric units. The U.S. customary units govern.

7 **Where to Find this AC.**

You can view a list of all ACs at http://www.faa.gov/regulations_policies/advisory_circulars/. You can view the Federal Aviation Regulations at http://www.faa.gov/regulations_policies/faa_regulations/.

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.

John R. Dermody
Director of Airport Safety and Standards

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CHAPTER 1. PLANNING AN AIRFIELD CONSTRUCTION PROJECT

1.1 Overview.

Airports are complex environments, and procedures and conditions associated with construction activities often affect aircraft operations and can jeopardize operational safety. Safety considerations are paramount and may make operational impacts unavoidable. However, careful planning, scheduling, and coordination of construction activities can minimize disruption of normal aircraft operations and avoid situations that compromise the airport's operational safety. The airport operator must understand how construction activities and aircraft operations affect one another to be able to develop an effective plan to complete the project. While the guidance in this AC is primarily used for construction operations, the concepts, methods and procedures described may also enhance the day-to-day airport maintenance operations, such as lighting maintenance and snow removal operations.

1.2 Plan for Safety.

Safety, maintaining aircraft operations, and construction costs are all interrelated. Since safety must not be compromised, the airport operator must strike a balance between maintaining aircraft operations and construction costs. This balance will vary widely depending on the operational needs and resources of the airport and will require early coordination with airport users and the FAA. As the project design progresses, the necessary construction locations, activities, and associated costs will be identified and their impact to airport operations must be assessed. Adjustments are made to the proposed construction activities, often by phasing the project, and/or to airport operations to maintain operational safety. This planning effort will ultimately result in a project Construction Safety and Phasing Plan (CSPP). The development of the CSPP takes place through the following five steps:

1.2.1 Identify Affected Areas.

The airport operator must determine the geographic areas on the airport affected by the construction project. Some, such as a runway extension, will be defined by the project. Others may be variable, such as the location of haul routes and material stockpiles.

1.2.2 Describe Current Operations.

Identify the normal airport operations in each affected area for each phase of the project. This becomes the baseline from which the impact on operations by construction activities can be measured. This should include a narrative of the typical users and aircraft operating within the affected areas. It should also include information related to airport operations: the Aircraft Approach Category (AAC) and Airplane Design Group (ADG) of the airplanes that operate on each runway; the ADG and Taxiway Design Group (TDG)[1] for each affected taxiway; designated approach visibility minimums;

[1] Find Taxiway Design Group information in AC 150/5300-13, *Airport Design*.

available approach and departure procedures; most demanding aircraft; declared distances; available air traffic control services; airport Surface Movement Guidance and Control System (SMGCS) plan; and others. The applicable seasons, days and times for certain operations should also be identified as applicable.

1.2.3 Allow for Temporary Changes to Operations.

To the extent practical, current airport operations should be maintained during the construction. In consultation with airport users, Aircraft Rescue and Fire Fighting (ARFF) personnel, and FAA Air Traffic Organization (ATO) personnel, the airport operator should identify and prioritize the airport's most important operations. The construction activities should be planned, through project phasing if necessary, to safely accommodate these operations. When the construction activities cannot be adjusted to safely maintain current operations, regardless of their importance, then the operations must be revised accordingly. Allowable changes include temporary revisions to approach procedures, restricting certain aircraft to specific runways and taxiways, suspension of certain operations, decreased weights for some aircraft due to shortened runways, and other changes. An example of a table showing temporary operations versus current operations is shown in Appendix E.

1.2.4 Take Required Measures to Revise Operations.

Once the level and type of aircraft operations to be maintained are identified, the airport operator must determine the measures required to safely conduct the planned operations during the construction. These measures will result in associated costs, which can be broadly interpreted to include not only direct construction costs, but also loss of revenue from impacted operations. Analysis of costs may indicate a need to reevaluate allowable changes to operations. As aircraft operations and allowable changes will vary widely among airports, this AC presents general guidance on those subjects.

1.2.5 Manage Safety Risk.

The FAA is committed to incorporating proactive safety risk management (SRM) tools into its decision-making processes. FAA Order 5200.11, *FAA Airports (ARP) Safety Management System (SMS)*, requires the FAA to conduct a Safety Assessment for certain triggering actions. Certain airport projects may require the airport operator to provide a Project Proposal Summary to help the FAA determine whether a Safety Assessment is required prior to FAA approval of the CSPP. The airport operator must coordinate with the appropriate FAA Airports Regional or District Office early in the development of the CSPP to determine the need for a Safety Risk Assessment. If the FAA requires an assessment, the airport operator must at a minimum:

1. Notify the appropriate FAA Airports Regional or District Office during the project "scope development" phase of any project requiring a CSPP.
2. Provide documents identified by the FAA as necessary to conduct SRM.
3. Participate in the SRM process for airport projects.
4. Provide a representative to participate on the SRM panel.

5. Ensure that all applicable SRM identified risks elements are recorded and mitigated within the CSPP.

1.3 Develop a Construction Safety and Phasing Plan (CSPP).

Development of an effective CSPP will require familiarity with many other documents referenced throughout this AC. See Appendix A for a list of related reading material.

1.3.1 List Requirements.

A CSPP must be developed for each on-airfield construction project funded by the Airport Improvement Program (AIP) or located on an airport certificated under Part 139. For on-airfield construction projects at Part 139 airports funded without AIP funds, the preparation of a CSPP represents an acceptable method the certificate holder may use to meet Part 139 requirements during airfield construction activity. As per FAA Order 5200.11, projects that require Safety Assessments do not include construction, rehabilitation, or change of any facility that is entirely outside the air operations area, does not involve any expansion of the facility envelope and does not involve construction equipment, haul routes or placement of material in locations that require access to the air operations area, increase the facility envelope, or impact line-of-sight. Such facilities may include passenger terminals and parking or other structures. However, extraordinary circumstances may trigger the need for a Safety Assessment and a CSPP. The CSPP is subject to subsequent review and approval under the FAA's Safety Risk Management procedures (see paragraph 1.2.5).

1.3.2 Prepare a Safety Plan Compliance Document (SPCD).

The Safety Plan Compliance Document (SPCD) details how the contractor will comply with the CSPP. Also, it will not be possible to determine all safety plan details (for example specific hazard equipment and lighting, contractor's points of contact, construction equipment heights) during the development of the CSPP. The successful contractor must define such details by preparing an SPCD that the airport operator reviews for approval prior to issuance of a notice-to-proceed. The SPCD is a subset of the CSPP, similar to how a shop drawing review is a subset to the technical specifications.

1.3.3 Assume Responsibility for the CSPP.

The airport operator is responsible for establishing and enforcing the CSPP. The airport operator may use the services of an engineering consultant to help develop the CSPP. However, writing the CSPP cannot be delegated to the construction contractor. Only those details the airport operator determines cannot be addressed before contract award are developed by the contractor and submitted for approval as the SPCD. The SPCD does not restate nor propose differences to provisions already addressed in the CSPP.

1.4 Who Is Responsible for Safety During Construction?

1.4.1 Establish a Safety Culture.

Everyone has a role in operational safety on airports during construction: the airport operator, the airport's consultants, the construction contractor and subcontractors, airport users, airport tenants, ARFF personnel, Air Traffic personnel, including Technical Operations personnel, FAA Airports Division personnel, and others, such as military personnel at any airport supporting military operations (e.g. national guard or a joint use facility). Close communication and coordination between all affected parties is the key to maintaining safe operations. Such communication and coordination should start at the project scoping meeting and continue through the completion of the project. The airport operator and contractor should conduct onsite safety inspections throughout the project and immediately remedy any deficiencies, whether caused by negligence, oversight, or project scope change.

1.4.2 Assess Airport Operator's Responsibilities.

An airport operator has overall responsibility for all activities on an airport, including construction. This includes the predesign, design, preconstruction, construction, and inspection phases. Additional information on the responsibilities listed below can be found throughout this AC. The airport operator must:

1.4.2.1 Develop a CSPP that complies with the safety guidelines of Chapter 2, Construction Safety and Phasing Plans, and Chapter 3, Guidelines for Writing a CSPP. The airport operator may develop the CSPP internally or have a consultant develop the CSPP for approval by the airport operator. For tenant sponsored projects, approve a CSPP developed by the tenant or its consultant.

1.4.2.2 Require, review and approve the SPCD by the contractor that indicates how it will comply with the CSPP and provides details that cannot be determined before contract award.

1.4.2.3 Convene a preconstruction meeting with the construction contractor, consultant, airport employees and, if appropriate, tenant sponsor and other tenants to review and discuss project safety before beginning construction activity. The appropriate FAA representatives should be invited to attend the meeting. See AC 150/5370-12*, Quality Management for Federally Funded Airport Construction Projects.* (Note "FAA" refers to the Airports Regional or District Office, the Air Traffic Organization, Flight Standards Service, and other offices that support airport operations, flight regulations, and construction/environmental policies.)

1.4.2.4 Ensure contact information is accurate for each representative/point of contact identified in the CSPP and SPCD.

1.4.2.5 Hold weekly or, if necessary, daily safety meetings with all affected parties to coordinate activities.

1.4.2.6 Notify users, ARFF personnel, and FAA ATO personnel of construction and conditions that may adversely affect the operational safety of the airport via Notices to Airmen (NOTAM) and other methods, as appropriate. Convene a meeting for review and discussion if necessary.

1.4.2.7 Ensure construction personnel know applicable airport procedures and changes to those procedures that may affect their work.

1.4.2.8 Ensure that all temporary construction signs are located per the scheduled list for each phase of the project.

1.4.2.9 Ensure construction contractors and subcontractors undergo training required by the CSPP and SPCD.

1.4.2.10 Ensure vehicle and pedestrian operations addressed in the CSPP and SPCD are coordinated with airport tenants, the airport traffic control tower (ATCT), and construction contractors.

1.4.2.11 At certificated airports, ensure each CSPP and SPCD is consistent with Part 139.

1.4.2.12 Conduct inspections sufficiently frequently to ensure construction contractors and tenants comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards.

1.4.2.13 Take immediate action to resolve safety deficiencies.

1.4.2.14 At airports subject to 49 CFR Part 1542, *Airport Security*, ensure construction access complies with the security requirements of that regulation.

1.4.2.15 Notify appropriate parties when conditions exist that invoke provisions of the CSPP and SPCD (for example, implementation of low-visibility operations).

1.4.2.16 Ensure prompt submittal of a Notice of Proposed Construction or Alteration (Form 7460-1) for conducting an aeronautical study of potential obstructions such as tall equipment (cranes, concrete pumps, other), stock piles, and haul routes. A separate form may be filed for each potential obstruction, or one form may be filed describing the entire construction area and maximum equipment height. In the latter case, a separate form must be filed for any object beyond or higher than the originally evaluated area/height. The FAA encourages online submittal of forms for expediency at https://oeaaa.faa.gov/oeaaa/external/portal.jsp. The appropriate FAA Airports Regional or District Office can provide assistance in determining which objects require an aeronautical study.

1.4.2.17 Ensure prompt transmission of the Airport Sponsor Strategic Event Submission, FAA Form 6000-26, located at https://oeaaa.faa.gov/oeaaa/external/content/AIRPORT_SPONSOR_STRATEGIC_EVENT_SUBMISSION_FORM.pdf, to assure proper coordination for NAS Strategic Interruption per Service Level Agreement with ATO.

1.4.2.18 Promptly notify the FAA Airports Regional or District Office of any proposed changes to the CSPP prior to implementation of the change. Changes to the CSPP require review and approval by the airport operator and the FAA. The FAA Airports Regional or District office will determine if further coordination within the FAA is needed. Coordinate with appropriate local and other federal government agencies, such as Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), Transportation Security Administration (TSA), and the state environmental agency.

1.4.3 Define Construction Contractor's Responsibilities.

The contractor is responsible for complying with the CSPP and SPCD. The contractor must:

1.4.3.1 Submit a Safety Plan Compliance Document (SPCD) to the airport operator describing how it will comply with the requirements of the CSPP and supply any details that could not be determined before contract award. The SPCD must include a certification statement by the contractor, indicating an understanding of the operational safety requirements of the CSPP and the assertion of compliance with the approved CSPP and SPCD unless written approval is granted by the airport operator. Any construction practice proposed by the contractor that does not conform to the CSPP and SPCD may impact the airport's operational safety and will require a revision to the CSPP and SPCD and re-coordination with the airport operator and the FAA in advance.

1.4.3.2 Have available at all times copies of the CSPP and SPCD for reference by the airport operator and its representatives, and by subcontractors and contractor employees.

1.4.3.3 Ensure that construction personnel are familiar with safety procedures and regulations on the airport. Provide a point of contact who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport. Many projects will require 24-hour coverage.

1.4.3.4 Identify in the SPCD the contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD during construction. At least one of these employees must be on-site when active construction is taking place.

1.4.3.5 Conduct sufficient inspections to ensure construction personnel comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards.

1.4.3.6 Restrict movement of construction vehicles and personnel to permitted construction areas by flagging, barricading, erecting temporary fencing, or providing escorts, as appropriate, and as specified in the CSPP and SPCD.

1.4.3.7 Ensure that no contractor employees, employees of subcontractors or suppliers, or other persons enter any part of the air operations area (AOA) from the construction site unless authorized.

1.4.3.8 Ensure prompt submittal through the airport operator of Form 7460-1 for the purpose of conducting an aeronautical study of contractor equipment such as tall equipment (cranes, concrete pumps, and other equipment), stock piles, and haul routes when different from cases previously filed by the airport operator. The FAA encourages online submittal of forms for expediency at https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

1.4.3.9 Ensure that all necessary safety mitigations are understood by all parties involved, and any special requirements of each construction phase will be fulfilled per the approved timeframe.

1.4.3.10 Participate in pre-construction meetings to review construction limits, safety mitigations, NOTAMs, and understand all special airport operational needs during each phase of the project.

1.4.4 Define Tenant's Responsibilities.

If planning construction activities on leased property, Airport tenants, such as airline operators, fixed base operators, and FAA ATO/Technical Operations sponsoring construction are strongly encouraged to:

1. Develop, or have a consultant develop, a project specific CSPP and submit it to the airport operator. The airport operator may forgo a complete CSPP submittal and instead incorporate appropriate operational safety principles and measures addressed in the advisory circular within their tenant lease agreements.
2. In coordination with its contractor, develop an SPCD and submit it to the airport operator for approval issued prior to issuance of a Notice to Proceed.
3. Ensure that construction personnel are familiar with safety procedures and regulations on the airport during all phases of the construction.
4. Provide a point of contact of who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport.
5. Identify in the SPCD the contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD during construction. At least one of these employees must be on-site when active construction is taking place.
6. Ensure that no tenant or contractor employees, employees of subcontractors or suppliers, or any other persons enter any part of the AOA from the construction site unless authorized.
7. Restrict movement of construction vehicles to construction areas by flagging and barricading, erecting temporary fencing, or providing escorts, as appropriate, as specified in the CSPP and SPCD.
8. Ensure prompt submittal through the airport operator of Form 7460-1 for conducting an aeronautical study of contractor equipment such as tall equipment (cranes, concrete pumps, other), stock piles, and haul routes. The FAA encourages online submittal of forms for expediency at https://oeaaa.faa.gov/oeaaa/external/portal.jsp.
9. Participate in pre-construction meetings to review construction limits, safety mitigations, NOTAMs, and understand all special airport operational needs during each phase of the project.

CHAPTER 2. CONSTRUCTION SAFETY AND PHASING PLANS

2.1 Overview.

Aviation safety is the primary consideration at airports, especially during construction. The airport operator's CSPP and the contractor's Safety Plan Compliance Document (SPCD) are the primary tools to ensure safety compliance when coordinating construction activities with airport operations. These documents identify all aspects of the construction project that pose a potential safety hazard to airport operations and outline respective mitigation procedures for each hazard. They must provide information necessary for the Airport Operations department to conduct airfield inspections and expeditiously identify and correct unsafe conditions during construction. All aviation safety provisions included within the project drawings, contract specifications, and other related documents must also be reflected in the CSPP and SPCD.

2.2 Assume Responsibility.

Operational safety on the airport remains the airport operator's responsibility at all times. The airport operator must develop, certify, and submit for FAA approval each CSPP. It is the airport operator's responsibility to apply the requirements of the FAA approved CSPP. The airport operator must revise the CSPP when conditions warrant changes and must submit the revised CSPP to the FAA for approval. The airport operator must also require and approve a SPCD from the project contractor.

2.3 Submit the CSPP.

Construction Safety and Phasing Plans should be developed concurrently with the project design. Milestone versions of the CSPP should be submitted for review and approval as follows. While these milestones are not mandatory, early submission will help to avoid delays. Submittals are preferred in 8.5 × 11 inch or 11 × 17 inch format for compatibility with the FAA's Obstruction Evaluation / Airport Airspace Analysis (OE / AAA) process.

2.3.1 Submit an Outline/Draft.

By the time approximately 25% to 30% of the project design is completed, the principal elements of the CSPP should be established. Airport operators are encouraged to submit an outline or draft, detailing all CSPP provisions developed to date, to the FAA for review at this stage of the project design.

2.3.2 Submit a CSPP.

The CSPP should be formally submitted for FAA approval when the project design is 80 percent to 90 percent complete. Since provisions in the CSPP will influence contract costs, it is important to obtain FAA approval in time to include all such provisions in the procurement contract.

2.3.3 Submit an SPCD.

The contractor should submit the SPCD to the airport operator for approval to be issued prior to the Notice to Proceed.

2.3.4 Submit CSPP Revisions.

All revisions to a previously approved CSPP must be re-submitted to the FAA for review and approval/disapproval action.

2.4 Meet CSPP Requirements.

2.4.1 To the extent possible, the CSPP should address the following as outlined in Chapter 3, Guidelines for Writing a CSPP. Details that cannot be determined at this stage are to be included in the SPCD.

1. Coordination.
   a. Contractor progress meetings.
   b. Scope or schedule changes.
   c. FAA ATO coordination.
2. Phasing.
   a. Phase elements.
   b. Construction safety drawings.
3. Areas and operations affected by the construction activity.
   a. Identification of affected areas.
   b. Mitigation of effects.
4. Protection of navigation aids (NAVAIDs).
5. Contractor access.
   a. Location of stockpiled construction materials.
   b. Vehicle and pedestrian operations.
6. Wildlife management.
   a. Trash.
   b. Standing water.
   c. Tall grass and seeds.
   d. Poorly maintained fencing and gates.
   e. Disruption of existing wildlife habitat.
7. Foreign Object Debris (FOD) management.
8. Hazardous materials (HAZMAT) management.
9. Notification of construction activities.

a. Maintenance of a list of responsible representatives/ points of contact.

b. NOTAM.

c. Emergency notification procedures.

d. Coordination with ARFF Personnel.

e. Notification to the FAA.

10. Inspection requirements.

a. Daily (or more frequent) inspections.

b. Final inspections.

11. Underground utilities.

12. Penalties.

13. Special conditions.

14. Runway and taxiway visual aids. Marking, lighting, signs, and visual NAVAIDs.

a. General.

b. Markings.

c. Lighting and visual NAVAIDs.

d. Signs, temporary, including orange construction signs, and permanent signs.

15. Marking and signs for access routes.

16. Hazard marking and lighting.

a. Purpose.

b. Equipment.

17. Work zone lighting for nighttime construction (if applicable).

18. Protection of runway and taxiway safety areas, object free areas, obstacle free zones, and approach/departure surfaces.

a. Runway Safety Area (RSA).

b. Runway Object Free Area (ROFA).

c. Taxiway Safety Area (TSA). Provide details for any adjustments to Taxiway Safety Area width to allow continued operation of smaller aircraft. See paragraph 2.22.3.

d. Taxiway Object Free Area (TOFA). Provide details for any continued aircraft operations while construction occurs within the TOFA. See paragraph 2.22.4.

e. Obstacle Free Zone (OFZ).

f. Runway approach/departure surfaces.

19. Other limitations on construction.

a. Prohibitions.

b. Restrictions.

2.4.2 The Safety Plan Compliance Document (SPCD) should include a general statement by the construction contractor that he/she has read and will abide by the CSPP. In addition, the SPCD must include all supplemental information that could not be included in the CSPP prior to the contract award. The contractor statement should include the name of the contractor, the title of the project CSPP, the approval date of the CSPP, and a reference to any supplemental information (that is, "I, (Name of Contractor), have read the (Title of Project) CSPP, approved on (Date), and will abide by it as written and with the following additions as noted:"). The supplemental information in the SPCD should be written to match the format of the CSPP indicating each subject by corresponding CSPP subject number and title. If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title. The SPCD should not duplicate information in the CSPP:

1. Coordination. Discuss details of proposed safety meetings with the airport operator and with contractor employees and subcontractors.
2. Phasing. Discuss proposed construction schedule elements, including:
   a. Duration of each phase.
   b. Daily start and finish of construction, including "night only" construction.
   c. Duration of construction activities during:
      i. Normal runway operations.
      ii. Closed runway operations.
      iii. Modified runway "Aircraft Reference Code" usage.
3. Areas and operations affected by the construction activity. These areas and operations should be identified in the CSPP and should not require an entry in the SPCD.
4. Protection of NAVAIDs. Discuss specific methods proposed to protect operating NAVAIDs.
5. Contractor access. Provide the following:
   a. Details on how the contractor will maintain the integrity of the airport security fence (gate guards, daily log of construction personnel, and other).
   b. Listing of individuals requiring driver training (for certificated airports and as requested).
   c. Radio communications.
      i. Types of radios and backup capabilities.
      ii. Who will be monitoring radios.
      iii. Who to contact if the ATCT cannot reach the contractor's designated person by radio.

d. Details on how the contractor will escort material delivery vehicles.

6. Wildlife management. Discuss the following:
   a. Methods and procedures to prevent wildlife attraction.
   b. Wildlife reporting procedures.
7. Foreign Object Debris (FOD) management. Discuss equipment and methods for control of FOD, including construction debris and dust.
8. Hazardous Materials (HAZMAT) management. Discuss equipment and methods for responding to hazardous spills.
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 for submitting 7460-1 forms not previously submitted by the airport operator.
   d. Batch plant details, including 7460-1 submittal.
10. Inspection requirements. Discuss daily (or more frequent) inspections and special inspection procedures.
11. Underground utilities. Discuss proposed methods of identifying and protecting underground utilities.
12. Penalties. Penalties should be identified in the CSPP and should not require an entry in the SPCD.
13. Special conditions. Discuss proposed actions for each special condition identified in the CSPP.
14. Runway and taxiway visual aids. Including marking, lighting, signs, and visual NAVAIDs. Discuss proposed visual aids 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. Temporary orange construction signs.
    d. Types of temporary Visual Guidance Slope Indicators (VGSI).
15. Marking and signs for access routes. Discuss proposed methods of demarcating access routes for vehicle drivers.
16. Hazard marking and lighting. Discuss proposed equipment and methods for identifying excavation areas.
17. Work zone lighting for nighttime construction (if applicable). Discuss proposed equipment, locations, aiming, and shielding to prevent interference with air traffic control and aircraft operations.

18. Protection of runway and taxiway safety areas, object free areas, obstacle free zones, and approach/departure surfaces. Discuss proposed methods of identifying, demarcating, and protecting airport surfaces including:
    a. Equipment and methods for maintaining Taxiway Safety Area standards.
    b. Equipment and methods to ensure the safe passage of aircraft where Taxiway Safety Area or Taxiway Object Free Area standards cannot be maintained.
    c. Equipment and methods for separation of construction operations from aircraft operations, including details of barricades.
19. Other limitations on construction should be identified in the CSPP and should not require an entry in the SPCD.

2.5 Coordination.

Airport operators, or tenants responsible for design, bidding and conducting construction on their leased properties, should ensure at all project developmental stages, such as predesign, prebid, and preconstruction conferences, they capture the subject of airport operational safety during construction (see AC 150/5370-12, *Quality Management for Federally Funded Airport Construction Projects*). In addition, the following should be coordinated as required:

2.5.1 Progress Meetings.

Operational safety should be a standing agenda item for discussion during progress meetings throughout the project developmental stages.

2.5.2 Scope or Schedule Changes.

Changes in the scope or duration at any of the project stages may require revisions to the CSPP and review and approval by the airport operator and the FAA (see paragraph 1.4.2.17).

2.5.3 FAA ATO Coordination.

Early coordination with FAA ATO is highly recommended during the design phase and is required for scheduling Technical Operations shutdowns prior to construction. Coordination is critical to restarts of NAVAID services and to the establishment of any special procedures for the movement of aircraft. Formal agreements between the airport operator and appropriate FAA offices are recommended. All relocation or adjustments to NAVAIDs, or changes to final grades in critical areas, should be coordinated with FAA ATO and may require an FAA flight inspection prior to restarting the facility. Flight inspections must be coordinated and scheduled well in advance of the intended facility restart. Flight inspections may require a reimbursable agreement between the airport operator and FAA ATO. Reimbursable agreements should be coordinated a minimum of 12 months prior to the start of construction. (See paragraph 2.13.5.3.2 for required FAA notification regarding FAA-owned NAVAIDs.)

2.6 Phasing.

Once it has been determined what types and levels of airport operations will be maintained, the most efficient sequence of construction may not be feasible. In this case, the sequence of construction may be phased to gain maximum efficiency while allowing for the required operations. The development of the resulting construction phases should be coordinated with local Air Traffic personnel and airport users. The sequenced construction phases established in the CSPP must be incorporated into the project design and must be reflected in the contract drawings and specifications.

