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ADDENDUM NO. 1

Date:	**August 11, 2023**
Project Name:	**Runway 18L-36R Pavement Reconstruction**
Owner:	**Denton Enterprise Airport**
TxDOT CSJ No.:	**2318DENTN**
Garver Project No.	**23A11280**

This addendum shall be a part of the Plans, Contract Documents and Specifications to the same extent as though it were originally included therein, and it shall supersede anything contained in the Plans, Contract Documents, and Specifications with which it might conflict. This addendum, including all attachments, shall become part of the Contract and all provisions of the Contract shall apply thereto. The time provided for completion of the Contract has not been changed as noted in this addendum. Acknowledgement of receipt of this Addendum must be provided on TxDOT Bid Form page 7 included in the Contract Documents.

Questions asked prior to the Pre-Bid Meeting Include:

1. The plans state “Remove existing conduit or duct bank. Remove cables. Conduit and Cable removal shall be considered incidental to other items of work. “Just a quick figure of 20,000 + LFT of removal of wire and conduit. With removing the conduit, this number could be well in excess of $125,000.00. Just wanted to confirm that the plan note is correct.
   - The note has been revised in Addendum No. 1.
2. The supplemental specifications are not found within the IFB uploaded set of documents posted on TxDOT’s FTP website.
   - These documents have been included in Addendum No. 1.

Revisions or additions made to the Contract Documents:

A. Specifications

1. Addition of “SS-101 Safety Plan Compliance Document (SPCD)”
   - Included due to upload error in IFB set.
2. Addition of “SS-110 Standard Specifications”
   - Included due to upload error in IFB set.
3. Addition of “SS-120 Construction Safety and Security”
   - Included due to upload error in IFB set.
4. Addition of “SS-130 Trench and Excavation Safety Systems”
   - Included due to upload error in IFB set.
5. Addition of “SS-140 Demolition and Disposal”
   - Included due to upload error in IFB set.
6. Addition of “SS-300 Basic Electrical Requirements”
   - Included due to upload error in IFB set.
7. Addition of “SS-301 Electrical Demolition and Relocation Work”
   - Included due to upload error in IFB set.
8. Addition of “SS-310 Airport Lighting Systems”

- Included due to upload error in IFB set.

9. Addition of “P-403 Asphalt Mix Pavement Base Course” in its entirety and replace with attached “P-403 Asphalt Mix Pavement Base Course” – Addendum No. 1.
10. Addition of “L-125 Installation of Airport Lighting Systems – MOD” in its entirety and replace with attached “L-125 Installation of Airport Lighting Systems – MOD” – Addendum No. 1.
11. Addition of “L-125 Installation of Airport Lighting Systems” in its entirety and replace with attached L-125 Installation of Airport Lighting Systems” – Addendum No. 1.

B. Plans

1. Updated Existing Survey Monument Locations, Sheet “CV-101 Existing Conditions”
2. Updated Detail of housekeeping pads to be removed around existing PAPI. Sheet “CV-106 Existing Conditions 6”
3. Updated Demo Detail of housekeeping pads to be removed around existing PAPI. Sheet “CD-102 Demolition Plan 2”
4. Updated Grading Plans around Existing Survey Monument Locations, Sheet “CG-101 Grading Plan 1”
5. Updated Restoration plans of housekeeping pads to be removed around existing PAPI. Sheet “CG-202 Restoration Plan 2”
6. Updated Lighting Removal Plan, updating conduit removal detail, and the PAPI removal. Sheet “ED-101 Lighting Removal Plan 1”
7. Updated Lighting Removal Plan, updating conduit removal detail, and the PAPI removal. Sheet “ED-102 Lighting Removal Plan 2”
8. Updated Lighting Removal Plan, updating conduit removal detail, and the PAPI removal. Sheet “ED-103 Lighting Removal Plan 3”
9. Updated Lighting Removal Plan, updating conduit removal detail, and the PAPI removal. Sheet “ED-104 Lighting Removal Plan 4”
10. Updated Lighting Removal Plan, updating conduit removal detail, and the PAPI removal. Sheet “ED-105 Lighting Removal Plan 5”
11. Updated Lighting Removal Plan, updating conduit removal detail, and the PAPI removal. Sheet “ED-106 Lighting Removal Plan 6”
12. Updated Lighting Installation Plan 1, updated Localizer Checkpoint Locations. Sheet “EL-101 Lighting Installation Plan 1”
13. Updated Lighting Installation Plan 2, updated to include PAPI replacement. Sheet “EL-102 Lighting Installation Plan 2”
14. Updated Lighting Installation Plan 3, updated to include PAPI replacement. Sheet “EL-103 Lighting Installation Plan 3”
15. Updated Lighting Installation Plan 4, updated to include PAPI replacement. Sheet “EL-104 Lighting Installation Plan 4”
16. Updated Lighting Installation Plan 5, updated to include PAPI replacement. Sheet “EL-105 Lighting Installation Plan 5”
17. Updated Lighting Installation Plan 6, updated to include PAPI replacement. Sheet “EL-106 Lighting Installation Plan 6”
18. Updated Lighting Installation Details 4, Sheet “EL-204 Lighting Installation Details 4”
19. Updated Lighting Installation Details 7, Sheet “EL-207 Lighting Installation Details 7”
20. Addition of Lighting Installation Details 7A, Sheet “EL-207A Lighting Installation Details 7A”

21. Addition of Lighting Installation Details 7B, Sheet “EL-207B Lighting Installation Details 7B”
22. Addition of Lighting Installation Details 7C, Sheet “EL-207C Lighting Installation Details 7C”
23. Updated Lighting Installation Details 9, Sheet “EL-209 Lighting Installation Details 9”
24. Updated Runway Cross Sections 3, Sheet “XS-103 Runway Cross Sections 3”

By: _____

Mitchell McAnally, P.E.
Senior Project Manager

B. Attachments:

1. Pre-Bid Meeting Minutes
2. SS-101 Safety Plan Compliance Document (SPCD)
3. SS-110 Standard Specifications
4. SS-120 Construction Safety and Security
5. SS-130 Trench and Excavation Safety Systems
6. SS-140 Demolition and Disposal
7. SS-300 Basic Electrical Requirements
8. SS-301 Electrical Demolition and Relocation Work
9. SS-310 Airport Lighting Systems
10. P-403 Asphalt Mix Pavement Base Course
11. L-125 Installation of Airport Lighting Systems – MOD
12. L-125 Installation of Airport Lighting Systems
13. CV-101 EXISTING CONDITIONS
14. CV-106 EXISTING CONDITIONS 6
15. CD-102 DEMOLITION PLAN 2
16. CG-101 GRADING PLAN 1
17. CG-202 RESTORATION PLAN 2
18. ED-101 LIGHTING REMOVAL PLAN 1
19. ED-102 LIGHTING REMOVAL PLAN 2
20. ED-103 LIGHTING REMOVAL PLAN 3
21. ED-104 LIGHTING REMOVAL PLAN 4
22. ED-105 LIGHTING REMOVAL PLAN 5
23. ED-106 LIGHTING REMOVAL PLAN 6
24. EL-101 LIGHTING INSTALLATION PLAN 1
25. EL-102 LIGHTING INSTALLATION PLAN 2
26. EL-103 LIGHTING INSTALLATION PLAN 3

27. EL-104 LIGHTING INSTALLATION PLAN 4
28. EL-105 LIGHTING INSTALLATION PLAN 5
29. EL-106 LIGHTING INSTALLATION PLAN 6
30. EL-204 LIGHTING INSTALLATION DETAILS 4
31. EL-207 LIGHTING INSTALLATION DETAILS 7
32. EL-207A LIGHTING INSTALLATION DETAILS 7A
33. EL-207B LIGHTING INSTALLATION DETAILS 7B
34. EL-207C LIGHTING INSTALLATION DETAILS 7C
35. EL-209 LIGHTING INSTALLATION DETAILS 9
36. XS-103 RUNWAY CROSS SECTIONS 3

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To: Attendees **Date:** August 09, 2023

From: Mitchell McAnally, PE
Colin Tinsley, EIT

RE: Denton Enterprise Airport
Runway 18L-36R Pavement Reconstruction
Pre-Bid Meeting Minutes

Copies To: Attendees

On Tuesday, August 08, 2023 at 9:00am, a pre-bid meeting for the Runway 18L-36R Pavement Reconstruction project was held in the Airport Operations Conference room at the Denton Enterprise Airport. The following items were discussed:

1. **Introductions & Roles**
   a) See attached Sign-In Sheet

2. **Bidding Procedures**
   a) Sealed bids for the construction of airport improvements at Denton Enterprise Airport need to be addressed and delivered to the Mr. Scott Gray, CM, CAE, Airport Director, Denton Enterprise Airport, 5000 Airport Road, Denton, TX 76207**.** *Bids will be received until **2:00 PM, Thursday August 24, 2023**, then publicly opened and read.*
   b) Technical questions concerning the specifications and plans should be directed to Mitchell McAnally, PE, PMP at MRMcAnally@GarverUSA.com or 214-619-9023.
   c) Deadline for questions is **5:00 pm on Wednesday August 16, 2023**. Answers will be provided by **5:00pm on Friday, August 18, 2023**.
   d) Required Documents
      i. Bid Form
      ii. Bid Bond (2%)
      iii. Required Language in Proposals for AIP Contracts
      iv. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
      v. Certification of Bidder Regarding Equal Employment Opportunity
      vi. DBE Participation Plan (see Section 3, Federal Provisions)
   e) Instructions to Bidders
   f) Bid Proposal
      i. **Contract Time: 113 Calendar Days**
         - Base Bid: Proposed RW 18L-36R Pavement Reconstruction
         - Deductive Alternate 1: Deduct North End Mill/Inlay Improvements
            - No Additional time for Deduct Alt 1
      ii. $2,500 Liquidated Damages per calendar day
      iii. An Addendum will be issued to include the pre-bid meeting minutes, sign-in sheet, and pre-bid questions.

3. **Federal Provisions**
   a) The DBE goal is **12%**
      i. DBE Participation Plan to include but not limited to: (no later than 5 calendar days from bid opening):
         1) DBE Commitment Agreement Form No. SMS.4901
         2) DBE Program Material/Supplier Form No. SMS.4901-MS
         3) DBE Trucking Commitment Form No. SMS.4901-T.

Please download the appropriate DBE Commitment Agreement or Good faith effort form from the TxDOT website at:
http://www.txdot.gov/business/partnerships/dbe-forms.html
There are three available DBE commitment forms. You must pick which commitment applies to your subcontract agreement. Then you and your DBE/s must complete the form and return it with the signed DBE plan by the required date.

4) Form 4000 Contractor's Certification Good Faith Effort **(if unable to meet specified goal)**

b) Questions regarding goals and Good Faith Efforts should be directed to Eli Lopez at Eli.Lopez@txdot.gov.
c) Contractor shall follow all Davis Bacon Wage Rate Requirements
d) Contractor shall follow all Buy American clauses.

4. TxDOT General Provisions

a) General Provisions are provided in a standalone publication entitled General Provisions.
b) Electronic copies are available on TxDOT Aviation website.
   i. http://www.txdot.gov/inside-txdot/division/aviation/general-provisions.html
c) Contractors shall pay close attention to Section 100 in the General Provisions regarding Contractor Quality Control Program and Contractor Quality Control Testing.
   i. The contractor is required to prepare a quality control program following the specifications where it is required.
   ii. Owner will perform quality assurance (QA) testing on all materials.
d) Any failed tests performed by the QA lab will be deducted from the contractor.

5. Construction Plans

a) Airport Safety and Security
b) Project Layout
c) Safety and Phasing
   i. Phase 1 (2 Calendar Days)
      - Consists of obscuring Runway 18L-36 pavement markings, Install Displaced Threshold, Construct Temporary Pavement at Taxiway A6.
   ii. Phase 2 (60 Calendar Days)
      - Consists of Runway reconstruction work from to the south end of Runway 18L-36R up to Taxiway A6, along with the relocation of A6 scheduled begin March of 2024.
   iii. Phase 3 (40 Calendar Days)
      - Consists of Runway reconstruction work from A6 to A1 during a scheduled Runway 18L-36R Closure to begin no earlier than July 8th, 2024.
   iv. Phase 4 (5 Calendar Days)
      - Consists of Runway Final Asphalt of the Runway and Taxiway Pavements from A6 to A1 during a scheduled Runway 18L-36R Closure.
   v. Phase M1 (2 Calendar Days)
      - Consists of Temporary Markings to Final Asphalt Lift until asphalt has cured to 30 Days.
   vi. Phase M (4 Calendar Days)
      - Consists of Permanent Markings to Final Asphalt Lift after curing period.

6. Technical Specifications

C-100 Contractor Quality Control Program (CQCP)
C-102 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control
C-105 Mobilization
P-101 Preparation & Removal of Existing Pavement
P-152 Excavation, Subgrade, And Embankment

P-155 Lime-Treated Subgrade
P-304 Cement-Treated Aggregate Base Course (CTB)
P-401 Asphalt Mix Pavement
P-403 Asphalt Mix Pavement Base/Leveling Course

7. Supplemental Specifications

SS-101 Safety Plan Compliance Document (SPCD)
SS-110 Standard Specifications
SS-120 Construction Safety And Security
SS-130 Trench And Excavation Safety Systems
SS-140 Demolition And Disposal
SS-300 Basic Electrical Requirements
SS-301 Electrical Demolition And Relocation Work
SS-310 Airport Lighting Systems

8. Questions asked During the Pre-Bid Meeting

a) Will a call-in number be provided for the bid opening?
- Yes. Bidders may call in to listen to the bid opening results by using the following information:
  Call in (audio only)

  +1 501-214-8852,,93340283# United States, Little Rock

  (833) 450-2980,,93340283# United States (Toll-free)

  Phone Conference ID: 933 402 83#

- With Addendum No. 1, the bid opening date will not be changed: Bids will be received until 2:00 PM, Thursday August 24, 2023 – any bid received after closing time will be returned unopened. Deadline for addendums will be posted one week prior to bid opening.

b) What is the general contact email for submission of DBE documents?
- For all federally funded construction projects with a DBE goal, bidders shall submit the DBE participation plan and appropriate commitment agreement form/s to TxDOT Aviation within 5 calendar days after the bid opening via email to AVNRFQ@txdot.gov.

c) Does the Contractor need to provide radios?
- The Contractor shall provide two-way radio for the Contractor's personnel only.

d) Does the Contractor incur a cost for airport badging of Contractor's personnel?
- There is a small fee for Airport badging to the Contractor. Contractor badging and training will be coordinated after the contract has been awarded. The fee can be found at https://www.dentonairport.com/access-card-program.

e) Who is the engineer's quality assurance (QA) testing firm?
- The engineer's QA lab is ECS Engineers. The contractor may not use the same lab as the engineer.

f) When will the contract be awarded and when will construction start?
- TxDOT Aviation will be issuing contracts for this project. TxDOT Aviation stated in the pre-bid meeting this could take up to 60-90 days after the bid opening to get contracts executed. Construction is anticipated to begin in March of 2024.

g) Is there any hard dates or phase constraints associated with the project?
   - Yes. The intent of the hard date of July 8th, 2024 is to coordinate with the Airports Tenants, and to plan the large majority of temperature dependent work during anticipated drier months. Time suspensions will be granted between phases.

h) Are Contractor's required to register in the Department of Homeland Security's E-Verify Program?
   - The E-Verify Program is not required for TxDOT Aviation Projects.

i) Can a CTB plant be setup at the location shown in the plans?
   - Yes. The contractor can choose to pug CTB onsite in the area shown in the plans. There will be two optional sites, one within the fence and one outside of the airport perimeter fencing.

j) What is the procedure for Contractor entry through the Airport Perimeter Gates? Will a gate guard be required?
   - The Contractor will be provided access by the airport for entry through Airport Perimeter Gate. No gate guard will be required if the gate is kept closed, but the contractor is responsible for waiting for the gate to close so unauthorized personnel are not following construction vehicles through the gate onto the airfield. If the contractor does not recognize a vehicle or persons entering, they should notify the airport immediately. If the contractor chooses to keep the gate open, a gate guard will be required.

k) What is the plan for the excavated material generated from P-152-4.1 – Unclassified Excavation?
   - The contractor may coordinate with Airport Operations to stockpile the material on the southwest side of the airfield. The contractor will be responsible for shaping, compacting the pile into a uniform state, and establishing vegetations before the project is complete. If chosen, the contractor may dispose of the material offsite, the contractor must supply the engineer a disposal letter and locations before the excess material leaves the airport.

l) What is the intent of the Additive Deductive Alternate No. 01?
   - The intent of the Additive Deductive Alternate is to remove the mill and inlay section of P-401 on the north end of the Runway and replace with a lower cost alternative in the form of seal coat.

Denton Enterprise Airport (DTO)
Runway 18L-36R Pavement Reconstruction (TxDOT CSJ No. 2318DENTN)
Denton, Texas

Pre-Bid Meeting
August 08, 2023, 9:00am

SIGN-IN SHEET

Name	Representing	Phone #	Email
Sean Newton	TxDOT	512 694 1767	sean.newton@txdot.gov
Ryan Hindman	TxDOT	(512) 520-7467	ryan.hindman@txdot.gov
Zane Brown	Austin	214 317 9337	pebrown@austin-ind.com
JASON KINLY	ZACHRY	469-890-4390	JASON.KINLY@ZACHRYCORP.COM
Alex katsenis	Royal Electric	918-802-1181	Alex K@Royalelect.com
Clay Lasseu	Airside Solution	903926-4013	classeu@airsidesolutionsinc.com
BRIAN LEE	JACOB-PUBLIC COMPANY	817559-0829	BRIAN.LEE@JACOBPUBLIC.COM
BEN TECONCHUK	Jacob	9404[illegible] 4039	Ben.teconchuk@Jacobpublic.com

Denton Enterprise Airport (DTO)
Runway 18L-36R Pavement Reconstruction (TxDOT CSJ No. 2318DENTN)
Denton, Texas

Pre-Bid Meeting
August 08, 2023, 9:00am

SIGN-IN SHEET

Name	Representing	Phone #	Email
JAISON CHERIAN	ZACHRY CORP.	203-512-3475	JAISON.CHERIAN@ZACHRYCORP.COM
Aaron Barry	Sinacola	214 387 3900	engineering@MarioSinacola.com

Denton Enterprise Airport (DTO)
Runway 18L-36R Pavement Reconstruction (TxDOT CSJ No. 2318DENTN)
Denton, Texas

Pre-Bid Meeting
August 08, 2023, 9:00am

SIGN-IN SHEET

Name	Representing	Phone #	Email
Matt Armellino	Topographic	682-270-3632	matthew.armellino@topographic.com
Matt Bradley	Topographic	817-691-0242	Matthew.bradley@topographic.com

ITEM SS-101 SAFETY PLAN COMPLIANCE DOCUMENT (SPCD)

DESCRIPTION

101-1.1 The Contractor shall thoroughly review the approved Construction Safety and Phasing Plan (CSPP) and shall comply with approved CSPP. The Contractor shall certify such compliance by completing the attached SPCD and submitting to the Engineer for approval.

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Contractor Safety Plan Compliance Documents

Owner Name: City of Denton

Airport: Denton Enterprise Airport

Project Description: Runway 18L—36R Pavement Reconstruction

Contractor: _____

Each item listed below corresponds to a specific section of the approved CSPP. The Contractor shall certify that he/she will comply with each section of the approved CSPP. Each certified section with a "no" response must be fully explained in an attachment to the SPCD. The document shall be signed and dated by a principal or owner in the Contractor's company. All other requested information shall be completed by the Contractor and submitted to the Engineer for approval as part of the SPCD.

1. **Section 1 - Correspondence:** This project shall be completed in accordance with Section 1 "Coordination" of the approved Construction Safety and Phasing Plan.

Owner:	
Contact: Chase Patterson	**Phone:**
Engineer:	
Project Manager: Colin Tinsley	**Phone:**
Project Engineer: Alex Jessop, PE	**Phone:**
Construction Observer:	**Phone:**
Materials Testing:	**Phone:**
Contractor:	
Project Manager:	**Phone:**
Superintendent:	**Phone:**
Subcontractors:	**Phone:**
LIST ALL SUBS	

Yes_____ No_____

2. **Section 2 - Phasing:** This project shall be completed in accordance with Section 2 "Phasing" of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

3. **Section 3 – Areas of Operations Affected by Construction Activity:** This project shall be completed in accordance with Section 3 "Areas of Operations Affected by Construction Activity" of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

4. **Section 4 – Protection of Navigational Aids (NAVAIDS):** This project shall be completed in accordance with Section 4 “Protection of Navigational Aids (NAVAIDS)” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

5. **Section 5 – Contractor Access:** This project shall be completed in accordance with Section 5 “Contractor Access” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

6. **Section 6 – Wildlife Management:** This project shall be completed in accordance with Section 6 “Wildlife Management” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

7. **Section 7 – Foreign Object Debris (FOD) Management:** This project shall be completed in accordance with Section 7 “Foreign Object Debris (FOD) Management” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

8. **Section 8 – Hazardous Materials (HAZMAT) Management:** This project shall be completed in accordance with Section 8 “Hazardous Materials (HAZMAT) Management” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

9. **Section 9 – Notification of Construction Activities:** This project shall be completed in accordance with Section 9 “Notification of Construction Activities” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

10. **Section 10 – Inspection Requirements:** This project shall be completed in accordance with Section 10 “Inspection Requirements” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

11. **Section 11 – Underground Utilities:** This project shall be completed in accordance with Section 11 “Underground Utilities” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

12. **Section 12 – Penalties:** This project shall be completed in accordance with Section 12 “Penalties” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

13. **Section 13 – Special Conditions:** This project shall be completed in accordance with Section 13 “Special Conditions” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

14. **Section 14 – Runway and Taxiway Visual Aids:** This project shall be completed in accordance with Section 14 “Runway and Taxiway Visual Aids” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

15. **Section 15 – Marking and Signs for Access Routes:** This project shall be completed in accordance with Section 15 “Marking and Signs for Access Routes” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

16. **Section 16 – Hazard Marking and Lighting:** This project shall be completed in accordance with Section 16 “Hazard Marking and Lighting” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

17. Section 17 – Work Zone Lighting for Nighttime Construction: This project shall be completed in accordance with Section 17 “Work Zone Lighting for Nighttime Construction” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

18. **Section 18 – Protection of Safety Areas, Object Free Areas, Object Free Zones, and Approach / Departure Surfaces:** This project shall be completed in accordance with Section 18 “Protection of Safety Areas, Object Free Areas, Object Free Zones, and Approach / Departure Surfaces” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

19. **Section 19 – Other Limitations on Construction:** This project shall be completed in accordance with Section 19 “Other Limitations on Construction” of the approved Construction Safety and Phasing Plan.

Yes_____ No_____

I certify that, for the project identified herein, the responses to the foregoing items are correct as marked, and that I shall comply with the approved Construction Safety and Plan.

Signed: _____
Contractor's Authorized Representative

Date: _____

_____
Print Name and Title of Contractor's Representative

END OF ITEM SS-101

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ITEM SS-110 STANDARD SPECIFICATIONS

GENERAL

110-1.1 The standard specifications of the Texas Department of Transportation (TXDOT) are bound in a book titled Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges. These specifications are referred to herein as "Standard Specifications." The latest edition shall apply. A copy of these "Standard Specifications" may be obtained from the TXDOT at their customary charge.

INCORPORATION AND MODIFICATION

110-2.1 Certain parts of the Standard Specifications are appropriate for inclusion in these Technical Specifications. Such parts are incorporated herein by reference to the proper section or paragraph number. The individual specification numbers noted herein may be different from those in the latest edition of the "Standard Specifications." The most current specification number shall apply. Each such referenced part shall be considered to be a part of these Contract Documents as though copied herein in full.

110-2.2 Certain referenced parts of the Standard Specifications are modified in the Specifications that follow. In case of conflict between the Standard Specifications and the Specifications that follow, the Specifications that follow shall govern.

110-2.3 Individual material test numbers change from time to time. Use the latest applicable test.

110-2.4 Reference in the Standard Specifications to the “Department” is herein changed to the “Owner”.

MEASUREMENT AND PAYMENT

110-3.1 Standard Specifications will not be measured for separate payment.

END OF ITEM SS-110

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ITEM SS-120 CONSTRUCTION SAFETY AND SECURITY

DESCRIPTION

120-1.1 This item covers safety and security for construction of the proposed improvements.

The attention of the bidder is directed to the necessity for careful examination of the entire project site to determine, at the time of bid preparation, the full extent of work to be done under the item "Construction Safety and Security."

The item "Construction Safety and Security" shall include:

1. Lighted Barricades and Closed Taxiway and Runway Markers
2. Temporary Relocated Threshold
3. Airport Security Requirements
4. Airport Safety Requirements
5. Temporary Taxilane Pavement

CONSTRUCTION METHODS

120-2.1 Lighted barricades and closed taxiway and runway markers.

a. The Contractor shall furnish, install, maintain, and remove closed taxiway and runway markers and lighted closure X's and lighted barricades in accordance with details on the plans and as directed by the Engineer. The closed taxiway shall be aviation yellow, nylon-reinforced vinyl. The closed runway markers shall be lighted runway closure markers as indicated in the plans. The markers shall be secured to the pavement/ground as shown on the plans and as directed by the Engineer. The lighted barricades shall be constructed and installed as shown on the plans. All lighted barricades and closed taxiway and runway markers shall be constructed in accordance with AC 150/5370-2G Operational Safety on Airports During Construction.

b. All work involved in the furnishing, installation, maintenance, and removal of lighted barricades, barrels and closed taxiway and runway markers will not be measured for separate payment, but will be considered subsidiary to the bid item "Construction Safety and Security."

120-2.2 Temporary Relocated Threshold. Before commencing work within the air operations areas the Contractor shall temporarily relocate the Runway 18L-36R threshold as shown in the Plans. The Contractor shall furnish, install and maintain the temporary threshold in accordance with details on the Plans. Contractor shall remove the temporary threshold when work is complete within the safety area, and as directed by the sequence of construction in the Plans.

a. Before relocating the threshold, the Contractor shall perform a Megger test from the regulator serving the runway in the presence of the Owner/Engineer. Data from the test shall be reported in writing to the Owner/Engineer. The Contractor shall determine the appropriate method of disabling the lights on the closed portion of the runway and shall verify the circuit prior to re-energizing. Strict adherence to OSHA Lockout/Tagout procedures is mandatory. The Contractor will be held responsible for any damage to the lighting system caused by his operations. Following restoration of the lighting system to its original/final configuration, the Megger test procedure shall be repeated by the Contractor in the presence of the Owner/Engineer, and the results of the test reported in writing to the Owner/Engineer.

b. All work involved in the furnishing, fabrication, installation, maintenance, and removal of the temporary relocated threshold, including marking installation and removal, lighting, and procurement of

miscellaneous devices as directed on the plans and details, will be measured for separate payment under the bid item "Temporary Relocated Threshold."

120-2.3 Airport security requirements. The Contractor shall abide by the Airport Security requirements that are outlined in the Construction Safety and Phasing Plan (CSPP). Any costs associated with the Airport Security requirements will not be measured for separate payment but will be considered subsidiary to the bid item "Construction Safety and Security."

120-2.4 Airport safety requirements. The Contractor shall abide by the Airport Safety requirements that are outlined in the Construction Safety and Phasing Plan (CSPP). All costs associated with the Airport Safety requirements will not be measured for separate payment but will be considered subsidiary to the bid item "Construction Safety and Security."

120-2.5 Temporary Taxilane Pavement. The contractor shall construct a temporary taxilane as indicated in the plans and specified in the specifications. The contractor shall remove the temporary taxilane as indicated in the plans. Contractor shall refer to applicable specification sections for installation and removal of proposed temporary taxilane pavement.

MEASUREMENT AND PAYMENT

120-3.1 Construction safety and security will be measured as a lump sum complete item. Work completed and accepted under this item will be paid for at the contract lump sum price bid for "Construction Safety and Security", which price shall be full compensation for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

120-3.2 Temporary Relocated Threshold will be measured as a lump sum complete item. Work completed and accepted under this item, which price shall be full compensation for furnishing all labor, tools, equipment, and incidentals necessary to complete the installation and removal of the temporary relocated threshold, this shall include all pavement markings installed and removed, barricades, closure markers, and coordination required to complete the work.

120-3.3 Temporary Taxilane Construction and removal will be measured as a lump sum complete item. Work completed and accepted under this item, which price shall be full compensation for all labor, materials, tools, equipment, and incidentals necessary to install the proposed pavement section, including asphalt, and subgrade preparation in accordance with the specifications. This item shall also include the removal of the proposed temporary pavement. No separate payment shall be made for excavation, subgrade preparation, asphalt, or pavement removal associated with the temporary taxilane.

Periodic payments will be made under this item in proportion to the amount of work accomplished, as determined by the Engineer.

Payment will be made under:

Item SS-120-3.1	Construction Safety and Security - per Lump Sum
Item SS-120-3.2	Temporary Relocated Threshold - per Lump Sum
Item SS-120-3.3	Temporary Taxilane Construction and Removal – per Lump Sum

END OF ITEM SS-120

ITEM SS-130 TRENCH AND EXCAVATION SAFETY SYSTEMS

DESCRIPTION

130-1.1 This section covers trench and excavation safety system required for constructing improvements that necessitate open excavations on the project. All work under this item shall be in accordance with the current edition of the "Occupational Safety and Health Administration Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart "P", a copy of which may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NOTIFICATIONS REQUIRED

130-2.1 The Contractor, prior to beginning any excavation, shall notify the State Department of Labor (Safety Division) that work is commencing on a project with excavations greater than five feet.

The Contractor shall notify all Utility Companies and Owners in accordance with OSHA Administration 29 CFR 1926.651(b)(2) for the purpose of locating utilities and underground installations.

EXISTING STRUCTURES AND UTILITIES

130-3.1 Where the trench or excavation endangers the stability of a building, wall, street, highway, utilities or other installation, the Contractor shall provide support systems such as shoring, bracing, or underpinning to ensure the stability of such structure or utility.

The Contractor may elect to remove and replace or relocate such structures or utilities with the written approval of the owner of the structure or utility and the Project Owner.

MEASUREMENT AND PAYMENT

130-4.1 The work required by this item will be paid for at the lump sum price bid for "Trench and Excavation Safety Systems", which price shall be full compensation for furnishing all labor, tools, equipment and incidentals necessary to complete the work. After award of the contract, the Contractor shall submit to the Engineer a breakdown of cost for work involved in the lump sum price bid for "Trench and Excavation Safety Systems" and shall, with each periodic payment request, submit a certification by the Contractor's "competent person" as defined in Subpart "P" 1926.650(b) that the Contractor has complied with the provisions of "Occupational Safety and Health Administration Standard for Excavation and Trenches Safety System", 29 CFR 1926 Subpart P for work for which payment is requested.

Periodic payments will be made under this item in proportion to the amount of work accomplished, as determined by the Engineer.

Payment will be made under:

Item SS-130-4.1 Trench and Excavation Safety Systems - per Lump Sum

END OF ITEM SS-130

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ITEM SS-140 DEMOLITION AND DISPOSAL

DESCRIPTION

140-1.1 This item shall consist of the removal and satisfactory disposal of drainage structures (including reinforced concrete channels, headwalls, and wingwalls) and concrete ducts and pipe culverts, all of which are not designated or permitted to remain. While an attempt has been made to outline all structures included in the plans, all structures required to be removed may not be designated as such in the plans.

CONSTRUCTION METHODS

140-3.1 General. No demolition shall be started until the work has been laid out and approved by the Engineer. All material shall be disposed of off-site. All hauling and disposal will be considered a necessary and incidental part of the work. Hauling cost shall be considered by the Contractor and included 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.

140-3.2 Utility & drainage removal. Existing concrete pipe and parts thereof that interfere with the new construction shall be removed.

Existing pipe culverts or parts thereof that interfere with the new construction shall be removed. When existing pipe culverts to be removed are connected to existing structures to remain, the existing structure shall be repaired.

Where existing pipe culverts are to be extended or otherwise incorporated into the new work, only such part of the existing structure shall be removed as to provide a proper connection to the new work. The connecting edges or joints shall be cut, chipped, and trimmed to the required lines and grades without weakening or damaging the part of the structure to be retained.

For a pipe culvert extension, the headwall and the attached end joint of concrete pipe or the flared end section on all types of pipe shall be removed to accommodate the extension. This work will not be paid for directly but will be considered included in the items involved in the culvert extension.

Trenches or voids resulting from the removal or demolition of existing culverts or other structures shall be filled with approved material placed in layers in accordance with Item P-152.

140-3.3 Headwalls, Manholes, and Inlet Removal. Headwalls, manholes, and inlets shall be removed as shown on the plans. Trenches or voids resulting from the removal or demolition of existing structures shall be filled with approved material placed in layers in accordance with Item P-152. At locations where existing pipe is to be re-connected after structure removal, the affected pipe shall be removed, at a minimum, to the nearest joint or further if required. The connecting edges or joints shall be cut, chipped, and trimmed to the required lines and grades without weakening or damaging the part of the structure to be retained. All connections to existing pipes shall be made at joints. New pipe segments shall be installed to provide a proper connection to the existing pipe. The new pipe shall match the size of the existing matching pipe. All connections shall be performed per D-701, Reinforced Concrete Pipe.

METHOD OF MEASUREMENT

140-4.1 Storm Drain Pipe Removal. The unit of measurement for storm drain pipe removal shall be measured by the linear foot of pipe removed, regardless of pipe diameter. All plugging and capping of pipe to remain shall be subsidiary to drainage pipe removal. Pipe removal necessary to construct new inlets will not be measured for payment.

140-4.2 Drainage Structure Removal. The unit of measurement for removal of drainage structures including headwalls, manholes and inlets shall be the number of structures removed. Any additional pipe segments or material required to perform the work as specified shall not be measured for separate payment, but shall be considered subsidiary to the structure in which it is contained.

BASIS OF PAYMENT

140-5.1 Payment shall be made at the unit bid price for the unit of measurement specified above. This price shall be full compensation for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Item SS-140-5.1	Storm Drain Pipe Removal – per Linear Foot
Item SS-140-5.2	Drainage Structure Removal – per Each

END OF ITEM SS-140

ITEM SS-300 BASIC ELECTRICAL REQUIREMENTS

DESCRIPTION

300-1.1 This item shall consist of furnishing and installing complete electrical systems as defined in the plans and in these specifications. The work includes the installation, connection and testing of new electrical systems, equipment and all required appurtenances to construct and demonstrate proper operation of the completed electrical systems.

300-1.2 The Contractor shall maintain current copies of all referenced and applicable standards on the job site. The Contractor is responsible to make known to the Engineer any conflict between plans and specifications that he observes or of which he is made aware.

300-1.3 This work shall consist of lockout/tagout and constant current regulator calibration procedures at the airport electrical vault in accordance with the design and details shown in the plans and in compliance with these specification documents.

300-1.4 This work shall also consist of modifications to the existing airport electrical vault in accordance with the design and dimensions shown in the plans. This work shall also include the demolition and removal of equipment and items in the existing electrical vault building in accordance with the details shown in the plans.

EQUIPMENT AND MATERIALS

300-2.1 Standards.

a. Applicable National Fire Protection Association (NFPA) codes, including but not limited to:
   (1) NFPA 70 - National Electrical Code.
   (2) NFPA 70E - Standard for Electrical Safety in the Workplace.
   (3) NFPA 101 - Life Safety Code.
   (4) Internet Website: http://www.nfpa.org
b. Applicable Code of Federal Regulations (CFR) codes, including but not limited to:
   (1) 29 CFR 1910 - Occupational Safety and Health Standards (OSHA)
   (2) 29 CFR 1926 - Safety and Health Regulations for Construction.
   (3) Internet Website: http://www.gpoaccess.gov/cfr/index.html
c. ANSI/IEEE C2 - National Electrical Safety Code.
d. NECA 1 – Standard for Good Workmanship in Electrical Construction.
e. Applicable Federal, State and Local Electrical Codes.
f. Applicable Federal, State and Local Energy Codes.
g. Applicable Federal, State and Local Building Codes.
h. Applicable Federal, State and Local Fire Codes.
i. Applicable City Electrical Code.
j. Applicable City Ordinances pertaining to electrical work.
k. Applicable Federal, State and Local - Environmental, Health and Safety Laws and Regulations.

Contractor shall utilize the most current editions of standards, which are current at time of bid and as recognized by the Authority Having Jurisdiction for the respective standard.

300-2.2 General.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified and listed under Advisory Circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program, current version on the date that the submittals are received by the Engineer. When an equipment advisory circular is being updated and two equipment lists for the same specific equipment are listed in the current certified equipment AC 150/5345-53 addendum, only that equipment qualified to the latest advisory circular will be acceptable.

b. Airport lighting equipment and materials shall also meet the Buy American Preference requirements in 49 USC 50101 and the Aviation Safety and Capacity Expansion Act. The equipment shall be approved and listed on the FAA "Equipment Meeting Buy American Requirements" list located at *www.faa.gov/airports/aip/procurement/federal_contract_provisions/*, current version on the date that the submittals are received by the Engineer, or the Contractor may submit a signed formal letter from the manufacturer that clearly lists the specific equipment, model number, location where it is manufactured, and statement certifying that the equipment and/or materials meet the Buy American Preference requirements.

c. 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 Engineer. All equipment and materials shall be new and meet applicable manufacturer's standards. All electrical components and products shall be tested and listed by an OSHA accepted, nationally recognized testing laboratory (NRTL) to conform to the standards indicated in these contract documents and to the industry standards required in the NEC, NEMA, IEEE, UL, and applicable FAA advisory circulars.

d. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

e. All materials and equipment used to construct this item shall be submitted to the Engineer 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 pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components or electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

f. The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the Contract Documents plans and specifications. The Engineer reserves the right to reject all equipment, materials or procedures, which, in the Engineer's opinion, does not meet the system design and the standards and codes, specified herein.

g. 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.

(1) All LED light fixtures, except for obstruction lighting, shall be warranted by the manufacturer for a minimum of 4 years after date of installation, final acceptance testing by the Engineer, and Owner's beneficial use of the equipment, inclusive of

all electronics. Refer to FAA Engineering Brief No. 67D for additional requirements.

h. After approval of submitted equipment, the Contractor shall supply the following Operation and Maintenance Manual documentation to the Owner. Two (2) complete sets of documentation shall be supplied for each model of equipment. The documentation shall be securely bound in heavy-duty 3-ring binders. The information for each piece of equipment shall be indexed using typewritten label tabs. The spine of each binder shall have a typewritten label, which indicates the included equipment types. The documentation shall include:

(1) Approved Submittals and Shop Drawings
(2) Cable Splicer Qualifications, Type and Voltage
(3) State Contractors License with Electrical Classification
(4) Master, Journeyman and Apprentice Electrician Licenses and Certifications
(5) Lockout/Tagout Program
(6) Installation Manuals
(7) Operation Manuals
(8) Maintenance Manuals
(9) Parts Lists, including recommended spare parts. Recommended spare parts shall be furnished with the respective equipment.
(10) Ground Rod Impedance Test Reports
(11) Cable Pulling Tension Value Logs
(12) Insulation Resistance Test Reports
(13) Regulator Load and Calibration Reports for testing, checking and adjusting all regulators in the electrical vault

i. After approval of the O&M Manuals, the Contractor shall provide three (3) complete electronic copies of all documentation in Adobe PDF file format on CD-R (non-rewriteable) discs storage media. The electronic files shall contain searchable text and include a hyperlink index for ease in locating information with the PDF file.

j. All requirements herein Item SS-300 shall be applicable to all referenced sections in these contract documents and applicable to all sections, which reference Item SS-300.

k. The Contractor is the single source of responsibility for the installation and integration of the airport's lighting, power, and control systems. New airport lighting equipment and materials shall be fully compatible with all other new and existing airport lighting equipment and systems. Any non-compatible components furnished by the Contractor shall be replaced at no additional cost to the Owner with a similar unit that is approved by the Engineer and compatible with the remainder of the airport lighting system.

300-2.3 Operation and maintenance data.

Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment. Provide bound hard copies and electronic copies as noted in section 300-2.2.

a. Certificate of Substantial Completion, Release and Contractor's Affidavit, executed copies.

b. Final approved equipment submittals, including product data sheets and shop drawings, clearly labeled.

c. Installation manuals: Description of function, installation and calibration manuals, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

d. Operations manuals: Manufacturer's printed operating instructions and procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; summer and winter operating instructions; and all programming and equipment settings.

e. Maintenance manuals: Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

f. Service manuals: Servicing instructions and lubrication charts and schedules, including the names and telephone numbers of personnel to contact for both routine periodic and warranty service for equipment and materials provided under this Specification.

g. Final test reports, clearly labeled, including but not limited to, insulation resistance test reports, ground rod impedance test reports, cable pulling tension values logs, and equipment certification tests.

h. Final certified calibration sheets for all equipment and instruments.

i. Preventive maintenance programs for the visual aid facilities and equipment installed in this project, including the applicable equipment sections within Chapter 5 “Preventive Maintenance” from AC 150/5340-26 (latest edition) “Maintenance of Airport Visual Aid Facilities”.

300-2.4 Overcurrent protective devices.

a. Circuit Breakers: Circuit breakers shall be the molded-case type, as indicated, with each pole equipped with inverse time and instantaneous overcurrent tripping devices. Circuit breakers shall be UL listed. Single pole breakers shall be full module size; two poles shall not be installed in a single module. Multi-pole breakers shall be of the common-trip type having a single operating handle, and for sizes of 50 amperes or less may consist of single pole breakers permanently assembled at the factory into a multi-pole unit. Circuit breakers used for motor disconnects and not in sight of the motor controller shall be capable of being locked in the open position. Minimum interrupting rating shall be as shown.

b. Fuses: All fuses shall be Bussman; Gould-Shawmut, or equal. Plug fuses are not acceptable. Cartridge fuses shall be rated at 250 or 600 volts, as applicable, and shall conform to the requirements of UL 198 and NEMA Standard FU-1. 600 volts or less fuses shall be rated at 200,000 Amperes Interrupting Capacity.

300-2.5 Wire.

Unless otherwise indicated, conductors No. 10 AWG and smaller shall be solid, and conductors No. 8 AWG and larger shall be stranded.

For electrical work of 600 volts or less, all conductors, terminations, terminal blocks, lugs, connectors, devices and equipment shall be listed, marked, and rated 75 degrees C minimum unless otherwise noted.

Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway. Pull ropes and pull wires shall have sufficient tensile strength for the cable(s) to be pulled and installed. Damaged cable or raceway shall be replaced at no additional cost to the Owner. Calculate and do not exceed the maximum allowable pulling tension or maximum allowable sidewall bearing pressure for all conductors and cables.

Install pull wires in empty raceways. Use a polypropylene plastic line with not less than 200-pound tensile strength. Secure and leave at least 12 inches of slack at each end of pull wire to prevent it from slipping back into the conduit. Cap spare raceways with removable tapered plugs, designed for this purpose.

300-2.6 Concrete. Concrete shall conform to Item P-610, Concrete for Miscellaneous Structures, with a minimum 28-day compressive strength of 4000 PSI (unless otherwise noted) using 1-inch (25-mm) maximum size coarse aggregate, as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39.

~~**300-2.7 Constant current regulators.** Constant current regulators shall be:~~

~~a. L-829, constant current regulator with integral control, monitoring, and meggering, Ferroresonant type for runway regulators,~~
~~b. Class 1, (6.6 amps)~~
~~c. Style 1, (3 brightness steps)~~
~~d. 208 VAC, 1-phase, 60 Hz~~
~~e. Integral S-1 Cutout~~
~~f. Integral distributed control and monitoring system including current voltage module (output power monitoring of the current, voltage, apparent power in VA, true power in Watts, and power factor), and insulation resistance monitoring module~~

~~The output power rating of the regulators shall be as noted on plans and meet the criteria set forth in the most current version of AC 150/5345-10, Specification for Constant Current Regulators and Regulator Monitors. The output power rating of all existing and new regulators within the electrical vault shall be tested, checked and adjusted to meet the AC criteria prior to placing the airfield lighting circuits into service.~~

~~Regulators with output winding power taps shall have a dedicated separate nameplate on the front of the regulator indicating the power tap setting and this setting shall also be recorded in the as-built drawings. Power taps shall be set as shown on the plans or as indicated by the Engineer to provide the highest operation efficiency for the specified lighting load.~~

~~Each regulator shall be equipped with the following options:~~

~~a. Internal 120 VAC control power transformer~~
~~b. Remote/Local and Intensity control selector switches~~
~~c. Output ammeter~~
~~d. Input and output current surge limitation~~
~~e. Circuit isolation~~
~~f. Open circuit protection~~
~~g. Overcurrent protection~~
~~h. Lightning arresters across the output terminals~~

~~The regulators shall be supplied with all features and accessories required for a complete installation as defined in these Specifications and as shown on the plans.~~

~~The trip rating of all circuit breakers which are used to protect constant current lighting circuit regulators shall be coordinated with the approved regulator manufacturer. The manufacturer's recommended circuit breaker size shall be submitted to the Engineer for approval.~~

~~The Contractor shall submit his initial regulator load test reports prior to any work on the electrical system. The Contractor shall test all regulators within the electrical vault and submit these reports to the Engineer prior to Contractor proceeding with his work.~~

~~The Contractor shall calibrate all new and existing regulators following construction and prior to final acceptance testing in accordance with FAA AC 150/5340-26 "Maintenance of Airport Visual Aid Facilities" and manufacturer's recommendations. Contractor shall submit calibration report to Engineer.~~

~~After final acceptance testing has been completed, the Contractor shall complete and submit his final regulator load test reports to the Engineer for all regulators and insert copies of the final regulator load test reports in the Operation and Maintenance Manuals.~~

~~300-2.8~~300-2.7 Wind cones and segmented circles.

Wind cone shall be installed as indicated in the plans and in accordance with the manufacturer's recommendations.

The series lighting circuit shall be used as the power source for the wind cone.

The segmented circle airport marker system shall conform to the requirements of AC 150/5340-5, Segmented Circle Airport Marker System. Install the segmented circle as indicated in the plans. Submit shop drawings for review and approval by the Engineer prior to field construction work.

CONSTRUCTION METHODS

300-3.1 Lockout/tagout program. The Contractor shall provide a complete copy of an electrical energy source Lockout/Tagout Program to the Owner, with copy to the Engineer. The document shall clearly identify the on-site master electricians and their contact information, including office and mobile telephone numbers.

The Lockout/Tagout Program shall comply with Part 1910 – Occupational Safety and Health Standards (OSHA) Subpart S – Electrical, and meet the requirements of 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout), including requirements listed in 1910.331 through 1910.335.

Implementation of the Lockout/Tagout Program and all other related safety requirements are the sole responsibility of the Contractor.

300-3.2 Safety program. The Contractor shall implement an electrical safety program that complies with NFPA 70E and 29 CFR 1926.