2.6.1 Phase Elements.

For each phase the CSPP should detail:

- Areas closed to aircraft operations.
- Duration of closures.
- Taxi routes and/or areas of reduced TSA and TOFA to reflect reduced ADG use.
- ARFF access routes.
- Construction staging, disposal, and cleanout areas.
- Construction access and haul routes.
- Impacts to NAVAIDs.
- Lighting, marking, and signing changes.
- Available runway length and/or reduced RSA and ROFA to reflect reduced ADG use.
- Declared distances (if applicable).
- Required hazard marking, lighting, and signing.
- Work zone lighting for nighttime construction (if applicable).
- Lead times for required notifications.

2.6.2 Construction Safety Drawings.

Drawings specifically indicating operational safety procedures and methods in affected areas (i.e., construction safety drawings) should be developed for each construction phase. Such drawings should be included in the CSPP as referenced attachments and should also be included in the contract drawing package.

2.7 Areas and Operations Affected by Construction Activity.

Runways and taxiways should remain in use by aircraft to the maximum extent possible without compromising safety. Pre-meetings with the FAA ATO will support operational simulations. See Appendix E for an example of a table showing temporary operations versus current operations. The tables in Appendix E can be useful for coordination among all interested parties, including FAA Lines of Business.

2.7.1 Identification of Affected Areas.

Identifying areas and operations affected by the construction helps to determine possible safety problems. The affected areas should be identified in the construction safety drawings for each construction phase. (See paragraph 2.6.2.) Of particular concern are:

2.7.1.1 **Closing, or Partial Closing, of Runways, Taxiways and Aprons, and Displaced Thresholds.**

When a runway is partially closed, a portion of the pavement is unavailable for any aircraft operation, meaning taxiing, landing, or takeoff in either direction on that pavement is prohibited. A displaced threshold, by contrast, is established to ensure obstacle clearance and adequate safety area for landing aircraft. The pavement prior to the displaced threshold is normally available for take-off in the direction of the displacement and for landing and takeoff in the opposite direction. Misunderstanding this difference, may result in issuance of an inaccurate NOTAM, and can lead to a hazardous condition.

2.7.1.1.1 Partially Closed Runways.

The temporarily closed portion of a partially closed runway will generally extend from the threshold to a taxiway that may be used for entering and exiting the runway. If the closed portion extends to a point between taxiways, pilots will have to back-taxi on the runway, which is an undesirable operation. See Figure 2-1 for a desirable configuration.

2.7.1.1.2 Displaced Thresholds.

Since the portion of the runway pavement between the permanent threshold and a standard displaced threshold is available for takeoff and for landing in the opposite direction, the temporary displaced threshold need not be located at an entrance/exit taxiway. See Figure 2-2.

2.7.1.2 Closing of aircraft rescue and fire fighting access routes.

2.7.1.3 Closing of access routes used by airport and airline support vehicles.

2.7.1.4 Interruption of utilities, including water supplies for fire fighting.

2.7.1.5 Approach/departure surfaces affected by heights of objects.

2.7.1.6 Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads.

Figure 2-1. Temporary Partially Closed Runway

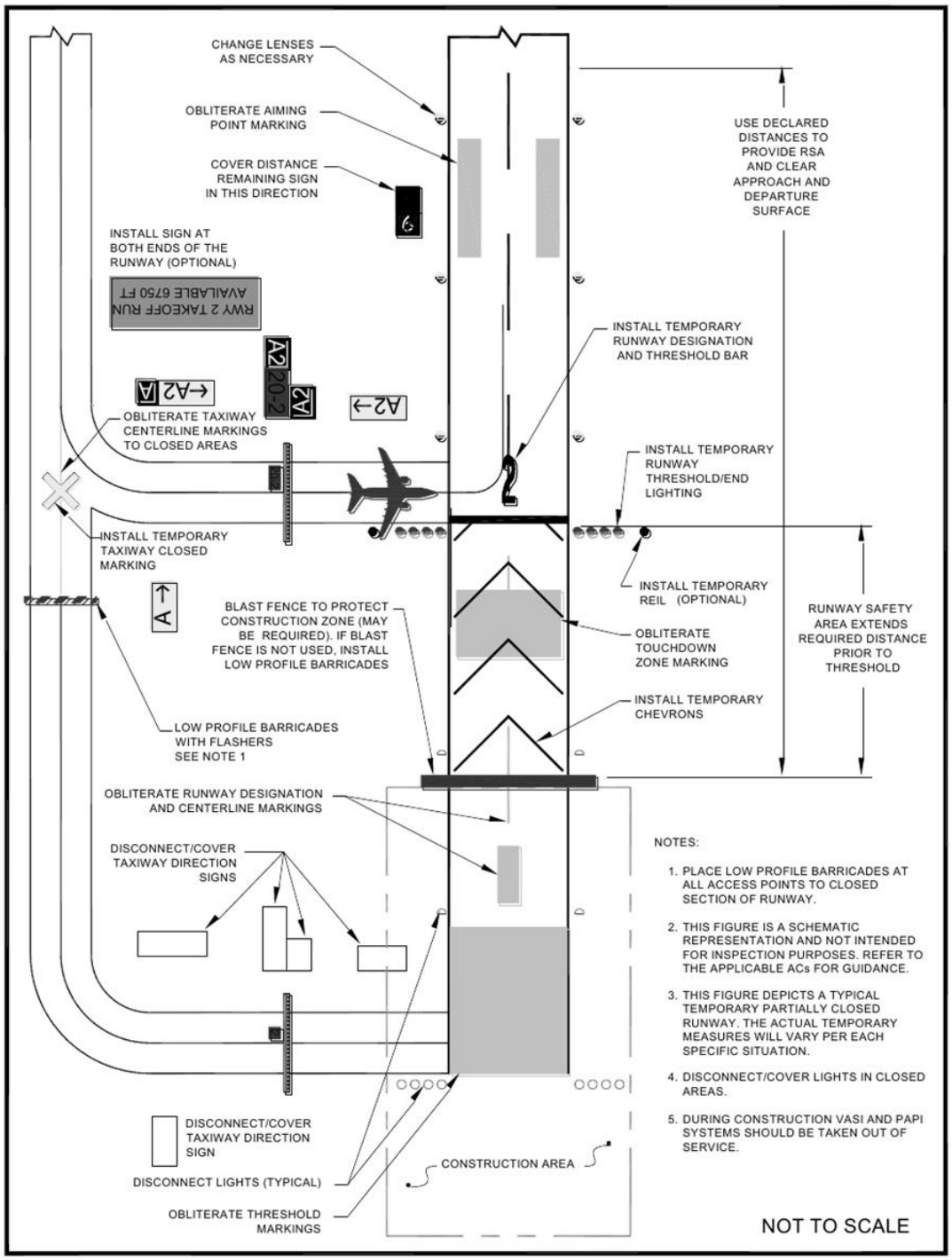
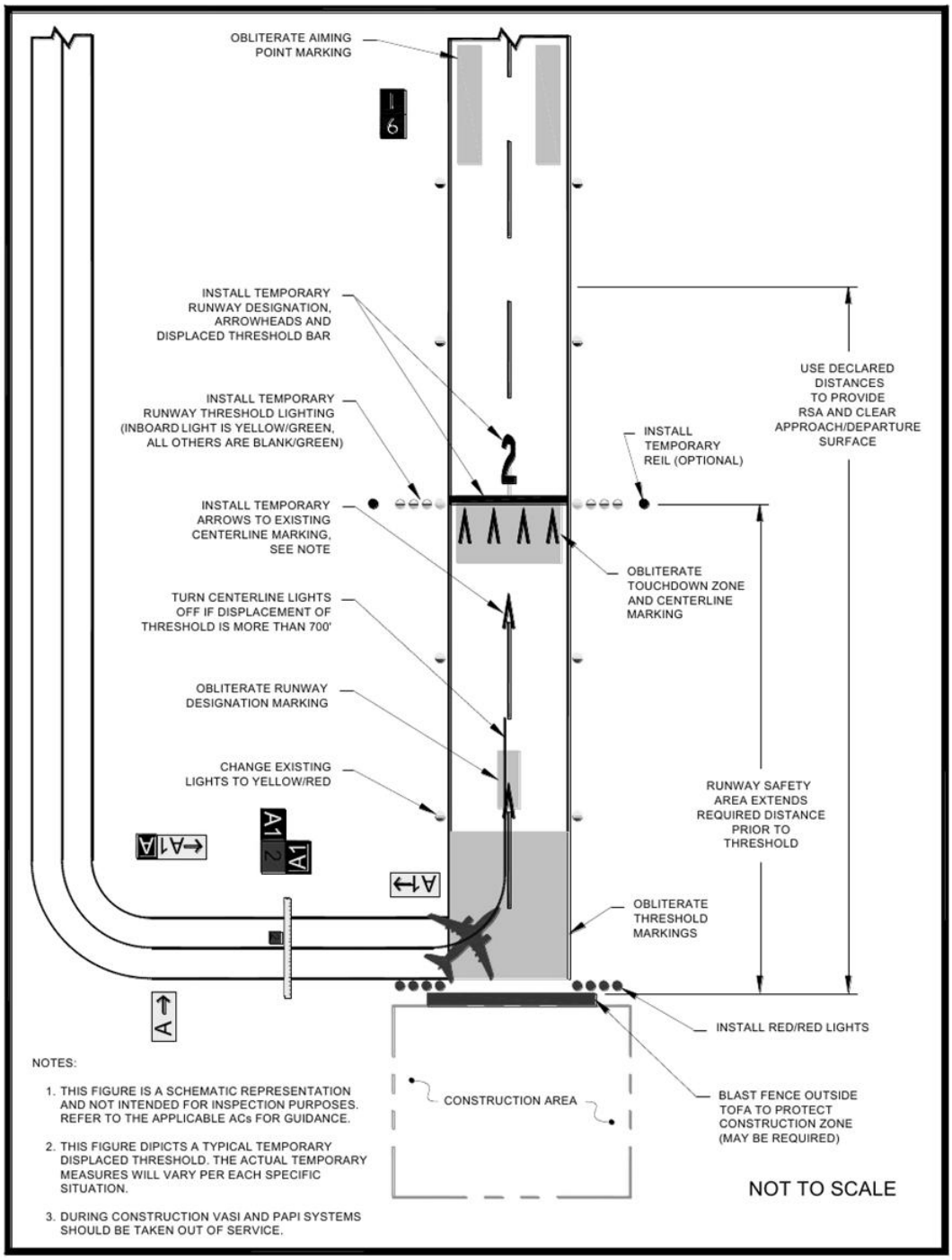


Figure 2-2. Temporary Displaced Threshold



Note: See paragraph 2.18.2.5.

2.7.2 Mitigation of Effects.

Establishment of specific procedures is necessary to maintain the safety and efficiency of airport operations. The CSPP must address:

2.7.2.1 Temporary changes to runway and/or taxi operations.

2.7.2.2 Detours for ARFF and other airport vehicles.

2.7.2.3 Maintenance of essential utilities.

2.7.2.4 Temporary changes to air traffic control procedures. Such changes must be coordinated with the ATO.

2.8 Navigation Aid (NAVAID) Protection.

Before commencing construction activity, parking vehicles, or storing construction equipment and materials near a NAVAID, coordinate with the appropriate FAA ATO/Technical Operations office to evaluate the effect of construction activity and the required distance and direction from the NAVAID. (See paragraph 2.13.5.3.) Construction activities, materials/equipment storage, and vehicle parking near electronic NAVAIDs require special consideration since they may interfere with signals essential to air navigation. If any NAVAID may be affected, the CSPP and SPCD must show an understanding of the "critical area" associated with each NAVAID and describe how it will be protected. Where applicable, the operational critical areas of NAVAIDs should be graphically delineated on the project drawings. Pay particular attention to stockpiling material, as well as to movement and parking of equipment that may interfere with line of sight from the ATCT or with electronic emissions. Interference from construction equipment and activities may require NAVAID shutdown or adjustment of instrument approach minimums for low visibility operations. This condition requires that a NOTAM be filed (see paragraph 2.13.2). Construction activities and materials/equipment storage near a NAVAID must not obstruct access to the equipment and instruments for maintenance. Submittal of a 7460-1 form is required for construction vehicles operating near FAA NAVAIDs. (See paragraph 2.13.5.3.)

2.9 Contractor Access.

The CSPP must detail the areas to which the contractor must have access, and explain how contractor personnel will access those areas. Specifically address:

2.9.1 Location of Stockpiled Construction Materials.

Stockpiled materials and equipment storage are not permitted within the RSA and OFZ, and if possible should not be permitted within the Object Free Area (OFA) of an operational runway. Stockpiling material in the OFA requires submittal of a 7460-1 form and justification provided to the appropriate FAA Airports Regional or District Office for approval. The airport operator must ensure that stockpiled materials and equipment adjacent to these areas are prominently marked and lighted during hours of restricted visibility or darkness. (See paragraph 2.18.2.) This includes determining and

verifying that materials are stabilized and stored at an approved location so as not to be a hazard to aircraft operations and to prevent attraction of wildlife and foreign object damage from blowing or tracked material. See paragraphs 2.10 and 2.11.

2.9.2 Vehicle and Pedestrian Operations.

The CSPP should include specific vehicle and pedestrian requirements. Vehicle and pedestrian access routes for airport construction projects must be controlled to prevent inadvertent or unauthorized entry of persons, vehicles, or animals onto the AOA. The airport operator should coordinate requirements for vehicle operations with airport tenants, contractors, and the FAA air traffic manager. In regard to vehicle and pedestrian operations, the CSPP should include the following, with associated training requirements:

2.9.2.1 **Construction Site Parking.**

Designate in advance vehicle parking areas for contractor employees to prevent any unauthorized entry of persons or vehicles onto the AOA. These areas should provide reasonable contractor employee access to the job site.

2.9.2.2 **Construction Equipment Parking.**

Contractor employees must park and service all construction vehicles in an area designated by the airport operator outside the OFZ and never in the safety area of an active runway or taxiway. Unless a complex setup procedure makes movement of specialized equipment infeasible, inactive equipment must not be parked on a closed taxiway or runway. If it is necessary to leave specialized equipment on a closed taxiway or runway at night, the equipment must be well lighted. Employees should also park construction vehicles outside the OFA when not in use by construction personnel (for example, overnight, on weekends, or during other periods when construction is not active). Parking areas must not obstruct the clear line of sight by the ATCT to any taxiways or runways under air traffic control nor obstruct any runway visual aids, signs, or navigation aids. The FAA must also study those areas to determine effects on airport design criteria, surfaces established by 14 CFR Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace (Part 77), and on NAVAIDs and Instrument Approach Procedures (IAP). See paragraph 2.13.1 for further information.

2.9.2.3 **Access and Haul Roads.**

Determine the construction contractor's access to the construction sites and haul roads. Do not permit the construction contractor to use any access or haul roads other than those approved. Access routes used by contractor vehicles must be clearly marked to prevent inadvertent entry to areas open to airport operations. Pay special attention to ensure that if construction traffic is to share or cross any ARFF routes that ARFF right of way is not impeded at any time, and that construction traffic on haul

roads does not interfere with NAVAIDs or approach surfaces of operational runways. Address whether access gates will be blocked or inoperative or if a rally point will be blocked or inaccessible.

2.9.2.4 Marking and lighting of vehicles in accordance with AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport.*

2.9.2.5 Description of proper vehicle operations on various areas under normal, lost communications, and emergency conditions.

2.9.2.6 Required escorts.

2.9.2.7 **Training Requirements for Vehicle Drivers to Ensure Compliance with the Airport Operator's Vehicle Rules and Regulations.**

Specific training should be provided to vehicle operators, including those providing escorts. See AC 150/5210-20, *Ground Vehicle Operations on Airports*, for information on training and records maintenance requirements.

2.9.2.8 **Situational Awareness.**

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 airport operations. In addition, it is the responsibility of the escort vehicle driver to verify the movement/position of all escorted vehicles at any given time. At non-towered airports, all aircraft movements and flight operations rely on aircraft operators to self-report their positions and intentions. However, there is no requirement for an aircraft to have radio communications. Because aircraft do not always broadcast their positions or intentions, visual checking, radio monitoring, and situational awareness of the surroundings is critical to safety.

2.9.2.9 **Two-Way Radio Communication Procedures.**

2.9.2.9.1 General.

The airport operator must ensure that tenant and construction contractor personnel engaged in activities involving unescorted operation on aircraft movement areas observe the proper procedures for communications, including using appropriate radio frequencies at airports with and without ATCT. When operating vehicles on or near open runways or taxiways, construction personnel must understand the critical importance of maintaining radio contact, as directed by the airport operator, with:

1. Airport operations
2. ATCT

3. Common Traffic Advisory Frequency (CTAF), which may include UNICOM, MULTICOM.
4. Automatic Terminal Information Service (ATIS). This frequency is useful for monitoring conditions on the airport. Local air traffic will broadcast information regarding construction related runway closures and "shortened" runways on the ATIS frequency.

2.9.2.9.2 Areas Requiring Two-Way Radio Communication with the ATCT.

Vehicular traffic crossing active movement areas must be controlled either by two-way radio with the ATCT, escort, flagman, signal light, or other means appropriate for the particular airport.

2.9.2.9.3 Frequencies to be Used.

The airport operator will specify the frequencies to be used by the contractor, which may include the CTAF for monitoring of aircraft operations. Frequencies may also be assigned by the airport operator for other communications, including any radio frequency in compliance with Federal Communications Commission requirements. At airports with an ATCT, the airport operator will specify the frequency assigned by the ATCT to be used between contractor vehicles and the ATCT.

2.9.2.9.4 Proper radio usage, including read back requirements.

2.9.2.9.5 Proper phraseology, including the International Phonetic Alphabet.

2.9.2.9.6 Light Gun Signals.

Even though radio communication is maintained, escort vehicle drivers must also familiarize themselves with ATCT light gun signals in the event of radio failure. See the FAA safety placard "Ground Vehicle Guide to Airport Signs and Markings." This safety placard may be downloaded through the Runway Safety Program Web site at http://www.faa.gov/airports/runway_safety/publications/ (see "Signs & Markings Vehicle Dashboard Sticker") or obtained from the FAA Airports Regional Office.

2.9.2.10 **Maintenance of the secured area of the airport, including:**

2.9.2.10.1 Fencing and Gates.

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. Temporary gates should be equipped so they can be securely closed and locked to prevent access by animals and unauthorized people. Procedures should be in place to ensure that only authorized persons and vehicles have access to the AOA and to prohibit "piggybacking" behind another person or vehicle. The Department of Transportation (DOT) document DOT/FAA/AR-

00/52, *Recommended Security Guidelines for Airport Planning and Construction*, provides more specific information on fencing. A copy of this document can be obtained from the Airport Consultants Council, Airports Council International, or American Association of Airport Executives.

2.9.2.10.2 Badging Requirements.

Airports subject to 49 CFR Part 1542, *Airport Security*, must meet standards for access control, movement of ground vehicles, and identification of construction contractor and tenant personnel.

2.10 Wildlife Management.

The CSPP and SPCD must be in accordance with the airport operator's wildlife hazard management plan, if applicable. See AC 150/5200-33, *Hazardous Wildlife Attractants On or Near Airports,* and CertAlert 98-05, *Grasses Attractive to Hazardous Wildlife.* Construction contractors must carefully control and continuously remove waste or loose materials that might attract wildlife. Contractor personnel must be aware of and avoid construction activities that can create wildlife hazards on airports, such as:

2.10.1 Trash.

Food scraps must be collected from construction personnel activity.

2.10.2 Standing Water.

2.10.3 Tall Grass and Seeds.

Requirements for turf establishment can be at odds with requirements for wildlife control. Grass seed is attractive to birds. Lower quality seed mixtures can contain seeds of plants (such as clover) that attract larger wildlife. Seeding should comply with the guidance in AC 150/5370-10, *Standards for Specifying Construction of Airports,* Item T-901, Seeding. Contact the local office of the United Sates Department of Agriculture Soil Conservation Service or the State University Agricultural Extension Service (County Agent or equivalent) for assistance and recommendations. These agencies can also provide liming and fertilizer recommendations.

2.10.4 Poorly Maintained Fencing and Gates.

See paragraph 2.9.2.10.1.

2.10.5 Disruption of Existing Wildlife Habitat.

While this will frequently be unavoidable due to the nature of the project, the CSPP should specify under what circumstances (location, wildlife type) contractor personnel should immediately notify the airport operator of wildlife sightings.

2.11 **Foreign Object Debris (FOD) Management.**

Waste and loose materials, commonly referred to as FOD, are capable of causing damage to aircraft landing gears, propellers, and jet engines. Construction contractors must not leave or place FOD on or near active aircraft movement areas. Materials capable of creating FOD must be continuously removed during the construction project. Fencing (other than security fencing) or covers may be necessary to contain material that can be carried by wind into areas where aircraft operate. See AC 150/5210-24, *Foreign Object Debris (FOD) Management.*

2.12 **Hazardous Materials (HAZMAT) Management.**

Contractors operating construction vehicles and equipment on the airport must be prepared to expeditiously contain and clean-up spills resulting from fuel or hydraulic fluid leaks. Transport and handling of other hazardous materials on an airport also requires special procedures. See AC 150/5320-15, *Management of Airport Industrial Waste.*

2.13 **Notification of Construction Activities.**

The CSPP and SPCD must detail procedures for the immediate notification of airport users and the FAA of any conditions adversely affecting the operational safety of the airport. It must address the notification actions described below, as applicable.

2.13.1 List of Responsible Representatives/points of contact for all involved parties, and procedures for contacting each of them, including after hours.

2.13.2 NOTAMs.

Only the airport operator may initiate or cancel NOTAMs on airport conditions, and is the only entity that can close or open a runway. The airport operator must coordinate the issuance, maintenance, and cancellation of NOTAMs about airport conditions resulting from construction activities with tenants and the local air traffic facility (control tower, approach control, or air traffic control center), and must either enter the NOTAM into NOTAM Manager, or 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 airport operator must file and maintain a list of authorized representatives with the FSS. Refer to AC 150/5200-28, *Notices to Airmen (NOTAMs) for Airport Operators,* for a sample NOTAM form. Only the FAA may issue or cancel NOTAMs on shutdown or irregular operation of FAA owned facilities. Any person having reason to believe that a NOTAM is missing, incomplete, or inaccurate must notify the airport operator. See paragraph 2.7.1.1 about issuing NOTAMs for partially closed runways versus runways with displaced thresholds.

2.13.3 Emergency notification procedures for medical, fire fighting, and police response.

2.13.4 Coordination with ARFF.

The CSPP must detail procedures for coordinating through the airport sponsor with ARFF personnel, mutual aid providers, and other emergency services if construction requires:

1. The deactivation and subsequent reactivation of water lines or fire hydrants, or
2. The rerouting, blocking and restoration of emergency access routes, or
3. The use of hazardous materials on the airfield.

2.13.5 Notification to the FAA.

2.13.5.1 **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 and proposed parking areas for this equipment (i.e., cranes, graders, other equipment) on airports. FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, can be used for this purpose and submitted to the appropriate FAA Airports Regional or District Office. See Appendix A to download the form. Further guidance is available on the FAA web site at oeaaa.faa.gov.

2.13.5.2 **Part 157.**

With some exceptions, Title 14 CFR Part 157, *Notice of Construction, Alteration, Activation, and Deactivation of Airports*, requires that the airport operator notify the FAA in writing whenever a non-Federally funded project involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport. Notification involves submitting FAA Form 7480-1, *Notice of Landing Area Proposal*, to the nearest FAA Airports Regional or District Office. See Appendix A to download the form.

2.13.5.3 **NAVAIDs.**

For emergency (short-notice) notification about impacts to both airport owned and FAA owned NAVAIDs, contact: 866-432-2622.

2.13.5.3.1 Airport Owned/FAA Maintained.

If construction operations require a shutdown of 24 hours or greater in duration, or more than 4 hours daily on consecutive days, of a NAVAID owned by the airport but maintained by the FAA, provide a 45-day minimum notice to FAA ATO/Technical Operations prior to facility shutdown, using Strategic Event Coordination (SEC) Form 6000.26 contained within FAA Order 6000.15, *General Maintenance Handbook for National Airspace System (NAS) Facilities*.

2.13.5.3.2 FAA Owned.

1. The airport operator must notify the appropriate FAA ATO Service Area Planning and Requirements (P&R) Group a minimum of 45 days prior to implementing an event that causes impacts to NAVAIDs, using SEC Form 6000.26.
2. Coordinate work for an FAA owned NAVAID shutdown with the local FAA ATO/Technical Operations office, including any necessary reimbursable agreements and flight checks. Detail procedures that address unanticipated utility outages and cable cuts that could impact FAA NAVAIDs. Refer to active Service Level Agreement with ATO for specifics.

2.14 Inspection Requirements.

2.14.1 Daily Inspections.

Inspections should be conducted at least daily, but more frequently if necessary to ensure conformance with the CSPP. A sample checklist is provided in Appendix D, Construction Project Daily Safety Inspection Checklist. See also AC 150/5200-18, *Airport Safety Self-Inspection.* Airport operators holding a Part 139 certificate are required to conduct self-inspections during unusual conditions, such as construction activities, that may affect safe air carrier operations.

2.14.2 Interim Inspections.

Inspections should 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 contractor should conduct an inspection of the work area with airport operations personnel. The contractor should 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. Only if all items on the list meet with the airport operator's approval should the air traffic control tower be notified to open the area to aircraft operations. The contractor should be required to retain a suitable workforce and the necessary equipment at the work area for any last minute cleanup that may be requested by the airport operator prior to opening the area.

2.14.3 Final Inspections.

New runways and extended runway closures may require safety inspections at certificated airports prior to allowing air carrier service. Coordinate with the FAA Airport Certification Safety Inspector (ACSI) to determine if a final inspection will be necessary.