Implementation of the Electrical Safety Program, determining and providing proper Personal Protective Equipment (PPE), training and enforcing personnel to wear the prescribed PPE, conducting work area safety inspections (including correcting deficiencies), and all other related safety requirements are the sole responsibility of the Contractor.

All work involved in the preparation and implementation of the safety program will not be measured for separate payment but will be considered subsidiary to the lockout/tagout bid item.

300-3.3 General.

The Contractor shall be responsible for coordinating all electrical work with the Utility. The Contractor shall provide temporary service conductors and raceway system. The Contractor shall then provide and connect permanent service conductors and raceway system after the completion.

All secondary conductors and controls, signaling and lighting shown in or on buildings are included in this project. Electrical service shall be extended from the service equipment as indicated.

In general, the various electrical equipment and material to be installed by the various trades under this specification shall be run as indicated, as specified herein, as required by particular conditions at the site,

and as required to conform to the generally accepted standards to complete the work in a neat and satisfactory manner. The following is a general outline concerning the running of various systems and is to be expected where the drawings or conditions at the buildings necessitate deviating from these standards.

The drawings and specifications are complementary; any work required by one, but not by the other, shall be performed as though required by both.

The Contractor shall maintain copies of all equipment installation manuals on site during construction.

The electrical plans do not give exact locations, etc., and do not show all the offsets, control lines, junction boxes, and other installation details. Each Contractor shall carefully lay out his work at the site to conform to the job conditions, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and thereby to provide complete operating systems.

The electrical plans show diagrammatically the locations of the various electrical outlets and apparatus and the method of circulating and controlling them. Exact locations of these outlets and apparatus shall be determined by reference to the general plans and to all detail drawings, etc., by measurements at the buildings, and in cooperation with other crafts, and in all cases shall be subject to the approval of the Engineer. The Engineer reserves the right to make any reasonable change in location of any outlet or apparatus before installation, without additional cost to the Owner.

These Specifications and the accompanying Drawings are intended to cover systems which will not interfere with the structure of the buildings, which will fit into the several available spaces, and which will insure complete and satisfactory systems. Each bidder shall be responsible for the proper fitting of his material and apparatus into the buildings.

Should the particular equipment which any bidder proposes to install require other space conditions than those indicated on the Drawings, he shall arrange for such space with the Engineer before submitting his bid. Should changes become necessary because of failure to comply with this clause, the Contractor shall make such changes at the Contractor's expense.

Should the particular equipment which any bidder proposes to install require other installation methods, such as larger light base junction structures, etc., he shall include all such equipment and appurtenances in his bid. Should changes become necessary because of failure to coordinate equipment requirements and comply with this clause, the Contractor shall make such changes at the Contractor’s expense.

The Contractor shall be responsible to see that each party furnishes electrical equipment which meets the electrical requirements specified herein and that all systems work together to produce the specified operation.

Where two or more units of the same kind or class of equipment are required, these shall be products of a single manufacturer; however, the component parts need not be the products of one manufacturer.

Each Contractor shall submit working scale drawings of all his apparatus and equipment which in any way varies from these Specifications and Plans, which shall be checked by the Engineer and approved before the work is started, and interferences with the structural conditions shall be corrected by the Contractor before the work proceeds.

Electrical equipment, such as switchgear, switchboards, panelboards, load centers and other power supply equipment, shall not be used as a common enclosure, pull box or junction box for routing conductors of different systems, unless the equipment is specifically designed for this purpose and indicated as such on the Plans.

All electrical equipment shall be securely mounted as indicated in the plans, as required by the contract specifications, as required by guidelines and codes, and as required by the manufacturer using hardware compliant with the environmental conditions.

Interior components of electrical enclosures shall be securely mounted using appropriate hardware within the enclosure. Adhesives or adhesive tapes/strips are not allowed and are prohibited.

Electrical components, including but not limited to, relays, circuit boards, electronics, etc., shall be installed within approved enclosures.

The Contractor shall keep ends of conduits, including those extending through roofs, equipment and fixtures covered or closed with caps or plugs to prevent foreign material from entering during construction.

Where portions of raceways are known to be subjected to different temperatures, where condensation is a problem, and where passing from interior to exterior of a building, the portion of raceway or sleeve shall be filled with an approved material to prevent the circulation of air, prevent condensation, and prevent moisture entry. Sealing of raceways shall not occur until after the conductors and cables have been installed, tested and accepted by the Engineer.

The Contractor shall install any temporary lines and connections required to maintain electric services and safely remove and dispose of them when complete.

All temporary wiring shall conform to OSHA standards. Remove temporary services when work is complete. Any damage to electrical equipment caused by the Contractor shall be repaired at no cost to the Owner.

All non-current carrying parts and neutrals shall be grounded as indicated on the Drawings or as required by the Codes.

White and/or gray outer finish conductors may only be used as grounded conductors or neutral conductors in accordance with NEC.

Install insulated green equipment grounding conductors with all feeder and branch circuits.

Provide separate insulated equipment grounding conductors from grounding system to each electrical equipment, telecommunication equipment, other special electrical system equipment, and appurtenance item location in accordance with NFPA 70 and other applicable standard requirements.

The bidder shall inspect the site, thoroughly acquaint himself with conditions to be met and work to be accomplished. Failure to comply with this shall not constitute grounds for any additional payments.

Where electrical equipment is installed that causes electrical noise interference with other systems either existing or installed under this contract, the offending equipment shall be equipped with isolating transformers, filters, reactors, shielding, or any other means as required for the satisfactory suppression of the interferences, as determined by the Engineer.

All junction boxes, expansion joints, flexible connections, instruments and similar items requiring servicing or repairs shall be installed in an accessible location.

All salvage and equipment removed by the work shall remain the property of the Owner. Material removed from the project shall be stored on the project site where and as directed. Debris shall be removed from the job site and disposed of by the Contractor.

The Contractor shall maintain his work area clean and orderly at all times. Debris shall be removed promptly. The electrical system shall be thoroughly cleaned inside and outside of all enclosures to remove all metal shavings or other work debris, dust, concrete splatter, plaster, paint and lint.

The Contractor shall do all excavating and backfilling made necessary by electrical work and shall remove all surplus or supply any earth required to establish the proper finished grade.

The Contractor shall do all cutting and patching made necessary by electrical work, but in no case shall he cut through or into any structural member without written permission of the Engineer.

All steel conduits, supports, channels, fittings, nuts, bolts, etc. shall be galvanized, corrosion-resistant type unless otherwise noted.

An approved anti-seize compound shall be used on all threads to prevent equipment and thread damage.

Equipment shall be installed in accordance with manufacturer's recommendation. Make all final electrical connections and coordinate all items with other trades.

Correct unnecessary damage caused due to installation of work, brought about through carelessness or lack of coordination. All openings, sleeves, and holes to be properly sealed, fire proofed and waterproofed. Any water leaks arising from project construction will be immediately corrected to the satisfaction of the Owner and the Engineer.

300-3.4 Power supply equipment. Electrical equipment, such as switchgear, switchboards, panelboards, load centers, and other power supply equipment, shall not be used as a common enclosure, pull box or junction box for routing conductors of different systems, unless the equipment is specifically designed for this purpose and indicated as such on the Plans.

If shown in the plans, the power supply equipment shall be set on concrete housekeeping pads to provide a minimum space of 3-1/2 inches between the equipment and the floor. All equipment shall be secured to the floor or wall in accordance with the manufacturer's recommendations and these contract document requirements.

300-3.5 Duct and conduit. Conduits shall be galvanized rigid steel unless otherwise indicated or specified. Refer to one-line diagram conduit notes for specific requirements.

Conduit runs shall be one trade size continuously with no reducers allowed. Changing of conduit size is only permitted at manholes, handholes, and boxes and conduit bodies used as outlet, device, junction, or pull boxes, including approved, listed fittings with removable covers.

Use an approved, listed adapter/coupling to convert to other types of conduit. Reducer couplings are not allowed.

For underground service entrance, feeder and branch circuit raceways, offsets and bends over 30 degrees and elbows in Schedule 40 PVC conduit runs shall be Schedule 80 PVC conduit. Underground service entrance PVC conduits shall be concrete encased unless otherwise noted. Underground PVC conduits shall be concrete encased under driveways, roadways, parking lots and other paved areas.

Non-encased conduits shall convert to concrete encased ducts under all paved areas and shall extend at least 3 feet beyond the edges of the pavement unless otherwise noted.

The Contractor shall provide a staked centerline or offset for the duct and manhole system - utilizing the drawings and a site inspection of the existing grounds, grades and utility crossings. The Owner and Engineer shall approve the staking plan that shall be indicated on a drawing submitted for approval before

starting any excavation for the ducts. The staking plan shall indicate the proposed location, elevation and dimensions of manholes and handholes. The Engineer reserves the right to adjust duct, manhole and handhole locations and elevations before installation at no additional cost to the Owner.

The bottom surface of trenches shall be essentially smooth and free from coarse aggregate.

Install grounding-and-bonding type bushings and bonding jumpers on all service entrance conduits and on all feeder and branch circuit conduits.

Use conduit bushings at each conduit termination. Where No. 4 AWG or larger ungrounded wire is installed, use insulated bushings.

When EMT is allowed, utilize only steel compression fittings. Die-cast and set-screw fittings shall not be used.

Use double lock nuts at each conduit termination. Use weather tight hubs in damp and wet locations. Sealing lock nuts shall not be used.

Grounding continuity to rigid metal conduit shall be accomplished by grounding bushings/adapters with lugs for connection to grounding counterpoise and/or grounding electrode conductor as defined by NEC.

All exposed wiring shall be run in not less than 1/2 inch (12 mm) galvanized rigid steel conduit. All conduits shall be installed to provide for drainage. Conduit shall be attached to wooden structures with galvanized pipe straps and fastened with galvanized wood screws not less than No. 8 nor less than 1-1/4 inches (31 mm) long. There shall be at least two fastenings for each 10-foot (3 m) length.

Existing ducts may require clearing before use. It is the responsibility of the Contractor to locate the existing ducts, identify empty or partially empty conduits and clear the conduits as required. Where new cable is to be installed in existing duct, the full length of the duct shall be cleared of debris by mechanical means before the installation of the new cable. Acceptable methods of clearing existing ducts include "hydro-jetting" and "roto-rooting." All existing cables in each re-used duct shall be replaced for the length of the duct and properly spliced in a method approved by the Engineer. Clearing of existing duct banks or conduits is incidental to the cable pay item.

Dedicated ground rods shall be installed and exothermically welded to the counterpoise wire at each end of a duct bank crossing under pavement.

For concrete markers, the impression of letters shall be done in a manner, approved by the Engineer, to affect a neat, professional appearance. The letters shall be stenciled neatly. After placement, all markers shall be given one coat of high-visibility aviation orange paint, as approved by the Engineer.

Existing concrete markers or survey pins for runway thresholds, duct/conduit/cable/splice markings, utility line markings, taxiway points of tangency markings, or other similar items shall be removed and reinstalled or replaced, depending on the project work requirements, as required by a registered professional surveyor to the satisfaction of the Owner and the Engineer.

300-3.6 Junction boxes.

Junction cans shall have both internal and external ground lugs. Size (diameter) and depth shall be as specified in the plans.

Galvanized cans shall have an external ground lug for mechanical connection/bolting ground clamps bonding.

300-3.7 Concrete structures.

For concrete structures, each cover and frame shall be galvanized and have a spring assisted, latching mechanism allowing one individual to open the manhole hinged cover(s) using the recessed lifting handles. Covers shall be secured by stainless steel penta-head bolts.

300-3.8 Backfill, compaction, and restoration. Refer to the backfill, compaction and restoration requirements within Item P-152 where other compaction requirements are specified (under pavements, embankments, etc.)

Trenches shall be backfilled and compacted in 6" layers to 90% maximum density for cohesive soils and to 100% maximum density for non-cohesive soils, as determined by ASTM D1557. The in-place field density shall be determined in accordance with ASTM D1556, D2167, or D6938.

Backfilling from two directions will not be allowed. No backfilling will be accomplished without the approval of the Engineer or Construction Observer. The Contractor shall ensure all trenches are inspected prior to being covered and prior to encasement. Any uninspected trenches which are prematurely covered shall be exposed for inspection at the Engineer and Owner's convenience at no additional cost to the Owner. The Construction Observer will coordinate with the Contractor for advance scheduling of trench inspection.

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.

300-3.9 Cable and utility coordination. The existing and the proposed locations of lighting cable are approximate. The Contractor shall be responsible for field locating and identifying the existing lighting circuits to determine their exact routing. The Contractor shall also be responsible for maintaining the lighting systems in a working condition until the new lighting circuits have been installed and tested. The Contractor shall proactively and expeditiously accomplish this cable identification work prior to performing any modifications to the lighting circuits. Coordinate identification work with the Owner and Engineer and make all corrections, additions, etc. on the as-built drawings.

Underground cable and utilities exist within and adjacent to the limits of construction. An attempt has been made to locate these cables and utilities on the Plans. All existing cable and utilities may not be shown on the Plans and the location of the cables and utilities shown may vary from the location shown on the Plans. Prior to beginning of any type of excavation, the Contractor shall contact the utilities, the airport maintenance staff, FAA field personnel and other organizations as required and make arrangements for the location of the utilities on the ground. The Contractor shall maintain the cable and utility location markings until they are no longer required.

The Contractor shall replace or repair any underground cable or utility that has been damaged by the Contractor during excavation to the satisfaction of the owner of the cable or utility at no additional cost to the Owner.

The Contractor shall be responsible for all coordination work associated with existing and new utilities, their marking, their identification, proposed outages/shutoffs, connections, cutovers, etc.

300-3.10 Wiring. The Contractor shall furnish all labor and materials and shall make complete electrical connections in accordance with 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 Electrical Code.

Provide color-coding for phase identification.

Colors for 240/120V Circuits:

a. Phase A: Black
b. Phase B: Red
c. Neutral: White

Colors for 208Y/120V Circuits:

a. Phase A: Black
b. Phase B: Red
c. Phase C: Blue
d. Neutral: White

Colors for 480Y/277V Circuits:

a. Phase A: Brown
b. Phase B: Orange
c. Phase C: Yellow
d. Neutral: Gray

All new electrical cable shall be marked using color-coded plastic electrical tape, which is specifically designed for application on polyethylene-jacketed cable. The tape shall be applied as detailed on the Plans. Marking tape shall be Scotch 35 Vinyl Plastic tape or approved equal.

300-3.11 Marking and labeling. Properly identify all electrical equipment.

Wire/Cable Designation Tape Markers:

a. Indoor Dry Locations: UL Recognized Materials, vinyl or vinyl-cloth, self-adhesive, wraparound, self-laminating, cable/conductor markers with computer printer-generated numbers and letters, minimum 1" width. Provide Brady B-427 with thermal transfer print type or approved equal.

b. Outdoor Locations and Indoor Wet and Damp Locations: White polyolefin, non-adhesive, full circle, heat-shrinkable sleeve, cable/conductor markers with computer printer-generated numbers and letters, minimum 1" width. Provide Brady B-342 with thermal transfer print type or approved equal.

Properly identify all electrical equipment, including but not limited to the following:

a. Switchgear, switchboards, and control panels.
b. Main distribution panel and individual devices within it.
c. Panelboards and individual devices within it.
d. Safety switches and disconnects.
e. Contactors and lighting control center, including all branch circuits.
f. Individually mounted circuit breakers.
g. Starters and relays.
h. Transformers.
i. Generators and automatic transfer switches.

Use permanently attached black phenolic plates with 3/8" white engraved lettering on the face of each, attached with minimum two sheet metal screws. Starters and relays connected under this Specification shall be identified whether furnished under this Specification or under other Specifications of this contract. Plates shall be indoor or outdoor rated as required by installation location.

Panelboard identification plates shall indicate panel by identification name, voltage system, ampacity rating and type, AIC rating, and feeder source description.

Identify each receptacle, light switch, junction box, etc. with panelboard identification and circuit number. For all wiring device covers, use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

Identify fire alarm junction boxes with red covers and mechanical control junction boxes with blue covers.

Install all identification as required by current adopted editions of the NFPA 70 - National Electrical Code and NFPA 70E - Standard for Electrical Safety in the Workplace.

300-3.12 Removal and relocation of existing equipment. The Contractor shall carefully remove all salvageable equipment as indicated on the Plans. Any equipment which is damaged during the removal operation shall be subject to a reduction in payment for removal of the equipment. All equipment which is removed during this project shall be transported to a site on the Airfield or removed from the Airfield and properly disposed of as directed by the Owner and the Engineer.

The Contractor shall carefully relocate existing equipment as indicated in the Plans. Any equipment that is damaged during the relocation operation shall be replaced at no additional cost to the Owner.

Any existing electrical equipment, conduit, cables, etc. that is damaged during construction shall be replaced at no additional cost to the Owner to the satisfaction of the Owner and the Engineer.

Existing equipment that contains oils which may have Polychlorinated Biphenyls (PCBs) shall be properly removed from the Airfield in accordance with the governing environmental disposal standard. The Contractor shall submit removal and disposal plans prior to removing this equipment.

300-3.13 Electrical vault conduit and wiring. Electrical work within the electrical vault shall be installed in accordance with specific FAA Advisory Circular requirements, including but not limited to the following:

Install all conduit and wiring in the electrical vault or shelter in accordance with NEC and local electrical code requirements.

Install all power and control cables in conduit or enclosed wire ways. The standard L-824 airfield lighting primary series circuit cable does not comply with NEC for installation in open cable trays. High voltage conductors (exceeding 600 volts) shall be installed within rigid steel galvanized conduit, intermediate metal conduit, flexible metal conduit, liquid tight flexible metal conduit, metal wire ways, or PVC conduit. Low voltage feeders and control wires shall be installed within rigid steel galvanized conduit, intermediate metal conduit, or electrical metallic tubing (EMT) when run on the walls or ceiling; and in cable trays supported from the ceiling or walls when there are many cables and the possibility of future expansion. Do not install conduit in concrete slabs on grade.

Install the primary series cables from the regulators and various other feeders out of the vault in coated rigid steel galvanized conduit or PVC conduit, a minimum of 2 feet below grade.

Do not use PVC above the ground-level slab of buildings, vaults or shelters. PVC shall convert to coated galvanized rigid steel conduit prior to its emergence; no PVC shall emerge from the ground or concrete slab or encasement. Use manufactured sweep bend, coated galvanized rigid steel conduit elbows for stub-up risers. Coated galvanized rigid steel conduit shall transition to non-coated galvanized rigid steel conduit no sooner than 3” above finished grade.

300-3.14 5 kv and under 600v cable connections.

Cable splicing/terminating personnel shall be licensed electricians who have the minimum continuous experience in terminating/splicing medium voltage cable as listed in Item L-108. The qualifications for these airfield lighting cable splicers shall be submitted for review and approval by the Engineer prior to any work. The Engineer may request sample splices be performed in his presence by the proposed

personnel to clearly demonstrate that they have the skill and experience to perform this work. Connector kits and cables shall be provided in sufficient quantity by the Contractor in demonstrating these qualifications at no additional cost to the Owner.

Field-attached plug-in splices using FAA certified L-823 plug and receptacle connector kits, properly sized to the cable being used, shall be installed as shown in the plans. This work shall include the taping and heat shrinking. Refer to Item L-108 for additional requirements.

As an option, the Contractor may utilize enhanced FAA certified L-823 connector kits, such as the Amerace 54Super Kit. These kits do not require taping or heat shrinking. These kits shall be installed in accordance with the manufacturer's installation requirements. Note that the mixing of connector kits is unacceptable. The Contractor shall clearly list and submit the connector kits he proposes to utilize on the project for approval prior to any field construction work, and he shall only install that type during construction unless otherwise noted by the Engineer.

For under 600V cable connections of voltage powered circuits, splices whether direct buried or within an underground enclosure shall only utilize approved cast splices, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M Company, or an approved equivalent.

300-3.15 Certification and performance. Equipment and materials covered by FAA Advisory Circulars are referred to by item numbers and approved equipment is listed within the AC 150/5345-53 Airport Lighting Equipment Certification Program's monthly Addendum, which contains a complete and updated listing of the certified equipment and manufacturers and is listed in the FAA Buy American Preference equipment list, which is also updated monthly. The Contractor shall provide and install new certified equipment that works reliably and efficiently with the existing equipment to remain in service. The Contractor shall provide any additional accessories and/or appurtenances required to provide fully functional electrical systems to the satisfaction of the Owner and Engineer, at no additional cost to the Owner.

The Contractor shall ascertain that all lighting system components furnished (including FAA certified and approved equipment) are compatible in all respects with each other and the remainder of the new and existing systems. Any non-compatible components furnished by the Contractor shall be replaced at no additional cost to the Owner with a similar unit that is approved by the Engineer and compatible with the remainder of the airport lighting system.

300-3.16 As-built drawings. The Contractor shall keep one (1) full-sized set of prints for As-Built Drawings at the site, in good order, and annotated to show all changes made during the construction process.

The Contractor shall locate all underground and concealed work, identifying all equipment, conduit, circuit numbers, motors, feeders, breakers, switches, and starters. The Contractor will certify accuracy by endorsement. As-Built drawings shall be correct in every detail, so Owner can properly operate, maintain, and repair exposed and concealed work.

The As-Built drawings shall indicate all control system labeling and marking.

The Contractor shall store the As-Built drawings on the site. Drawings shall not be rolled. Make corrections, additions, etc., with pencil, with date and authorization of change.

As-Built drawings must be submitted to Engineer before project will be accepted.

Minor deviations from the Plans and Specifications shall be as approved by the Engineer.

Upon completion of the installation, the Contractor shall adjust the systems to the satisfaction of the Engineer.

300-3.17 Testing.

General Electrical Testing: Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification and certify compliance with test parameters. Tests shall be conducted in the presence of the Engineer and shall be to his/her satisfaction. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest. Perform infrared scan tests and inspections of service and power distribution equipment at the respective buildings and provide reports. Electrical equipment will be considered defective if it does not pass tests and inspections. Reports shall include notations of deficiencies, remedial action taken and observations after remedial action.

System and Equipment Testing: All installations shall be fully tested by continuous operation for not less than 24 hours as completed systems prior to acceptance. These tests shall include the functioning of each control not less than 10 times.

Test equipment and instruments utilized by the Contractor shall have been calibrated following the manufacturer's recommended schedule to verify their accuracy prior to performing the testing work. The Contractor shall provide instrument calibration certificates on test equipment when requested by the Engineer. Retesting work due to inaccurate or defective instruments shall be performed by the Contractor to the satisfaction of the Engineer at no additional cost to the Owner.

a. Regulator Calibration:

The Contractor shall check and calibrate both ~~new and~~ existing regulators utilizing the enclosed "Constant Current Regulator Calibration Report". Refer to the material section on constant current regulators for additional requirements.

New regulators are calibrated at the factory prior to shipping, while existing regulators typically need checks and calibrations on a routine basis so that they do not get out of tolerance. The intent is to check and/or calibrate these regulators using a high accuracy meter prior to energizing and placing the airfield lighting system in service.

Utilize a high accuracy true RMS ammeter with high accuracy clamp-on current probe when making these measurements (use round type probes, accuracy + or – 2% required, sized per the cable diameter and circuit ampacity to achieve the best accuracy). Adjust regulators per manufacturer's instructions to meet the output currents on each brightness step as listed in Tables 5-2 and 5-3 in AC 150/5340-26.

b. Megger Testing:

The Contractor shall perform megger testing on each existing regulator circuit prior to any work on the electrical system. This information shall be recorded and documented by the Contractor and submitted to the Engineer. The Contractor shall perform megger tests on each regulator circuit after the acceptance test period. This acceptance test information shall be recorded and documented by the Contractor and submitted to the Engineer. Megger test shall be performed in accordance with the requirements of Item L-108.

The Contractor shall submit his initial megger test reports on the enclosed "Insulation-Resistance Test Report" form prior to any work on the electrical system. This report shall be submitted to the Engineer and approved by the Owner prior to Contractor proceeding with his work.

After final acceptance testing has been completed, the Contractor shall complete and submit his final megger test reports to the Engineer and insert copies of the initial and final megger test reports in the Operation and Maintenance Manuals.

Megger testing shall be performed using an insulation meter, such as a Fluke 1507 Insulation Resistance Multimeter, Ideal 61-797 Digital Insulation Meter, or approved equal having an insulation test range up to 10 Gigohms or greater.

Insulation resistance testers for 5kV series circuits shall utilize the 1000V DC source output for testing. The test equipment shall be submitted for review and approval by the Engineer prior to performing the tests.

The Contractor shall be responsible to maintain an insulation resistance equal to minimum 80% of the initial testing value through the end of the contract warranty period. This requirement is based on AC 150/5340-26C which states that resistance values inevitably decline over the service life of the circuit and that a 10-20 percent decline per year is considered normal. Note that AC 150/5340-26C cancels AC 150/5340-26B; thus, refer to the current edition of the maintenance AC for requirements in this project.

For existing circuit insulation resistance requirements, refer to “Existing Circuits” section of Item L-108.

The insulation resistance to ground for 600V rated cables shall be not less than 100 Megohms when measured per NETA standards.

The installations shall be tested in operation as a completed unit prior to acceptance. Tests shall include taking megger and voltage readings in accordance with manufacturer’s requirements. Testing equipment shall be furnished by the Contractor.

c. Ground Rod Impedance Testing:

The enclosed “Ground Rod Impedance Test Report” form shall be used, and testing shall be performed in the presence of the Engineer.

As-Built drawings shall indicate the location of all installed ground rods. Each ground rod shall have a unique identifier that corresponds with its submitted ground impedance test report.

Three-pole fall-of-potential testers that can measure the ground resistance of a ground rod using auxiliary electrodes (staked testing), such as a Fluke 1621 Earth Ground Tester, shall be used for testing individual dedicated equipment ground rods at fixtures and equipment, or for testing isolated counterpoise ground rods not yet connected to the counterpoise wire.

Clamp-on testers that can measure the ground resistance of a ground rod without using auxiliary ground rods (stakeless testing), such as a Fluke 1630 Earth Ground Clamp Meter or approved equal, shall be used for testing counterpoise ground rods which have already been connected to the counterpoise wire, or ground ring ground rods which have already been connected to the established ground ring system.

Ground impedance test equipment shall be submitted for review and approval by the Engineer prior to performing the tests.

If the ground rod’s impedance exceeds 25 ohms, an additional rod shall be driven in a location suitable and approved by the Engineer. However, the additional rod must satisfy

the requirements of NEC 250.53 and not be less than 6 feet away from any other ground rod electrode. Additional ground rods shall not be measured for separate payment but shall be considered subsidiary to the counterpoise or respective equipment pay item.

The Contractor shall perform additional tests if required and requested by the Engineer at no additional cost.

The Contractor shall coordinate with the resident Engineer to approve tests daily before proceeding. The Contractor shall fill out a separate test report for each date. Test reports shall be submitted weekly to the Engineer.

d. Cable Pulling Tension Values Log:

The enclosed "Cable Pulling Tension Values Log" form shall be used for monitoring cable pull tension values in the presence of the Engineer.

Airport lighting equipment and special systems shall be tested in accordance with applicable FAA Advisory Circular requirements and the manufacturer's installation instructions. These tests shall also include those system requirements listed within AC 150/5340-26 Maintenance of Airport Visual Aid Facilities.

300-3.18 Inspection fees and permits. The Contractor shall obtain and pay for all necessary construction permits, licenses, government charges, and inspection fees necessary for prosecution of the Work. Unless otherwise noted, the Contractor shall pay all charges of utility owners for connections for providing permanent service to the Work, ready for subsequent utility account transfer to the Owner after final acceptance.

300-3.19 Work supervision.

State of Texas: The electrical contractor (whether the general contractor or a subcontractor) shall be a licensed contractor in the state of Texas having an electrical classification suitable for performing the work required in these contract documents.

The Contractor shall designate in writing the qualified electrical supervisor who shall provide supervision to all electrical work on this project. The minimum qualifications for the electrical supervisor shall be a master electrician as defined by Texas Electrical Safety and Advisory Board requirements. The supervisor or his appointed alternate possessing at least a journeyman electrician license shall be on site whenever electrical work is being performed. The qualifications of the electrical supervisor shall be subject to approval of the Owner and the Engineer.

All master and journeyman electricians shall be licensed in accordance with Texas Board Requirements. The website located at http://www.license.state.tx.us publishes the text of this statutory requirement. No unlicensed electrical workers shall perform electrical work on this project. Apprentice electricians in a ratio of not more than one apprentice per journeyman electrician will be allowed if the apprentices are licensed and actively participating in an apprenticeship program recognized and approved by the Texas Electrical Safety and Advisory Board.

300-3.20 Training. The training classes shall be coordinated with the Owner and Engineer in advance of the final acceptance testing. Comprehensive operational and maintenance training materials shall be provided by the equipment manufacturer and the Contractor (see section 2.3 OPERATION AND MAINTENANCE DATA).

Schedule the training with the Owner at least 10 days in advance and notify the Engineer.

Provide hands-on demonstrations and training of equipment components and functions, including adjusting, operating and maintaining the lighting equipment and systems. Coordinate the training schedule with the Owner in advance, so that the Owner may record the training if desired. Provide 4 hours training for the operational personnel and 4-hours training for the maintenance personnel.

All training sessions shall be recorded, and documentation of training shall be turned over to the Owner as part of the O&M materials at project completion.

METHOD OF MEASUREMENT

300-4.1 The quantity of lockout/tagout and constant current regulator calibration procedures to be paid for shall consist of all lockout/tagout procedure work and all constant current regulator calibration work completed in place, accepted and ready for operation. This item does not include measurement for constant current regulator equipment.

300-4.2 The quantity of electrical vault modifications to be paid for under this item shall consist all work in the vicinity of the electrical vaults which is not paid separately by other items, including but not limited to ~~new~~ modifying the output rating of existing constant current regulators ~~, removal of existing regulator and equipment~~ as indicated by the plans, ~~conduits, wires, circuit breakers, panelboard modifications,~~ connections, connectors, grounding, control system modifications and additions, testing and methods required to complete the work to the satisfaction of the Owner and the Engineer. This item shall also include all existing electrical vault building rehabilitation work as indicated in these Plans and Specifications.

BASIS OF PAYMENT

300-5.1 Payment will be made at the contract unit price for each complete item, measured as provided above, and accepted by the Engineer. 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 to the satisfaction of the Engineer.

Payment will be made under:

Item SS-300-5.1	Lockout/Tagout and Constant Current Regulator Calibration Procedures – per Lump Sum
Item SS-300-5.2	Electrical Vault Modifications – per Lump Sum

MATERIAL REQUIREMENTS

Commercial Item Description A-A-59544	Cable and Wire, Electrical (Power, Fixed Installation)
Fed. Spec. W-C-1094	Conduit and Conduit Fittings; Plastic, Rigid
Fed. Spec. W-P-115	Panel, Power Distribution
Fed. Std. 595	Colors
Underwriters Laboratories Standard 6	Rigid Metal Conduit
Underwriters	Fittings for Conduit and Outlet Boxes

Laboratories Standard 514	
Underwriters Laboratories Laboratories Standard 651	Schedule 40 and 80 Rigid PVC Conduit (for Direct Burial)
Underwriters Laboratories Laboratories Standard 1242	Intermediate Metal Conduit
CFR 1910	Occupational Safety and Health Regulations
CFR 1926	Safety and Health Regulations for Construction
ANSI/IEEE C2	National Electrical Safety Code
NFPA 70	National Electrical Code (NEC)
NFPA 70E	Standard for Electrical Safety in the Workplace
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
29 CFR 1910	Occupational Safety and Health Standards (OSHA)
29 CFR 1926	Safety and Health Regulations for Construction
Jaquith Industries, Inc.	The Design, Installation, and Maintenance of In-Pavement Airport Lighting

FAA ADVISORY CIRCULARS

AC 150/5300-13	Airport Design
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 150/5345-3	Specification for L-821 Panels for Control of Airport Lighting
AC 150/5345-5	Specifications for Airport Lighting Circuit Selector Switch
AC 150/5345-7	Specification for L-824 for Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors

AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Standard for 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 Base and Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-44	Specification for Taxiway and Runway Signs
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Isolation Transformers for Airport Lighting Systems
AC 150/5346-49	Specification L-854, Radio Control Equipment
AC 150/5345-51	Specification for Discharge-Type Flashing Light Equipment
AC 150/5345-53	Airport Lighting Equipment Certification Program
AC 150/5345-56	Specification for L-890 Airport Lighting Control and Monitoring System (ALCMS)

END OF ITEM SS-300

CONSTANT CURRENT REGULATOR CALIBRATION REPORT

Standard Requirements: FAA AC 150/5340-26 (latest edition) Maintenance of Airport Visual Aid Facilities

Owner / Sponsor: _____ Engineer: Garver, LLC

Airport:_____ Contractor: _____

Project Title: _____ Garver Project Number:_____

Vault ID / Location: _____ Date: _____

Weather / Site Conditions: _____ Last Two Weeks of Rain: _____inches

Constant Current Regulator #: _____ Serves: _____

	Completed	Comments
1. Check all control equipment for proper operation.	☐	_____
2. Perform short-circuit test. Record results and recalibrate if necessary.	☐	_____
3. Perform open-circuit test on regulators with open circuit protection. Open circuit protective device should de-energize the regulator. Record results.	☐	_____
4. Check and record regulator input voltage and current.	☐	_____
Input Voltage: _____ Input Current: _____		
5. Check and record regulator output load. (ONLY if regulator has monitoring package)	☐	_____
Volt-Amperes: _____		
6. Check and record output current on each brightness step. If output current is outside of the allowable range, adjust the regulator's on-board potentiometer to re-calibrate the output current within the allowable range. Re-record the new output current on this form.	☐	_____

3-Step CCR: B10: _____ B30: _____ B100: _____

5-Step CCR: 1: _____ 2: _____ 3: _____ 4: _____ 5: _____

Nominal: 4.8A 5.5A 6.6A 2.8A 3.4A 4.1A 5.2A 6.6A

Tested By: _____ (Signature and Date)

Test Equipment: _____ (Manufacturer and Model No.)

Engineer Witness: _____ (Signature and Date)

Owner / Sponsor Witness: _____ (Signature and Date)

INSULATION RESISTANCE TEST REPORT

Owner / Sponsor: _____ Engineer: Garver, LLC_____

Airport:_____ Contractor: _____

Project Title: _____ Garver Project Number:_____

Vault ID / Location: _____ Date Initial / Final Tests: _____

Weather / Site Conditions (Initial Test): _____ Last Two Weeks of Rain:_____inches

Weather / Site Conditions (Final Test): _____ Last Two Weeks of Rain:_____inches

		Initial Test Results		**Final Test Results**	
	Circuit Designation and Color Code	Regulator Size (kW)	Megger Reading Before Field Work (Megohms)	Regulator Size (kW)	Megger Reading After Field Work (Megohms)
1					
2					
3					
4					
5					
6					
Tested By:					
Test Equipment:					
Engineer Witness:					
Owner/Sponsor Witness:					

Provide signature/date and manufacturer/model no. as required in the fields above.

Initial Test Record – Owner Disposition

Owner / Sponsor: _____ (Signature and Date)

Check one only: ☐ Proceed with Installation ☐ Hold

GROUND ROD IMPEDANCE TEST REPORT

Owner / Sponsor: _____ Engineer: Garver, LLC

Airport: _____ Contractor: _____

Project Title: _____ Garver Project Number: _____

Date: _____ Weather / Site Conditions: _____

Fall-of-Potential Style Tester (F):
Manufacturer: _____ Model #: _____

Clamp-On Style Tester (C):
Manufacturer: _____ Model #: _____

Ground Rod #	Test Equipment Style (F or C)	Impedance Value (Ohms)	Ground Rod #	Test Equipment Style (F or C)	Impedance Value (Ohms)

Tested By:	
Engineer Witness:	

Provide signature/date in the fields above.

CABLE PULLING TENSION VALUES LOG

Owner / Sponsor: _____ Engineer: Garver, LLC

Airport: _____ Contractor: _____

Project Title: _____ Garver Project Number: _____

Date: _____ Weather / Site Conditions: _____

Dynamometer Manufacturer/Model #: _____ Cable / Wire Manufacturer: _____

From / To Locations	Wire/Cable Size	Length of Pull	Pull Method	Maximum Value	Measured Value
Tested By:					
Engineer Witness:					

Provide signature/date in the fields above.

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ITEM SS-301 ELECTRICAL DEMOLITION AND RELOCATION WORK

DESCRIPTION

301-1.1 This item shall consist of the removal and satisfactory disposal of existing runway and taxiway edge lights, guidance signs, junction structures, pads, equipment, and other incidentals, all of which are not designated or permitted to remain, in accordance with this specification, the referenced specifications and drawings, and applicable advisory circulars. This work shall include the removal of indicated equipment, materials, and incidentals necessary for a complete item removal, including all restoration work, as a completed unit to the satisfaction of the Engineer.

301-1.2 The Contractor shall maintain current copies of all referenced and applicable standards on the job site. The Contractor is responsible to make known to the Engineer any conflict between plans and specifications that he observes or of which he is made aware.

301-1.3 Additional details pertaining to the lighting system covered in this item are contained in the advisory circular, AC 150/5340-30, Design and Installation Details for Airport Visual Aids. Additional details pertaining to the PAPI system covered in this item are contained in the advisory circular, AC 150/5345-28, Standard for Precision Approach Path Indicator (PAPI) Systems.

301-1.4 This item shall consist of removing ~~and resetting~~ Precision Approach Path Indicators (PAPIs) in accordance with these specifications. ~~This work shall include the mounting, leveling, wiring, and testing of the lighting equipment and all materials and incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the Engineer.~~

MATERIALS

301-2.1 All backfill and repair materials used in electrical demolition, repair and restoration work shall comply with the referenced specifications and be approved by the Engineer.

Airport lighting equipment and materials shall meet the requirements outlined in Item SS-300 and Item L-125.

CONSTRUCTION METHODS

301-3.1 General. No demolition shall be started until the removal and/or relocation work has been laid out and approved by the Engineer. All material shall be disposed of off-site. All hauling and disposal will be considered a necessary and incidental part of the work. Hauling cost shall be considered by the Contractor and included 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.

Equipment removal shall typically include removing the equipment and its accessories, removing foundations/pads, removing existing conduits, conductors and appurtenances, removal of conduit to below grade, and removal of existing circuits back to source. The work shall include restoring the area to match existing, including filling and tamping all holes with earth, and clearing and leveling the site.

The Contractor shall remove all existing underground cable, which is unused or rendered unusable by this project, when such is exposed or made accessible during this work. All such wiring removed shall become property of the Contractor and shall be immediately removed from the project. Wiring in conduit shall be removed as indicated or if new wiring is shown to be installed in its place. Existing wiring shall not be reused or reinstalled.

Wiring not exposed shall be abandoned in place, if a reasonable effort will not remove it. No measurement

or payment will be made for this cable removal work. Damage to turf or other systems will not be permitted to salvage or retrieve existing cable.

Any damage to electrical equipment, systems, structures, conduits, cables, and accessories or other utilities, designated to remain in place, shall be repaired or replaced expeditiously at no additional cost to the Owner and to the satisfaction of the Owner and Engineer.

Holes, ditches, or other abrupt changes in elevation caused by the removal operations that could obstruct drainage or be considered hazardous or unsightly shall be backfilled, compacted, and left in a workmanlike condition.

Trenches or voids resulting from the removal or demolition of existing electrical equipment or other structures shall be filled with approved material placed in layers in accordance with Item P-152.

Concrete foundations and pads to be removed shall be obliterated full depth.

301-3.2 Removal and/or relocation of light fixtures and equipment. Light fixtures and other equipment which are to be removed shall be carefully excavated. All concrete bases and concrete anchors shall be removed by the Contractor. The removed lights, guidance signs, isolation transformers and wiring harnesses shall then be given to the Owner, or properly disposed of if so directed by the Owner. The ground around the removed lighting equipment shall be backfilled and properly compacted. Light fixtures and equipment which are to be relocated shall be stored on site and reinstalled with new lamps, new transformers, and all other new required accessories as indicated in the plans.

301-3.3 Removal of existing equipment. The Contractor shall carefully remove all salvageable equipment as indicated in the plans. Any equipment that is damaged during the removal and/or relocation operation shall be subject to a reduction in payment for removal and/or relocation of the equipment. All equipment that is removed during this project shall be transported to a site on the Airfield or removed from the Airfield and properly disposed of as directed by the Owner and the Engineer.

301-3.4 Relocation of existing equipment. Existing equipment that is to be relocated shall be carefully disconnected from the existing electrical system. The equipment shall be stored on site in an enclosed area protected from the weather as directed by the Owner and Engineer. The Contractor shall remove existing concrete bases and shall backfill and compact these areas to match existing. The electrical power circuit shall be field located and extended to the new installation location unless otherwise noted in the Plans. Coordinate the extension of the electrical service with the extension of the electrical duct serving the equipment and install duct, splice and cable markers to mark the new complete route.

Refer to the plans for additional installation requirements concerning the relocation of existing lights, signs, systems and incidentals.

Any equipment that is damaged during the relocation operation shall be repaired or replaced by the Contractor at his expense to the satisfaction of the Owner and Engineer.

301-3.5 Clearing of existing duct banks or conduits. Where existing cables are being removed from an existing duct bank or conduit and replaced with new cables, the Contractor shall use the existing cable to clear the conduit and to pull in the new cable. No separate payment will be made for clearing these duct banks or conduits or for the existing cable removal. Clearing of these existing duct banks or conduits is incidental to the cable pay item unless otherwise noted.

METHOD OF MEASUREMENT

301-4.1 The quantity of existing lights or guidance signs, handholes, junction structures, wind cones, and segmented circles, removed, to be measured under this item shall be the number of each complete unit

removed, and accepted by the Engineer.

This item shall include removing and storing the existing equipment as directed by the Engineer.

This item shall also include the removal of cable back to the electrical vault and the cleaning of existing base cans as indicated by the plans.

Where the light base and concrete structure are indicated to be removed or demolished, the item shall include restoring the area to match existing, including removing the complete concrete item, filling and tamping all holes with earth, and clearing and leveling the site.

Where the light base and concrete structure are to remain, a new blank cover shall be installed for protecting the light base during the construction work. Blank covers shall be removed when the existing equipment is reinstalled and given to the Owner after completion of construction work in the respective area.

301-4.2 Measurement for the removal of the PAPI system shall be the number of each removed for a completed and accepted removal of a complete PAPI system~~. Equipment shall be carefully removed and stored as directed by the Engineer and Owner~~. Concrete foundation~~,~~ ~~shall remain in place~~ gravel housekeeping pad, and appurtenances shall be demolished and removed. The area shall be restored to match existing including seeding and topsoiling.

BASIS OF PAYMENT

301-5.1 Payment will be made at the contract unit price for each complete item, measured as provided above, and accepted by the Engineer. 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 to the satisfaction of the Engineer.

Payment will be made under:

Item SS-301-5.1	Existing Base Mounted Taxiway Edge Light, Removed and Stored, Base Demolished –per Each
Item SS-301-5.2	Existing Base Mounted Runway Edge or Threshold Light, Removed, Base Demolished –per Each
Item SS-301-5.3	Existing Base Mounted Runway Edge or Threshold Light, Removed with Light Base to Remain –per Each
Item SS-301-5.4	Existing Base Mounted Guidance or Runway Distance Remaining Sign, Removed and Stored, Foundation Demolished –per Each
Item SS-301-5.5	Existing Base Mounted Guidance Sign, Removed, Foundation Demolished –per Each
Item SS-301-5.6	Existing Electrical Junction Structure, Removed –per Each
Item SS-301-5.7	Existing Electrical Handhole, Removed –per Each
Item SS-301-5.8	Existing Primary Wind Cone, Removed and Stored, with Segmented Circle and Foundation Demolished – per Each
Item SS-301-5.9	Existing Supplemental Wind Cone, Removed and Stored, Foundation Demolished –per Each

Item SS-301-5.10 Existing Runway 36R Precision Approach Path Indicator System, Removed, Foundation Demolished ~~and Stored with Foundation to Remain~~ –per Each

Item SS-301-5.11 Existing Runway 18L Precision Approach Path Indicator System, Removed, Foundation Demolished –per Each

END OF ITEM SS-301

ITEM SS-310 AIRPORT LIGHTING SYSTEMS

DESCRIPTION

310-1.1 This item shall consist of furnishing and installing airport runway and taxiway edge lighting systems, guidance signs, and other approach lighting aid systems, in accordance with this specification, the referenced specifications and drawings, and applicable advisory circulars. The system shall be installed at the locations and in accordance with the dimensions, design and details shown on the plans. This work shall include the furnishing of all equipment, materials, services and incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the Engineer.

310-1.2 The Contractor shall maintain current copies of all referenced and applicable standards on the job site. The Contractor is responsible to make known to the Engineer any conflict between plans and specifications that he observes or of which he is made aware.

310-1.3 Additional details pertaining to the lighting system covered in this item are contained in the advisory circular, AC 150/5340-30, Design and Installation Details for Airport Visual Aids. Additional details pertaining to the PAPI system covered in this item are contained in the advisory circular, AC 150/5345-28, Standard for Precision Approach Path Indicator (PAPI) Systems.

~~**310-1.3**~~**310-1.4** This item shall consist of furnishing and installing Precision Approach Path Indicators (PAPIs) in accordance with these specifications. This work shall include the mounting, leveling, wiring, and testing of the lighting equipment and all materials and incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the Engineer. This item shall include mounting accessories, controls, relays, circuit breakers, transformers, inter-unit wiring, disconnect switches and concrete pads specified in the plans.

EQUIPMENT AND MATERIALS

310-2.1 General.

a. Airport lighting equipment and materials shall meet the requirements outlined in Item SS-300 and the applicable Item L Series Specifications.

b. For pre-cast or prefabricated concrete encased light base installations, the Contractor shall submit and coordinate the construction of the proposed pre-cast units with the Engineer onsite to review and approve the construction process. The Contractor shall submit his proposed installation process for review and approval by the Engineer. The Contractor shall provide additional items and work if required and requested by the Engineer for the construction and installation of the pre-cast units at no additional cost to the Owner.

Pre-cast or prefabricated concrete encased light bases may only be assembled at the Contactor's staging area at the airport to allow the Engineer to check and approve all such construction items. Pre-cast bases assembled offsite will not be allowed.

310-2.2 PAPI. The PAPI systems shall be reinstalled in accordance with AC 150/5345-28, Specification for Precision Approach Path Indicator, the manufacturer's installation requirements and these contract documents.

The Contractor shall provide the services of a licensed professional land surveyor to perform the site survey and obstacle clearance surface check for the PAPI systems in accordance with AC 150/5340-30.