2.15 **Underground Utilities.**

The CSPP and/or SPCD must include procedures for locating and protecting existing underground utilities, cables, wires, pipelines, and other underground facilities in excavation areas. This may involve coordinating with public utilities and FAA ATO/Technical Operations. Note that "One Call" or "Miss Utility" services do not include FAA ATO/Technical Operations.

2.16 **Penalties.**

The CSPP should detail penalty provisions for noncompliance with airport rules and regulations and the safety plans (for example, if a vehicle is involved in a runway incursion). Such penalties typically include rescission of driving privileges or access to the AOA.

2.17 **Special Conditions.**

The CSPP must detail any special conditions that affect the operation of the airport and will require the activation of any special procedures (for example, low-visibility operations, snow removal, aircraft in distress, aircraft accident, security breach, Vehicle / Pedestrian Deviation (VPD) and other activities requiring construction suspension/resumption).

2.18 **Runway and Taxiway Visual Aids.**

This includes marking, lighting, signs, and visual NAVAIDs. The CSPP must ensure that areas where aircraft will be operating are clearly and visibly separated from construction areas, including closed runways. Throughout the duration of the construction project, verify that these areas remain clearly marked and visible at all times and that marking, lighting, signs, and visual NAVAIDs that are to continue to perform their functions during construction remain in place and operational. Visual NAVAIDs that are not serving their intended function during construction must be temporarily disabled, covered, or modified as necessary. The CSPP must address the following, as appropriate:

2.18.1 General.

Airport markings, lighting, signs, and visual NAVAIDs must be clearly visible to pilots, not misleading, confusing, or deceptive. All must be secured in place to prevent movement by prop wash, jet blast, wing vortices, and other wind currents and constructed of materials that will minimize damage to an aircraft in the event of inadvertent contact. Items used to secure such markings must be of a color similar to the marking.

2.18.2 Markings.

During the course of construction projects, temporary pavement markings are often required to allow for aircraft operations during or between work periods. During the design phase of the project, the designer should coordinate with the project manager,

airport operations, airport users, the FAA Airports project manager, and Airport Certification Safety Inspector for Part 139 airports to determine minimum temporary markings. The FAA Airports project manager will, wherever a runway is closed, coordinate with the appropriate FAA Flight Standards Office and disseminate findings to all parties. Where possible, the temporary markings on finish grade pavements should be placed to mirror the dimensions of the final markings. Markings must be in compliance with the standards of AC 150/5340-1, *Standards for Airport Markings,* except as noted herein. Runways and runway exit taxiways closed to aircraft operations are marked with a yellow X. The preferred visual aid to depict temporary runway closure is the lighted X signal placed on or near the runway designation numbers. (See paragraph 2.18.2.1.2.)

2.18.2.1 **Closed Runways and Taxiways.**

2.18.2.1.1 Permanently Closed Runways.

For runways, obliterate the threshold marking, runway designation marking, and touchdown zone markings, and place an X at each end and at 1,000-foot (300 m) intervals. For a multiple runway environment, if the lighted X on a designated number will be located in the RSA of an adjacent active runway, locate the lighted X farther down the closed runway to clear the RSA of the active runway. In addition, the closed runway numbers located in the RSA of an active runway must be marked with a flat yellow X.

2.18.2.1.2 Temporarily Closed Runways.

For runways that have been temporarily closed, place an X at each end of the runway directly on or as near as practicable to the runway designation numbers. For a multiple runway environment, if the lighted X on a designated number will be located in the RSA of an adjacent active runway, locate the lighted X farther down the closed runway to clear the RSA of the active runway. In addition, the closed runway numbers located in the RSA of an active runway must be marked with a flat yellow X. See Figure 2-3. See also paragraph 2.18.3.3.

2.18.2.1.3 Partially Closed Runways and Displaced Thresholds.

When threshold markings are needed to identify the temporary beginning of the runway that is available for landing, the markings must comply with AC 150/5340-1. An X is not used on a partially closed runway or a runway with a displaced threshold. See paragraph 2.7.1.1 for the difference between partially closed runways and runways with displaced thresholds. Because of the temporary nature of threshold displacement due to construction, it is not necessary to re-adjust the existing runway centerline markings to meet standard spacing for a runway with a visual approach. Some of the requirements below may be waived in the cases of low-activity airports and/or short duration changes that are measured in days rather than weeks. Consider whether the presence of an airport traffic

control tower allows for the development of special procedures. Contact the appropriate FAA Airports Regional or District Office for assistance.

Figure 2-3. Markings for a Temporarily Closed Runway

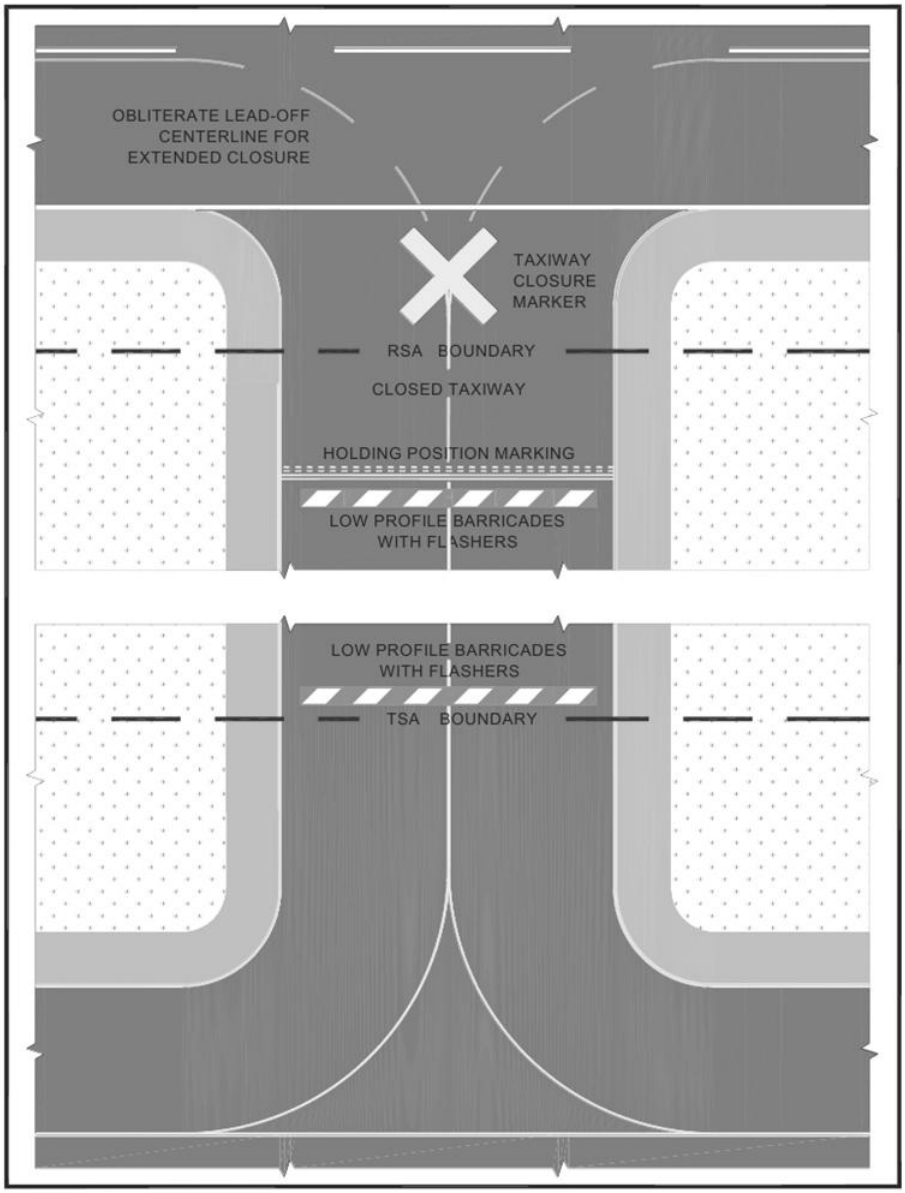
1. **Partially Closed Runways.** Pavement markings for temporary closed portions of the runway consist of a runway threshold bar, runway designation, and yellow chevrons to identify pavement areas that are unsuitable for takeoff or landing (see AC 150/5340-1). Obliterate or cover markings prior to the moved threshold. Existing touchdown zone markings beyond the moved threshold may remain in place. Obliterate aiming point markings. Issue appropriate NOTAMs regarding any nonstandard markings. See Figure 2-4.

2. **Displaced Thresholds.** Pavement markings for a displaced threshold consist of a runway threshold bar, runway designation, and white arrowheads with and without arrow shafts. These markings are required to identify the portion of the runway before the displaced threshold to provide centerline guidance for pilots during approaches, takeoffs, and landing rollouts from the opposite direction. See AC 150/5340-1. Obliterate markings prior to the displaced threshold. Existing touchdown zone markings beyond the displaced threshold may remain in place. Obliterate aiming point markings. Issue appropriate NOTAMs regarding any nonstandard markings. See Figure 2-2.

2.18.2.1.4 Taxiways.

1. **Permanently Closed Taxiways.** AC 150/5300-13 *Airport Design,* notes that it is preferable to remove the pavement, but for pavement that is to remain, place an X at the entrance to both ends of the closed section. Obliterate taxiway centerline markings, including runway leadoff lines, leading to the closed taxiway. See Figure 2-4.

Figure 2-4. Temporary Taxiway Closure



2. **Temporarily Closed Taxiways.** Place barricades outside the safety area of intersecting taxiways. For runway/taxiway intersections, place an X at the entrance to the closed taxiway from the runway. If the taxiway will be closed for an extended period, obliterate taxiway centerline markings, including runway leadoff lines and taxiway to taxiway turns, leading to the closed section. Always obliterate runway lead-off lines for high speed exits, regardless of the duration of the closure. If the centerline markings will be reused upon reopening the taxiway, it is preferable to paint over the marking. This will result in less damage to the pavement when the upper layer of paint is ultimately removed. See Figure 2-4.

2.18.2.1.5 Temporarily Closed Airport.

When the airport is closed temporarily, mark all the runways as closed.

2.18.2.2 If unable to paint temporary markings on the pavement, construct them from any of the following materials: fabric, colored plastic, painted sheets of plywood, or similar materials. They must be properly configured and appropriately secured to prevent movement by prop wash, jet blast, or other wind currents. Items used to secure such markings must be of a color similar to the marking.

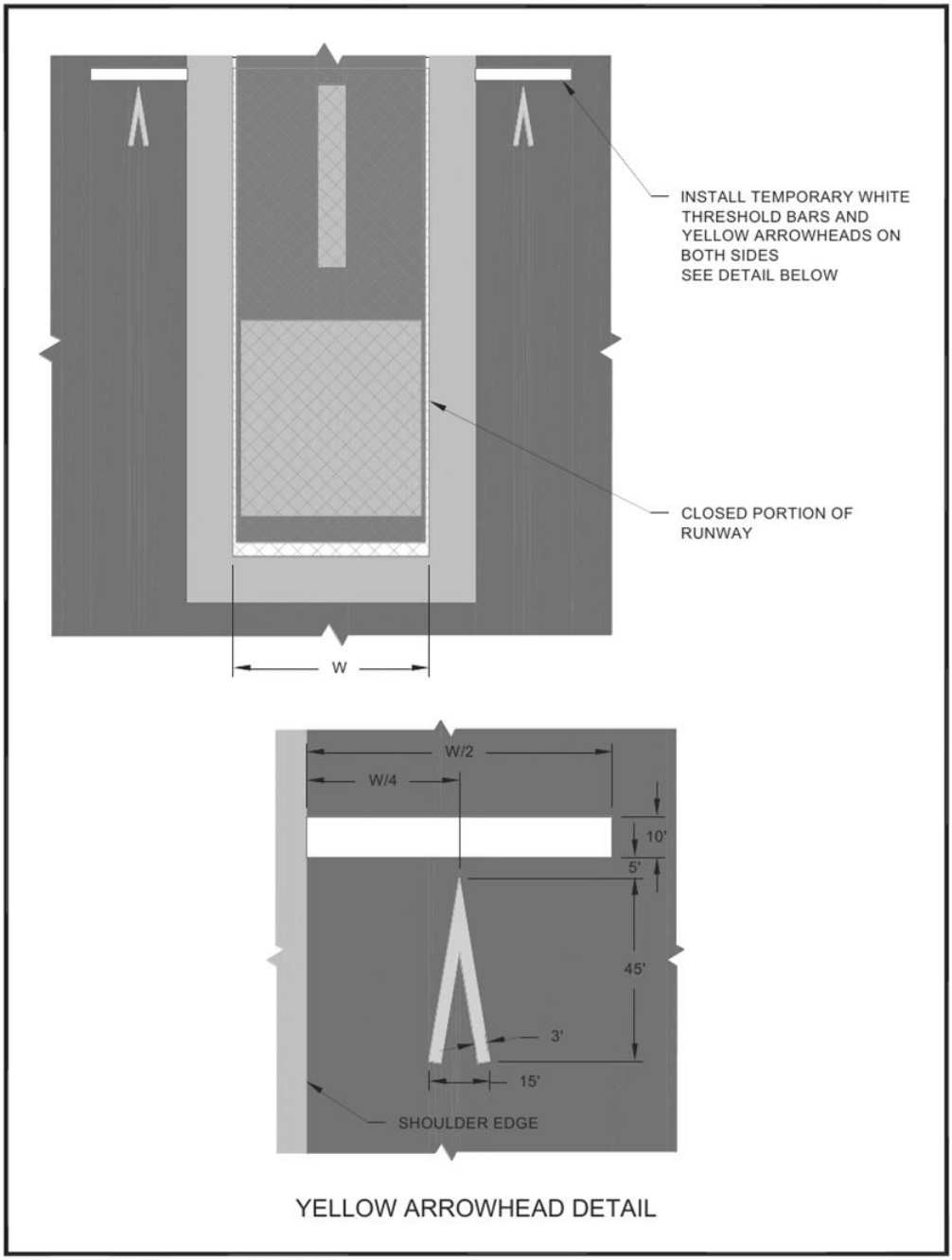
2.18.2.3 It may be necessary to remove or cover runway markings, including but not limited to, runway designation markings, threshold markings, centerline markings, edge stripes, touchdown zone markings and aiming point markings, depending on the length of construction and type of activity at the airport. When removing runway markings, apply the same treatment to areas between stripes or numbers, as the cleaned area will appear to pilots as a marking in the shape of the treated area.

2.18.2.4 If it is not possible to install threshold bars, chevrons, and arrows on the pavement, "temporary outboard white threshold bars and yellow arrowheads", see Figure 2-5, may be used. Locate them outside of the runway pavement surface on both sides of the runway. The dimensions must be as shown in Figure 2-5. If the markings are not discernible on grass or snow, apply a black background with appropriate material over the ground to ensure they are clearly visible.

2.18.2.5 The application rate of paint to mark a short-term temporary runway and taxiway markings may deviate from the standard (see Item P-620, "Runway and Taxiway Painting," in AC 150/5370-10), but the dimensions must meet the existing standards. When applying temporary markings at night, it is recommended that the fast curing, Type II paint be used to help offset the higher humidity and cooler temperatures often experienced at night. Diluting the paint will substantially increase cure time and is not recommended. Glass beads are not recommended for temporary markings. Striated markings may also be used for certain temporary markings. AC

150/5340-1, *Standards for Airport Markings,* has additional guidance on temporary markings.

Figure 2-5. Temporary Outboard White Threshold Bars and Yellow Arrowheads



2.18.3 Lighting and Visual NAVAIDs.

This paragraph refers to standard runway and taxiway lighting systems. See below for hazard lighting. Lighting installation must be in conformance with AC 150/5340-30, *Design and Installation Details for Airport Visual Aids,* and fixture design in conformance with AC 150/5345-50, *Specification for Portable Runway and Taxiway Lights.* When disconnecting runway and taxiway lighting fixtures, disconnect the associated isolation transformers. See AC 150/5340-26, *Maintenance of Airport Visual Aid Facilities*, for disconnect procedures and safety precautions. Alternately, cover the light fixture in such a way as to prevent light leakage. Avoid removing the lamp from energized fixtures because an excessive number of isolation transformers with open secondaries may damage the regulators and/or increase the current above its normal value. Secure, identify, and place any above ground temporary wiring in conduit to prevent electrocution and fire ignition sources. Maintain mandatory hold signs to operate normally in any situation where pilots or vehicle drivers could mistakenly be in that location. At towered airports certificated under Part 139, holding position signs are required to be illuminated on open taxiways crossing to closed or inactive runways. If the holding position sign is installed on the runway circuit for the closed runway, install a jumper to the taxiway circuit to provide power to the holding position sign for nighttime operations. Where it is not possible to maintain power to signs that would normally be operational, install barricades to exclude aircraft. Figure 2-1, Figure 2-2, Figure 2-3, and Figure 2-4 illustrate temporary changes to lighting and visual NAVAIDs.

2.18.3.1 **Permanently Closed Runways and Taxiways.**

For runways and taxiways that have been permanently closed, disconnect the lighting circuits.

2.18.3.2 **Temporarily Closed Runways and New Runways Not Yet Open to Air Traffic.**

If available, use a lighted X, both at night and during the day, placed at each end of the runway on or near the runway designation numbers facing the approach. (Note that the lighted X must be illuminated at all times that it is on a runway.) The use of a lighted X is required if night work requires runway lighting to be on. See AC 150/5345-55, *Specification for L-893, Lighted Visual Aid to Indicate Temporary Runway Closure.* For runways that have been temporarily closed, but for an extended period, and for those with pilot controlled lighting, disconnect the lighting circuits or secure switches to prevent inadvertent activation. For runways that will be opened periodically, coordinate procedures with the FAA air traffic manager or, at airports without an ATCT, the airport operator. Activate stop bars if available. Figure 2-6 shows a lighted X by day. Figure 2-7 shows a lighted X at night.

Figure 2-6. Lighted X in Daytime

Figure 2-7. Lighted X at Night

2.18.3.3 **Partially Closed Runways and Displaced Thresholds.**

When a runway is partially closed, a portion of the pavement is unavailable for any aircraft operation, meaning taxiing and landing or taking off in either direction. A displaced threshold, by contrast, is put in place to ensure obstacle clearance by landing aircraft. The pavement prior to the displaced threshold is available for takeoff in the direction of the displacement, and for landing and takeoff in the opposite direction. Misunderstanding this difference and issuance of a subsequently inaccurate NOTAM can result in a hazardous situation. For both partially

closed runways and displaced thresholds, approach lighting systems at the affected end must be placed out of service.

2.18.3.3.1 Partially Closed Runways.

Disconnect edge and threshold lights on that part of the runway at and behind the threshold (that is, the portion of the runway that is closed). Alternately, cover the light fixtures in such a way as to prevent light leakage. See Figure 2-1.

2.18.3.3.2 Temporary Displaced Thresholds.

Edge lighting in the area of the displacement emits red light in the direction of approach and yellow light (white for visual runways) in the opposite direction. If the displacement is 700 feet or less, blank out centerline lights in the direction of approach or place the centerline lights out of service. If the displacement is over 700 feet, place the centerline lights out of service. See AC 150/5340-30 for details on lighting displaced thresholds. See Figure 2-2.

2.18.3.3.3 Temporary runway thresholds and runway ends must be lighted if the runway is lighted and it is the intended threshold for night landings or instrument meteorological conditions.

2.18.3.3.4 A temporary threshold on an unlighted runway may be marked by retroreflective, elevated markers in addition to markings noted in paragraph 2.18.2.1.3. Markers seen by aircraft on approach are green. Markers at the rollout end of the runway are red. At certificated airports, temporary elevated threshold markers must be mounted with a frangible fitting (see 14 CFR Part 139.309). At non-certificated airports, the temporary elevated threshold markings may either be mounted with a frangible fitting or be flexible. See AC 150/5345-39, *Specification for L-853, Runway and Taxiway Retroreflective Markers.*

2.18.3.3.5 Temporary threshold lights and runway end lights and related visual NAVAIDs are installed outboard of the edges of the full-strength pavement only when they cannot be installed on the pavement. They are installed with bases at grade level or as low as possible, but not more than 3 inch (7.6 cm) above ground. (The standard above ground height for airport lighting fixtures is 14 inches (35 cm)). When any portion of a base is above grade, place properly compacted fill around the base to minimize the rate of gradient change so aircraft can, in an emergency, cross at normal landing or takeoff speeds without incurring significant damage. See AC 150/5370-10.

2.18.3.3.6 Maintain threshold and edge lighting color and spacing standards as described in AC 150/5340-30. Battery powered, solar, or portable lights that meet the criteria in AC 150/5345-50 may be used. These systems are intended primarily for visual flight rules (VFR) aircraft operations but may

be used for instrument flight rules (IFR) aircraft operations, upon individual approval from the Flight Standards Division of the applicable FAA Regional Office.

2.18.3.3.7 When runway thresholds are temporarily displaced, reconfigure yellow lenses (caution zone), as necessary, and place the centerline lights out of service.

2.18.3.3.8 Relocate the Visual Glide Slope Indicator (VGSI), such as Visual Approach Slope Indicator (VASI) and Precision Approach Path Indicator (PAPI); other airport lights, such as Runway End Identifier Lights (REIL); and approach lights to identify the temporary threshold. Another option is to disable the VGSI or any equipment that would give misleading indications to pilots as to the new threshold location. Installation of temporary visual aids may be necessary to provide adequate guidance to pilots on approach to the affected runway. If the FAA owns and operates the VGSI, coordinate its installation or disabling with the local ATO/Technical Operations Office. Relocation of such visual aids will depend on the duration of the project and the benefits gained from the relocation, as this can result in great expense. See FAA JO 6850.2, *Visual Guidance Lighting Systems*, for installation criteria for FAA owned and operated NAVAIDs.

2.18.3.3.9 Issue a NOTAM to inform pilots of temporary lighting conditions.

2.18.3.4 **Temporarily Closed Taxiways.**

If possible, deactivate the taxiway lighting circuits. When deactivation is not possible (for example other taxiways on the same circuit are to remain open), cover the light fixture in a way as to prevent light leakage.

2.18.4 Signs.

To the extent possible, signs must be in conformance with AC 150/5345-44, *Specification for Runway and Taxiway Signs,* and AC 150/5340-18, *Standard for Airport Sign Systems.*

2.18.4.1 **Existing Signs.**

Runway exit signs are to be covered for closed runway exits. Outbound destination signs are to be covered for closed runways. Any time a sign does not serve its normal function or would provide conflicting information, it must be covered or removed to prevent misdirecting pilots. Note that information signs identifying a crossing taxiway continue to perform their normal function even if the crossing taxiway is closed. For long term construction projects, consider relocating signs, especially runway distance remaining signs.

2.18.4.2 **Temporary Signs.**

Orange construction signs comprise a message in black on an orange background. Orange construction signs may help pilots be aware of changed conditions. The airport operator may choose to introduce these signs as part of a movement area construction project to increase situational awareness when needed. Locate signs outside the taxiway safety limits and ahead of construction areas so pilots can take timely action. Use temporary signs judiciously, striking a balance between the need for information and the increase in pilot workload. When there is a concern of pilot "information overload," the applicability of mandatory hold signs must take precedence over orange construction signs recommended during construction. Temporary signs must meet the standards for such signs in Engineering Brief 93, *Guidance for the Assembly and Installation of Temporary Orange Construction Signs.* Many criteria in AC 150/5345-44, *Specification for Runway and Taxiway Signs,* are referenced in the Engineering Brief. Permissible sign legends are:

1. CONSTRUCTION AHEAD,
2. CONSTRUCTION ON RAMP, and
3. RWY XX TAKEOFF RUN AVAILABLE XXX FT.

Phasing, supported by drawings and sign schedule, for the installation of orange construction signs must be included in the CSPP or SPCD.

2.18.4.2.1 Takeoff Run Available (TORA) signs.

Recommended: Where a runway has been shortened for takeoff, install orange TORA signs well before the hold lines, such as on a parallel taxiway prior to a turn to a runway hold position. See EB 93 for sign size and location.

2.18.4.2.2 Sign legends are shown in Figure F-1.

Note: See Figure E-1, Figure E-2, Figure E-3, Figure F-2, and Figure F-3 for examples of orange construction sign locations.

2.19 **Marking and Signs for Access Routes.**

The CSPP should indicate that pavement markings and signs for construction personnel will conform to AC 150/5340-18 and, to the extent practicable, with the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD) and/or State highway specifications. Signs adjacent to areas used by aircraft must comply with the frangibility requirements of AC 150/5220-23, *Frangible Connections,* which may require modification to size and height guidance in the MUTCD.

2.20 Hazard Marking, Lighting and Signing.

2.20.1 Hazard marking, lighting, and signing prevent pilots from entering areas closed to aircraft, and prevent construction personnel from entering areas open to aircraft. The CSPP must specify prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles. Hazard marking and lighting must also be specified to identify open manholes, small areas under repair, stockpiled material, waste areas, and areas subject to jet blast. Also consider less obvious construction-related hazards and include markings to identify FAA, airport, and National Weather Service facilities cables and power lines; instrument landing system (ILS) critical areas; airport surfaces, such as RSA, OFA, and OFZ; and other sensitive areas to make it easier for contractor personnel to avoid these areas.

2.20.2 Equipment.

2.20.2.1 **Barricades.**

Low profile barricades, including traffic cones, (weighted or sturdily attached to the surface) are acceptable methods used to identify and define the limits of construction and hazardous areas on airports. Careful consideration must be given to selecting equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash and jet blast. The spacing of barricades must be such that a breach is physically prevented barring a deliberate act. For example, if barricades are intended to exclude aircraft, gaps between barricades must be smaller than the wingspan of the smallest aircraft to be excluded; if barricades are intended to exclude vehicles, gaps between barricades must be smaller than the width of the excluded vehicles, generally 4 feet (1.2 meters). Provision must be made for ARFF access if necessary. If barricades are intended to exclude pedestrians, they must be continuously linked. Continuous linking may be accomplished through the use of ropes, securely attached to prevent FOD.