The survey check shall be coordinated with the Engineer to witness the work. The surveyor shall provide a written/stamped letter to the Engineer with description on how he performed the obstacle clearance surface check with disposition on his findings. Upon verification letter acceptance that no obstacles are present, the Engineer will provide instruction to the Contractor to proceed with construction work in the field.

If the surveyor determines that obstacles exist within the obstruction clearance surface, then he shall note the location of those obstacles in his report. The report must state the locations and heights of obstacle(s) above the obstruction clearance surface. The Engineer will then consult with the Owner and FAA on making siting adjustments of the PAPI installation to comply with the Advisory Circular requirements.

~~**310-2.2**~~

Utilize and install three-leg version (for ease of alignment) light units and provide consolidating harness equipment and all other appurtenances as required for a complete and operable system.

The Contractor shall obtain complete installation instructions including wiring diagrams and schematics from the manufacturer prior to any work and maintain copies of these manuals on site for use during installation work. The unit shall be mounted on a frangible support system as detailed on the plans.

All PAPI light boxes shall have a tilt switch and provision for grounding. All wiring, which enters the PAPI box, shall be through plugs and receptacles which will separate if struck by an aircraft.

Each light unit shall be aimed outward into the approach zone on a line parallel to the runway centerline within a tolerance of ±1/2 degree.

The beam centers of all light units shall be within ±1 inch of a horizontal plane. This horizontal plane shall be within ±1 foot of the elevation of the runway centerline at the intercept point of the visual glidepath with the runway.

The front face of each light unit in the bar shall be located on a line perpendicular to the runway centerline within ±6 inches.

If voltage powered, the PAPI system shall be equipped with a master control cabinet and photocell, integral with the equipment, which will automatically control the brightness of the beam.

All PAPI light boxes shall be provided with baffles to set the limits of the obstacle clearance surface (OCS) to 10 degrees either side of runway centerline (20 degrees total) to restrict excess horizontal light beam distribution.

The manufacturer shall furnish his recommended spare parts, instruction manual, and input voltage surge protection. The system shall be warranted for one year from acceptance of this project. Any failure that occurs in this warranty period shall be replaced by new factory tested assemblies at no additional cost to the Owner. At the end of the warranty period, the Contractor shall replace all the PAPI lamps and return useable lamps to the Owner.

The Contractor shall conduct an operating test for one week of continuous duty before acceptance. Failure to complete the test will require restarting the test without use of any spare parts. Two failures will be reason to reject the entire PAPI system at no cost to the Owner.

310-2.3 Light fixtures. Airfield lights shall be supplied with all features and accessories including isolation transformers, light bases, base covers, safety ground rods, concrete pads and incidentals required for a complete installation as defined in these Specifications and as shown on the plans.

310-2.4 Lamps. Lamps for elevated edge lights shall be 6.6A/T10 incandescent or LED type as specified.

310-2.5 Guidance signs. Guidance signs shall be L-858(L), meeting the criteria set forth in AC 150/5345-44, Specification for Taxiway and Runway Signs, and suitable for base mounting. Each unit shall be furnished with the required panels, mounting assemblies, frangible couplings, transformer, intensity control, identification tag, metal tethers, fasteners and safety ground rods.

Style 2 and Style 3 signs shall meet the luminance requirements in AC 150/5345-44 throughout the current ranges of the associated series circuit.

Guidance signs shall have an integral on/off switch for airport maintenance use.

Signs shall be furnished with permanent type nameplates that are both weather and sunlight resistant. Nameplates which are completed with ink markers or similar methods will not be accepted.

Refer to the guidance sign index in the Plans for information on each sign's size, style, class and mode.

The complete sign installation shall be designed to withstand a 200-mph wind load.

310-2.6 Isolation transformers. New isolation transformers shall be Type L-830 and have a wattage rating suitable for the wattage of the fixture and sign lamps. The transformer shall be listed in FAA Circular AC 150/5345-47.

CONSTRUCTION METHODS

310-3.1 General. The installation and testing details for the lighting system shall be as specified in the applicable advisory circulars.

The Contractor is responsible for all surveying and measurement which is required to accurately position and aim airfield lighting systems and equipment.

Airfield lighting systems and equipment that are improperly installed shall be removed and re-installed correctly as directed by the Engineer. No payment will be made for the removal and reinstallation of airfield lighting systems and equipment improperly installed. All remedial work shall be to the satisfaction of the Engineer.

310-3.2 Lighting layout plans. The Contractor shall stake the airfield lighting systems, prior to installation of any trench, cable or lighting apparatus. The intent is to stake the installation at the locations indicated, noting any deviation from plan dimensions to the Engineer prior to installation. The Contractor shall obtain the services of an experienced and licensed surveyor to perform this work.

The Engineer shall provide electronic CADD files to the Contractor for this staking work. The Contractor shall stake the items and his surveyor shall provide a CADD file submittal back to the Engineer. Based upon this submittal, the Engineer shall coordinate and provide directions on any adjustments necessary to meet existing field condition requirements and comply with FAA Advisory Circular requirements on the layout and spacing of equipment.

The Contractor and his surveyor shall then make any electronic CADD file spacing adjustments and/or field staking adjustments prior to installation at no additional cost to the Owner.

Refer to General Provisions Section 50 Control of Work for additional construction layout and staking requirements.

310-3.3 Placing the equipment. The PAPI and associated equipment shall be mounted on concrete pads as shown in the plans. Secure the equipment and make all final connections.

310-3.4 Mounting, leveling, and aiming. The concrete support to which the equipment is fastened shall be accurately leveled before mounting the equipment. The PAPI units shall be properly aimed, as recommended by the manufacturer of the supplied equipment. This adjustment shall be accomplished using factory-approved aiming devices and techniques.

PAPI units shall be aimed using aiming devices and integral electronic inclinometers where applicable. The light housing units shall be aimed and checked prior to the FAA flight check. The Contractor shall coordinate with the Engineer and the FAA for making any required adjustments as directed by the FAA flight inspection team. All aiming values and dates of work shall be recorded by permanent marker within each light housing unit, by written record document of the field inspection work, and by written document placed within the O&M manuals for each respective system.

The Engineer will obtain copy of the flight inspection report processing system (FIRPS) document from the FAA and forward to the Contractor, who shall put this report in both the electronic and hard copies of the O&M manuals.

~~310-3.3~~310-3.5 **Placing lights.** All equipment shall be installed at locations indicated in the plans. Lights shall be laid out by locating the two control points by station as indicated on the plans and measuring the indicated individual separation distances. Light bases shall be located within 1 inch +/- longitudinally and 0.5 inches +/- transversely of the location indicated unless deviation is approved by the Engineer. Excavation for installation of light bases shall be backfilled with at least 4 inches of granular leveling course, as approved by the Engineer. Fixture height shall be as indicated on the Drawings.

For pre-cast or prefabricated concrete encased light base installations, a leveling course of sand shall be placed in the bottom of the excavated hole, sufficient for accurately installing, leveling and placing the lights in accordance with the requirements in this specification and AC 150/5340-30. Concrete encased light bases shall be allowed to cure a minimum of 7 days prior to installation.

Utilize a bubble level device to level all light fixtures in the horizontal light plane during the day, and then check at night to ensure uniformity in light output.

Provide factory-approved alignment tools and aiming devices to properly level and align fixtures as required by the FAA Advisory Circulars and manufacturer's installation instructions. After all light fixture installations are completed and accepted by the Engineer, these alignment tools and aiming devices shall become property of the Owner and shall be delivered and stored as directed by the Owner.

~~310-3.4~~310-3.6 **Placing signs.** All signs shall be installed at the approximate location indicated in the plans. The specific requirements for sign location are specified in AC 150/5340-18, Standards for Airport Sign Systems. Specific requirements of this AC are also shown on the Plans. Signs shall be located within 1 inch +/- longitudinally or 0.5 inches +/- transversely of the required location unless deviation is approved by the Engineer. The locations for the signs shall be staked by the Contractor and approved by the Engineer before installation begins.

Provide single module signs with one tether. Provide multiple module signs with a tether at both ends.

~~310-3.5~~310-3.7 **Transformer installation.** The transformer for base mounted fixtures shall be placed inside the base. The transformer for stake mounted fixtures shall be located uniformly as shown on the plans. The primary cable connections shall be made with L-823 connectors as described in Item L-108 and have 3 feet of slack cable. The secondary leads connected to the lamp leads by means of a disconnecting

plug and receptacle provided with the unit, and this joint shall not be taped. The secondary joint shall be fastened with a holding ring provided for this purpose.

~~310-3.6~~310-3.8 **Unit assembly.** All electrical equipment, including edge lights, guidance signs and other visual aid units shall be assembled in accordance with the manufacturer's installation procedures. Anti-seize compound shall be used on all screws, nuts, and threads, including frangible coupling threads. If coated bolts are used (ceramic metallic/fluoropolymer coating), then do not apply anti-seize compound.

Provide and install all spacers, shims, and gaskets as required, and verify they are in place before installing the light fixture on the base.

Bolts and washers for new and existing bases shall be new. Do not reuse existing hardware.

The minimum thread engagement into top flange of the base shall be 0.5 inches. For in-pavement light fixture assemblies, the bolt protrusion requirement shall be minimum 0.75 inch; maximum 1 inch.

Coordinate recommended torque values with the light fixture manufacturer, light base can manufacturer, stainless steel bolts and hardware used, and exact anti-seize compound used, to prevent light base thread damage. Utilize a dial-type torque wrench for accuracy and to prevent over-tightening bolts. Never use impact wrenches/drills when removing or installing bolts.

The Contractor shall submit complete installation method shop drawings and calculations to determine the proper torque requirements for review and approval by the Engineer prior to any field removal or installation work for in-pavement light fixtures.

~~310-3.7~~310-3.9 **Identification numbers.** An identifying number shall be assigned to each light and sign in accordance with the plans or as approved by the Engineer and Owner. This number shall be imprinted with reflective black with 1/2" letters on a non-corrosive metal disc 2" minimum diameter and attached to the pavement side of the fixture with a metal screw.

~~310-3.8~~310-3.10**Temporary airfield lighting.** Refer to the Airfield Lighting Phasing Plans and Details for additional requirements. Existing lighting circuits shall remain operational by use of temporary circuits. New lighting circuits shall also be connected and remain operational by use of temporary circuits. This item shall include all work to maintain the existing and new lighting circuits during construction and allow all taxiways and runways in operation to remain lighted, including that portion through the construction area, as indicated in the Phasing Plans and as directed by the Engineer.

The Contractor shall perform initial field work including location and verification of existing circuits and submit plans for the temporary airfield lighting required in each work phase, for review and approval by the Engineer and Owner, prior to starting work of that phase. This work shall include megger testing of circuits and circuit segments before and after installation and connection of jumpers.

The Contractor shall install couplings and other required fittings/appurtenances in conduit systems at last pavement joint within each phase for connecting to conduit systems in the next phase, or for connecting to existing conduit systems to remain.

310-3.11 Precision approach path indicator flight check mobilization. The Contractor shall be responsible for being present at the site when the FAA performs a flight check on the Precision Approach Path Indicator (PAPI). Flight checking of the PAPI system shall occur on the FAA's schedule, therefore, the Contractor must provide for a separate mobilization to the site for this item of work.

~~310-3.9~~310-3.12**Testing.** The installation shall be tested in operation as a completed unit prior to acceptance. Tests shall include taking megger and voltage readings as outlined in Item SS-300 and Item L-108. Testing equipment shall be furnished by the Contractor. Refer to Item L-108 for additional test requirements.

Tests shall be conducted in the presence of the Engineer and shall be to his/her satisfaction.

All installations shall be fully tested by continuous operation for not less than 24 hours as completed systems prior to acceptance. These tests shall include the functioning of each control not less than 10 times.

Equipment and materials covered by FAA Advisory Circulars are referred to by item numbers and approved equipment is listed within the AC 150/5345-53 Airport Lighting Equipment Certification Program's monthly Addendum, which contains a complete and updated listing of the certified equipment and manufacturers, and is listed in the FAA Buy American Preference equipment list, which is also updated monthly. The Contractor shall provide and install new certified equipment that works reliably and efficiently with the existing equipment to remain in service. The Contractor shall provide any additional accessories and/or appurtenances required to provide fully functional electrical systems to the satisfaction of the Owner and Engineer, at no additional cost to the Owner.

The Contractor shall ascertain that all lighting system components furnished (including FAA certified and approved equipment) are compatible in all respects with each other and the remainder of the new and existing systems. Any non-compatible components furnished by the Contractor shall be replaced at no additional cost to the Owner with a similar unit that is approved by the Engineer and compatible with the remainder of the airport lighting system.

~~310-3.10~~310-3.13 **FAA flight inspection commissioning.** The Contractor shall be present on site during any FAA flight check(s) of all electrical systems and pavement markings. The Contractor shall be able to adjust VGSI or REIL aiming, fixture lenses, radio performance, and other parameters while on site during the flight check to the satisfaction of the FAA Flight Services personnel, Owner, and Engineer. All tools and manuals necessary to perform adjustments shall be present. Failure to attend all required flight check(s) will result in reduction of payment.

METHOD OF MEASUREMENT

310-4.1 Mobilization for the Contractor to return to the site to be present during the FAA's flight check of the Precision Approach Path Indicator (PAPI) shall be measured per each complete item, including all equipment and man-hours needed to complete the item. In the event the PAPI system fails the FAA's flight check, the Contractor will not be compensated for the next mobilization to the site for the flight check of the PAPI. In addition, the Contractor will be responsible for compensating the FAA for costs associated with additional flight checks. In the event the FAA cancels the flight check, the Contractor will be allowed an additional mobilization charge and shall not be responsible for the flight check cost.

310-4.2 Airfield Lighting shall be measured for payment under specification L-125.

310-4.3 The Temporary airfield lighting shall be measured as a lump sum complete item, including all work completed in place and ready for operation, and including the installation, protection, and removal of all temporary cables, conduits, lighting, grounding, marking, temporary reflective edge markers, temporary relocated threshold lights, temporary runway edge light lenses, and associated items and appurtenances, as indicated in the Drawings and as directed by the Engineer.

310-4.4 Measurement for the PAPI obstacle clearance and light signal clearance surface checks shall be

lump sum for all required mobilization, survey and layout work, including all equipment and man-hours needed to complete the item, with licensed surveyor letter and correspondence deliverables, including observation report verifying angle and clearances signed and stamped by the licensed surveyor, provided prior to the start of construction, for all PAPI units installed for the project, complete, and accepted by the Engineer.

~~**310-4.3**~~

BASIS OF PAYMENT

310-5.1 Payment will be made at the contract lump sum price for each complete item, measured as provided above, and accepted by the Engineer. 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 to the satisfaction of the Engineer.

Payment will be made under:

Item SS-310-5.1	Temporary Airfield Lighting -- per Lump Sum
Item SS-310-5.2	PAPI Flight Check Mobilization -- per Lump Sum
Item SS-310-5.3	PAPI Obstacle Clearance and Light Signal Clearance Surface Check -- per Lump Sum

END OF ITEM SS-310

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ITEM P-403 ASPHALT MIX PAVEMENT BASE/LEVELING COURSE

DESCRIPTION

403-1.1 This item shall consist of pavement courses composed of mineral aggregate and asphalt binder mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

403-2.1 Aggregate. Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. Coarse aggregate is the material retained on the No. 4 (4.75 mm) sieve. Fine aggregate is the material passing the No. 4 (4.75 mm) sieve.

a. Coarse aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Coarse aggregate material requirements are given in the table below.

Coarse Aggregate Material Requirements

Material Test	Requirement	Standard
Resistance to Degradation	Loss: 40% maximum for surface, asphalt binder, and leveling course Loss: 50% maximum for base course	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	1.0% maximum	ASTM C142
Percentage of Fractured Particles	For pavements designed for aircraft gross weights of 60,000 pounds or more: Minimum 75% by weight of particles with at least two fractured faces and 85% with at least one fractured face[1]	ASTM D5821
	For pavements designed for aircraft gross weights less than 60,000 pounds: Minimum 50% by weight of particles with at least two fractured faces and 65% with at least one fractured face[1]	
Flat, Elongated, or Flat and Elongated Particles	8% maximum, by weight, of flat, elongated, or flat and elongated particles with a value of 5:1 [2]	ASTM D4791
~~Bulk density of slag[3]~~	~~Weigh not less than 70 pounds per cubic foot~~	~~ASTM C29.~~

[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).

[3] ~~Only required if slag is specified.~~

b. Fine aggregate. Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, ~~slag~~, or gravel and shall be free from coatings of clay, silt, or other objectionable matter. Natural (non-manufactured) sand may be used to obtain the gradation of the 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	1.0% 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, and ASTM C183 shall be used in sampling mineral filler.

403-2.2 Mineral filler. Mineral filler (baghouse fines) may be added in addition to material naturally present in the aggregate. Mineral filler shall meet the requirements of ASTM D242.

Mineral filler Requirements

Material Test	Requirement	Standard
Plasticity Index	4 maximum	ASTM D4318

403-2.3 Asphalt binder. Asphalt binder shall conform to ASTM D6373 Performance Grade (PG) **70-22**.

403-2.4 Anti-stripping agent. Any anti-stripping agent or additive (anti-strip) shall be heat stable and shall not change the asphalt binder grade beyond specifications. Anti-strip shall be an approved material of the Department of Transportation of the State in which the project is located.

COMPOSITION

403-3.1 Composition of mixture. The asphalt plant mix shall be composed of a mixture of well-graded aggregate, filler and anti-strip agent if required, and asphalt binder. The several aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

403-3.2 Job mix formula (JMF) laboratory. The laboratory used to develop the JMF shall possess a current certificate of accreditation, listing D3666 from a national accrediting authority and all test methods required for developing the JMF, and listed on the accrediting authority's website. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the RPR prior to start of construction.

403-3.3 Job mix formula (JMF). No 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 403-3.2. 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 submitted 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 403-2.3. 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 403-2.4.
- Certified material test reports for the course and fine aggregate and mineral filler in accordance with paragraphs 403-2.1 and 403-2.2.
- 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 course 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 mixing and compaction temperatures.
- Plot of the combined gradation on the 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/gyrations	75	
Air voids (%)	3.5	ASTM D3203
Percent voids in mineral aggregate (VMA), minimum	See Table 2	ASTM D6995
TSR[1]	not less than 80 at a saturation of 70-80%	ASTM D4867

[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

[3] Where APA is not available, use Hamburg wheel test (AASHTO T324) 10 mm@ 20,000 passes at 50°C

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 (Base)	Percentage by Weight Passing Sieve (Leveling)
1 inch (25.0 mm)	--	--
3/4 inch (19.0 mm)	**100**	--
1/2 inch (12.5 mm)	**90-100**	**100**
3/8 inch (9.5 mm)	**72-88**	**90-100**
No. 4 (4.75 mm)	**53-73**	**58-78**
No. 8 (2.36 mm)	**38-60**	**40-60**
No. 16 (1.18 mm)	**26-48**	**28-48**
No. 30 (600 µm)	**18-38**	**18-38**
No. 50 (300 µm)	**11-27**	**11-27**
No. 100 (150 µm)	**6-18**	**6-18**
No. 200 (75 µm)	**3-6**	**3-6**
Voids in Mineral Aggregate (VMA)[1]	**15**	**16**
Asphalt Percent:		
Stone or gravel	**5.0-7.5**	**5.5-8.0**
Slag	**6.5-9.5**	**7.0-10.5**
Recommended Minimum Construction Lift Thickness	**2 inch**	**1 1/2 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.

403-3.4 Reclaimed Asphalt Pavement (RAP). Reclaimed asphalt pavement shall consist of reclaimed asphalt pavement (RAP), coarse aggregate, fine aggregate, mineral filler, and asphalt. Recycled asphalt shingles (RAS) shall not be allowed. The RAP shall be of a consistent gradation and asphalt content and properties. When RAP is fed into the plant, the maximum RAP chunk size shall not exceed 1-1/2 inches. The reclaimed asphalt mix shall be designed using procedures contained in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition. The percentage of asphalt in the RAP shall be established for the mixture design according to ASTM D2172 using the appropriate dust correction procedure. The JMF shall meet the requirements of paragraph 403-3.3. RAP should only be used for shoulder surface course mixes and for any intermediate courses. The use of RAP containing Coal Tar shall not be allowed. Coal Tar surface treatments must be removed prior to recycling underlying asphalt material. For the PG graded asphalt binder selected in paragraph 403-2.3, adjust as follows:

a. For 0-20% RAP, there is no change in virgin asphalt binder content.

b. For >20 to 30% RAP, select asphalt binder one grade softer, i.e., PG 70-22 would soften to PG 64-22.

403-3.5 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 403-5.1, has been accepted, in writing, by the RPR.

The control strip will consist of at least 250 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 403-4.13 using the same procedure that will be used during production. The cold joint for the control strip will be an exposed construction joint at least four (4) hours old or when the mat has cooled to less than 160°F. The equipment used in construction of the control strip shall be the same type, configuration and weight to be used on the project.

The control strip shall be evaluated for acceptance as a single lot in accordance with the acceptance criteria in paragraph 403-6.1 and 403-6.2. The control strip shall be divided into equal sublots. As a minimum, the control strip shall consist of three (3) sublots.

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 403-5.5a; and mat density greater than or equal to 94%, air voids 3.5% +/- 1%, and joint density greater than or equal to 92%.

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 403-8.1.

CONSTRUCTION METHODS

403-4.1 Weather limitations. The asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the RPR, if requested; however, all other requirements including compaction shall be met.

Table 4. Surface Temperature Limitations of Underlying Course

Mat Thickness	Base Temperature (Minimum)
	Degrees F
3 inches or greater	40
Greater than 2 inches but less than 3 inches	45

403-4.2 Asphalt plant. Plants used for the preparation of asphalt shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 including the following items:

a. Inspection of plant. The RPR, or RPR's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

b. Storage bins and surge bins. The asphalt mixture stored in storage and/or surge bins shall meet the same requirements as asphalt mixture loaded directly into trucks. Asphalt mixture shall not be stored in storage and/or surge bins for a period greater than twelve (12) hours. If the RPR determines there is an

excessive heat loss, segregation or oxidation of the asphalt mixture due to temporary storage, temporary storage shall not be allowed.

403-4.3 Aggregate stockpile management. Aggregate stockpiles shall be constructed in such a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the concrete batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used.

A continuous supply of materials shall be provided to the work to ensure continuous placement.

403-4.4 Hauling equipment. Trucks used for hauling asphalt shall have tight, clean, and smooth metal beds. To prevent the asphalt from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the RPR. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

403-4.4.1 Material transfer vehicle (MTV). Material transfer Vehicles shall be required due to the improvement in smoothness and decrease in both physical and thermal segregation. To transfer the material from the hauling equipment to the paver, use a self-propelled, material transfer vehicle with a swing conveyor that can deliver material to the paver without making contact with the paver. The MTV shall be able to move back and forth between the hauling equipment and the paver providing material transfer to the paver, while allowing the paver to operate at a constant speed. The Material Transfer Vehicle will have remixing and storage capability to prevent physical and thermal segregation.

403-4.5 Asphalt pavers. Asphalt pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of asphalt that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface. The asphalt paver shall be equipped with a control system capable of automatically maintaining the specified screed grade and elevation.

If the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued.

The paver shall be capable of paving to a minimum width specified in paragraph 403-4.11.

403-4.6 Rollers. The number, type, and weight of rollers shall be sufficient to compact the asphalt to the required density while it is still in a workable condition without crushing of the aggregate, depressions or other damage to the pavement surface. Rollers shall be in good condition, capable of operating at slow speeds to avoid displacement of the asphalt. All rollers shall be specifically designed and suitable for compacting asphalt concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used.