2.20.2.2 **Lights.**

Lights must be red, either steady burning or flashing, and must meet the luminance requirements of the State Highway Department. Batteries powering lights will last longer if lights flash. Lights must be mounted on barricades and spaced at no more than 10 feet (3 meters). 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 periods of low visibility during daytime hours.

2.20.2.3 **Supplement Barricades with Signs (for example) As Necessary.**

Examples are “No Entry” and “No Vehicles.” Be aware of the increased effects of wind and jet blast on barricades with attached signs.

2.20.2.4 **Air Operations Area – General.**

Barricades are not permitted in any active safety area or on the runway side of a runway hold line. Within a runway or taxiway object free area, and on aprons, use orange traffic cones, flashing or steady burning red lights as noted above, highly reflective collapsible barricades marked with diagonal, alternating orange and white stripes; and/or signs to separate all construction/maintenance areas from the movement area. Barricades may be supplemented with alternating orange and white flags at least 20 by 20 inch (50 by 50 cm) square and securely fastened to eliminate FOD. All barricades adjacent to any open runway or taxiway / taxilane safety area, or apron must be as low as possible to the ground, and no more than 18 inches high, exclusive of supplementary lights and flags. Barricades must be of low mass; easily collapsible upon contact with an aircraft or any of its components; and weighted or sturdily attached to the surface to prevent displacement from prop wash, jet blast, wing vortex, and other surface wind currents. If affixed to the surface, they must be frangible at grade level or as low as possible, but not to exceed 3 inch (7.6 cm) above the ground. Figure 2-8 and Figure 2-9 show sample barricades with proper coloring and flags.

Figure 2-8. Interlocking Barricades

Figure 2-9. Low Profile Barricades

2.20.2.5 **Air Operations Area – Runway/Taxiway Intersections.**

Use highly reflective barricades with lights to close taxiways leading to closed runways. Evaluate all operating factors when determining how to mark temporary closures that can last from 10 to 15 minutes to a much longer period of time. However, even for closures of relatively short duration, close all taxiway/runway intersections with barricades. The use of traffic cones is appropriate for short duration closures.

2.20.2.6 **Air Operations Area – Other.**

Beyond runway and taxiway object free areas and aprons, barricades intended for construction vehicles and personnel may be many different shapes and made from various materials, including railroad ties, sawhorses, jersey barriers, or barrels.

2.20.2.7 **Maintenance.**

The construction specifications must include a provision requiring the contractor to have a person on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades. The contractor must file the contact person's information with the airport operator. Lighting should be checked for proper operation at least once per day, preferably at dusk.

2.21 Work Zone Lighting for Nighttime Construction.

Lighting equipment must adequately illuminate the work area if the construction is to be performed during nighttime hours. Refer to AC 150/5370-10 for minimum illumination levels for nighttime paving projects. Additionally, it is recommended that all support equipment, except haul trucks, be equipped with artificial illumination to safely

illuminate the area immediately surrounding their work areas. The lights should be positioned to provide the most natural color illumination and contrast with a minimum of shadows. The spacing must be determined by trial. Light towers should be positioned and adjusted to aim away from ATCT cabs and active runways to prevent blinding effects. Shielding may be necessary. Light towers should be removed from the construction site when the area is reopened to aircraft operations. Construction lighting units should be identified and generally located on the construction phasing plans in relationship to the ATCT and active runways and taxiways.

2.22 **Protection of Runway and Taxiway Safety Areas.**

Runway and taxiway safety areas, OFZs, OFAs, and approach surfaces are described in AC 150/5300-13. Protection of these areas includes limitations on the location and height of equipment and stockpiled material. An FAA airspace study may be required. Coordinate with the appropriate FAA Airports Regional or District Office if there is any doubt as to requirements or dimensions (see paragraph 2.13.5) as soon as the location and height of materials or equipment are known. The CSPP should include drawings showing all safety areas, object free areas, obstacle free zones and approach departure surfaces affected by construction.

2.22.1 Runway Safety Area (RSA).

A runway safety area is the defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway (see AC 150/5300-13). Construction activities within the existing RSA are subject to the following conditions:

2.22.1.1 No construction may occur within the existing RSA while the runway is open for aircraft operations. The RSA dimensions may be temporarily adjusted if the runway is restricted to aircraft operations requiring an RSA that is equal to the RSA width and length beyond the runway ends available during construction. (See AC 150/5300-13). The temporary use of declared distances and/or partial runway closures may provide the necessary RSA under certain circumstances. Coordinate with the appropriate FAA Airports Regional or District Office to have declared distances information published, and appropriate NOTAMs issued. See AC 150/5300-13 for guidance on the use of declared distances.

2.22.1.2 The airport operator must coordinate the adjustment of RSA dimensions as permitted above with the appropriate FAA Airports Regional or District Office and the local FAA air traffic manager and issue a NOTAM.

2.22.1.3 The CSPP and SPCD must provide procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations.

2.22.1.4 **Excavations.**

2.22.1.4.1 Open trenches or excavations are not permitted within the RSA while the runway is open. Backfill trenches before the runway is opened. If backfilling excavations before the runway must be opened is impracticable, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the runway across the trench without damage to the aircraft.

2.22.1.4.2 Construction 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.

2.22.1.5 **Erosion Control.**

Soil erosion must be controlled to maintain RSA standards, that is, the RSA 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 fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

2.22.2 Runway Object Free Area (ROFA).

Construction, including excavations, may be permitted in the ROFA. However, equipment must be removed from the ROFA when not in use, and material should not be stockpiled in the ROFA if not necessary. Stockpiling material in the OFA requires submittal of a 7460-1 form and justification provided to the appropriate FAA Airports Regional or District Office for approval.

2.22.3 Taxiway Safety Area (TSA).

2.22.3.1 A taxiway safety area is a defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway. (See AC 150/5300-13.) Since the width of the TSA is equal to the wingspan of the design aircraft, no construction may occur within the TSA while the taxiway is open for aircraft operations. The TSA dimensions may be temporarily adjusted if the taxiway is restricted to aircraft operations requiring a TSA that is equal to the TSA width available during construction. Give special consideration to TSA dimensions at taxiway turns and intersections. (see AC 150/5300-13).

2.22.3.2 The airport operator must coordinate the adjustment of the TSA width as permitted above with the appropriate FAA Airports Regional or District Office and the FAA air traffic manager and issue a NOTAM.

2.22.3.3 The CSPP and SPCD must provide procedures for ensuring adequate distance for protection from blasting operations.

2.22.3.4 **Excavations.**

1. Curves. Open trenches or excavations are not permitted within the TSA while the taxiway is open. Trenches should be backfilled before the taxiway is opened. If backfilling excavations before the taxiway must be opened is impracticable, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the taxiway across the trench without damage to the aircraft.
2. Straight Sections. Open trenches or excavations are not permitted within the TSA while the taxiway is open for unrestricted aircraft operations. Trenches should be backfilled before the taxiway is opened. If backfilling excavations before the taxiway must be opened is impracticable, cover the excavations to allow the safe passage of ARFF equipment and of the heaviest aircraft operating on the taxiway across the trench without causing damage to the equipment or aircraft. In rare circumstances where the section of taxiway is indispensable for aircraft movement, open trenches or excavations may be permitted in the TSA while the taxiway is open to aircraft operations, subject to the following restrictions:
   a. Taxiing speed is limited to 10 mph.
   b. Appropriate NOTAMs are issued.
   c. Marking and lighting meeting the provisions of paragraphs 2.18 and 2.20 are implemented.
   d. Low mass, low-profile lighted barricades are installed.
   e. Appropriate temporary orange construction signs are installed.
3. Construction 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.

2.22.3.5 **Erosion control.**

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 aircraft.

2.22.4 Taxiway Object Free Area (TOFA).

Unlike the Runway Object Free Area, aircraft wings regularly penetrate the taxiway object free area during normal operations. Thus, the restrictions are more stringent. Except as provided below, no construction may occur within the taxiway object free area while the taxiway is open for aircraft operations.

2.22.4.1 The taxiway object free area dimensions may be temporarily adjusted if the taxiway is restricted to aircraft operations requiring a taxiway object free area that is equal to the taxiway object free area width available. Give special consideration to TOFA dimensions at taxiway turns and intersections.

2.22.4.2 Offset taxiway centerline and edge pavement markings (do not use glass beads) may be used as a temporary measure to provide the required taxiway object free area. Where offset taxiway pavement markings are provided, centerline lighting, centerline reflectors, or taxiway edge reflectors are required. Existing lighting that does not coincide with the temporary markings must be taken out of service.

2.22.4.3 Construction activity, including open excavations, may be accomplished without adjusting the width of the taxiway object free area, subject to the following restrictions:

2.22.4.3.1 Taxiing speed is limited to 10 mph.

2.22.4.3.2 NOTAMs issued advising taxiing pilots of hazard and recommending reduced taxiing speeds on the taxiway.

2.22.4.3.3 Marking and lighting meeting the provisions of paragraphs 2.18 and 2.20 are implemented.

2.22.4.3.4 If desired, appropriate orange construction signs are installed. See paragraph 2.18.4.2 and Appendix F.

2.22.4.3.5 Five-foot clearance is maintained between equipment and materials and any part of an aircraft (includes wingtip overhang). If such clearance can only be maintained if an aircraft does not have full use of the entire taxiway width (with its main landing gear at the edge of the usable pavement), then it will be necessary to move personnel and equipment for the passage of that aircraft.

2.22.4.3.6 Flaggers furnished by the contractor must be used to direct and control construction equipment and personnel to a pre-established setback distance for safe passage of aircraft, and airline and/or airport personnel. Flaggers must also be used to direct taxiing aircraft. Due to liability issues, the airport operator should require airlines to provide flaggers for directing taxiing aircraft.

2.22.5 Obstacle Free Zone (OFZ).

In general, personnel, material, and/or equipment may not penetrate the OFZ while the runway is open for aircraft operations. If a penetration to the OFZ is necessary, it may be possible to continue aircraft operations through operational restrictions. Coordinate with the FAA through the appropriate FAA Airports Regional or District Office.

2.22.6 Runway Approach/Departure Areas and Clearways.

All personnel, materials, and/or equipment must remain clear of the applicable threshold siting surfaces, as defined in AC 150/5300-13. Objects that do not penetrate these surfaces may still be obstructions to air navigation and may affect standard instrument approach procedures. Coordinate with the FAA through the appropriate FAA Airports Regional or District Office.

2.22.6.1 Construction activity in a runway approach/departure area may result in the need to partially close a runway or displace the existing runway threshold. Partial runway closure, displacement of the runway threshold, as well as closure of the complete runway and other portions of the movement area also require coordination through the airport operator with the appropriate FAA air traffic manager (FSS if non-towered) and ATO/Technical Operations (for affected NAVAIDS) and airport users.

2.22.6.2 **Caution About Partial Runway Closures.**

When filing a NOTAM for a partial runway closure, clearly state that the portion of pavement located prior to the threshold is not available for landing and departing traffic. In this case, the threshold has been moved for both landing and takeoff purposes (this is different than a displaced threshold). There may be situations where the portion of closed runway is available for taxiing only. If so, the NOTAM must reflect this condition).

2.22.6.3 **Caution About Displaced Thresholds.**

Implementation of a displaced threshold affects runway length available for aircraft landing over the displacement. Depending on the reason for the displacement (to provide obstruction clearance or RSA), such a displacement may also require an adjustment in the landing distance available and accelerate-stop distance available in the opposite direction. If project scope includes personnel, equipment, excavation, or other work within the existing RSA of any usable runway end, do not implement a displaced threshold unless arrivals and departures toward the construction activity are prohibited. Instead, implement a partial closure.

2.23 **Other Limitations on Construction.**

The CSPP must specify any other limitations on construction, including but not limited to:

2.23.1 Prohibitions.

2.23.1.1 No use of tall equipment (cranes, concrete pumps, and so on) unless a 7460-1 determination letter is issued for such equipment.

2.23.1.2 No use of open flame welding or torches unless fire safety precautions are provided and the airport operator has approved their use.

2.23.1.3 No use of electrical blasting caps on or within 1,000 feet (300 meters) of the airport property. See AC 150/5370-10.

2.23.2 Restrictions.

2.23.2.1 Construction suspension required during specific airport operations.

2.23.2.2 Areas that cannot be worked on simultaneously.

2.23.2.3 Day or night construction restrictions.

2.23.2.4 Seasonal construction restrictions.

2.23.2.5 Temporary signs not approved by the airport operator.

2.23.2.6 Grades changes that could result in unplanned effects on NAVAIDs.

CHAPTER 3. GUIDELINES FOR WRITING A CSPP

3.1 General Requirements.

The CSPP is a standalone document written to correspond with the subjects outlined in paragraph 2.4. The CSPP is organized by numbered sections corresponding to each subject listed in paragraph 2.4, and described in detail in paragraphs 2.5 - 2.23. Each section number and title in the CSPP matches the corresponding subject outlined in paragraph 2.4 (for example, 1. Coordination, 2. Phasing, 3. Areas and Operations Affected by the Construction Activity, and so on). With the exception of the project scope of work outlined in Section 2. Phasing, only subjects specific to operational safety during construction should be addressed.

3.2 Applicability of Subjects.

Each section should, to the extent practical, focus on the specific subject. Where an overlapping requirement spans several sections, the requirement should be explained in detail in the most applicable section. A reference to that section should be included in all other sections where the requirement may apply. For example, the requirement to protect existing underground FAA ILS cables during trenching operations could be considered FAA ATO coordination (Coordination, paragraph 2.5.3), an area and operation affected by the construction activity (Areas and Operations Affected by the Construction Activity, paragraph 2.7.1.4), a protection of a NAVAID (Protection of Navigational Aids (NAVAIDs), paragraph 2.8), or a notification to the FAA of construction activities (Notification of Construction Activities, paragraph 2.13.5.3.2). However, it is more specifically an underground utility requirement (Underground Utilities, paragraph 2.15). The procedure for protecting underground ILS cables during trenching operations should therefore be described in 2.4.2.11: "The contractor must coordinate with the local FAA System Support Center (SSC) to mark existing ILS cable routes along Runway 17-35. The ILS cables will be located by hand digging whenever the trenching operation moves within 10 feet of the cable markings." All other applicable sections should include a reference to 2.4.2.11: "ILS cables shall be identified and protected as described in 2.4.2.11" or "See 2.4.2.11 for ILS cable identification and protection requirements." Thus, the CSPP should be considered as a whole, with no need to duplicate responses to related issues.

3.3 Graphical Representations.

Construction safety drawings should be included in the CSPP as attachments. When other graphical representations will aid in supporting written statements, the drawings, diagrams, and/or photographs should also be attached to the CSPP. References should be made in the CSPP to each graphical attachment and may be made in multiple sections.

3.4 **Reference Documents.**

The CSPP must not incorporate a document by reference unless reproduction of the material in that document is prohibited. In that case, either copies of or a source for the referenced document must be provided to the contractor. Where this AC recommends references (e.g. as in paragraph 3.9) the intent is to include a reference to the corresponding section in the CSPP, not to this Advisory Circular.

3.5 **Restrictions.**

The CSPP should not be considered as a project design review document. The CSPP should also avoid mention of permanent ("as-built") features such as pavements, markings, signs, and lighting, except when such features are intended to aid in maintaining operational safety during the construction.

3.6 **Coordination.**

Include in this section a detailed description of conferences and meetings to be held both before and during the project. Include appropriate information from AC 150/5370-12. Discuss coordination procedures and schedules for each required FAA ATO Technical Operations shutdown and restart and all required flight inspections.

3.7 **Phasing.**

Include in this section a detailed scope of work description for the project as a whole and each phase of work covered by the CSPP. This includes all locations and durations of the work proposed. Attach drawings to graphically support the written scope of work. Detail in this section the sequenced phases of the proposed construction. Include a reference to paragraph 3.8, as appropriate.

3.8 **Areas and Operations Affected by Construction.**

Focus in this section on identifying the areas and operations affected by the construction. Describe corresponding mitigation that is not covered in detail elsewhere in the CSPP. Include references to paragraphs below as appropriate. Attach drawings as necessary to graphically describe affected areas and mechanisms proposed. See Appendix F for sample operational effects tables and figures.

3.9 **NAVAID Protection.**

List in this section all NAVAID facilities that will be affected by the construction. Identify NAVAID facilities that will be placed out of service at any time prior to or during construction activities. Identify individuals responsible for coordinating each shutdown and when each facility will be out of service. Include a reference to paragraph 3.6 for FAA ATO NAVAID shutdown, restart, and flight inspection coordination. Outline in detail procedures to protect each NAVAID facility remaining in service from interference by construction activities. Include a reference to paragraph 3.14 for the

issuance of NOTAMs as required. Include a reference to paragraph 3.16 for the protection of underground cables and piping serving NAVAIDs. If temporary visual aids are proposed to replace or supplement existing facilities, include a reference to paragraph 3.19. Attach drawings to graphically indicate the affected NAVAIDS and the corresponding critical areas.

3.10 **Contractor Access.**

This will necessarily be the most extensive section of the CSPP. Provide sufficient detail so that a contractor not experienced in working on airports will understand the unique restrictions such work will require. Due to this extent, it should be broken down into subsections as described below:

3.10.1 Location of Stockpiled Construction Materials.

Describe in this section specific locations for stockpiling material. Note any height restrictions on stockpiles. Include a reference to paragraph 3.21 for hazard marking and lighting devices used to identify stockpiles. Include a reference to paragraph 3.11 for provisions to prevent stockpile material from becoming wildlife attractants. Include a reference to paragraph 3.12 for provisions to prevent stockpile material from becoming FOD. Attach drawings to graphically indicate the stockpile locations.

3.10.2 Vehicle and Pedestrian Operations.

While there are many items to be addressed in this major subsection of the CSPP, all are concerned with one main issue: keeping people and vehicles from areas of the airport where they don't belong. This includes preventing unauthorized entry to the AOA and preventing the improper movement of pedestrians or vehicles on the airport. In this section, focus on mechanisms to prevent construction vehicles and workers traveling to and from the worksite from unauthorized entry into movement areas. Specify locations of parking for both employee vehicles and construction equipment, and routes for access and haul roads. In most cases, this will best be accomplished by attaching a drawing. Quote from AC 150/5210-5 specific requirements for contractor vehicles rather than referring to the AC as a whole, and include special requirements for identifying HAZMAT vehicles. Quote from, rather than incorporate by reference, AC 150/5210-20 as appropriate to address the airport's rules for ground vehicle operations, including its training program. Discuss the airport's recordkeeping system listing authorized vehicle operators.

3.10.3 Two-Way Radio Communications.

Include a special section to identify all individuals who are required to maintain communications with Air Traffic (AT) at airports with active towers, or monitor CTAF at airports without or with closed ATCT. Include training requirements for all individuals required to communicate with AT. Individuals required to monitor AT frequencies should also be identified. If construction employees are also required to communicate by radio with Airport Operations, this procedure should be described in detail. Usage of vehicle mounted radios and/or portable radios should be addressed. Communication procedures for the event of disabled radio communication (that is, light

signals, telephone numbers, others) must be included. All radio frequencies should by identified (Tower, Ground Control, CTAF, UNICOM, ATIS, and so on).

3.10.4 Airport Security.

Address security as it applies to vehicle and pedestrian operations. Discuss TSA requirements, security badging requirements, perimeter fence integrity, gate security, and other needs. Attach drawings to graphically indicate secured and/or Security Identification Display Areas (SIDA), perimeter fencing, and available access points.

3.11 **Wildlife Management.**

Discuss in this section wildlife management procedures. Describe the maintenance of existing wildlife mitigation devices, such as perimeter fences, and procedures to limit wildlife attractants. Include procedures to notify Airport Operations of wildlife encounters. Include a reference to paragraph 3.10 for security (wildlife) fence integrity maintenance as required.

3.12 **FOD Management.**

In this section, discuss methods to control and monitor FOD: worksite housekeeping, ground vehicle tire inspections, runway sweeps, and so on. Include a reference to paragraph 3.15 for inspection requirements as required.

3.13 **HAZMAT Management.**

Describe in this section HAZMAT management procedures: fuel deliveries, spill recovery procedures, Safety Data Sheet (SDS), Material Safety Data Sheet (MSDS) or Product Safety Data Sheet (PSDS) availability, and other considerations. Any specific airport HAZMAT restrictions should also be identified. Include a reference to paragraph 3.10 for HAZMAT vehicle identification requirements. Quote from, rather than incorporate by reference, AC 150/5320-15.

3.14 **Notification of Construction Activities.**

List in this section the names and telephone numbers of points of contact for all parties affected by the construction project. We recommend a single list that includes all telephone numbers required under this section. Include emergency notification procedures for all representatives of all parties potentially impacted by the construction. Identify individual representatives – and at least one alternate – for each party. List both on-duty and off-duty contact information for each individual, including individuals responsible for emergency maintenance of airport construction hazard lighting and barricades. Describe procedures to coordinate immediate response to events that might adversely affect the operational safety of the airport (such as interrupted NAVAID service). Explain requirements for and the procedures for the issuance of Notices to Airmen (NOTAMs), notification to FAA required by 14 CFR Part 77 and Part 157 and in the event of affected NAVAIDs. For NOTAMs, identify an individual, and at least one alternate, responsible for issuing and cancelling each specific type of Notice to

Airmen (NOTAM) required. Detail notification methods for police, fire fighting, and medical emergencies. This may include 911, but should also include direct phone numbers of local police departments and nearby hospitals. Identify the E911 address of the airport and the emergency access route via haul roads to the construction site. Require the contractor to have this information available to all workers. The local Poison Control number should be listed. Procedures regarding notification of Airport Operations and/or the ARFF Department of such emergencies should be identified, as applicable. If airport radio communications are identified as a means of emergency notification, include a reference to paragraph 3.10. Differentiate between emergency and nonemergency notification of ARFF personnel, the latter including activities that affect ARFF water supplies and access roads. Identify the primary ARFF contact person and at least one alternate. If notification is to be made through Airport Operations, then detail this procedure. Include a method of confirmation from the ARFF department.

3.15 **Inspection Requirements.**

Describe in this section inspection requirements to ensure airfield safety compliance. Include a requirement for routine inspections by the resident engineer (RE) or other airport operator's representative and the construction contractors. If the engineering consultants and/or contractors have a Safety Officer who will conduct such inspections, identify this individual. Describe procedures for special inspections, such as those required to reopen areas for aircraft operations. Part 139 requires daily airfield inspections at certificated airports, but these may need to be more frequent when construction is in progress. Discuss the role of such inspections on areas under construction. Include a requirement to immediately remedy any deficiencies, whether caused by negligence, oversight, or project scope change.

3.16 **Underground Utilities.**

Explain how existing underground utilities will be located and protected. Identify each utility owner and include contact information for each company/agency in the master list. Address emergency response procedures for damaged or disrupted utilities. Include a reference to paragraph 3.14 for notification of utility owners of accidental utility disruption as required.

3.17 **Penalties.**

Describe in this section specific penalties imposed for noncompliance with airport rules and regulations, including the CSPP: SIDA violations, VPD, and others.

3.18 **Special Conditions.**

Identify any special conditions that may trigger specific safety mitigation actions outlined in this CSPP: low visibility operations, snow removal, aircraft in distress, aircraft accident, security breach, VPD, and other activities requiring construction suspension/resumption. Include a reference to paragraph 3.10 for compliance with airport safety and security measures and for radio communications as required. Include

a reference to paragraph 3.14 for emergency notification of all involved parties, including police/security, ARFF, and medical services.

3.19 **Runway and Taxiway Visual Aids.**

Include marking, lighting, signs, and visual NAVAIDS. Detail temporary runway and taxiway marking, lighting, signs, and visual NAVAIDs required for the construction. Discuss existing marking, lighting, signs, and visual NAVAIDs that are temporarily, altered, obliterated, or shut down. Consider non-federal facilities and address requirements for reimbursable agreements necessary for alteration of FAA facilities and for necessary flight checks. Identify temporary TORA signs or runway distance remaining signs if appropriate. Identify required temporary visual NAVAIDs such as REIL or PAPI. Quote from, rather than incorporate by reference, AC 150/5340-1, *Standards for Airport Markings;* AC 150/5340-18, *Standards for Airport Sign Systems;* and AC 150/5340-30, as required. Attach drawings to graphically indicate proposed marking, lighting, signs, and visual NAVAIDs.

3.20 **Marking and Signs for Access Routes.**

Detail plans for marking and signs for vehicle access routes. To the extent possible, signs should be in conformance with the Federal Highway Administration MUTCD and/or State highway specifications, not hand lettered. Detail any modifications to the guidance in the MUTCD necessary to meet frangibility/height requirements.

3.21 **Hazard Marking and Lighting.**

Specify all marking and lighting equipment, including when and where each type of device is to be used. Specify maximum gaps between barricades and the maximum spacing of hazard lighting. Identify one individual and at least one alternate responsible for maintenance of hazard marking and lighting equipment in the master telephone list. Include a reference to paragraph 3.14. Attach drawings to graphically indicate the placement of hazard marking and lighting equipment.

3.22 **Work Zone Lighting for Nighttime Construction.**

If work is to be conducted at night, specify all lighting equipment, including when and where each type of device is to be used. Indicate the direction lights are to be aimed and any directions that aiming of lights is prohibited. Specify any shielding necessary in instances where aiming is not sufficient to prevent interference with air traffic control and aircraft operations. Attach drawings to graphically indicate the placement and aiming of lighting equipment. Where the plan only indicates directions that aiming of lights is prohibited, the placement and positioning of portable lights must be proposed by the Contractor and approved by the airport operator's representative each time lights are relocated or repositioned.