403-4.6.1 Density device. The Contractor shall have on site a density gauge during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall also supply a qualified technician during all paving operations to calibrate the density gauge and obtain accurate density readings for all new asphalt. These densities shall be supplied to the RPR upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

403-4.7 Preparation of asphalt binder. The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of the unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F when added to the aggregate.

403-4.8 Preparation of mineral aggregate. The aggregate for the asphalt shall be heated and dried. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

403-4.9 Preparation of asphalt mixture. The aggregates and the asphalt binder shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all asphalt upon discharge shall not exceed 0.5%.

403-4.10 Application of Prime and Tack Coat. Immediately before placing the asphalt mixture, the underlying course shall be cleaned of all dust and debris.

A tack coat shall be applied in accordance with Item P-603 to all vertical and horizontal asphalt and concrete surfaces prior to placement of the first and each subsequent lift of asphalt mixture.

403-4.11 Laydown plan, transporting, placing, and finishing. Prior to the placement of the asphalt, the Contractor shall prepare a laydown plan with the sequence of paving lanes and width to minimize the number of cold joints; the location of any temporary ramps; laydown temperature; and estimated time of completion for each portion of the work (milling, paving, rolling, cooling, etc.). The laydown plan and any modifications shall be approved by the RPR.

Deliveries shall be scheduled so that placing and compacting of asphalt is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to approximately ambient temperature. The Contractor, at their expense, shall be responsible for repair of any damage to the pavement caused by hauling operations.

Contractor shall survey each lift of asphalt surface course and certify to RPR that every lot of each lift meets the grade tolerances of paragraph 403-6.2e before the next lift can be placed.

Edges of existing asphalt pavement abutting the new work shall be saw cut and the cut off material and laitance removed. Apply a tack coat in accordance with P-603 before new asphalt material is placed against it.

The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Placement of the asphalt mix shall begin along the centerline of a crowned section or on the high side of areas with a one way slope unless shown otherwise on the laydown plan as accepted by the RPR. The asphalt mix shall be placed in consecutive adjacent lanes having a minimum width of 15 feet except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot; 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 from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt mixture. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 403-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet long.

403-4.12 Compaction of asphalt mixture. After placing, the asphalt mixture shall be thoroughly and uniformly compacted by self-propelled rollers. The surface shall be compacted as soon as possible when the asphalt has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any surface defects and/or displacement occurring as a result of the roller, or from any other cause, shall be corrected at the Contractor's expense.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross-section, and the required field density is obtained. To prevent adhesion of the asphalt to the roller, the wheels shall be equipped with a scraper and kept moistened with water as necessary.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power tampers.

Any asphalt that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed**.**

403-4.13 Joints. The formation of all joints shall be made in such a manner as to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid asphalt except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be coated with an asphalt tack coat before placing any fresh asphalt against the joint.

Longitudinal joints which are have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F; or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. An asphalt tack coat or other product approved by the RPR shall be applied to the clean, dry joint prior to placing any additional fresh asphalt against the joint. The cost of this work shall be considered incidental to the cost of the asphalt.

403-4.14 Saw-cut grooving. Saw-cut grooving is not required.

403-4.15 Diamond grinding. Diamond grinding shall be completed prior to pavement grooving. Diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive.

Diamond grinding shall be performed with a machine designed specifically for diamond grinding capable of cutting a path at least 3 feet wide. The saw blades shall be 1/8-inch wide with a minimum of 55 to 60 blades

per 12 inches of cutting head width; grooves between 0.090 and 0.130 inches wide; and peaks and ridges approximately 1/32 inch higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that causes ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted.

Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. The Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

403-4.16 Nighttime Paving Requirements. The Contractor shall provide adequate lighting during any nighttime construction. A lighting plan shall be submitted by the Contractor and approved by the RPR prior to the start of any nighttime work. All work shall be in accordance with the approved CSPP and lighting plan.

CONTRACTOR QUALITY CONTROL (CQC)

403-5.1 General. The Contractor shall develop a CQCP in accordance with Item C-100. No partial payment will be made for materials that are subject to specific QC requirements without an approved CQCP.

403-5.2 Contractor quality control (QC) facilities. The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The RPR shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

403-5.3 Quality Control (QC) testing. The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved CQCP. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A QC Testing Plan shall be developed as part of the CQCP**.**

a. Asphalt content. A minimum of two tests shall be performed per day in accordance with ASTM D6307 or ASTM D2172 for determination of asphalt content. When using ASTM D6307, the correction factor shall be determined as part of the first test performed at the beginning of plant production; and as part of every tenth test performed thereafter. The asphalt content for the day will be determined by averaging the test results.

b. Gradation. Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with ASTM D5444 and ASTM C136, and ASTM C117.

c. Moisture content of aggregate. The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C566.

d. Moisture content of asphalt. The moisture content of the asphalt shall be determined once per lot in accordance with AASHTO T329 or ASTM D1461.

e. Temperatures. Temperatures shall be checked, at least four times per lot, at necessary locations to determine the temperatures of the dryer, the asphalt 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 straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot straightedge approved by the RPR. Straight-edge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling inclinometer or external reference device is used, the data may be evaluated using 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 will be taken perpendicular to the pavement centerline each 50 feet (15 m) or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

(2) Longitudinal measurements. Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests will be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet; and at the third points of paving lanes when widths of paving lanes are 20 ft or greater. When placement abuts previously placed material the first measurement shall start with one half the length of the straight edge on the previously placed material.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch shall be corrected with diamond grinding per paragraph 403-4.15 or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 403-6.1d(3) Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

h. Grade. Grade shall be evaluated daily to allow adjustments to paving operations when grade measurements do not meet specifications. As a minimum, grade shall be evaluated prior to the placement of the first lift and then prior to and after placement of the surface lift.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch vertically. The documentation will be provided by the Contractor to the RPR by the end of the following working day.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 403-4.15.

The Contractor shall repair low areas or areas that cannot be corrected by grinding by removal of deficient areas to the depth of the final course plus ½ inch and replacing with new material. Skin patching is not allowed.

403-5.4 Sampling. When directed by the RPR, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

403-5.5 Control charts. The Contractor shall maintain linear control charts both for individual measurements and range (i.e., difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each day shall be calculated and monitored by the QC laboratory.

Control charts shall be posted in a location satisfactory to the RPR and kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the RPR may suspend production or acceptance of the material.

a. Individual measurements. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation, asphalt content, and VMA. The control charts shall use the JMF target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

Control Chart Limits for Individual Measurements

Sieve	Action Limit	Suspension Limit
3/4 inch (19.0 mm)	±6%	±9%
1/2 inch (12.5 mm)	±6%	±9%
3/8 inch (9.5 mm)	±6%	±9%
No. 4 (4.75 mm)	±6%	±9%
No. 16 (1.18 mm)	±5%	±7.5%
No. 50 (300 µm)	±3%	±4.5%
No. 200 (75 µm)	±2%	±3%
Asphalt Content	±0.45%	±0.70%
Minimum VMA	-0.5%	-1.0%

b. Range. Control charts for range shall be established to control process variability for the test parameters and Suspension Limits listed below. The range shall be computed for each lot as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.

Control Chart Limits Based on Range
(n = 2)

Sieve	Suspension Limit
1/2 inch (12.5 mm)	11%
3/8 inch (9.5 mm)	11%
No. 4 (4.75 mm)	11%
No. 16 (1.18 mm)	9%
No. 50 (300 µm)	6%
No. 200 (75 µm)	3.5%
Asphalt Content	0.8%

c. Corrective action. The CQCP shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain sets of rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

(1) One point falls outside the Suspension Limit line for individual measurements or range; or

(2) Two points in a row fall outside the Action Limit line for individual measurements.

403-5.6 Quality control (QC) reports. The Contractor shall maintain records and shall submit reports of QC activities daily, in accordance with the CQCP described in Item C-100.

MATERIAL ACCEPTANCE

403-6.1. Quality Assurance Acceptance sampling and testing. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the RPR at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor.

a. Quality Assurance (QA) testing laboratory. The QA testing laboratory performing these acceptance tests will be accredited in accordance with ASTM D3666. The QA laboratory accreditation will be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing will be listed on the lab accreditation.

b. Lot Size. A standard lot will be equal to one day's production divided into approximately equal sublots of between 400 to 600 tons. When only one or two sublots are produced in a day's production, the sublots will be combined with the production lot from the previous or next day.

Where more than one plant is simultaneously producing asphalt for the job, the lot sizes will apply separately for each plant.

c. Asphalt air voids. Plant-produced asphalt will be tested for air voids on a sublot basis.

(1) Sampling. Material from each sublot shall be sampled in accordance with ASTM D3665. Samples shall be taken from material deposited into trucks at the plant or at the job site in accordance with ASTM D979. The sample of asphalt may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to maintain the material at or above the compaction temperature as specified in the JMF.

(2) Testing. Air voids will be determined for each sublot in accordance with ASTM D3203 for a set of three 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 inches 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 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 from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the TMD for that sublot.

(5) Joint density. One core centered over the longitudinal joint shall be taken for each sublot which contains a longitudinal joint. Core locations will be determined by the RPR in accordance with ASTM D3665. The bulk specific gravity of each core sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each joint density sample by the average TMD for the lot. The TMD used to determine the joint density at joints formed between lots will be the lower of the average TMD values from the adjacent lots.

403-6.2 Acceptance criteria.

a. General. Acceptance will be based on the implementation of the Contractor Quality Control Program (CQCP) and the following characteristics of the asphalt and completed pavements: air voids, mat density, joint density, grade and Profilograph smoothness**.**

b. Air voids. Acceptance of each lot of plant produced material for air voids will be based upon the average air void from the sublots. If the average air voids of the lot are equal to or greater than 2% and equal to or less than 5%, then the lot will be acceptable. If the average is below 2% or greater than 5%, the lot shall be removed and replaced at the Contractor's expense.

c. Mat density. Acceptance of each lot of plant produced material for mat density will be based on the average of all of the densities taken from the sublots. If the average mat density of the lot so established equals or exceeds 94%, the lot will be acceptable. If the average mat density of the lot is below 94%, the lot shall be removed and replaced at the Contractor's expense.

d. Joint density. Acceptance of each lot of plant produced asphalt for joint density will be based on the average of all of the joint densities taken from the sublots. If the average joint density of the lot so established equals or exceeds 92%, the lot will be acceptable. If the average joint density of the lot is less than 92%, the Contractor shall stop production and evaluate the method of compacting joints. Production may resume once the reason for poor compaction has been determined and appropriate measures have been taken to ensure proper compaction.

e. Grade. The final finished surface of the pavement of the completed project shall be surveyed to verify that the grade elevations and cross-sections shown on the plans do not deviate more than 1/2 inch vertically.

Cross-sections of the pavement shall be taken at a minimum 50-foot longitudinal spacing and at all longitudinal grade breaks. Minimum cross-section grade points shall include grade at centerline and edge of runway and 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%.

f. 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 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 blanking band. The bump template must span one inch with an offset of 0.4 inches. 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 equals 25 feet and a vertical scale of one inch equals one inch. Profilograph shall be performed one foot right and left of project centerline and 15 feet right and left of project centerline. Any areas that indicate “must grind” shall be corrected with diamond grinding per paragraph 403-4.15 or by removing and replacing full depth of surface course. as directed by the RPR. Where corrections are necessary, a second profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

403-6.3 Resampling Pavement for Mat Density.

a. General. Resampling of a lot of pavement will only be allowed for mat density and then, only if the Contractor requests same in writing, within 48 hours after receiving the written test results from the RPR. A retest will consist of all the sampling and testing procedures contained in paragraphs 403-6.1. Only one resampling per lot will be permitted.

(1) A redefined mat density will be calculated for the resampled lot. The number of tests used to calculate the redefined mat density will include the initial tests made for that lot plus the retests.

(2) The cost for resampling and retesting shall be borne by the Contractor.

b. Payment for resampled lots. The redefined mat density for a resampled lot will be used to evaluate the acceptance of that lot in accordance with paragraph 403-6.2.

c. Outliers. Check for outliers in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded and density determined using the remaining test values.

403-6.4 Leveling course. The leveling course is the first variable thickness lift placed to correct surface irregularities prior to placement of subsequent courses. The leveling course shall meet the aggregate gradation in Table 2, paragraph 403-3.3. The leveling course shall meet the requirements of paragraph 403-3.3, 403-6.1b for air voids, but shall not be subject to the density requirements of paragraph 403-6.1c. The leveling course shall be compacted with the same effort used to achieve density of the control strip. The leveling course shall not exceed the lift thickness associated with each gradation in Table 2, paragraph 403-3.3.

METHOD OF MEASUREMENT

403-7.1 Measurement. Plant mix asphalt mix pavement shall be measured by the number of tons of asphalt pavement used in the accepted work. Recorded batch weights or truck scale weights will be used to determine the basis for the tonnage.

BASIS OF PAYMENT

403-8.1 Payment. Payment for a lot of asphalt mixture meeting all acceptance criteria as specified in paragraph 403-6.2 shall be made at the contract unit price per ton for asphalt. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-403-8.1 **Asphalt Base Course (5" Thickness) - per ton**

Item P-403-8.2 **Asphalt Leveling Course (0" -7" Thickness) - per ton**

REFERENCES

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

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C183	Standard Practice for Sampling and the Amount of Testing of Hydraulic Cement
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D242	Standard Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D946	Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D979	Standard Practice for Sampling Bituminous Paving Mixtures
ASTM D1073	Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
ASTM D1074	Standard Test Method for Compressive Strength of Bituminous Mixtures
ASTM D1461	Standard Test Method for Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

ASTM D2172	Standard Test Method for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2489	Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3203	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D3381	Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4125	Standard Test Methods for Asphalt Content of Bituminous mixtures by the Nuclear Method
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4552	Standard Practice for Classifying Hot-Mix Recycling Agents
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D4867	Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D5444	Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
ASTM D5581	Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6 inch-Diameter Specimen)
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6307	Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method
ASTM D6373	Standard Specification for Performance Graded Asphalt Binder
ASTM D6752	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
ASTM D6925	Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor

ASTM 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 E2133	Standard Test Method for Using a Rolling Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M156	Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
AASHTO T329	Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method
AASHTO T 340	Standard Method of Test for Determining the Rutting Susceptibility of Hot Mix Asphalt (APA) Using the Asphalt Pavement Analyzer (APA)

Asphalt Institute (AI)

MS-2	Mix Design Manual, 7th Edition
MS-26	Asphalt Binder Handbook AI State Binder Specification Database

FAA Orders

5300.1	Modifications to Agency Airport Design, Construction, and Equipment Standards

Federal Highway Administration (FHWA)

Long Term Pavement Performance Binder program

Software

FAARFIELD

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ITEM L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS MODIFICATIONS

Item L-125 Installation of Airport Lighting Systems is hereby amended with respect to the paragraphs and sections sited below.

Revise the following section 125-2.7 and section 125-2.8 as noted:

125-2.7 Runway and Taxiway Lights. Runway and taxiway lights shall conform to the requirements of AC 150/5345-46. Lamps shall be of size and type indicated, or as required by fixture manufacturer for each lighting fixture required under this contract. Filters shall be of colors conforming to the specification for the light concerned or to the standard referenced.

Lights

Type	Class	Mode	Style	Option	Base	Filter	Transformer	Notes
L-861(L)	2	1	NA	4	L-867	Y/W, W/W, W/Y	L-830	LED
L-861E(L)	2	1	NA	4	L-867	R/R, R/G, G/Y, G/O	L-830	LED
L-861T	2	1	NA	4	L-867	Blue	L-830	Incandescent

125-2.8 Runway and Taxiway Signs. Runway and Taxiway Guidance Signs should conform to the requirements of AC 150/5345-44.

Signs

Type	Size	Style	Class	Mode	Notes
L-858(L) Y/R/ L	1	2	2	2	LED

Remove the following section 125-2.11 as noted:

~~**125-2.11 Circuit Selector Cabinet.** The circuit selector cabinet shall meet the requirements of AC 150/5345-5, Type L-847, **[**one**][**two**][**three**][**four**]** circuit control **[**as indicated**]**, Class **[**A, indoor**][**B, outdoor**]**, Rating **[**1, for 6.6 amperes**][**2, for 20 amperes**]**.~~

Replace the following section 125-4.1 and 125-5.1 with the paragraphs below:

125-4.1 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. Guidance sign panels will be measured per each complete sign panel replacement, including both sides of the existing sign, in place, ready for operation, and accepted by the RPR.

Precision Approach Path Indicator shall be measured by each system ~~*lump sum*~~ installed as a completed unit, in place, ready for operation, and accepted by the RPR. This item shall include the installation of power and control unit as indicated by the Plans.

125-5.1 Payment will be made at the Contract unit price for each complete runway or taxiway light, guidance sign installed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

Item L-125-5.1	Existing Stored Taxiway Edge Light, Installed on New Base-- per Each
Item L-125-5.2	New L-861T Base Mounted Taxiway Edge Light, Installed on New Base – per Each
Item L-125-5.3	New L-861(L) Base Mounted Runway Edge Light, Installed on New Base – per Each
Item L-125-5.4	New L-861(L) Base Mounted Runway Edge Light, Installed on Existing Base – per Each
Item L-125-5.5	New L-861E(L) Base Mounted Runway Threshold Light, Installed on New Base -- per Each
Item L-125-5.6	New L-861E(L) Base Mounted Runway End Light, Installed on Existing Base -- per Each
Item L-125-5.7	Existing Stored 2-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.8	New L-858(L) Base Mounted, Size 1, 2-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.9	Existing Stored 3-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.10	New L-858(L) Base Mounted, Size 1, 3-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.11	Existing Stored 4-Module Guidance Sign, Installed on New Foundation With New Panels -- per Each
Item L-125-5.12	New L-858(L) Base Mounted, Size 1, 5-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.13	Existing Stored Runway Distance Remaining Sign, Installed on New Foundation -- per Each
Item L-125-5.14	~~Existing Stored~~ New L-880(L) Precision Approach Path Indicator System, Installed on ~~Existing~~ New Foundation on Runway 36R -- per Lump Sum
Item L-125-5.15	New L-880(L) Precision Approach Path Indicator System, Installed on New Foundation on Runway 18L -- per Lump Sum
Item L-125-5.16	New Sign Panels Installed in Existing Guidance Sign -- per Each

ITEM L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS

DESCRIPTION

125-1.1 This item shall consist of airport lighting systems furnished and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

125-2.1 General.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not performs as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

b. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in electronic PDF format, tabbed by specification section. The RPR reserves the right to reject any or all equipment, materials or procedures, which, in the RPR’s opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

EQUIPMENT AND MATERIALS

125-2.2 Conduit/Duct. 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 type L-853 and shall conform to the requirements of AC 150/5345-39.

125-2.7 Runway and Taxiway Lights. Runway and taxiway lights shall conform to the requirements of AC 150/5345-46. Lamps shall be of size and type indicated, or as required by fixture manufacturer for each lighting fixture required under this contract. Filters shall be of colors conforming to the specification for the light concerned or to the standard referenced.

Lights

Type	Class	Mode	Style	Option	Base	Filter	Transformer	Notes
L-861(L)	2	1	NA	4	L-867	Y/W, W/W, W/Y	L-830	LED
L-861E(L)	2	1	NA	4	L-867	R/R, R/G, G/Y, G/O	L-830	LED
L-861T	2	1	NA	4	L-867	Blue	L-830	Incandescent

125-2.8 Runway and Taxiway Signs. Runway and Taxiway Guidance Signs should conform to the requirements of AC 150/5345-44.

Signs

Type	Size	Style	Class	Mode	Notes
L-858(L) Y/R/ L	1	2	2	2	LED

125-2.9 Runway End Identifier Light (REIL). Not required.

125-2.10 Precision Approach Path Indicator (PAPI). ~~Not required.~~ The light units for the PAPI shall meet the requirements of AC 150/5345-28, Type L-880, Style A, Class I.

~~**125-2.11 Circuit Selector Cabinet.** The circuit selector cabinet shall meet the requirements of AC 150/5345-5, Type L-847, **[**one**][**two**][**three**][**four**]** circuit control **[**as indicated**]**, Class **[**A, indoor**][**B, outdoor**]**, Rating **[**1, for 6.6 amperes**][**2, for 20 amperes**].**~~

125-2.12 Light Base and Transformer Housings. Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type L-867, Class 1A, Size B shall be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates shall be provided to accommodate various sizes of fixtures.

125-2.13 Isolation Transformers. Isolation Transformers shall be Type L-830, size as required for each installation. Transformer shall conform to AC 150/5345-47.

INSTALLATION

125-3.1 Installation. The Contractor shall furnish, install, connect and test all equipment, accessories, conduit, cables, wires, buses, grounds and support items necessary to ensure a complete and operable airport lighting system as specified here and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and state and local code agencies having jurisdiction.

The Contractor shall install the specified equipment in accordance with the applicable advisory circulars and the details shown on the plans.

125-3.2 Testing. All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

125-3.3 Shipping and Storage. Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the RPR, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

125-3.4 Elevated and In-pavement Lights. Water, debris, and other foreign substances shall be removed prior to installing fixture base and light.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction. The outermost edge of fixture shall be level with the surrounding pavement. Surplus sealant or flexible embedding material shall be removed. The holding device shall remain in place until sealant has reached its initial set.

METHOD OF MEASUREMENT

125-4.1 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. Guidance sign panels will be measured per each complete sign panel replacement, including both sides of the existing sign, in place, ready for operation, and accepted by the RPR.

Precision Approach Path Indicator shall be measured by each system ~~*lump sum*~~ installed as a completed unit, in place, ready for operation, and accepted by the RPR. This item shall include the installation of power and control unit as indicated by the Plans.

BASIS OF PAYMENT

125-5.1 Payment will be made at the Contract unit price for each complete runway or taxiway light, guidance sign installed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

Item L-125-5.1	Existing Stored Taxiway Edge Light, Installed on New Base-- per Each
Item L-125-5.2	New L-861T Base Mounted Taxiway Edge Light, Installed on New Base – per Each
Item L-125-5.3	New L-861(L) Base Mounted Runway Edge Light, Installed on New Base – per Each
Item L-125-5.4	New L-861(L) Base Mounted Runway Edge Light, Installed on Existing Base – per Each
Item L-125-5.5	New L-861E(L) Base Mounted Runway Threshold Light, Installed on New Base -- per Each

Item L-125-5.6	New L-861E(L) Base Mounted Runway End Light, Installed on Existing Base -- per Each
Item L-125-5.7	Existing Stored 2-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.8	New L-858(L) Base Mounted, Size 1, 2-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.9	Existing Stored 3-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.10	New L-858(L) Base Mounted, Size 1, 3-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.11	Existing Stored 4-Module Guidance Sign, Installed on New Foundation With New Panels -- per Each
Item L-125-5.12	New L-858(L) Base Mounted, Size 1, 5-Module Guidance Sign, Installed on New Foundation -- per Each
Item L-125-5.13	Existing Stored Runway Distance Remaining Sign, Installed on New Foundation -- per Each
Item L-125-5.14	~~Existing Stored~~ New L-880(L) Precision Approach Path Indicator System, Installed on ~~Existing~~ New Foundation on Runway 36R -- per ~~Lump Sum~~ Each
Item L-125-5.15	New L-880(L) Precision Approach Path Indicator System, Installed on New Foundation on Runway 18L -- per Each
Item L-125-5.16	New Sign Panels Installed in Existing Guidance Sign -- per Each

REFERENCES

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

Advisory Circulars (AC)

AC 150/5340-18	Standards for Airport Sign Systems
AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-44	Specification for Runway and Taxiway Signs

AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-51	Specification for Discharge-Type Flashing Light Equipment
AC 150/5345-53	Airport Lighting Equipment Certification Program

Engineering Brief (EB)

EB No. 67	Light Sources Other than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures

END OF ITEM L-125

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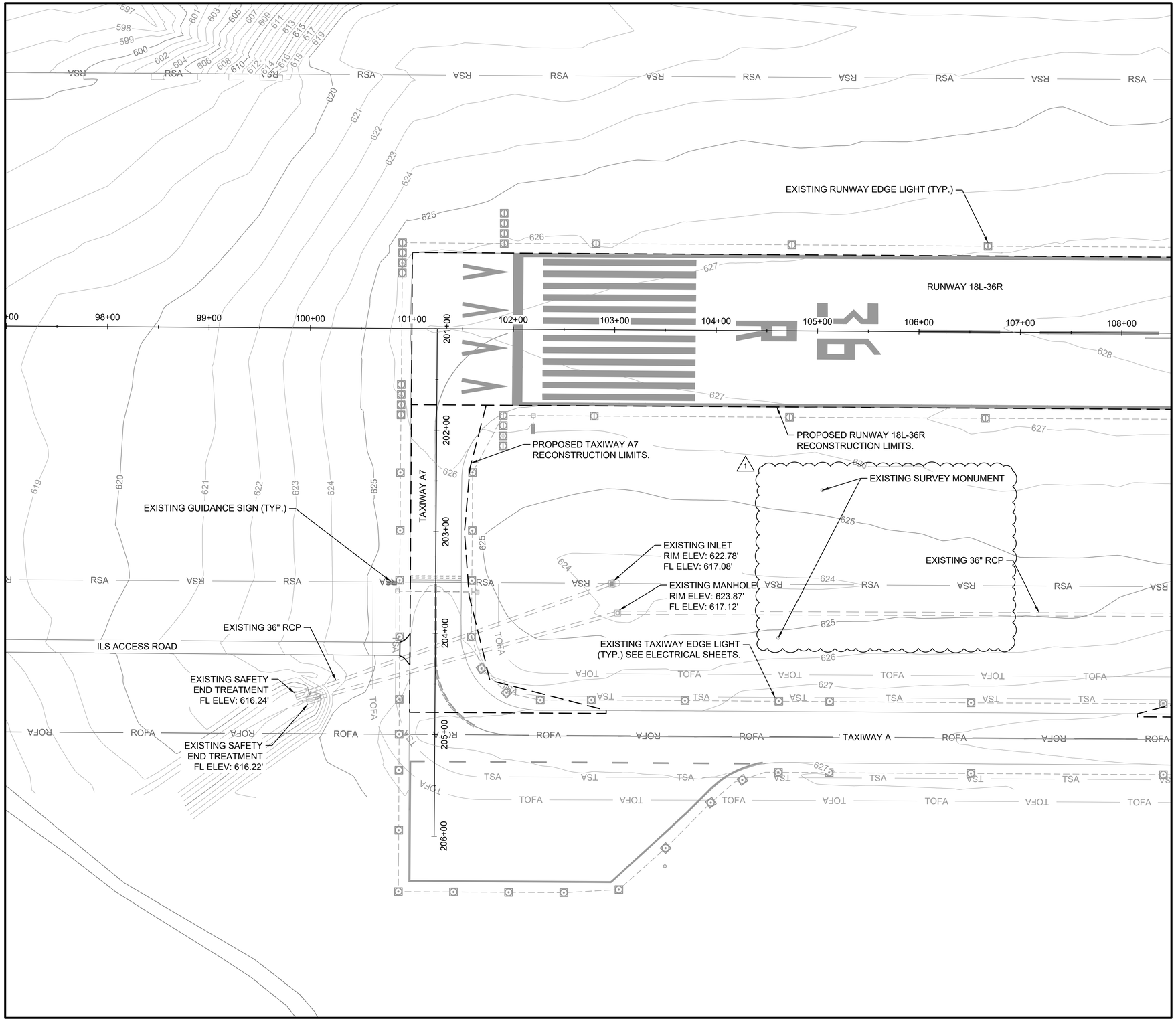


0 25' 50' 100' 150'

(IN FEET)

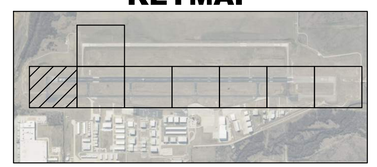
LEGEND

- EXISTING ASPHALT PAVEMENT
- XXX — EXISTING CONTOUR
- RSA — RUNWAY SAFETY AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA
- ROFA — RUNWAY OBJECT FREE AREA
- EXISTING STORM SEWER PIPE
- EXISTING DRAINAGE STRUCTURE
- EXISTING TAXIWAY EDGE LIGHT
- EXISTING RUNWAY EDGE LIGHT
- EXISTING GUIDANCE SIGN
- PROPOSED PAVEMENT LIMITS
- EXISTING ELECTRICAL HANDHOLE, MANHOLE, OR JUNCTION STRUCTURE
- EXISTING GRATE INLET

NOTES:

1. EXISTING UTILITIES AND UNDERGROUND FACILITIES ARE LOCATED FROM AVAILABLE SURFACE INFORMATION OR RECORDS RESEARCH. THE LOCATION AND ELEVATIONS SHOWN ARE APPROXIMATED AND ARE BASED ON THE INFORMATION AVAILABLE AT THE TIME OF DESIGN. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING EXACT LOCATION, DEPTH, AND CONDITION OF ALL UTILITIES AND AIRPORT FACILITIES DURING THE CONSTRUCTION PERIOD. ANY CONFLICTING UTILITY INFORMATION SHALL BE REPORTED TO THE ENGINEER FOR ASSESSMENT PRIOR TO THE START OF DEMOLITION OPERATIONS.
2. ALL EXISTING INFRASTRUCTURE SHALL REMAIN UNLESS OTHERWISE NOTED ON CIVIL AND /OR ELECTRICAL DEMOLITION SHEETS.
3. SEE ED-101 SERIES FOR ELECTRICAL DEMOLITION.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
MITCHELL R. McANALLY
114422
PROFESSIONAL ENGINEER
Digitally Signed 08/11/2023

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	MRM

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

EXISTING CONDITIONS 1

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: GJT
DRAWN BY: DJD

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
CV-101

SHEET NUMBER 23

File: L:\2023\23A11280 - DTO - RW 18L-36R Pvmt Recon\Drawings\DTO_RW_REC-CV-101.dwg Last Save: 8/8/2023 11:56 AM Last saved by: KCPaik
Last plotted by: Paik, Kelly C Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/8/2023 1:43 PM Plotter used: DWG To PDF.pc3

MATCHLINE SHEET CV-105

MATCHLINE SHEET CV-107

EXISTING GLIDESCOPE ACCESS ROAD.

EXISTING UNDERDRAIN CLEANOUT

EXISTING RUNWAY EDGE LIGHT (TYP.)

RUNWAY 18L-36R

PROPOSED RUNWAY 18L-36R RECONSTRUCTION LIMITS.

EXISTING GUIDANCE SIGN (TYP.)

EXISTING CONCRETE STRUCTURES

TAXIWAY A2

CONTRACTOR SHALL REMOVE EXISTING GRAVEL PAPI HOUSEKEEPING PADS. PAYMENT FOR THIS WORK SHALL BE CONSIDERED INCIDENTAL TO PAPI REMOVAL. SEE LIGHTING REMOVAL SHEETS.

EXISTING FLARED END SECTION FL ELEV: 630.99'

EXISTING TAXIWAY EDGE LIGHT (TYP.)

EXISTING UNDERDRAIN OUTLET PROTECTION

EXISTING GRATE INLET RIM ELEV: 630.49

TAXIWAY A

EXISTING 36" RCP

EXISTING 30" RCP

0 25' 50' 100' 150'

(IN FEET)

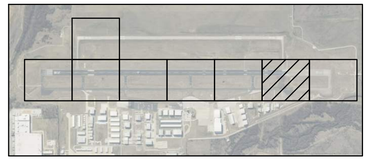
LEGEND

- EXISTING ASPHALT PAVEMENT
- XXX — EXISTING CONTOUR
- RSA — RUNWAY SAFETY AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA
- ROFA — RUNWAY OBJECT FREE AREA
- EXISTING STORM SEWER PIPE
- EXISTING DRAINAGE STRUCTURE
- EXISTING TAXIWAY EDGE LIGHT
- EXISTING RUNWAY EDGE LIGHT
- EXISTING GUIDANCE SIGN
- PROPOSED PAVEMENT LIMITS
- EXISTING ELECTRICAL HANDHOLE, MANHOLE, OR JUNCTION STRUCTURE
- EXISTING GRATE INLET
- EXISTING UNDERDRAIN

NOTES:

1. SEE SHEET CV-101 FOR EXISTING CONDITION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
MITCHELL R. McANALLY
114422
PROFESSIONAL ENGINEER

Digitally Signed 08/11/2023

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	MRM

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

EXISTING CONDITIONS 6

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: GJT
DRAWN BY: DJD

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
CV-106

SHEET NUMBER 28

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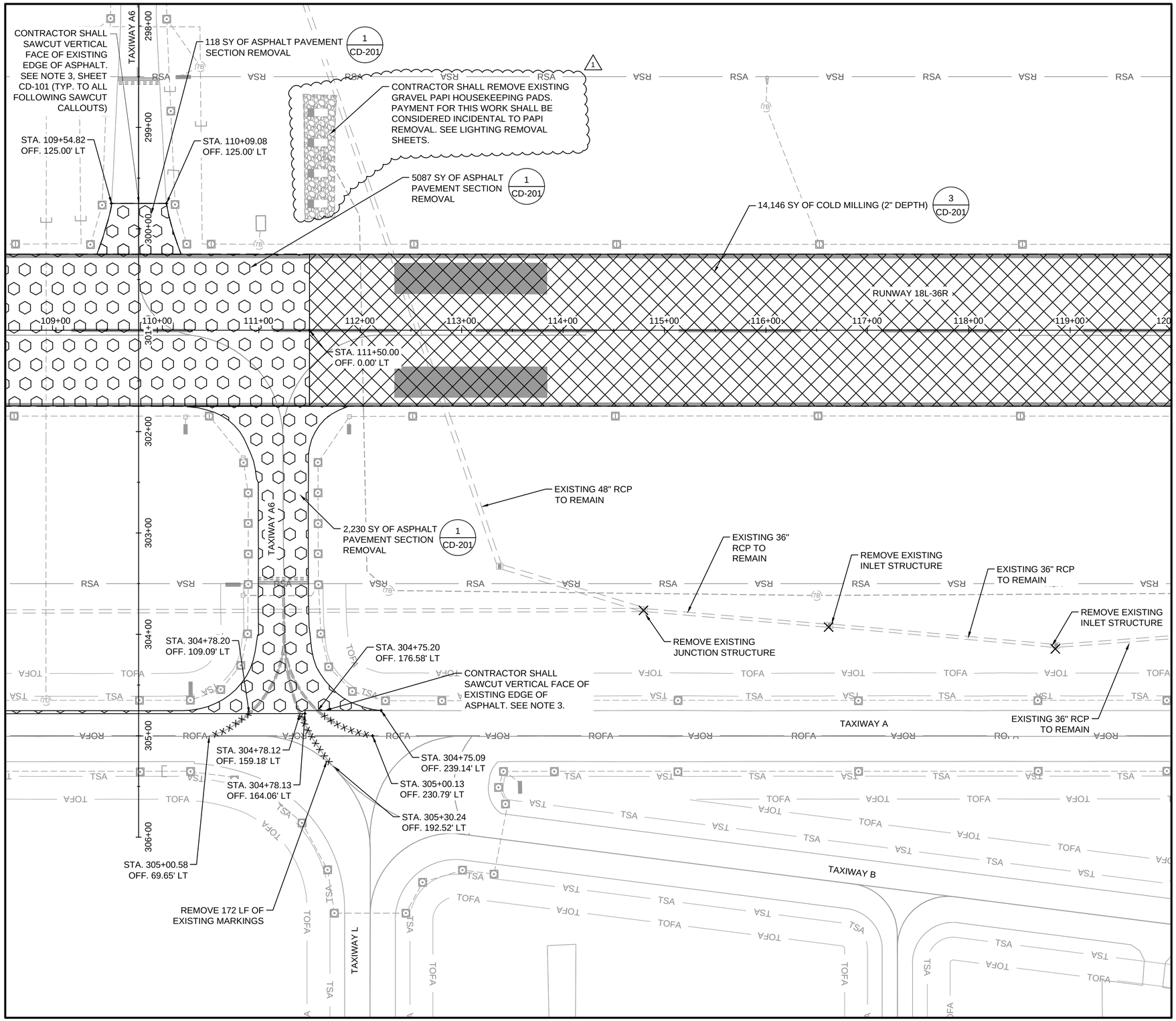


MATCHLINE SHEET CD-101

MATCHLINE SHEET CD-103

0 25' 50' 100' 150'

(IN FEET)

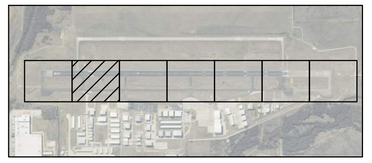
LEGEND

- EXISTING ASPHALT PAVEMENT TO REMAIN
- ASPHALT PAVEMENT SECTION REMOVAL
- COLD MILLING (2" DEPTH)
- COMPOSITE PAVEMENT SECTION REMOVAL
- ASPHALT OVER CONCRETE REMOVAL
- EXISTING STORM DRAIN PIPE
- EXISTING DRAINAGE STRUCTURE
- EXISTING TAXIWAY LIGHT
- PROPOSED PAVEMENT LIMITS
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA
- SINGULAR ITEM REMOVAL
- XXXXXXXXX LINEAR ITEM REMOVAL

NOTES:

1. SEE SHEET CD-101 FOR DEMOLITION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
MITCHELL R. McANALLY
114422
PROFESSIONAL ENGINEER
Digitally Signed 08/11/2023

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	MRM

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

DEMOLITION PLAN 2

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: GJT
DRAWN BY: DJD

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWING NUMBER
CD-102

SHEET NUMBER 38

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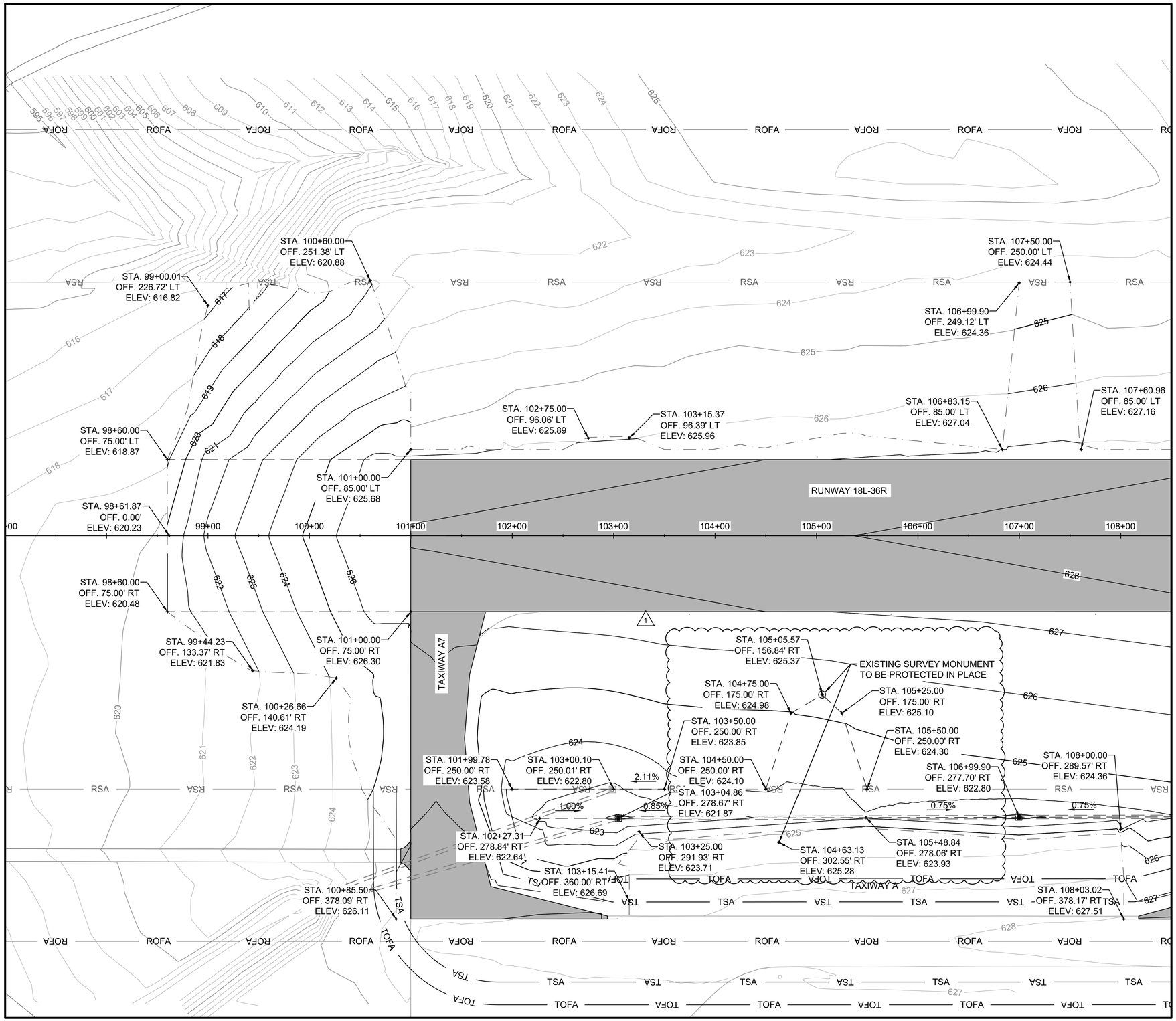

MATCHLINE SHEET CG-102

0 25' 50' 100' 150'

(IN FEET)

LEGEND

- EXISTING PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- 624 — PROPOSED CONTOUR
- 626 — EXISTING CONTOUR
- PROPOSED TAXIWAY LIGHT
- EXISTING TAXIWAY LIGHT
- PROPOSED DUCT
- EXISTING DUCT
- GRADING FEATURE
- H — PROPOSED HANDHOLE
- H — EXISTING HANDHOLE
- # — PROPOSED SIGN
- PROPOSED DRAINAGE STRUCTURE
- EXISTING DRAINAGE STRUCTURE
- STA: OFF: ELEV: — GRADING PVI
- GRADING LIMITS

NOTES:

1. SEE SHEET(S) CC-201 FOR DRAINAGE DETAILS.
2. CONTRACTOR SHALL LOCATE AND CONFIRM LOCATION, SIZE, AND FLOWLINE FOR EXISTING STORM DRAIN LINES IN THE VICINITY OF PROPOSED DRAINAGE INFRASTRUCTURE PRIOR TO BEGINNING WORK ON NEW STROM DRAIN LINES. ALL CONFLICTS SHALL BE REPORTED TO THE ENGINEER PRIOR TO BEGINNING WORK.

KEYMAP

REGISTRATION NO. F-5713

STATE OF TEXAS
MITCHELL R. McANALLY
114422
PROFESSIONAL ENGINEER
Digitally Signed 08/11/2023

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	MRM

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

GRADING PLAN 1

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: GJT
DRAWN BY: DJD

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
CG-101

SHEET NUMBER **79**

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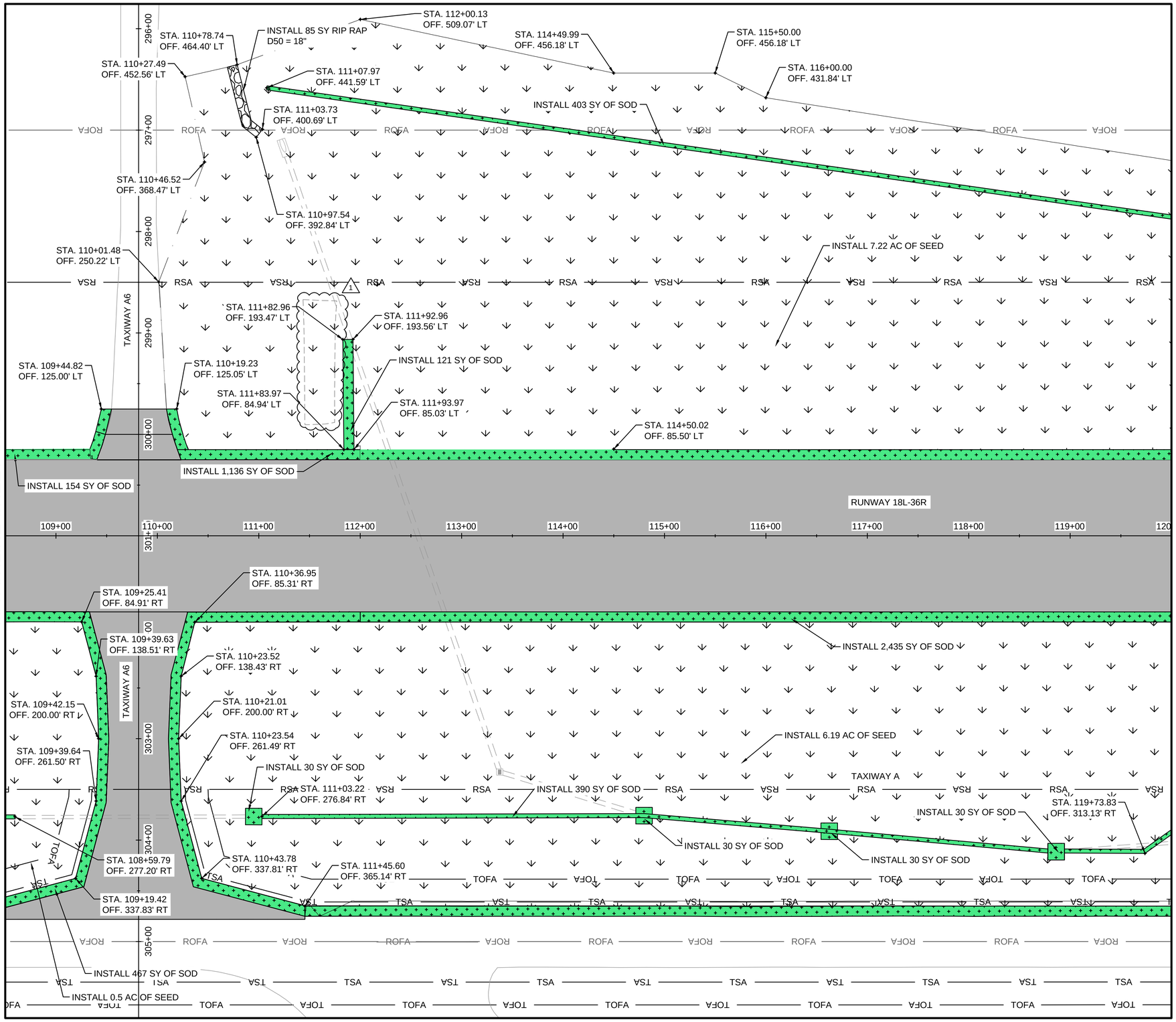
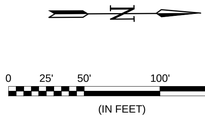