3.23 **Protection of Runway and Taxiway Safety Areas.**

This section should focus exclusively on procedures for protecting all safety areas, including those altered by the construction: methods of demarcation, limit of access, movement within safety areas, stockpiling and trenching restrictions, and so on. Reference AC 150/5300-13, as required. Include a reference to paragraph 3.10 for procedures regarding vehicle and personnel movement within safety areas. Include a reference to paragraph 3.10 for material stockpile restrictions as required. Detail requirements for trenching, excavations, and backfill. Include a reference to paragraph 3.21 for hazard marking and lighting devices used to identify open excavations as required. If runway and taxiway closures are proposed to protect safety areas, or if temporary displaced thresholds and/or revised declared distances are used to provide the required Runway Safety Area, include a reference to paragraphs 3.14 and 3.19. Detail procedures for protecting the runway OFZ, runway OFA, taxiway OFA and runway approach surfaces including those altered by the construction: methods of demarcation, limit of cranes, storage of equipment, and so on. Quote from, rather than incorporate by reference, AC 150/5300-13, as required. Include a reference to paragraph 3.24 for height (i.e., crane) restrictions as required. One way to address the height of equipment that will move during the project is to establish a three-dimensional "box" within which equipment will be confined that can be studied as a single object. Attach drawings to graphically indicate the safety area, OFZ, and OFA boundaries.

3.24 **Other Limitations on Construction.**

This section should describe what limitations must be applied to each area of work and when each limitation will be applied: limitations due to airport operations, height (i.e., crane) restrictions, areas which cannot be worked at simultaneously, day/night work restrictions, winter construction, and other limitations. Include a reference to paragraph 3.7 for project phasing requirements based on construction limitations as required.

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APPENDIX A. RELATED READING MATERIAL

Obtain the latest version of the following free publications from the FAA on its Web site at http://www.faa.gov/airports/.

Table A-1. FAA Publications

Number	Title and Description
AC 150/5200-28	*Notices to Airmen (NOTAMs) for Airport Operators* Guidance for using the NOTAM System in airport reporting.
AC 150/5200-30	*Airport Field Condition Assessments and Winter Operations Safety* Guidance for airport owners/operators on the development of an acceptable airport snow and ice control program and on appropriate field condition reporting procedures.
AC 150/5200-33	*Hazardous Wildlife Attractants On or Near Airports* Guidance on locating certain land uses that might attract hazardous wildlife to public-use airports.
AC 150/5210-5	*Painting, Marking, and Lighting of Vehicles Used on an Airport* Guidance, specifications, and standards for painting, marking, and lighting vehicles operating in the airport air operations areas.
AC 150/5210-20	*Ground Vehicle Operations to include Taxiing or Towing an Aircraft on Airports* Guidance to airport operators on developing ground vehicle operation training programs.
AC 150/5300-13	*Airport Design* FAA standards and recommendations for airport design. Establishes approach visibility minimums as an airport design parameter, and contains the Object Free area and the obstacle free-zone criteria.
AC 150/5210-24	*Airport Foreign Object Debris (FOD) Management* Guidance for developing and managing an airport foreign object debris (FOD) program

Number	Title and Description
AC 150/5320-15	*Management of Airport Industrial Waste* Basic information on the characteristics, management, and regulations of industrial wastes generated at airports. Guidance for developing a Storm Water Pollution Prevention Plan (SWPPP) that applies best management practices to eliminate, prevent, or reduce pollutants in storm water runoff with particular airport industrial activities.
AC 150/5340-1	*Standards for Airport Markings* FAA standards for the siting and installation of signs on airport runways and taxiways.
AC 150/5340-18	*Standards for Airport Sign Systems* FAA standards for the siting and installation of signs on airport runways and taxiways.
AC 150/5345-28	*Precision Approach Path Indicator (PAPI) Systems* FAA standards for PAPI systems, which provide pilots with visual glide slope guidance during approach for landing.
AC 150/5340-30	*Design and Installation Details for Airport Visual Aids* Guidance and recommendations on the installation of airport visual aids.
AC 150/5345-39	*Specification for L-853, Runway and Taxiway Retroreflective Markers*
AC 150/5345-44	*Specification for Runway and Taxiway Signs* FAA specifications for unlighted and lighted signs for taxiways and runways.
AC 150/5345-53	*Airport Lighting Equipment Certification Program* Details on the Airport Lighting Equipment Certification Program (ALECP).
AC 150/5345-50	*Specification for Portable Runway and Taxiway Lights* FAA standards for portable runway and taxiway lights and runway end identifier lights for temporary use to permit continued aircraft operations while all or part of a runway lighting system is inoperative.
AC 150/5345-55	*Specification for L-893, Lighted Visual Aid to Indicate Temporary Runway Closure*

Number	Title and Description
AC 150/5370-10	*Standards for Specifying Construction of Airports* Standards for construction of airports, including earthwork, drainage, paving, turfing, lighting, and incidental construction.
AC 150/5370-12	*Quality Management for Federally Funded Airport Construction Projects*
EB 93	*Guidance for the Assembly and Installation of Temporary Orange Construction Signs*
FAA Order 5200.11	FAA Airports (ARP) Safety Management System (SMS) Basics for implementing SMS within ARP. Includes roles and responsibilities of ARP management and staff as well as other FAA lines of business that contribute to the ARP SMS.
FAA Certalert 98-05	*Grasses Attractive to Hazardous Wildlife* Guidance on grass management and seed selection.
FAA Form 7460-1	Notice of Proposed Construction or Alteration
FAA Form 7480-1	Notice of Landing Area Proposal
FAA Form 6000.26	National NAS Strategic Interruption Service Level Agreement, Strategic Events Coordination, Airport Sponsor Form

Obtain the latest version of the following free publications from the Electronic Code of Federal Regulations at http://www.ecfr.gov/.

Table A-2. Code of Federal Regulation

Number	Title
Title 14 CFR Part 77	Safe, Efficient Use and Preservation of the Navigable Airspace
Title 14 CFR Part 139	Certification of Airports
Title 49 CFR Part 1542	Airport Security

Obtain the latest version of the Manual on Uniform Traffic Control Devices from the Federal Highway Administration at http://mutcd.fhwa.dot.gov/.

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APPENDIX B. TERMS AND ACRONYMS

Table B-1. Terms and Acronyms

Term	Definition
Form 7460-1	Notice of Proposed Construction or Alteration. For on-airport projects, the form submitted to the FAA regional or airports division office as formal written notification of any kind of construction or alteration of objects that affect navigable airspace, as defined in 14 CFR Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*. (See guidance available on the FAA web site at https://oeaaa.faa.gov.) The form may be downloaded at http://www.faa.gov/airports/resources/forms/, or filed electronically at: https://oeaaa.faa.gov.
Form 7480-1	Notice of Landing Area Proposal. Form submitted to the FAA Airports Regional Division Office or Airports District Office as formal written notification whenever a project without an airport layout plan on file with the FAA involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport The form may be downloaded at http://www.faa.gov/airports/resources/forms/.
Form 6000-26	Airport Sponsor Strategic Event Submission Form
AC	Advisory Circular
ACSI	Airport Certification Safety Inspector
ADG	Airplane Design Group
AIP	Airport Improvement Program
ALECP	Airport Lighting Equipment Certification Program
ANG	Air National Guard
AOA	Air Operations Area, as defined in 14 CFR Part 107. Means a portion of an airport, specified in the airport security program, in which security measures are carried out. This area includes aircraft movement areas, aircraft parking areas, loading ramps, and safety areas, and any adjacent areas (such as general aviation areas) that are not separated by adequate security systems, measures, or procedures. This area does not include the secured area of the airport terminal building.
ARFF	Aircraft Rescue and Fire Fighting
ARP	FAA Office of Airports
ASDA	Accelerate-Stop Distance Available
AT	Air Traffic
ATCT	Airport Traffic Control Tower
ATIS	Automatic Terminal Information Service
ATO	Air Traffic Organization
Certificated Airport	An airport that has been issued an Airport Operating Certificate by the FAA under

Term	Definition
	the authority of 14 CFR Part 139, *Certification of Airports*.
CFR	Code of Federal Regulations
Construction	The presence of construction-related personnel, equipment, and materials in any location that could infringe upon the movement of aircraft.
CSPP	Construction Safety and Phasing Plan. 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.
CTAF	Common Traffic Advisory Frequency
Displaced Threshold	A threshold that is located at a point on the runway other than the designated beginning of the runway. The portion of pavement behind a displaced threshold is available for takeoffs in either direction or landing from the opposite direction.
DOT	Department of Transportation
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FOD	Foreign Object Debris/Damage
FSS	Flight Service Station
GA	General Aviation
HAZMAT	Hazardous Materials
HMA	Hot Mix Asphalt
IAP	Instrument Approach Procedures
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LDA	Landing Distance Available
LOC	Localizer antenna array
Movement Area	The runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading aprons and aircraft parking areas (reference 14 CFR Part 139).
MSDS	Material Safety Data Sheet
MUTCD	Manual on Uniform Traffic Control Devices
NAVAID	Navigation Aid
NAVAID Critical Area	An area of defined shape and size associated with a NAVAID that must remain clear and graded to avoid interference with the electronic signal.
Non-Movement Area	The area inside the airport security fence exclusive of the Movement Area. It is important to note that the non-movement area includes pavement traversed by aircraft.

Term	Definition
NOTAM	Notices to Airmen
Obstruction	Any object/obstacle exceeding the obstruction standards specified by 14 CFR Part 77, subpart C.
OCC	Operations Control Center
OE / AAA	Obstruction Evaluation / Airport Airspace Analysis
OFA	Object Free Area. An area on the ground centered on the runway, taxiway, or taxi lane centerline provided to enhance safety of aircraft operations by having the area free of objects except for those objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. (See AC 150/5300-13 for additional guidance on OFA standards and wingtip clearance criteria.)
OFZ	Obstacle Free Zone. The airspace below 150 ft (45 m) above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway and for missed approaches. The OFZ is subdivided as follows: Runway OFZ, Inner Approach OFZ, Inner Transitional OFZ, and Precision OFZ. Refer to AC 150/5300-13 for guidance on OFZ.
OSHA	Occupational Safety and Health Administration
OTS	Out of Service
P&R	Planning and Requirements Group
NPI	NAS Planning & Integration
PAPI	Precision Approach Path Indicator
PFC	Passenger Facility Charge
PLASI	Pulse Light Approach Slope Indicator
Project Proposal Summary	A clear and concise description of the proposed project or change that is the object of Safety Risk Management.
RA	Reimbursable Agreement
RE	Resident Engineer
REIL	Runway End Identifier Lights
RNAV	Area Navigation
ROFA	Runway Object Free Area
RSA	Runway Safety Area. A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway, in accordance with AC 150/5300-13.
SDS	Safety Data Sheet
SIDA	Security Identification Display Area
SMS	Safety Management System

Term	Definition
SPCD	Safety Plan Compliance Document. Details developed and submitted by a contractor to the airport operator for approval providing details on how the performance of a construction project will comply with the CSPP.
SRM	Safety Risk Management
SSC	System Support Center
Taxiway Safety Area	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway, in accordance with AC 150/5300-13.
TDG	Taxiway Design Group
Temporary	Any condition that is not intended to be permanent.
Temporary Runway End	The beginning of that portion of the runway available for landing and taking off in one direction, and for landing in the other direction. Note the difference from a displaced threshold.
Threshold	The beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced.
TODA	Takeoff Distance Available
TOFA	Taxiway Object Free Area
TORA	Takeoff Run Available. The length of the runway less any length of runway unavailable and/or unsuitable for takeoff run computations. See AC 150/5300-13 for guidance on declared distances.
TSA	Taxiway Safety Area, or Transportation Security Administration
UNICOM	A radio communications system of a type used at small airports.
VASI	Visual Approach Slope Indicator
VGSI	Visual Glide Slope Indicator. A device that provides a visual glide slope indicator to landing pilots. These systems include precision approach path indicator (PAPI), visual approach slope indicator (VASI), and pulse light approach slope indicator (PLASI).
VFR	Visual Flight Rules
VOR	Very High Frequency Omnidirectional Radio Range
VPD	Vehicle / Pedestrian Deviation

APPENDIX C. SAFETY AND PHASING PLAN CHECKLIST

This appendix is keyed to Chapter 2. In the electronic version of this AC, clicking on the paragraph designation in the Reference column will access the applicable paragraph. There may be instances where the CSPP requires provisions that are not covered by the list in this appendix.

This checklist is intended as an aid, not a required submittal.

Table C-1. CSPP Checklist

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
General Considerations					
Requirements for predesign, prebid, and preconstruction conferences to introduce the subject of airport operational safety during construction are specified.	2.5				
Operational safety is a standing agenda item for construction progress meetings.	2.5				
Scheduling of the construction phases is properly addressed.	2.6				
Any formal agreements are established.	2.5.3				
Areas and Operations Affected by Construction Activity					
Drawings showing affected areas are included.	2.7.1				
Closed or partially closed runways, taxiways, and aprons are depicted on drawings.	2.7.1.1				
Access routes used by ARFF vehicles affected by the project are addressed.	2.7.1.2				
Access routes used by airport and airline support vehicles affected by the project are addressed.	2.7.1.3				
Underground utilities, including water supplies for firefighting and drainage.	2.7.1.4				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Approach/departure surfaces affected by heights of temporary objects are addressed.	2.7.1.5				
Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads are properly depicted on drawings.	2.7.1				
Temporary changes to taxi operations are addressed.	2.7.2.1				
Detours for ARFF and other airport vehicles are identified.	2.7.2.2				
Maintenance of essential utilities and underground infrastructure is addressed.	2.7.2.3				
Temporary changes to air traffic control procedures are addressed.	2.7.2.4				
NAVAIDs					
Critical areas for NAVAIDs are depicted on drawings.	2.8				
Effects of construction activity on the performance of NAVAIDS, including unanticipated power outages, are addressed.	2.8				
Protection of NAVAID facilities is addressed.	2.8				
The required distance and direction from each NAVAID to any construction activity is depicted on drawings.	2.8				
Procedures for coordination with FAA ATO/Technical Operations, including identification of points of contact, are included.	2.8, 2.13.1, 2.13.5.3.1, 2.18.1				
Contractor Access					
The CSPP addresses areas to which contractor will have access and how	2.9				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
the areas will be accessed.					
The application of 49 CFR Part 1542 Airport Security, where appropriate, is addressed.	2.9				
The location of stockpiled construction materials is depicted on drawings.	2.9.1				
The requirement for stockpiles in the ROFA to be approved by FAA is included.	2.9.1				
Requirements for proper stockpiling of materials are included.	2.9.1				
Construction site parking is addressed.	2.9.2.1				
Construction equipment parking is addressed.	2.9.2.2				
Access and haul roads are addressed.	2.9.2.3				
A requirement for marking and lighting of vehicles to comply with AC 150/5210-5, *Painting, Marking and Lighting of Vehicles Used on an Airport,* is included.	2.9.2.4				
Proper vehicle operations, including requirements for escorts, are described.	2.9.2.5, 2.9.2.6				
Training requirements for vehicle drivers are addressed.	2.9.2.7				
Two-way radio communications procedures are described.	2.9.2.9				
Maintenance of the secured area of the airport is addressed.	2.9.2.10				
Wildlife Management					
The airport operator's wildlife management procedures are addressed.	2.10				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Foreign Object Debris Management					
The airport operator's FOD management procedures are addressed.	2.11				
Hazardous Materials Management					
The airport operator's hazardous materials management procedures are addressed.	2.12				
Notification of Construction Activities					
Procedures for the immediate notification of airport user and local FAA of any conditions adversely affecting the operational safety of the airport are detailed.	2.13				
Maintenance of a list by the airport operator of the responsible representatives/points of contact for all involved parties and procedures for contacting them 24 hours a day, seven days a week is specified.	2.13.1				
A list of local ATO/Technical Operations personnel is included.	2.13.1				
A list of ATCT managers on duty is included.	2.13.1				
A list of authorized representatives to the OCC is included.	2.13.2				
Procedures for coordinating, issuing, maintaining and cancelling by the airport operator of NOTAMS about airport conditions resulting from construction are included.	2.8, 2.13.2, 2.18.3.3.9				
Provision of information on closed or hazardous conditions on airport movement areas by the airport operator to the OCC is specified.	2.13.2				
Emergency notification procedures for medical, fire fighting, and police	2.13.3				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
response are addressed.					
Coordination with ARFF personnel for non-emergency issues is addressed.	2.13.4				
Notification to the FAA under 14 CFR parts 77 and 157 is addressed.	2.13.5				
Reimbursable agreements for flight checks and/or design and construction for FAA owned NAVAIDs are addressed.	2.13.5.3.2				
Inspection Requirements					
Daily and interim inspections by both the airport operator and contractor are specified.	2.14.1, 2.14.2				
Final inspections at certificated airports are specified when required.	2.14.3				
Underground Utilities					
Procedures for protecting existing underground facilities in excavation areas are described.	2.15				
Penalties					
Penalty provisions for noncompliance with airport rules and regulations and the safety plans are detailed.	2.16				
Special Conditions					
Any special conditions that affect the operation of the airport or require the activation of any special procedures are addressed.	2.17				
Runway and Taxiway Visual Aids - Marking, Lighting, Signs, and Visual NAVAIDs					
The proper securing of temporary airport markings, lighting, signs, and visual NAVAIDs is addressed.	2.18.1				
Frangibility of airport markings, lighting, signs, and visual NAVAIDs is specified.	2.18.1, 2.18.3, 2.18.4.2, 2.20.2.4				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
The requirement for markings to be in compliance with AC 150/5340-1, *Standards for Airport Markings,* is specified.	2.18.2				
Detailed specifications for materials and methods for temporary markings are provided.	2.18.2				
The requirement for lighting to conform to AC 150/5340-30, *Design and Installation Details for Airport Visual Aids;* AC 150/5345-50, *Specification for Portable Runway and Taxiway Lights;* and AC 150/5345-53, *Airport Lighting Certification Program,* is specified.	2.18.3				
The use of a lighted X is specified where appropriate.	2.18.2.1.2, 2.18.3.2				
The requirement for signs to conform to AC 150/5345-44, *Specification for Runway and Taxiway Signs;* AC 50/5340-18, *Standards for Airport Sign Systems;* and AC 150/5345-53, *Airport Lighting Certification Program,* is specified.	2.18.4				
Marking and Signs For Access Routes					
The CSPP specifies that pavement markings and signs intended for construction personnel should conform to AC 150/5340-18 and, to the extent practicable, with the MUTCD and/or State highway specifications.	2.18.4.2				
Hazard Marking and Lighting					
Prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles are specified.	2.20.1				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Hazard marking and lighting are specified to identify open manholes, small areas under repair, stockpiled material, and waste areas.	2.20.1				
The CSPP considers less obvious construction-related hazards.	2.20.1				
Equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash and jet blast is specified.	2.20.2.1				
The spacing of barricades is specified such that a breach is physically prevented barring a deliberate act.	2.20.2.1				
Red lights meeting the luminance requirements of the State Highway Department are specified.	2.20.2.2				
Barricades, temporary markers, and other objects placed and left in areas adjacent to any open runway, taxiway, taxi lane, or apron are specified to be as low as possible to the ground, and no more than 18 inch high.	2.20.2.3				
Barricades are specified to indicate construction locations in which no part of an aircraft may enter.	2.20.2.3				
Highly reflective barriers with lights are specified to barricade taxiways leading to closed runways.	2.20.2.5				
Markings for temporary closures are specified.	2.20.2.5				
The provision of a contractor's representative on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades is specified.	2.20.2.7				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Work Zone Lighting for Nighttime Construction					
If work is to be conducted at night, the CSPP identifies construction lighting units and their general locations and aiming in relationship to the ATCT and active runways and taxiways.	2.21				
Protection of Runway and Taxiway Safety Areas					
The CSPP clearly states that no construction may occur within a safety area while the associated runway or taxiway is open for aircraft operations.	2.22.1.1, 2.22.3.1				
The CSPP specifies that the airport operator coordinates the adjustment of RSA or TSA dimensions with the ATCT and the appropriate FAA Airports Regional or District Office and issues a local NOTAM.	2.22.1.2, 2.22.3.2				
Procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations, are detailed.	2.22.3.3				
The CSPP specifies that open trenches or excavations are not permitted within a safety area while the associated runway or taxiway is open, subject to approved exceptions.	2.22.1.4				
Appropriate covering of excavations in the RSA or TSA that cannot be backfilled before the associated runway or taxiway is open is detailed.	2.22.1.4				
The CSPP includes provisions for prominent marking of open trenches and excavations at the construction site.	2.22.1.4				
Grading and soil erosion control to maintain RSA/TSA standards are	2.22.3.5				

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
addressed.					
The CSPP specifies that equipment is to be removed from the ROFA when not in use.	2.22.2				
The CSPP clearly states that no construction may occur within a taxiway safety area while the taxiway is open for aircraft operations.	2.22.3				
Appropriate details are specified for any construction work to be accomplished in a taxiway object free area.	2.22.4				
Measures to ensure that personnel, material, and/or equipment do not penetrate the OFZ or threshold siting surfaces while the runway is open for aircraft operations are included.	2.22.4.3.6				
Provisions for protection of runway approach/departure areas and clearways are included.	2.22.6				
Other Limitations on Construction					
The CSPP prohibits the use of open flame welding or torches unless adequate fire safety precautions are provided and the airport operator has approved their use.	2.23.1.2				
The CSPP prohibits the use of electrical blasting caps on or within 1,000 ft (300 m) of the airport property.	2.23.1.3				

APPENDIX D. CONSTRUCTION PROJECT DAILY SAFETY INSPECTION CHECKLIST

The situations identified below are potentially hazardous conditions that may occur during airport construction projects. Safety area encroachments, unauthorized and improper ground vehicle operations, and unmarked or uncovered holes and trenches near aircraft operating surfaces pose the most prevalent threats to airport operational safety during airport construction projects. The list below is one tool that the airport operator or contractor may use to aid in identifying and correcting potentially hazardous conditions. It should be customized as appropriate for each project including information such as the date, time and name of the person conducting the inspection.

Table D-1. Potentially Hazardous Conditions

Item	Action Required (Describe)	No Action Required (Check)
Excavation adjacent to runways, taxiways, and aprons improperly backfilled.		
Mounds of earth, construction materials, temporary structures, and other obstacles near any open runway, taxiway, or taxi lane; in the related Object Free area and aircraft approach or departure areas/zones; or obstructing any sign or marking.		
Runway resurfacing projects resulting in lips exceeding 3 inch (7.6 cm) from pavement edges and ends.		
Heavy equipment (stationary or mobile) operating or idle near AOA, in runway approaches and departures areas, or in OFZ.		
Equipment or material near NAVAIDs that may degrade or impair radiated signals and/or the monitoring of navigation and visual aids. Unauthorized or improper vehicle operations in localizer or glide slope critical areas, resulting in electronic interference and/or facility shutdown.		
Tall and especially relatively low visibility units (that is, equipment with slim profiles) — cranes, drills, and similar objects — located in critical areas, such as OFZ and		

Item	Action Required (Describe)	No Action Required (Check)
approach zones.		
Improperly positioned or malfunctioning lights or unlighted airport hazards, such as holes or excavations, on any apron, open taxiway, or open taxi lane or in a related safety, approach, or departure area.		
Obstacles, loose pavement, trash, and other debris on or near AOA. Construction debris (gravel, sand, mud, paving materials) on airport pavements may result in aircraft propeller, turbine engine, or tire damage. Also, loose materials may blow about, potentially causing personal injury or equipment damage.		
Inappropriate or poorly maintained fencing during construction intended to deter human and animal intrusions into the AOA. Fencing and other markings that are inadequate to separate construction areas from open AOA create aviation hazards.		
Improper or inadequate marking or lighting of runways (especially thresholds that have been displaced or runways that have been closed) and taxiways that could cause pilot confusion and provide a potential for a runway incursion. Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of AOA create aviation hazards.		
Wildlife attractants — such as trash (food scraps not collected from construction personnel activity), grass seeds, tall grass, or standing water — on or near airports.		
Obliterated or faded temporary markings on active operational areas.		
Misleading or malfunctioning obstruction lights. Unlighted or unmarked obstructions in the approach to any open runway pose aviation hazards.		

Item	Action Required (Describe)	No Action Required (Check)
Failure to issue, update, or cancel NOTAMs about airport or runway closures or other construction related airport conditions.		
Failure to mark and identify utilities or power cables. Damage to utilities and power cables during construction activity can result in the loss of runway / taxiway lighting; loss of navigation, visual, or approach aids; disruption of weather reporting services; and/or loss of communications.		
Restrictions on ARFF access from fire stations to the runway / taxiway system or airport buildings.		
Lack of radio communications with construction vehicles in airport movement areas.		
Objects, regardless of whether they are marked or flagged, or activities anywhere on or near an airport that could be distracting, confusing, or alarming to pilots during aircraft operations.		
Water, snow, dirt, debris, or other contaminants that temporarily obscure or derogate the visibility of runway/taxiway marking, lighting, and pavement edges. Any condition or factor that obscures or diminishes the visibility of areas under construction.		
Spillage from vehicles (gasoline, diesel fuel, oil) on active pavement areas, such as runways, taxiways, aprons, and airport roadways.		
Failure to maintain drainage system integrity during construction (for example, no temporary drainage provided when working on a drainage system).		

Item	Action Required (Describe)	No Action Required (Check)
Failure to provide for proper electrical lockout and tagging procedures. At larger airports with multiple maintenance shifts/workers, construction contractors should make provisions for coordinating work on circuits.		
Failure to control dust. Consider limiting the amount of area from which the contractor is allowed to strip turf.		
Exposed wiring that creates an electrocution or fire ignition hazard. Identify and secure wiring, and place it in conduit or bury it.		
Site burning, which can cause possible obscuration.		
Construction work taking place outside of designated work areas and out of phase.		

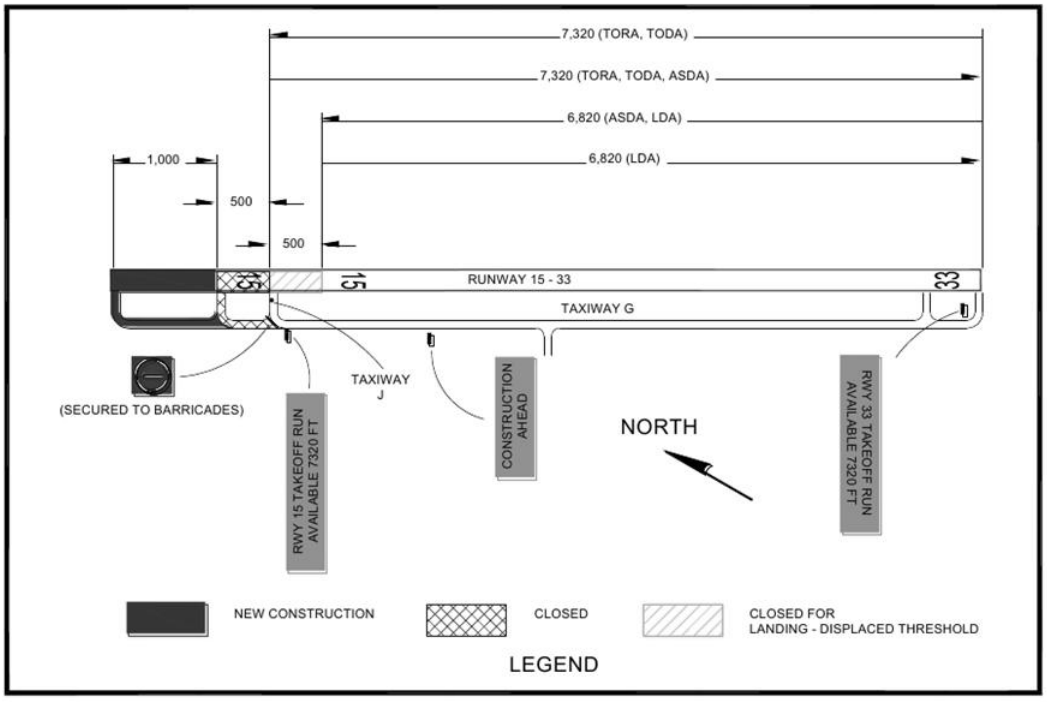
APPENDIX E. SAMPLE OPERATIONAL EFFECTS TABLE

E.1 **Project Description.**

Runway 15-33 is currently 7820 feet long, with a 500 foot stopway on the north end. This project will remove the stopway and extend the runway 1000 feet to the north and 500 feet to the south. Finally, the existing portion of the runway will be repaved. The runway 33 glide slope will be relocated. The new runway 33 localizer has already been installed by FAA Technical Operations and only needs to be switched on. Runway 15 is currently served only by a localizer, which will remain in operation as it will be beyond the future RSA. Appropriate NOTAMS will be issued throughout the project.

E.1.1 During Phase I, the runway 15 threshold will be displaced 1000 feet to keep construction equipment below the approach surface. The start of runway 15 takeoff and the departure end of runway 33 will also be moved 500 feet to protect workers from jet blast. Declared distances for runway 33 will be adjusted to provide the required RSA and applicable departure surface. Excavation near Taxiway G will require its ADG to be reduced from IV to III. See Figure E-1.

Figure E-1. Phase I Example

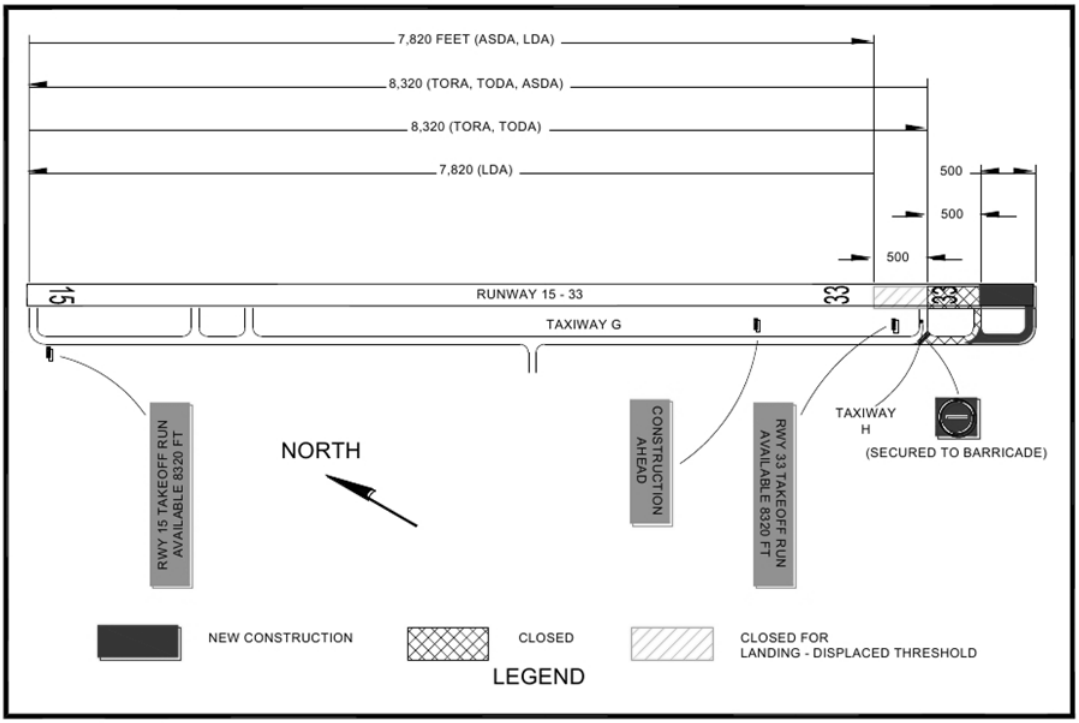


Note 1: Where hold signs are installed on both sides of a taxiway, install the TORA sign on the left side of the taxiway before the final turn to the runway intersection.

Note 2: Based on the declared distances for Runway 33 departures, the maximum equipment height in the construction area is 12.5 feet (500/40 = 12.5).

E.2 During Phase II, the runway 33 threshold will be displaced 1000 feet to keep construction equipment below the approach surface. The start of runway 33 takeoff and the departure end of runway 15 will also be moved 500 feet to protect workers from jet blast. Declared distances for runway 15 will be adjusted to provide the required RSA and applicable departure surface. See Figure E-2.

Figure E-2. Phase II Example



Note 1: Where hold signs are installed on both sides of a taxiway, install the TORA sign on the left side of the taxiway before the final turn to the runway intersection.

Note 2: Based on the declared distances for Runway 15 departures, the maximum equipment height in the construction area is 12.5 feet (500/40 = 12.5).

E.3 During Phase III, the existing portion of the runway will be repaved with Hot Mix Asphalt (HMA) and the runway 33 glide slope will be relocated. Construction will be accomplished between the hours of 8:00 pm and 5:00 am, during which the runway will be closed to operations.

Figure E-3. Phase III Example

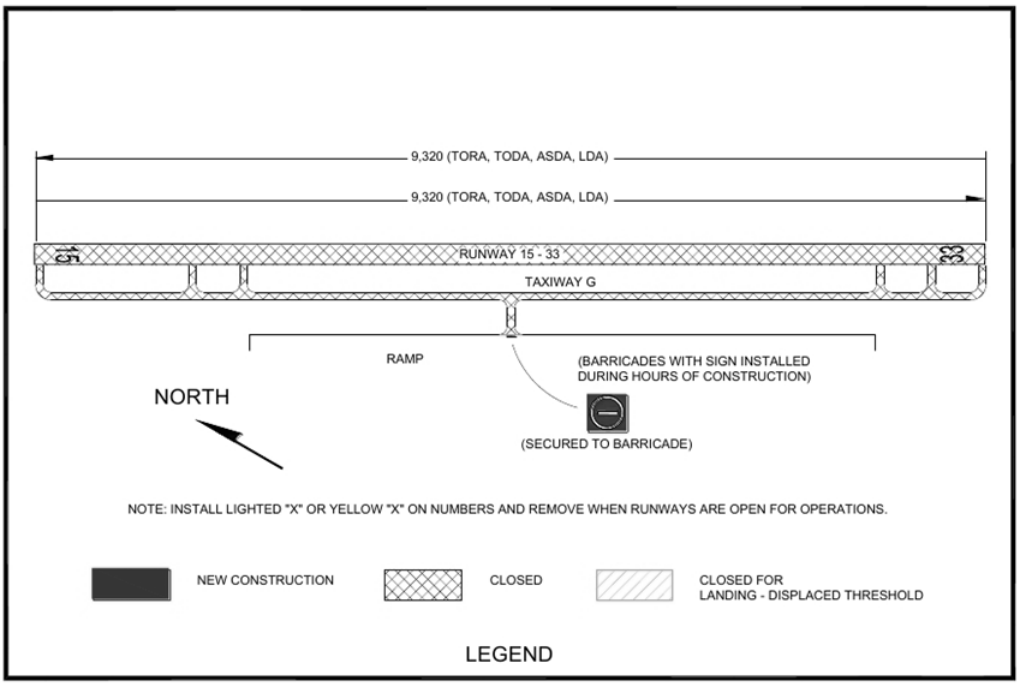


Table E-1. Operational Effects Table

Project	**Runway 15-33 Extension and Repaving**			
Phase	**Normal (Existing)**	**Phase I: Extend Runway 15 End**	**Phase II: Extend Runway 33 End**	**Phase III: Repave Runway**
Scope of Work	N/A	Extend Runway 15-33 1,000 ft on north end with Hot Mix Asphaltic Concrete (HMA).	Extend Runway 15-33 500 ft on south end with Hot Mix Asphaltic Concrete (HMA).	Repave existing runway with HMA Relocate Runway 33 Glide Slope
Effects of Construction Operations	N/A	Existing North 500 ft closed	Existing South 500 ft closed	Runway closed between 8:00 pm and 5:00 am Edge lighting out of service
Construction Phase	N/A	Phase I (Anticipated)	Phase II (Anticipated)	Phase III (Anticipated)
Runway 15 Average Aircraft Operations	Carrier: 52 /day GA: 26 /day Military: 11 /day	Carrier: 40 /day GA: 26 /day Military: 0 /day	Carrier: 45 /day GA: 26 /day Military: 5 /day	Carrier: 45 / day GA: 20 / day Military: 0 /day
Runway 33 Average Aircraft Operations	Carrier: 40 /day GA: 18 /day Military: 10 /day	Carrier: 30 /day GA: 18 /day Military: 0 /day	Carrier: 25 /day GA: 18 /day Military: 5 /day	Carrier: 20 /day GA: 5 /day Military: 0 /day
Runway 15-33 Aircraft Category	C-IV	C-IV	C-IV	C-IV
Runway 15 Approach Visibility Minimums	1 mile	1 mile	1 mile	1 mile
Runway 33 Approach Visibility Minimums	¾ mile	¾ mile	¾ mile	1 mile

Note: Proper coordination with Flight Procedures group is necessary to maintain instrument approach procedures during construction.

Project		Runway 15-33 Extension and Repaving			
Phase		Normal (Existing)	Phase I: Extend Runway 15 End	Phase II: Extend Runway 33 End	Phase III: Repave Runway
Runway 15 Declared Distances	TORA	7,820	7,320	8,320	9,320
	TODA	7,820	7,320	8,320	9,320
	ASDA	7,820	7,320	7,820	9,320
	LDA	7,820	6,820	7,820	9,320
Runway 33 Declared Distances	TORA	7,820	7,320	8,320	9,320
	TODA	7,820	7,320	8,320	9,320
	ASDA	8,320	6,820	8,320	9,320
	LDA	7,820	6,820	7,820	9,320
Runway 15 Approach Procedures		LOC only	LOC only	LOC only	LOC only
		RNAV	RNAV	RNAV	RNAV
		VOR	VOR	VOR	VOR
Runway 33 Approach Procedures		ILS	ILS	ILS	LOC only
		RNAV	RNAV	RNAV	RNAV
		VOR	VOR	VOR	VOR
Runway 15 NAVAIDs		LOC	LOC	LOC	LOC
Runway 33 NAVAIDs		ILS, MALSR	ILS, MALSR	ILS, MALSR	LOC, MALSR
Taxiway G ADG		IV	III	IV	IV
Taxiway G TDG		4	4	4	4
ATCT (hours open)		24 hours	24 hours	24 hours	0500 - 2000
ARFF Index		D	D	D	D

Project	Runway 15-33 Extension and Repaving			
Phase	**Normal (Existing)**	**Phase I: Extend Runway 15 End**	**Phase II: Extend Runway 33 End**	**Phase III: Repave Runway**
Special Conditions	Air National Guard (ANG) military operations	All military aircraft relocated to alternate ANG Base	Some large military aircraft relocated to alternate ANG Base	All military aircraft relocated to alternate ANG Base
Information for NOTAMs		Refer above for applicable declared distances. Taxiway G limited to 118 ft wingspan	Refer above for applicable declared distances.	Refer above for applicable declared distances. Airport closed 2000 – 0500. Runway 15 glide slope OTS.

Note: This table is one example. It may be advantageous to develop a separate table for each project phase and/or to address the operational status of the associated NAVAIDs per construction phase.

Complete the following chart for each phase to determine the area that must be protected along the runway and taxiway edges:

Table E-2. Runway and Taxiway Edge Protection

Runway/Taxiway	Aircraft Approach Category* A, B, C, or D	Airplane Design Group* I, II, III, or IV	Safety Area Width in Feet Divided by 2*

*See AC 150/5300-13 to complete the chart for a specific runway/taxiway.

Complete the following chart for each phase to determine the area that must be protected before the runway threshold:

Table E-3. Protection Prior to Runway Threshold

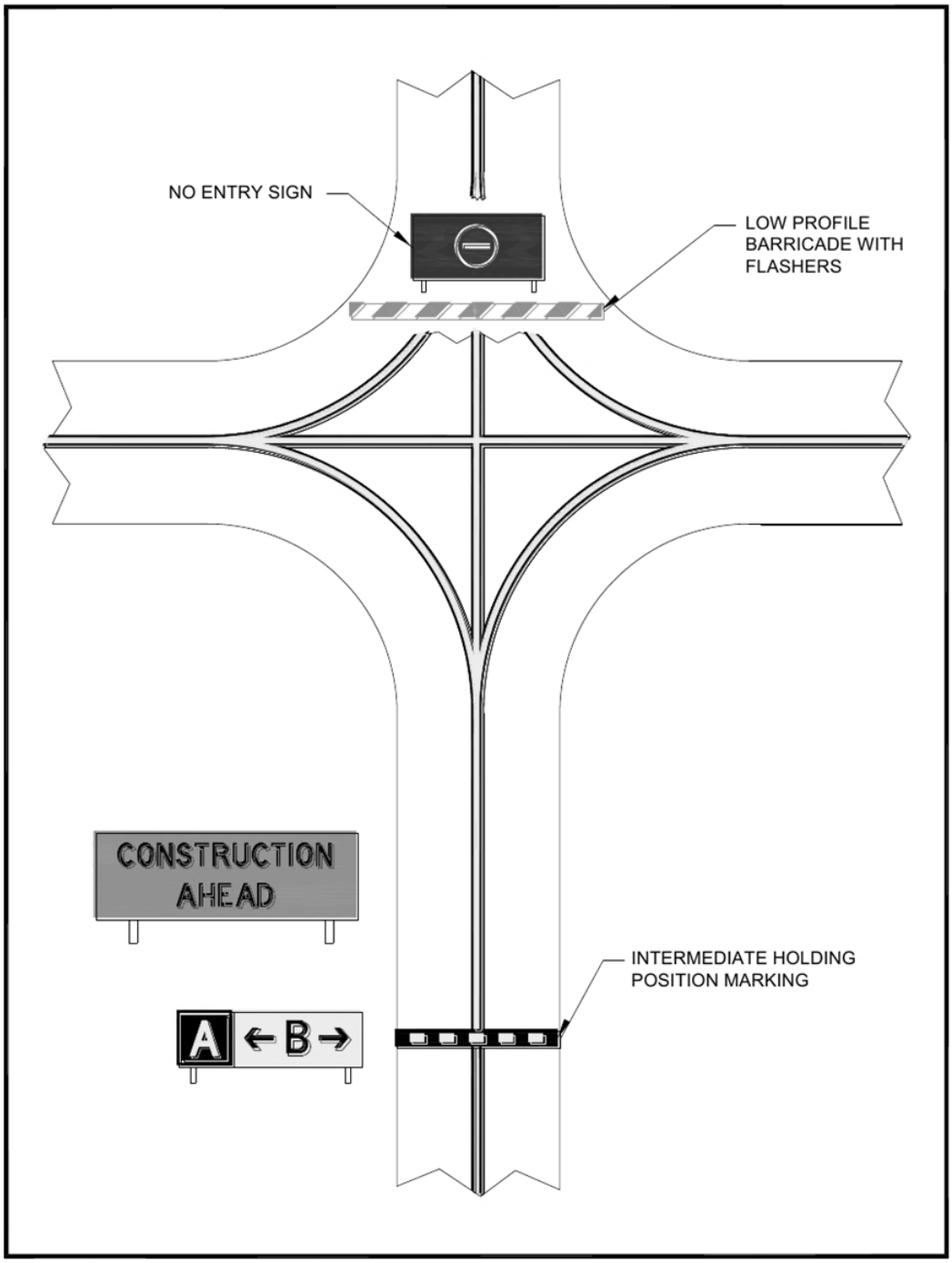
Runway End Number	Airplane Design Group* I, II, III, or IV	Aircraft Approach Category* A, B, C, or D	Minimum Safety Area Prior to the Threshold*	Minimum Distance to Threshold Based on Required Approach Slope*	
			ft	ft	: 1
			ft	ft	: 1
			ft	ft	: 1
			ft	ft	: 1

*See AC 150/5300-13 to complete the chart for a specific runway.

APPENDIX F. ORANGE CONSTRUCTION SIGNS

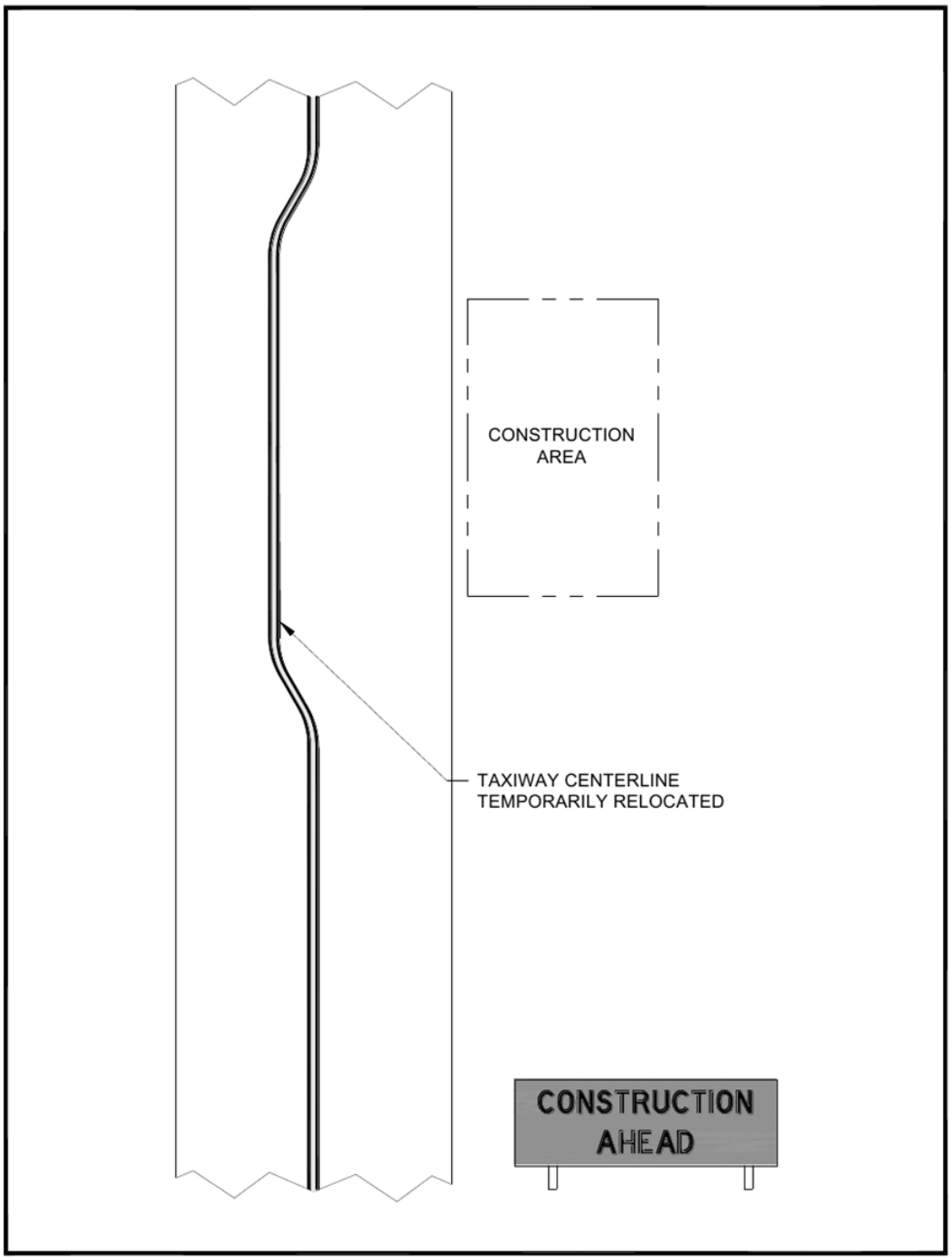
Figure F-1. Approved Sign Legends

Figure F-2. Orange Construction Sign Example 1



Note: For proper placement of signs, refer to EB 93.

Figure F-3. Orange Construction Sign Example 2



Note: For proper placement of signs, refer to EB 93.

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Advisory Circular Feedback

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by (1) mailing this form to Manager, Airport Engineering Division, Federal Aviation Administration ATTN: AAS-100, 800 Independence Avenue SW, Washington DC 20591 or (2) faxing it to the attention of the Office of Airport Safety and Standards at (202) 267-5383.

Subject: AC 150/5370-2G Date: _____

Please check all appropriate line items:

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page _____ be changed as follows:

_____
_____
_____

☐ In a future change to this AC, please cover the following subject:
(Briefly describe what you want added.)

_____
_____
_____

☐ Other comments:

_____
_____
_____

☐ I would like to discuss the above. Please contact me at (phone number, email address).

_____

Submitted by: _____ Date: _____

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PART VII – CONTRACT DOCUMENTS

PART VII – CONTRACT DOCUMENTS

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ATTACHMENT FOR PROPOSAL 525

CONTRACT 529

PAYMENT BOND 559

PERFORMANCE BOND 565

PROPOSAL FOR FURNISHING ALL LABOR AND MATERIALS AND THE CONSTRUCTION OF AIRFIELD IMPROVEMENTS

RUNWAY 11/29 & PARALLEL TAXIWAY CONSTRUCTION
FLANDREAU MUNICIPAL AIRPORT
FLANDREAU, SOUTH DAKOTA

Place:_____
Date: _____

TO: City of Flandreau, South Dakota

GENTLEMEN:

In compliance with your invitation for bids to furnish all necessary labor, tools, materials and equipment to construct and complete in all detail Runway 11/29 & Parallel Taxiway Construction, Flandreau Municipal Airport and all other related work for Airfield Improvements, AIP Project No. 3-46-0077-018-2026 complete and ready for use as shown on the plans and specifications as prepared by Helms and Associates, Consulting Engineers, Aberdeen, South Dakota, the undersigned bidder,

1) A Corporation organized and existing under the laws of the State of

_____

2) A Partnership, consisting of _____

_____

3) An Individual trading as _____

_____

having examined the detailed plans and specifications and contract with bond hereto attached, and being fully advised of the materials to be furnished and the work to be done in the construction of Runway 11/29 & Parallel Taxiway Construction and other related work of said improvements, does hereby propose to furnish all of the necessary labor, tools, materials, and equipment and do all work as specified to fully complete said work as shown on the plans and specifications at the following unit prices. We have examined the schedule of Minimum Wages established by the Department of Labor for this Project, and our bid is based on these rates.

PREVIOUS GOVERNMENT CONTRACTS

Section 60-1.6(b), Regulations of the Secretary of Labor, and Section 152.61, Federal Aviation Regulations, require each bidder or prospective contractor to state in the bid, or at the outset of contract negotiations, whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed with Joint Reporting Committee, Director, OFCCP, the FAA, or the former President's Committee on Equal Employment Opportunity all compliance reports due under applicable instructions. In any Case in which a bidder or prospective contractor or proposed subcontractor which has participated in a previous contract or subcontract subject to the equal opportunity clause has not filed a compliance report due under applicable instructions, such bidder, prospective contractor or proposed subcontractor shall be required to submit a compliance report with its bid or in any event prior to the award of the proposed contract or subcontract. For all purposes herein, a compliance report required of contractors or subcontractors means Standard Form 100, Employer Information Report EEO-1.

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

The Bidder (Proposer) [has, has not] _____ participated in a previous contract subject to the equal opportunity clause prescribed by Executive Order 10925, or Executive Order 11114, or Executive Order 11246.

The Bidder (Proposer) [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 (Proposer) 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 (Proposer) shall submit a compliance report on Standard Form 100, 'Employee Information Report (EEO-1)' prior to the award of contract. The Bidder (Proposer) [does, does not] have fifty (50) or more employees.

Where the bid of the apparent low responsible bidder is in the amount of $1 million or more, the bidder and his know first-tier subcontractors which will be awarded subcontracts of $1 million or more will be subject to full, on-site, preaward equal employment opportunity compliance reviews before award of the contract for the purpose of determining whether the bidder and his subcontractors are able to comply with the provisions of the equal opportunity clause.

Within 30 days after the award of this contract, the Contractor shall file a compliance report(Standard Form 100), if:

(1) The Contractor has not submitted a complete compliance report within 12 months proceeding the date of the award:
(2) The Contractor is within the definition of "Employer" in Paragraph 2.e(3) of the instruction included in Standard Form 100.

The Contractor shall require the subcontractor on any first-tier subcontract, in amounts in excess of $50,000.00, to file Standard Form 100 within 30 days after award of the subcontract if the above two conditions apply. Standard Form 100 is available at the following address:

Joint Reporting Committee
EEO-1 P.O. Box 2596
Norfolk, VA 22501

CERTIFICATION OF NONSEGREGATED FACILITIES

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the equal opportunity clause in this contract. As used in this certification, the term "segregated facilities" 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 which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex or national origin, because of habit, local custom, or any other reason. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications form proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the equal opportunity clause, and that he will retain such certifications in his files.

NON SEGREGATED FACILITIES

NOTICE OF PROSPECTIVE FEDERALLY ASSISTED CONSTRUCTION CONTRACTORS:

1. A Certification of Nonsegregated Facilities must be submitted prior to the award of a federally assisted construction contract exceeding $10,000, which is not exempt from the provisions of the equal opportunity clause.

2. Contractors receiving federally assisted construction contract awards exceeding $10,000, which are not exempt from the provisions of the equal opportunity clause will be required to provide for the forwarding of the notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the equal opportunity clause. NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

DISADVANTAGED BUSINESS ENTERPRISE PROVISIONS

1. It is the policy of the City of Flandreau, South Dakota that disadvantaged business enterprises as defined in 49 CFR Part 23 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this contract. Consequently, the DBE requirements of 49 CFR part 23 apply to this contract.

2. The contractor agrees to ensure the disadvantaged business enterprises as defined in 49 CFR Part 23 have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds provided under this contract. In this regard, all contractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 23 to ensure that disadvantaged business enterprises have the maximum opportunity to compete for and perform contracts. Contractors shall not discriminate on the basis of race, color, national origin or sex in the award and performance of DOT-assisted contracts.

The DBE contract goals for this project have been set as follows:

DBE 0.00 % *

* The South Dakota Department of Transportation (SDDOT) is the Unified Certification Program (UCP) for South Dakota. The SDDOT implemented an Interim Final Rule (IFR) on October 3, 2025 that immediately implemented changes to the DBE certifications are assessed and requires a reevaluation process. These changes include the suspension of goal setting until the reevaluation is finalized. Therefore in the interim, the City of Redfield will implement an interim DBE Goal of 0.00 percent for this project.

These contract goals apply to the prime contractor and the percentage of participation established is based on the amount of work that could be accomplished by certified DBE firms compared to the total contract amount.

A contractor may count toward its DBE goal expenditures for materials and supplies obtained from DBE suppliers and manufacturers, provided that the DBE's assume the actual and contractual responsibility for the provision of the materials and supplies. The contractor may count its entire expenditure to a DBE manufacturer (i.e., a supplier that produces goods from raw materials or substantially alters them before resale). The contractor may count 60 percent of its expenditures to DBE suppliers that are not manufacturers, provided that the DBE supplier performs a commercially useful function in the supply process.

The contractor will fully execute the Disadvantaged Business Enterprise Assurance attached to this proposal to be considered an eligible bidder.

The apparent successful contractor within 15 days after bid opening, prior to being awarded the contract, will be required to submit the name and address of any subcontractor which are DBE firms, description of work and dollar amount along with a certification of compliance with a good faith attempt to secure DBE participation. This certification of compliance shall include a listing of the methods used by the contractor to attempt to secure DBE participation, is the Disadvantaged Business Enterprise Participation form attached to this proposal. (Form SDDOT (OA) 289-A, 2-38-92)

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION AS REQUIRED BY 49 CFR PART 29

The bidder certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this proposal that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the bidder/contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this solicitation/proposal.

CERTIFICATION REGARDING FOREIGN TRADE RESTRICTIONS AS REQUIRED BY 49 CFR PART 30

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

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, United States Code, 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:

(1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the U.S.T.R. or

(2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such U.S.T.R. list or

(3) who incorporates in the public works project any product of a foreign country on such U.S.T.R. 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 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 U.S.T.R, 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 may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

Certification prohibiting the use of Federal Funds for lobbying and influencing Federal Employees.

The contractor or subcontractor, by submission of an offer and/or execution of a contract, certifies the following:

1. No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, 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 the awarding of any Federal contract, the making of any Federal grant, the agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer of employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, load, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobby Activities," in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was paced 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 civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

BUY AMERICAN - STEEL AND MANUFACTURED PRODUCTS FOR CONSTRUCTION CONTRACTS

The Buy-American Preference requirement in 49 USC § 50101 requires that all steel and manufactured goods used on AIP projects be produced in the United States. The statute gives the FAA the ability to issue a waiver to a sponsor to use non-domestic material on the AIP funded project. The sponsor may request that the FAA issue a waiver from the Buy American Preference requirements if the FAA finds that:

1) Applying the provision is not in the public interest;
2) The steel or manufactured goods are not available in sufficient quantity or quality in the United States;
3) The cost of components and subcomponents produced in the United States is more than 60 percent of the total components of a facility or equipment, and final assembly has taken place in the United States. Items that have an FAA standard specification item number (such as specific airport lighting equipment) are considered the equipment.
4) Applying this provision would increase the cost of the overall project by more than 25 percent.

Buy American Conformance List. The FAA Office of Airports maintains a listing of equipment that has received National waivers from the Buy American Preference requirements or that fully meet the Buy American requirements. This Buy American Conformance List is available online at www.faa.gov/airports/aip/buy_american/. Products listed on the Buy American Conformance list do not require a project specific Buy American Preference requirement waiver from the FAA.

CERTIFICATE OF BUY AMERICAN COMPLIANCE FOR TOTAL FACILITY

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend 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 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:

- To provide to the Owner evidence that documents the source and origin of the iron, steel and/or manufactured product.
- To faithfully comply with providing US domestic products.
- To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.
- 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% Buy American Preferences of 49 USC § 50101(a) but may qualify for either 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 the submit to the Airport Sponsor or FAA within 15 calendar days of being selected as a 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 US domestic products at or above the approved US domestic content percentage as approved by the FAA.
d) To furnish US 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 Nonavailabilty 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 that 60% 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% US 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 require documentation for this waiver is:

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

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

Date	Signature
Company Name	Title

ASBESTOS-CONTAINING MATERIALS STATEMENT

IN ACCORDANCE WITH THE PROVISIONS OF SDCL 34-44-8, ALL BIDDERS AND CONTRACTORS ARE HEREBY NOTIFIED THAT THIS PROJECT DOES NOT INVOLVE ASBESTOS-CONTAINING MATERIALS. BIDDERS ARE FURTHER NOTIFIED THAT NO ASBESTOS-CONTAINING MATERIALS ARE TO BE INSTALLED IN THIS PROJECT.

RUNWAY 11/29 & PARALLEL TAXIWAY CONSTRUCTION
FLANDREAU MUNICIPAL AIRPORT
AIP #3-46-0077-018-2026
A-9873

Base Bid - Runway 11/29 Grading and Aggregates

Item No.	Spec No.	Item Description	Quantity	Unit	Unit Price	Total Price
1	C-105	Mobilization	1	L.S.	$	$
2	C-100	Contractor Quality Control Program	1	L.S.	$	$
3	S-100	Construction Safety Phasing Plan	1	L.S.	$	$
4	P-152	Unclassified Excavation	121,004	CuYd	$	$
5	P-152	On-Site Borrow Material	43,268	CuYd	$	$
6	P-154	Subbase Course (Furnished)	20,681	CuYd	$	$
7	P-154	Geotextile Separator Fabric	33,842	SqYd	$	$
8	P-154	Geogrid	1,500	SqYd	$	$
9	P-208	Aggregate Base Course	5,362	CuYd	$	$
10	F-161	Furnish and Install Barbed Wire Fence	6,630	Ft	$	$
11	F-161	Furnish and Install 20' Tubular Swing Gate	3	Each	$	$
12	D-701	48" RCP	280	Ft	$	$
13	D-701	48" RCP Flared End	2	Each	$	$
14	D-701	24" RCP	114	Ft	$	$
15	D-701	24" RCP Flared End	2	Each	$	$
16	D-705	4" Perforated Underdrain Pipe	7,642	Ft	$	$
17	D-705	4"Solid Wall Underdrain Pipe	131	Ft	$	$
18	D-705	Underdrain Cleanout	20	Each	$	$
19	D-705	Underdrain Tee	1	Each	$	$
20	D-705	Underdrain Cross	1	Each	$	$
21	D-705	Connect Underdrain to RCP Storm Sewer	2	Each	$	$
22	T-901	Seeding and Fertilizing	35.0	Acre	$	$
23	T-905	Topsoil (Removed from Stockpile)	18,420	CuYd	$	$
24	T-908	Mulching	169,400	SqYd	$	$
25	Plans	Remove and Dispose Existing Barb Wire Fence	3,920	Ft	$	$
26	Plans	Underdrain Outlet Structure	1	Each	$	$
27	Plans	Culvert Protection	6	Each	$	$
28	Plans	Erosion Control Wattle	20	Each	$	$
29	Plans	High Flow Silt Fence	590	Ft	$	$
30	L-110	Sand-Encased, Electrical Conduit, (2) 2-Inch, Type III, Sch. 80 PVC in Trench	190	Ft	$	$
31	L-110	Sand-Encased, Electrical Conduit, (3) 2-Inch, Type III, Sch. 80 PVC in Trench	120	Ft	$	$
Total Base Bid					**$**	

Subtotal Base Bid items 1 – 31 inclusive $_____

Written: _____
_____Dollars
All Items Furnished and Installed

*For Base Bid, Unit Prices will govern where used. Incorrect extensions or totals will be corrected and the corrected figures will be used in determining the low bidder. Final contract amount after construction will be determined based upon final quantities and unit price.

Alternate Bid 1 - Runway 11/29 Asphalt Surfacing

Item No.	Spec No.	Item Description	Quantity	Unit	Unit Price	Total Price
1-1	C-105	Mobilization	1.0	L.S.	$	$
1-2	C-100	Contractor Quality Control Program	1.0	L.S.	$	$
1-3	P-401	Asphalt Base/Surface Course	7,730.8	Ton	$	$
1-4	P-401	Asphalt Binder (PG 64-34)	541.2	Ton	$	$
1-5	P-602	Emulsified Asphalt Prime Coat	41.5	Ton	$	$
1-6	P-603	Emulsified Asphalt Tack Coat	13.5	Ton	$	$
1-7	P-620	Runway and Taxiway Pavement Markings (White)	15,020	SqFt	$	$
1-8	P-620	Runway and Taxiway Pavement Markings (Yellow)	563	SqFt	$	$
1-9	P-620	Runway and Taxiway Pavement Markings (Black)	363	SqFt	$	$
1-10	P-620	Temporary Runway and Taxiway Pavement Markings (White)	15,020	SqFt	$	$
1-11	P-620	Temporary Runway and Taxiway Pavement Markings (Yellow)	563	SqFt	$	$
1-12	P-620	Temporary Runway and Taxiway Pavement Markings (Black)	363	SqFt	$	$
Total Alternate Bid 1					**$**	

Subtotal Alternate Bid 1 items 1-1 to 1-12 inclusive $_____

Written: _____
_____Dollars
All Items Furnished and Installed

*For Alternate Bid 1, Unit Prices will govern where used. Incorrect extensions or totals will be corrected and the corrected figures will be used in determining the low bidder. Final contract amount after construction will be determined based upon final quantities and unit price.

Alternate Bid 2 - Parallel (Sta 801+75 to 819+75) and Connector Taxiways and Lighting

Item No.	Spec No.	Item Description	Quantity	Unit	Unit Price	Total Price
2-1	C-105	Mobilization	1.0	L.S.	$	$
2-2	C-100	Contractor Quality Control Program	1.0	L.S.	$	$
2-3	S-100	Construction Safety Phasing Plan	1.0	L.S.	$	$
2-4	P-101	Asphalt Cold Milling (2.5" Nominal Depth)	2,532	SqYd	$	$
2-5	P-101	Asphalt Pavement/Base Removal (10" Nominal Depth)	6,259	SqYd	$	$
2-6	P-152	Unclassified Excavation	23,449	CuYd	$	$
2-7	P-152	Disposal of Excess Material	1,121	CuYd	$	$
2-8	P-154	Subbase Course (Furnished)	3,116	CuYd	$	$
2-9	P-154	Subbase Course (Recycled)	2,022	CuYd	$	$
2-10	P-154	Geotextile Separator Fabric	8,407	SqYd	$	$
2-11	P-154	Geogrid	1,500	SqYd	$	$
2-12	P-208	Aggregate Base Course	1,352	CuYd	$	$
2-13	P-208	Reshape and Recompact Base Prior to Overlay	2,532	SqYd	$	$
2-14	P-401	Asphalt Base/Surface Course	2,412.9	Ton	$	$
2-15	P-401	Asphalt Binder (PG 64-34)	168.9	Ton	$	$
2-16	P-602	Emulsified Asphalt Prime Coat	13.0	Ton	$	$
2-17	P-603	Emulsified Asphalt Tack Coat	3.2	Ton	$	$
2-18	P-620	Taxiway Pavement Markings (Yellow)	1,238	SqFt	$	$
2-19	P-620	Temporary Taxiway Pavement Markings (Yellow)	1,239	SqFt	$	$
2-20	D-701	24" RCP	292	Ft	$	$
2-21	D-701	24" RCP Flared End	4	Each	$	$
2-22	D-705	4" Perforated Underdrain Pipe	3,124	Ft	$	$
2-23	D-705	Underdrain Cleanout	11	Each	$	$
2-24	D-705	Connect Underdrain to RCP Storm Sewer	11	Each	$	$
2-25	D-705	Underdrain Tee	2	Each	$	$
2-26	D-705	Underdrain Bend	2	Each	$	$
2-27	T-901	Seeding and Fertilizing	13.0	Acre	$	$
2-28	T-905	Topsoil (Removed from Stockpile)	5,344	CuYd	$	$
2-29	T-908	Mulching	62,920	SqYd	$	$
2-30	Plans	Remove and Dispose Existing Culvert	200	Ft	$	$
2-31	Plans	Culvert Protection	6	Each	$	$
2-32	Plans	High Flow Silt Fence	370	Ft	$	$
2-33	01 51 26	Temporary Phasing Work, Electrical	1	L.S.	$	$
2-34	L-107	Remove & Salvage Existing Primary Wind Cone; Remove & Dispose of Concrete Footing & Junction Box	1	Each	$	$
2-35	L-107	L-807, LED, Style 1B (Internally Lit), Size 2 (12 Feet), Primary Wind Cone w/ Single L-810 LED Steady Burn Red Obstruction Light, Including Concrete Footing, Concrete Site Pad, & Electrical Equipment Rack	1	Each	$	$
2-36	L-108	1/C No. 8 AWG, 5 kV, XLPE, L-824, Type C Cable, Installed in Conduit	10,000	Ft	$	$

Item No.	Spec No.	Item Description	Quantity	Unit	Unit Price	Total Price
2-37	L-108	1/C No. 4 AWG, Cu, 600 V, THWN-2, Installed in Conduit	2,820	Ft	$	$
2-38	L-108	1/C No. 8 AWG, Cu, 600 V (GND), THWN-2, Installed in Conduit	1,410	Ft	$	$
2-39	L-108	1/C No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Including Trenching or Plowing, Including Ground Rods, Exothermic Welded Bonds, & Terminations	8,688	Ft	$	$
2-40	34 43 26.13	L-821, Airport Lighting Control Panel, Type I (Conventional), Class W (Wall-Mounted), Style 1 (Unlighted), Mode 1 (Generic)	1	Each	$	$
2-41	34 43 26.16	L-854, Type I, Air-to-Ground, Radio Control Equipment w/ Heavy Duty Antenna & Mounting Brackets	1	Each	$	$
2-42	34 43 26.19	L-829 Constant Current Regulator (CCR) w/ Monitoring Options, Class 1 (6.6 A), Style 1 (3-Step), Size 7.5 kW, Including Spare Parts	1	Each	$	$
2-43	L-109	Electrical Vault Work, Complete	1	L.S.	$	$
2-44	L-109	10' x 12' Pre-Fabricated, Airfield Electrical, Lighting, & Control Vault Building, Including Footings, Floor, Site Preparation, & Restoration	1	Each	$	$
2-45	L-110	Abandon Existing DEB Cable	1	L.S.	$	$
2-46	L-110	Abandon Existing DEB Counterpoise	1	L.S.	$	$
2-47	L-110	Trenching & Backfilling or Plowing for Conduit	9,505	Ft	$	$
2-48	L-110	Non-Encased, Electrical Conduit, (1) 2-Inch, Type I, Sch. 40 PVC in Trench or SDR 13 HDPE Plowed	10,790	Ft	$	$
2-49	L-110	Sand-Encased, Electrical Conduit, (2) 2-Inch, Type III, Sch. 80 PVC in Trench	130	Ft	$	$
2-50	L-110	Cable Markers	12	Each	$	$
2-51	L-115	L-867B (12"), Class 1A, Junction Box w/ Flat Etched Steel Cover	9	Each	$	$
2-52	L-115	L-867E (24"), Class 1A, Junction Box w/ Flat Etched Steel Cover	1	Each	$	$
2-53	L-125	Remove & Salvage Existing Runway Stake-Mounted Threshold Lights; Abandon Existing Transformers	12	Each	$	$
2-54	L-125	Remove & Salvage Existing Runway Stake-Mounted Edge Lights; Abandon Existing Transformers	27	Each	$	$
2-55	L-125	Remove & Salvage Existing Taxiway Stake-Mounted Edge Lights; Abandon Existing Transformers	4	Each	$	$
2-56	L-125	Remove & Salvage Existing Precision Approach Path Indicators (PAPI), Power Control Units, & Transformers; Remove & Dispose of Concrete Footings and Site Pads (2 per SET)	2	Set	$	$
2-57	L-125	Remove & Salvage Existing Sign; Remove & Dispose of Concrete Sign Pad	1	Each	$	$
2-58	L-125	L-853, Retroreflective Marker, Type II (Elevated), Style I (Plowable), Soil Anchored	88	Each	$	$
2-59	L-125	L-861, 30-Inch Elevated, Mode 1, LED, Medium Intensity Runway Light (MIRL), White/Yellow, Including Base Can & Concrete	34	Each	$	$
2-60	L-125	L-861T, 30-Inch Elevated, Mode 1, LED, Medium Intensity Taxiway Light (MITL), Blue, Including Light Base Can & Concrete	20	Each	$	$
2-61	L-125	L-858R, Mandatory, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 2-Module Including Concrete Sign Pad	4	Each	$	$

Item No.	Spec No.	Item Description	Quantity	Unit	Unit Price	Total Price
2-62	L-125	L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 2-Module Including Concrete Sign Pad	2	Each	$	$
2-63	L-125	L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 3-Module Including Concrete Sign Pad	1	Each	$	$
2-64	L-125	L-881, Abbreviated Precision Approach Path Indicator (PAPI), Style B (Current), Class 2, LED w/ Baffles, Including Concrete Footings, Junction Boxes, & Concrete Site Pads	2	Set	$	$
2-65	L-125	Lighting & Signage Spare Parts	1	L.S.	$	$
Total Alternate Bid 2					**$**	

Subtotal Alternate Bid 2 items 2-2 to 2-65 inclusive $_____

Written: _____

_____Dollars

All Items Furnished and Installed

*For Alternate Bid 2, Unit Prices will govern where used. Incorrect extensions or totals will be corrected and the corrected figures will be used in determining the low bidder. Final contract amount after construction will be determined based upon final quantities and unit price.

Alternate Bid 3 - Parallel and Connector Taxiway (Sta 819+75 to 842+50)

Item No.	Spec No.	Item Description	Quantity	Unit	Unit Price	Total Price
3-1	C-105	Mobilization	1.0	L.S.	$	$
3-2	C-100	Contractor Quality Control Program	1.0	L.S.	$	$
3-3	S-100	Construction Safety Phasing Plan	1.0	L.S.	$	$
3-4	P-101	Asphalt Cold Milling (2.5" Nominal Depth)	5,148	SqYd	$	$
3-5	P-101	Asphalt Pavement/Base Removal (10" Nominal Depth)	8,402	SqYd	$	$
3-6	P-152	Unclassified Excavation	28,773	CuYd	$	$
3-7	P-152	Disposal of Excess Material	13,942	CuYd	$	$
3-8	P-154	Subbase Course (Furnished)	797	CuYd	$	$
3-9	P-154	Subbase Course (Recycled)	2,329	CuYd	$	$
3-10	P-154	Geotextile Separator Fabric	5,116	SqYd	$	$
3-11	P-154	Geogrid	1,500	SqYd	$	$
3-12	P-208	Aggregate Base Course	915	CuYd	$	$
3-13	P-208	Reshape and Recompact Base Prior to Overlay	5,042	SqYd	$	$
3-14	P-401	Asphalt Base/Surface Course	2,293.4	Ton	$	$
3-15	P-401	Asphalt Binder (PG 64-34)	160.5	Ton	$	$
3-16	P-602	Emulsified Asphalt Prime Coat	12.3	Ton	$	$
3-17	P-603	Emulsified Asphalt Tack Coat	4.0	Ton	$	$
3-18	P-620	Runway and Taxiway Pavement Markings (Yellow)	1,153.0	SqFt	$	$
3-19	P-620	Temporary Runway and Taxiway Pavement Markings (Yellow)	1,154.0	SqFt	$	$

Item No.	Spec No.	Item Description	Quantity	Unit	Unit Price	Total Price
3-20	D-701	18" RCP	175	Ft	$	$
3-21	D-701	18" RCP Flared End	2	Each	$	$
3-22	D-705	4" Perforated Underdrain Pipe	2,107	Ft	$	$
3-23	D-705	4"Solid Wall Underdrain Pipe	108	Ft	$	$
3-24	D-705	Underdrain Cleanout	5	Each	$	$
3-25	D-705	Connect Underdrain to RCP Storm Sewer	2	Each	$	$
3-26	D-705	Underdrain Tee	2	Each	$	$
3-27	T-901	Seeding and Fertilizing	18.0	Acre	$	$
3-28	T-905	Topsoil (Removed from Stockpile)	9,233	CuYd	$	$
3-29	T-908	Mulching	87,120	SqYd	$	$
3-30	Plans	Underdrain Outlet Structure	1	Each	$	$
3-31	Plans	Remove and Dispose Existing Culvert	250	Ft	$	$
3-32	Plans	Culvert Protection	6	Each	$	$
3-33	L-125	L-853, Retroreflective Marker, Type II (Elevated), Style I (Plowable), Soil Anchored	57	Each	$	$
3-34	L-125	L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 3-Module Including Concrete Sign Pad	1	Each	$	$
3-35	L-125	L-858R/L, Mandatory/Location, Airfield Sign, Size 1, Style 4 (Unlighted), Mode 1, 4-Module Including Concrete Sign Pad	1	Each	$	$
Total Alternate Bid 3					**$**	

Subtotal Alternate Bid 3 items 3-1 to 3-35 inclusive $_____

Written: _____

_____Dollars

All Items Furnished and Installed

*For Alternate Bid 3, Unit Prices will govern where used. Incorrect extensions or totals will be corrected and the corrected figures will be used in determining the low bidder. Final contract amount after construction will be determined based upon final quantities and unit price.

Total Base Bid, Alternate Bids 1-3, all items inclusive $_____

Written: _____

_____Dollars

All Items Furnished and Installed

The undersigned bidder understands and agrees that the bidder is to furnish all necessary labor, tools, materials and equipment required to fully complete the work covered by this contract.

The undersigned bidder hereby agrees to enter into the prescribed contract and to furnish and execute the required Surety Bond within fifteen (15) days from the date of acceptance of this proposal and further agrees to fully complete the entire work within the schedule of working days after due notification by the Engineer that the contract and bond have been accepted and approved by the City of Flandreau, South Dakota.

As evidence of good faith, we herewith submit a certified check or cashier's check on a State or National Bank domiciled within the State of South Dakota in the amount of $_____, being five percent (5%) of the total amount bid, or a Bid Bond in the amount of ten percent (10%) of the total amount bid issued by a surety authorized to do business in the State of South Dakota, which shall become the property of the City of Flandreau, South Dakota should this proposal be accepted and the contract awarded to us and we fail to enter into the contract and furnish the specified bond in the form attached and prescribed; but otherwise, the check and bid bond shall be returned to the undersigned, upon the signing and acceptance of the executed contract and executed bond by the City of Flandreau, South Dakota.

The undersigned acknowledges that they have read and understand the Asbestos-Containing Materials Statement contained in the project manual.

Respectfully submitted:

_____
(Name of Firm)

_____
(Business Address)

_____
(Business Phone Number)

_____
(Signature of Responsible Official)

_____
(Title)

We acknowledge receipt of Addendum No._____.

ATTACHMENT FOR PROPOSAL

BIDDERS MUST EXECUTE THE FOLLOWING Form 289A

FLANDREAU MUNICIPAL AIRPORT

Disadvantage Business Enterprise (DBE) Assurance and Intended DBE Participation

Project No. AIP # 3-46-0077-018-2026

Policy: **It is the policy of the City of Flandreau that disadvantaged businesses, as defined in 49 CFR 26, shall have equal opportunity to participate in the performance of contracts financed in whole or part with federal funds. Consequently, the DRE requirements of 49 CFR Part 26 apply to this agreement.**

DBE Contract Goal 0.00* percent

*See justification on Sheet 266 of the "Proposal"

Contractors DBE Obligation

Prime contractors bidding on projects of The City of Flandreau, South Dakota agree to ensure that DBEs, as defined in 49 CFR Part 26, have equal opportunity to participate in the performance of contracts or subcontracts financed in whole or in part with federal funds. The prime contractor and its subcontractors shall not discriminate on the basis of race, color, national origin or sex in the award and administration or performance of contracts. Each bidder intending to subcontract any portion of the contract shall affirmatively solicit DBE interest, capabilities and prices and shall document such efforts and results that will be provided to The City of Flandreau, South Dakota upon request. The contractor is obligated to consider DBE firms as potential subcontractors throughout the life of the contract, and if a quote is received from a DBE firm, the contractor may use all or part of their quote.

The following section is to be used to list all intended DBE participation for this project regardless of whether it includes a DBE contract goal.

List DBE firms by name. Provide the bid item numbers and a general description of the work performed, or materials to be furnished. The contractor must use the DBEs listed and for the intended work as indicated on the form. The low bidder must submit a "DBE Notification of Intent to Subcontract" form 289B signed by each DBE listed on this form to the engineering consultant within 7 days of the bid opening,

For DBE trucking companies, list only the amount of hauling to be performed with each DBE's own trucks. DBE prime contractors list the work you will perform with your own forces, and any worked subcontracted or materials purchased from other DBEs.

DBE _____
Bid
Item(s) _____
Work
Description _____

$ value = $ _____

If regular dealer X 60% $ _____

DBE _____
Bid
Item(s) _____
Work
Description _____

$ value = $ _____

If regular dealer X 60% $ _____

DBE _____
Bid
Item(s) _____
Work
Description _____

$ value = $ _____

If regular dealer X 60% $ _____

DBE _____
Bid
Item(s) _____
Work
Description _____

$ value = $ _____

If regular dealer X 60% $ _____

(Add all DBE dollar values) **Total dollar value of DBE** $_____

Total bid amount $_____

Percent DBE participation _____%

(Copy additional pages if necessary)

Assurance

For this contract, and each subcontract signed with a subcontractor, I, acting in my capacity as an officer of the undersigned bidder, assure The City of Flandreau, South Dakota that I shall not discriminate on the basis of race, color, national origin or sex in the performance of the contract. I shall carry out applicable requirements of 49 CFR 26 in the award and administration of DOT-assisted contracts. Failure to carry out these requirements is a material breach of this contract" which may result in the termination of this contract or other remedy as The City of Flandreau, South Dakota deems appropriate.

I understand if a DBE subcontractor/supplier is unable to perform successfully any part of the intended work, my company is required to make sufficient reasonable efforts to utilize an alternate DBE firm, to provide written documentation of efforts to find an alternate, and to secure prior approval of any substitution from the Engineer.

_____ _____

Name of Company (print or type) Date

By_____ _____

Signature of Company Official Title

South Dakota Department of Transportation
Roster of Certified DBE Firms

The most current Roster of Certified DBE Firms can be found on the South Dakota Department of Transportation's website at:

https://dot.sd.gov/doing-business/contractors/dbe

CONTRACT

FOR

AIRPORT PROJECT NO. 3-46-0077-018-2026

LOCATED AT FLANDREAU, SOUTH DAKOTA

THIS CONTRACT AND AGREEMENT, made and entered into this ___ day of_____, 2026, by and between the City of Flandreau, South Dakota, Owner, and _____, Contractor:

WITNESSETH: That the Contractor, for and in consideration of $_____based on the unit bid prices payable as set forth in the specifications constituting a part of this Contract, hereby agrees to construct in accordance with the plans, specifications and special provisions therefore, and in the location designated in the special provisions, the various items of work awarded said Contractor on the _____ day of _____, 2026, as follows, being items numbered:

_____

_____

_____

_____

as shown in schedule of prices bid in the attached proposal which is a part of this Contract.

The project work will be completed within the time limit as follows:
See Special Conditions section SC-6.

That it is mutually understood and agreed by parties hereto that the general detailed plans, the Contractor's bonds, the proposal, all project specifications and special provisions, and all supplemental agreements are a part of this Contract.

The Contractor expressly warrants that he has employed no third person to solicit or obtain this Contract in his behalf, or to cause or procure the same to be obtained upon compensation in any way contingent, in whole or in part, upon such procurement, or in compensation for services in connection herewith, any brokerage, commission or percentage upon the amount to be received by him hereunder, and that he has not, in estimating the contract price demanded by him, included any sum by reason of any such brokerage, commission or percentage; and that all monies payable to him herewith are free from obligation of any other person for services rendered, or supposed to have been rendered, in the procurement of this Contract. He further agrees that any breach of this warrant shall constitute adequate cause for the annulment of this Contract by the Sponsor, and that the said Sponsor may retain for its own use, from any sums due or to become due hereunder, an amount equal to any brokerage, commission, or percentage, so paid or agreed to be paid.

All work required in carrying out this Contract shall be performed in compliance with the laws of the

State of South Dakota.

That the Contractor further agrees to pay all just claims for material, supplies, tools, fuels, lubricants, equipment, equipment rental machinery, insurance premiums, and services used or consumed in the construction of the work by him or any of his subcontractors, and for the payment of all laborers and mechanics for all labor performed in the work by him or any of his subcontractors, and for all other just claims filed against him or any of his subcontractors in carrying out the provisions of this Contract and further agrees that the Contractor's bond shall be held to cover all such claims.

The Contractor further agrees to perform the work under the direct supervision of the Sponsor, subject to inspection at all times by the South Dakota Department of Transportation and the Federal Aviation Administration or their authorized agents, and in accordance with the laws of the State of South Dakota and all the rules and regulations issued for the purpose of carrying out the provisions of the Airport and Airway Improvement Act of 1982, as amended by the Airport and Airway Safety And Capacity Expansion Act of 1987, (84 Stat. 219) and Part 152 of the Federal Aviation Regulations (14 CFR Part 152).

The Contractor further agrees that the Contractor and any subcontractor shall comply with all Federal-aid contract requirements as made part of this contract work in surrounding or under working conditions which are unsanitary hazardous, or dangerous to his health or safety, as determined under construction safety and health standards. (Title 29 Code of Federal Regulations, Part 1518 [36 F.R. 7340]) promulgated by the United States Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act, (82 Stat. 96).

The following is an index of Contract Clauses:

INDEX OF CONTRACT CLAUSES

A1 Access to Records and Reports

A2 Breach of Contract

A3 Buy American Preferences

A4 Civil Rights – General

A5 Civil Rights – Title VI Assurances

A6 Clean Air and Water Pollution Control

A7 Contract Workhours and Safety Standards Ace Requirements

A8 Copeland "Anti-Kickback" Act

A9 Davis Bacon Requirements

A10 Debarment and Suspension

A11 Disadvantaged Business Enterprise

A12 Distracted Driving

A13 Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment

A14 Drug Free Workplace Requirements

A15 Federal Fair Labor Standards Act (Federal Minimum Wage)

A16 Lobbying and Influencing Federal Employees

A17 Occupational Safety and Health Act of 1970

A18 Procurement of Recovered Materials

A19 Right to Inventions

A20 Seismic Safety

A21 Tax Delinquency and Felony Convictions

A22 Termination of Contract

A23 Trade Restriction Certification

A24 Veteran's Preference

A25 Domestic Preferences for Procurements

A26 Prohibition of Covered Unmanned Aircraft Systems (UAS)

A1 ACCESS TO RECORDS AND REPORTS

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

A2 BREACH OF CONTRACT TERMS

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

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

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

A3 BUY AMERICAN PREFERENCE

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

The bidder or offeror must complete and submit the certification of compliance with FAA's Buy American Preference, BABA, and Made in America laws included herein with their bid or offer. The 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 construction 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.

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

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

A4 CIVIL RIGHTS - GENERAL

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.

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

A5 CIVIL RIGHTS – TITLE VI ASSURANCE

The Sponsor, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC §§ 2000d to 2000d-4), 28 CFR § 50.3, and 49 CFR Part 21, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, all contractors will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of the owner's race, color, national origin, sex, creed, sex, age or disability in consideration for an award.

This provision is in addition to that required by Title VI of the Civil Rights Act of 1964

A5.1 CONTRACT CLAUSES

A5.1.1 Title VI List of Pertinent Nondiscrimination Acts and Authorities

Title VI List of Pertinent Nondiscrimination Acts and Authorities

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

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

A5.1.2 Nondiscrimination Requirements/Title VI Clauses for Compliance

Compliance with Nondiscrimination Requirements:

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

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

2) **Nondiscrimination:** The Contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin, creed, sex, age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21, including amendments thereto.

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

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

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

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

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

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.

A6 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.

A7 CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS

1. Overtime Requirements.

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

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

In the event of any violation of the clause set forth in paragraph (1) of this clause, the Contractor and any subcontractor responsible therefore 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 $33 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of

forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this clause.

3. Withholding for Unpaid Wages and Liquidated Damages.

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

4. Subcontractors.

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

A8 COPELAND "ANTI-KICKBACK" ACT

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

A9 DAVIS-BACON REQUIREMENTS

1. Minimum Wages.

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

relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

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

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

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

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

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

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers, or mechanics to be employed in the classification, or their representatives, and the contracting officer do not agree on the proposed classification

and wage rate (including the amount designated for fringe benefits where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

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

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

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

2. Withholding.

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

3. Payrolls and Basic Records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and

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

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

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

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

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

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

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

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

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

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the

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

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

Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

5. Compliance with Copeland Act Requirements.

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

6. Subcontracts.

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

7. Contract Termination: Debarment.

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

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

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

9. Disputes Concerning Labor Standards.

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

10. Certification of Eligibility.

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

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

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

A10 DEBARMENT AND SUSPENSION

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.

A11 DISADVANTAGED BUSINESS ENTERPRISE

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 responsibility, every Bidder or Offeror must submit the following information on the forms provided herein within five days after bid opening.

1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;
2) A description of the work that each DBE firm will perform;
3) The dollar amount of the participation of each DBE firm listed under (1);
4) Written statement from Bidder or Offeror that attests their commitment to use the DBE firm(s) listed under (1) to meet the Owner's project goal;

5) Written confirmation from each listed DBE firm that it is participating in the contract in the kind and amount of work provided in the prime contractor's commitment; and
6) If Bidder or Offeror cannot meet the advertised project DBE goal, evidence of good faith efforts undertaken by the Bidder or Offeror as described in appendix A to 49 CFR Part 26 including any amendments thereto. The documentation of good faith efforts must include copies of each DBE and non-DBE subcontractor quote submitted to the bidder when a non-DBE subcontractor was selected over a DBE for work on the contract.

The requirements of 49 CFR part 26 apply to this contract. It is the policy of the City of Flandreau 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.

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

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

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 15 days from the receipt of each payment the prime contractor receives from Sponsor. The prime contractor agrees further to return retainage payments to each subcontractor within 15 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 solicitation language (or an approved substitute DBE firm) without prior written consent of the City of Flandreau. 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 of the City of Flandreau. Unless City of Flandreau 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.

The City of Flandreau may provide such written consent only if the City of Flandreau 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 the City of Flandreau 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 the City of Flandreau, 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 City of Flandreau and the contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why the City of Flandreau should not approve the prime contractor's action. If required in a particular case as a matter of public necessity (e.g., safety), the City of Flandreau may provide a response period shorter than five days.

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

A12 DISTRACTED DRIVING

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

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

A13 PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

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

A14 DRUG FREE WORKPLACE REQUIREMENTS

The Drug-Free Workplace Act of 1988 requires some Federal contractors and *all* Federal grantees to agree that they will provide drug-free workplaces as a condition of receiving a

contract or grant from a federal agency. The Act does ***not*** apply to contractors, subcontractors, or subgrantees, although the Federal grantees workplace may be where the contractors, subcontractors, or subgrantees are working.

A15 FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

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

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

A16 LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

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

1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 31 U,S, § 1352. Any person who

fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

A17 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. 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.

A18 PROCUREMENT OF RECOVERED MATERIALS

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

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

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

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

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

1) Not reasonably available within a timeframe providing for compliance with the contract performance schedule;
2) Fails to meet reasonable contract performance requirements; or
3) Is only available at an unreasonable price.

A19 RIGHT TO INVENTIONS

Contracts or agreements that include the performance of experimental, developmental, or research work must provide for the rights of the Federal Government and the Owner in any resulting invention as established by 37 CFR part 401, Rights to Inventions Made by Non-profit Organizations and Small

Business Firms under Government Grants, Contracts, and Cooperative Agreements. This contract incorporates by reference the patent and inventions rights as specified within 37 CFR § 401.14. Contractor must include this requirement in all sub-tier contracts involving experimental, developmental, or research work.

A20 SEISMIC SAFETY

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

A21 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

1) 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.
2) The applicant represents that it is ( ) is not ( ) 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 owner about its tax liability or conviction to the Owner, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

Term Definitions

Felony conviction: Felony conviction means a conviction within the preceding twenty-four(24) months of a felony criminal violation under any Federal law and includes conviction of an

offense defined in a section of the U.S. Code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 USC § 3559.

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

A22 TERMINATION OF CONTRACT

TERMINATION FOR CONVENIENCE (CONSTRUCTION & EQUIPMENT CONTRACTS)

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

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

Owner agrees to pay Contractor for:

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

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

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

TERMINATION FOR CAUSE (EQUIPMENT)

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

1) Fails to begin the Work under the Contract within the time specified in the Notice- to-Proceed;
2) Fails to make adequate progress as to endanger performance of this Contract in accordance with its terms;
3) Fails to make delivery of the equipment within the time specified in the Contract, including any Owner approved extensions;
4) Fails to comply with material provisions of the Contract;
5) Submits certifications made under the Contract and as part of their proposal that include false or fraudulent statements; or
6) Becomes insolvent or declares bankruptcy.

If one or more of the stated events occur, the Owner will give notice in writing to the Contractor and Surety of its intent to terminate the contract for cause. At the Owner'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 Owner, the Owner has authority to acquire equipment by other procurement action. The Contractor will be liable to the Owner for any excess costs the Owner incurs for acquiring such similar equipment.

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

Owner 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 Owner, acts of another Contractor in the performance of a contract with the Owner, and severe weather events that substantially exceed normal conditions for the location.

If, after termination of the Contractor's right to proceed, the Owner 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 Owner issued the termination for the convenience the Owner.

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

TERMINATION FOR CAUSE (PROFESSIONAL SERVICES)

Either party may terminate this Agreement for cause if the other party fails to fulfill its obligations that are essential to the completion of the work per the terms and conditions of the Agreement. The party initiating the termination action must allow the breaching party an opportunity to dispute or cure the breach.

The terminating party must provide the breaching party [7] days advance written notice of its intent to terminate the Agreement. The notice must specify the nature and extent of the breach, the conditions necessary to cure the breach, and the effective date of the termination action. The rights and remedies in this clause are in addition to any other rights and remedies provided by law or under this agreement.

Termination by Owner: The Owner may terminate this Agreement for cause in whole or in part, for the failure of the Consultant to:

1) Perform the services within the time specified in this contract or by Owner approved extension;
2) Make adequate progress so as to endanger satisfactory performance of the Project; or
3) Fulfill the obligations of the Agreement that are essential to the completion of the Project.

Upon receipt of the notice of termination, the Consultant must immediately discontinue all services affected unless the notice directs otherwise. Upon termination of the Agreement, the Consultant must deliver to the Owner all data, surveys, models, drawings, specifications, reports, maps, photographs, estimates, summaries, and other documents and materials prepared by the Engineer under this contract, whether complete or partially complete.

Owner agrees to make just and equitable compensation to the Consultant for satisfactory work completed up through the date the Consultant receives the termination notice. Compensation will not include anticipated profit on non-performed services.

Owner further agrees to hold Consultant harmless for errors or omissions in documents that are incomplete as a result of the termination action under this clause.

If, after finalization of the termination action, the Owner determines the Consultant was not in default of the Agreement, the rights and obligations of the parties shall be the same as if the Owner issued the termination for the convenience of the Owner.

Termination by Consultant: The Consultant may terminate this Agreement for cause in whole or in part, if the Owner:

1) Defaults on its obligations under this Agreement;

2) Fails to make payment to the Consultant in accordance with the terms of this Agreement;

3) Suspends the project for more than [180] days due to reasons beyond the control of the Consultant.

Upon receipt of a notice of termination from the Consultant, Owner agrees to cooperate with Consultant for the purpose of terminating the agreement or portion thereof, by mutual consent. If Owner and Consultant cannot reach mutual agreement on the termination settlement, the Consultant may, without prejudice to any rights and remedies it may have, proceed with terminating all or parts of this Agreement based upon the Owner's breach of the contract.

In the event of termination due to Owner breach, the Consultant is entitled to invoice Owner and to receive full payment for all services performed or furnished in accordance with this Agreement and all justified reimbursable expenses incurred by the Consultant through the effective date of termination action. Owner agrees to hold Consultant harmless for errors or omissions in documents that are incomplete as a result of the termination action under this clause.

A23 TRADE RESTRICTION CERTIFICATION

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

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

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

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

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

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

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

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

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

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

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

A24 VETERAN'S PREFERENCE

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

A25 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 CRF § 200.322.

A26 PROHIBITION OF COVERED UNMANNED AIRCRAFT SYSTEMS (UAS)

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

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

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

IN WITNESS WHEREOF, the parties hereto have set their hands for the purpose herein expressed, to this instrument, this _____ day of _____, 2026.

APPROVED AS TO LEGAL FORM

CITY OF FLANDREAU, SOUTH DAKOTA

By_____
City Clerk

By_____
Daniel D. Sutton, Mayor

(SEAL)

Attest _____

By _____
(Contractor)

Title _____

Title _____

ACKNOWLEDGMENT OF PRINCIPAL
(Individual)

State of _____)
: SS
County of _____)

On this _____ day of _____, 2026, before me personally appeared _____ , known to me to be the individual described in and who executed the foregoing instrument and acknowledged to me that he executed the same.

_____
Notary Public

My Commission expires the _____ day of _____, 20 .

ACKNOWLEDGMENT OF PRINCIPAL
(Partnership)

State of _____)
: SS
County of _____)

On this _____ day of _____, 2026, before me personally appeared ,_____,who acknowledged himself to be one of the partners of partnership, and that he, as such partner, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the partnership by himself as a partner.

_____
Notary Public

My Commission expires the _____ day of _____, 20 .

ACKNOWLEDGMENT OF PRINCIPAL
(Corporation)

State of _____)
: SS
County of _____)

On this _____ day of _____, 2026, before me personally appeared , who acknowledged himself to be the _____ of _____, a corporation, and that he, as such _____ being authorized to so do, executed the foregoing instrument for the purposes therein contained, by signing the name of the corporation by himself as _____ _____.

_____
Notary Public

My Commission expires the _____ day of _____, 20 .

AFFIDAVIT OF CORPORATE SURETY

STATE OF)
:SS
COUNTY OF)

_____, being first duly sworn on oath, deposes and says that he is the of _____; and that he is duly authorized to execute and deliver the foregoing obligation; that said company is authorized to execute the same and has complied in all respects with the laws of _____ in reference to becoming sole surety upon bonds, undertakings and obligations.

_____

Subscribed and sworn to before me this _____ day of _____, 20 .

_____

Notary Public, residing in:

_____.

My Commission Expires: _____, 20 .

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership, or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called Owner, in the penal sum of _____

_____ Dollars, $(_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, dated the _____ day of _____, 2026 a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amount due for materials, lubricants, oil, gasoline, coal and coke, repairs of machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor,

performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation in this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in (No.) _____ counterparts, each one of which shall be deemed an original, this the _____ day of _____, 2026.

ATTEST:
Principal

_____
(Principal Secretary)

(SEAL)

By _____(s)

_____
(Address)

_____

_____
(Witness as to Principal)

_____
(Address)

_____
(Surety)

_____

ATTEST:

By*_____
(Attorney -in -Fact)

_____
(Witness as to Surety)

_____
(Address)

_____
(Address)

_____

COUNTERSIGNED:

_____

(Resident South Dakota Agent)

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND. *Bonds must be issued or co-signed by a South Dakota licensed agent.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

ACKNOWLEDGMENT OF PRINCIPAL
(individual)

STATE OF _____)
: SS
COUNTY OF _____)

On this _____ day of _____, 2026 before me personally appeared _____, known to me to be the individual described in and who executed the foregoing instrument and acknowledged to me that he executed the same.

_____
Notary Public

My Commission expires the _____ day of _____, 20 .

ACKNOWLEDGMENT OF PRINCIPAL
(Partnership)

STATE OF _____)
: SS
COUNTY OF _____)

On this _____ day of _____, 2026 before me personally appeared _____ who acknowledged himself to be one of the partners of _____ a partnership, and that he, as such partner, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the partnership by himself as a partner.

_____
Notary Public

My commission expires the _____ day of _____, 20 .

ACKNOWLEDGMENT OF PRINCIPAL
(Corporation)

STATE OF _____)
:SS
COUNTY OF _____)

On this _____ day of _____, 2026 before me personally appeared _____, who acknowledged himself to be the _____ of _____, a corporation, and that he, as such _____ being authorized to so do, executed the foregoing instrument for the purposes therein contained, by signing the name of the corporation by himself as _____ _____.

_____
Notary Public

My Commission expires the _____ day of _____, 20 .

AFFIDAVIT OF CORPORATE SURETY

STATE OF _____)
:SS
COUNTY OF _____)

_____ being first duly sworn on oath, deposes and says that he is the _____ of _____; and that he is duly authorized to execute and deliver the foregoing obligation; that said company is authorized to execute the same and has complied in all respects with the laws of _____ _____ in reference to becoming sole surety upon bonds, undertakings and obligations.

_____

Subscribed and sworn to before me this _____ day of _____, 2026.

_____
Notary Public, residing in

_____

_____

My Commission Expires:

_____, 20 .

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called PRINCIPAL, and
(Corporation) (Partnership) or (Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called SURETY, are held and firmly bound unto _____

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER in the penal sum of _____

_____ Dollars ($_____
_____)

in lawful money of the United States, for the payment of which sum well and truly made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the PRINCIPAL entered into a certain contract with the OWNER, dated the _____ day of _____, 2026, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

NOW THEREFORE, if the PRINCIPAL shall well, truly, and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said Agreement during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the SURETY and during the one-year guaranty period and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless

the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said SURETY, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation in this Bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the Work to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in (No.) _____ counterparts, each one of which shall be deemed an original, this the_____ day of _____, 2026.

ATTEST:

_____
Principal

_____

_____
(Principal Secretary)

By_____

(SEAL)

_____
Witness as to Principal

_____
Address

_____
Address

_____
(Surety)

ATTEST:

_____
(Surety) Secretary

By_____
Attorney-in-fact

(SEAL)

_____
(Address)

_____

_____
Witness as to Surety

COUNTERSIGNED:

_____
(Resident South Dakota Agent)

_____
Address

_____

NOTE: Date of Bond must not be prior to date of Contract. If CONTRACTOR is partnership, all partners should execute BOND. *Bonds must be issued or co-signed by a South Dakota licensed agent.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

ACKNOWLEDGMENT OF PRINCIPAL
(individual)

STATE OF _____)
: SS
COUNTY OF _____)

On this _____ day of _____, 2026 before me personally appeared _____, known to me to be the individual described in and who executed the foregoing instrument and acknowledged to me that he executed the same.

_____
Notary Public

My Commission expires the _____ day of _____, 20 .

ACKNOWLEDGMENT OF PRINCIPAL
(Partnership)

STATE OF _____)
: SS
COUNTY OF _____)

On this _____ day of _____, 2026 before me personally appeared _____ who acknowledged himself to be one of the partners of _____ a partnership, and that he, as such partner, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the partnership by himself as a partner.

_____
Notary Public

My commission expires the _____ day of _____, 20 .

ACKNOWLEDGMENT OF PRINCIPAL
(Corporation)

STATE OF _____)
:SS
COUNTY OF _____)

On this _____ day of _____, 2026 before me personally appeared _____, who acknowledged himself to be the _____ of _____, a corporation, and that he, as such _____ being authorized to so do, executed the foregoing instrument for the purposes therein contained, by signing the name of the corporation by himself as _____ _____.

_____
Notary Public

My Commission expires the _____ day of _____, 20 .

AFFIDAVIT OF CORPORATE SURETY

STATE OF _____)
:SS
COUNTY OF _____)

_____ being first duly sworn on oath, deposes and says that he is the _____ of _____; and that he is duly authorized to execute and deliver the foregoing obligation; that said company is authorized to execute the same and has complied in all respects with the laws of _____ _____ in reference to becoming sole surety upon bonds, undertakings and obligations.

_____

Subscribed and sworn to before me this _____ day of _____, 2026.

_____
Notary Public, residing in

_____

_____

My Commission Expires:

_____, 20 .