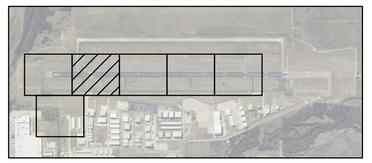
LEGEND

- EXISTING PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE STRUCTURE
- EXISTING DRAINAGE STRUCTURE
- PROPOSED SODDING LIMITS
- PROPOSED SEEDING LIMITS
- ESTIMATED LIMITS OF DISTURBANCE
- RIP RAP

NOTES:

1. SEE SHEET CG-301 FOR RESTORATION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
MITCHELL R. McANALLY
114422
PROFESSIONAL ENGINEER
Digitally Signed 08/11/2023

REV	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	MRM

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

RESTORATION PLAN 2

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: GJT
DRAWN BY: DJD

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWING NUMBER
CG-202

SHEET NUMBER 85

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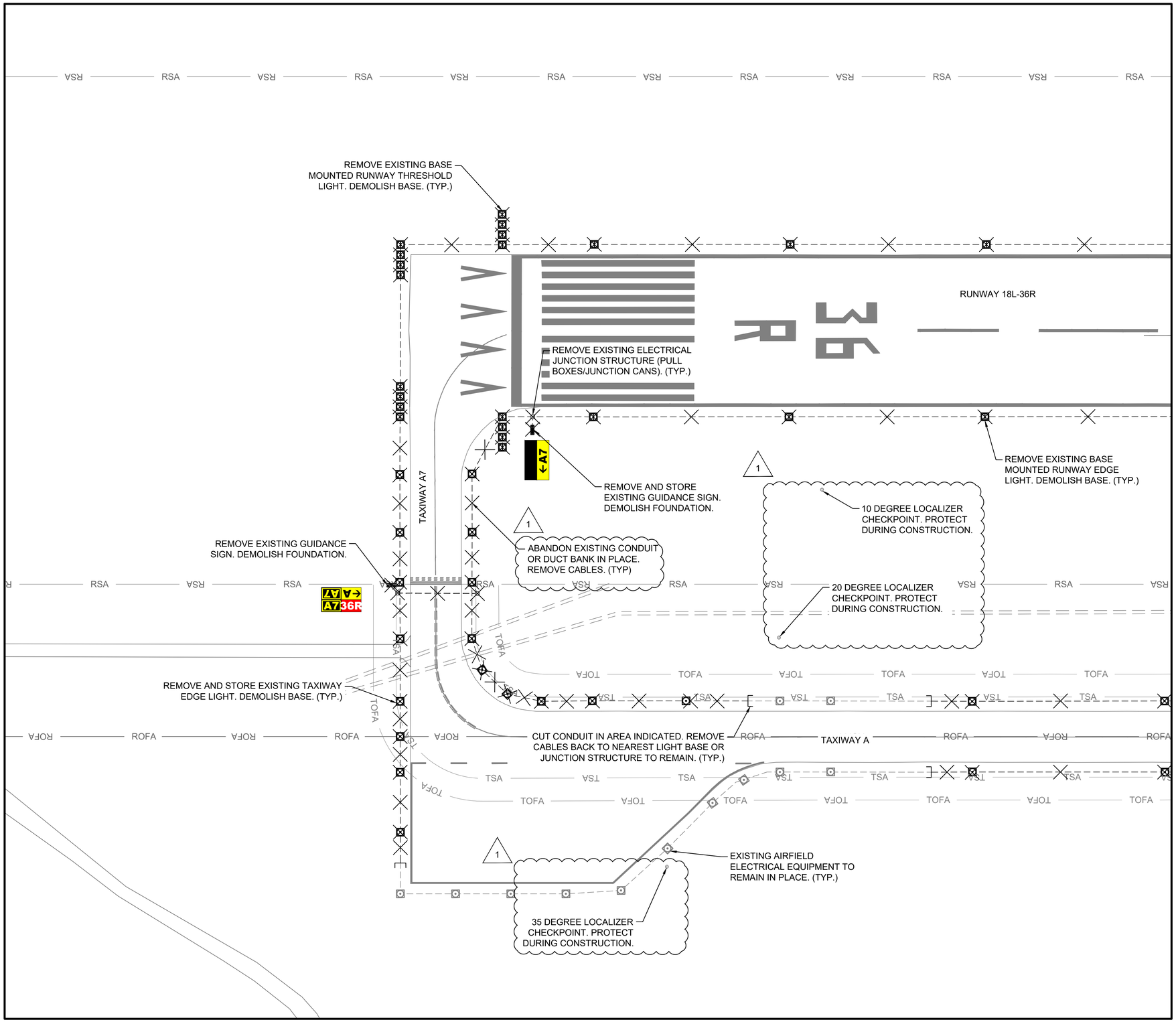


MATCHLINE SHEET ED-102

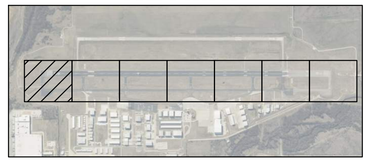
N

0 25' 50' 100' 150'
(IN FEET)

GENERAL NOTES:

1. SEE SHEET EN-001 FOR ELECTRICAL LEGEND, CONSTRUCTION NOTES, CAUTION NOTES, ELECTRICAL SAFETY NOTES, AND DEMOLITION NOTES.
2. SEE SHEET ED-201 FOR LIGHTING REMOVAL DETAILS.
3. EXISTING CIRCUIT ROUTING IS APPROXIMATE. IF ROUTING DIFFERS IN THE FIELD, COORDINATE WITH ENGINEER.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING REMOVAL PLAN 1

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWING NUMBER
ED-101

SHEET NUMBER 102

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-ED-101.dwg Last Save: 8/11/2023 2:11 PM Last saved by: KPaudel
Last plotted by: Paudel, Kushalla Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3

CUT CONDUIT IN AREA INDICATED. REMOVE CABLES BACK TO NEAREST LIGHT BASE OR JUNCTION STRUCTURE TO REMAIN. (TYP)

REMOVE AND STORE EXISTING SUPPLEMENTAL WIND CONE AND APPURTENANCES.

REMOVE EXISTING PAPI SYSTEM, PCU, FOUNDATION, AND GRAVEL HOUSEKEEPING PAD. REMOVE POWER CABLES BACK TO ELECTRICAL VAULT.

REMOVE AND STORE EXISTING RUNWAY DISTANCE REMAINING SIGN. DEMOLISH FOUNDATION.

REMOVE EXISTING BASE MOUNTED RUNWAY EDGE LIGHT. DEMOLISH BASE. (TYP.)

REMOVE AND STORE EXISTING GUIDANCE SIGN. DEMOLISH FOUNDATION. (TYP.)

RUNWAY 18L-36R

TAXIWAY A6

ABANDON EXISTING CONDUIT OR DUCT BANK IN PLACE. REMOVE CABLES. (TYP)

REMOVE AND STORE EXISTING TAXIWAY EDGE LIGHT. DEMOLISH BASE. (TYP.)

EXISTING AIRFIELD ELECTRICAL EQUIPMENT TO REMAIN IN PLACE. (TYP.)

REMOVE EXISTING GUIDANCE SIGN. DEMOLISH FOUNDATION.

TAXIWAY A

REMOVE EXISTING ELECTRICAL JUNCTION STRUCTURE (PULL BOXES/JUNCTION CANS). (TYP.)

EXISTING GUIDANCE SIGN TO REMAIN IN PLACE. REPLACE PANELS AS INDICATED IN EL-100 SERIES SHEETS.

TAXIWAY B

TAXIWAY L

TAXIWAY K

MATCHLINE SHEET ED-101

MATCHLINE SHEET ED-103

N

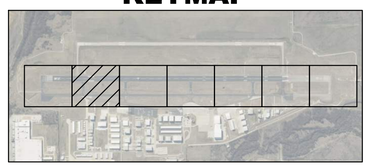
0 25' 50' 100' 150'

(IN FEET)

GENERAL NOTES:

1. SEE SHEET ED-101 FOR LIGHTING DEMOLITION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING REMOVAL PLAN 2

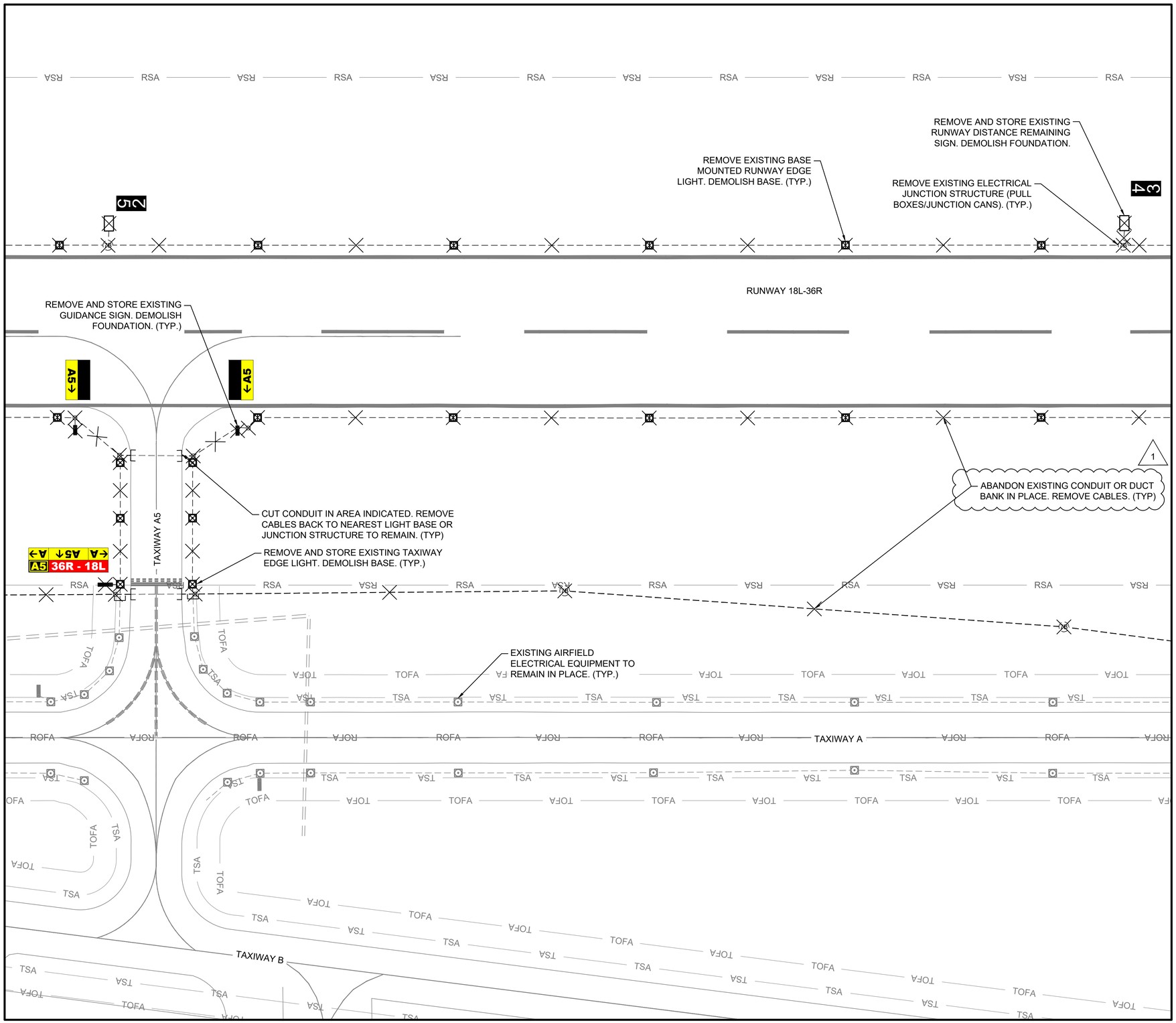
JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
ED-102

SHEET NUMBER **103**

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-ED-101.dwg Last Save: 8/11/2023 2:11 PM Last saved by: KPaudel
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3



N

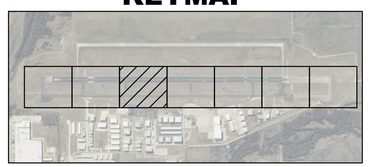
0 25' 50' 100' 150'

(IN FEET)

GENERAL NOTES:

1. SEE SHEET ED-101 FOR LIGHTING DEMOLITION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING REMOVAL PLAN 3

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
ED-103

SHEET NUMBER **104**

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-ED-101.dwg Last Save: 8/11/2023 2:11 PM Last saved by: KPaudel
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3

REMOVE EXISTING ELECTRICAL HANDHOLES. (TYP.)

REMOVE AND STORE EXISTING RUNWAY DISTANCE REMAINING SIGN. DEMOLISH FOUNDATION.

REMOVE EXISTING BASE MOUNTED RUNWAY EDGE LIGHT. DEMOLISH BASE. (TYP.)

REMOVE EXISTING ELECTRICAL JUNCTION STRUCTURE (PULL BOXES/JUNCTION CANS). (TYP.)

34

ABANDON EXISTING CONDUIT OR DUCT BANK IN PLACE. REMOVE CABLES. (TYP)

RUNWAY 18L-36R

REMOVE AND STORE EXISTING GUIDANCE SIGN. DEMOLISH FOUNDATION. (TYP.)

A4

A4

REMOVE AND STORE EXISTING TAXIWAY EDGE LIGHT. DEMOLISH BASE. (TYP.)

TAXIWAY A4

A4 A4 A4
A4 36R - 18L

A4 A4

ABANDON EXISTING CONDUIT OR DUCT BANK IN PLACE. REMOVE CABLES. (TYP)

CUT CONDUIT IN AREA INDICATED. REMOVE CABLES BACK TO NEAREST LIGHT BASE OR JUNCTION STRUCTURE TO REMAIN. (TYP)

REMOVE AND STORE EXISTING PRIMARY WIND CONE AND APPURTENANCES. REMOVE EXISTING SEGMENTED CIRCLE.

TAXIWAY A

MATCHLINE THIS SHEET

EXISTING CONDUIT OR DUCT BANK SHALL REMAIN IN PLACE. REMOVE RUNWAY 18L-36R, 18L PAPI, AND 36R PAPI CIRCUIT CABLES BACK TO ELECTRICAL VAULT.

EXISTING CONDUIT OR DUCT BANK SHALL REMAIN IN PLACE. REMOVE RUNWAY 18L-36R, 18L PAPI, AND 36R PAPI CIRCUIT CABLES BACK TO ELECTRICAL VAULT.

EXISTING ELECTRICAL VAULT

MATCHLINE THIS SHEET

MATCHLINE SHEET ED-103

MATCHLINE SHEET ED-105

RSA TOFA TSA ROFA

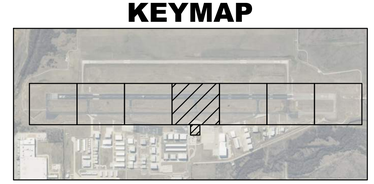
N

0 25' 50' 100' 150'
(IN FEET)

GENERAL NOTES:

1. SEE SHEET ED-101 FOR LIGHTING DEMOLITION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING REMOVAL PLAN 4

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
ED-104

SHEET NUMBER **105**

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-ED-101.dwg Last Save: 8/11/2023 2:11 PM Last saved by: KPaudel
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3

MATCHLINE SHEET ED-104

MATCHLINE SHEET ED-106

RSA

TOFA

TSA

ROFA

1

ABANDON EXISTING CONDUIT OR DUCT BANK IN PLACE. REMOVE CABLES. (TYP)

REMOVE EXISTING BASE MOUNTED RUNWAY EDGE LIGHT. DEMOLISH BASE. (TYP.)

REMOVE AND STORE EXISTING RUNWAY DISTANCE REMAINING SIGN. DEMOLISH FOUNDATION.

REMOVE EXISTING RUNWAY EDGE LIGHT FIXTURE, ISOLATION TRANSFORMER, AND ASSOCIATED ITEMS FROM EXISTING BASE CAN TO REMAIN. CLEAN AND REMOVE ALL MUD AND DEBRIS FROM INSIDE OF BASE CAN.

EXISTING CONDUIT OR DUCT BANK SHALL REMAIN IN PLACE. REMOVE RUNWAY CIRCUIT CABLES BACK TO ELECTRICAL VAULT. (TYP. OF RUNWAY 18L-36R CONDUIT)

RUNWAY 18L-36R

CUT CONDUIT IN AREA INDICATED. REMOVE CABLES BACK TO NEAREST LIGHT BASE OR JUNCTION STRUCTURE TO REMAIN. (TYP)

REMOVE AND STORE EXISTING TAXIWAY EDGE LIGHT. DEMOLISH BASE.

TAXIWAY A3

REMOVE EXISTING ELECTRICAL JUNCTION STRUCTURE (PULL BOXES/JUNCTION CANS). (TYP.)

EXISTING AIRFIELD ELECTRICAL EQUIPMENT TO REMAIN IN PLACE. (TYP.)

TAXIWAY A

EXISTING CONDUIT OR DUCT BANK SHALL REMAIN IN PLACE. REMOVE PAPI 18L CIRCUIT CABLES BACK TO ELECTRICAL VAULT. (TYP. OF PAPI 18L CONDUIT)

N

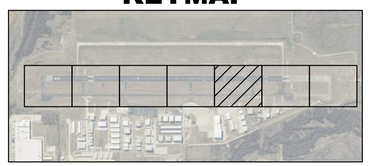
0 25' 50' 100' 150'

(IN FEET)

GENERAL NOTES:

1. SEE SHEET ED-101 FOR LIGHTING DEMOLITION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

DENTON ENTERPRISE AIRPORT

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING REMOVAL PLAN 5

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
ED-105

SHEET NUMBER **106**

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-ED-101.dwg Last Save: 8/11/2023 2:11 PM Last saved by: KPaudel
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3

MATCHLINE SHEET ED-105

MATCHLINE SHEET ED-107

RSA

TOFA

TSA

ROFA

RUNWAY 18L-36R

TAXIWAY A2

TAXIWAY A

1

REMOVE EXISTING RUNWAY EDGE LIGHT FIXTURE, ISOLATION TRANSFORMER, AND ASSOCIATED ITEMS FROM EXISTING BASE CAN TO REMAIN. CLEAN AND REMOVE ALL MUD AND DEBRIS FROM INSIDE OF BASE CAN. (TYP.)

ABANDON EXISTING CONDUIT OR DUCT BANK IN PLACE. REMOVE CABLES. (TYP)

EXISTING CONDUIT OR DUCT BANK SHALL REMAIN IN PLACE. REMOVE RUNWAY CIRCUIT CABLE BACK TO ELECTRICAL VAULT. (TYP. OF RUNWAY 18L-36R CONDUIT)

REMOVE EXISTING PAPI SYSTEM, PCU, FOUNDATION, AND GRAVEL HOUSEKEEPING PAD. REMOVE POWER CABLES BACK TO ELECTRICAL VAULT.

CUT CONDUIT IN AREA INDICATED. REMOVE CABLES. (TYP)

EXISTING AIRFIELD ELECTRICAL EQUIPMENT TO REMAIN IN PLACE. (TYP.)

EXISTING CONDUIT OR DUCT BANK SHALL REMAIN IN PLACE. REMOVE PAPI 18L CIRCUIT CABLES BACK TO ELECTRICAL VAULT. (TYP. OF PAPI 18L CONDUIT)

N

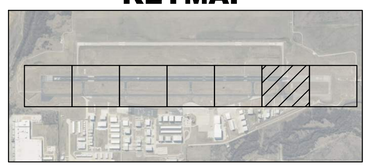
0 25' 50' 100' 150'

(IN FEET)

GENERAL NOTES:

1. SEE SHEET ED-101 FOR LIGHTING DEMOLITION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING REMOVAL PLAN 6

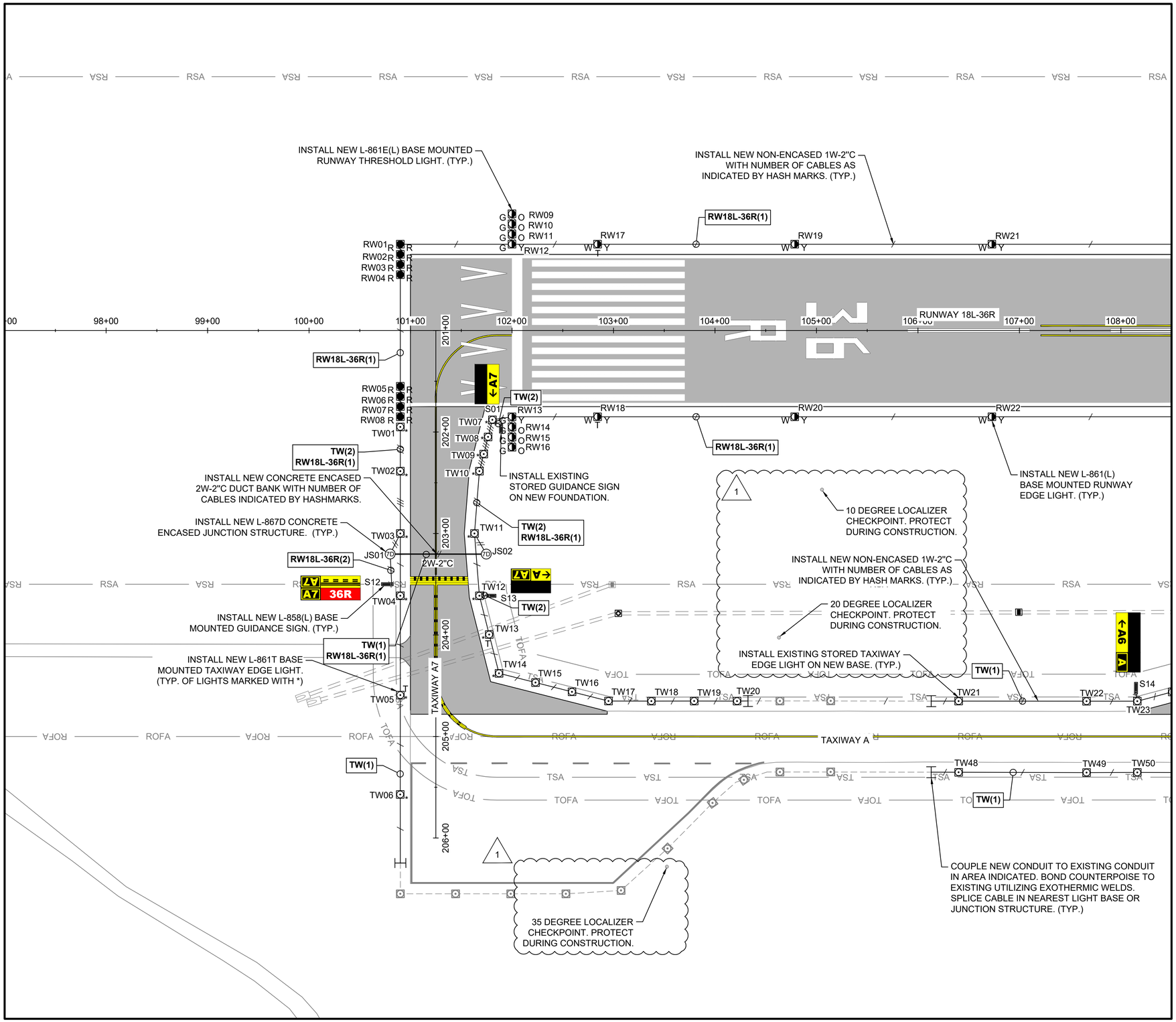
JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
ED-106

SHEET NUMBER **107**

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-ED-101.dwg Last Save: 8/11/2023 2:11 PM Last saved by: KPaudel
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3



MATCHLINE SHEET EL-102

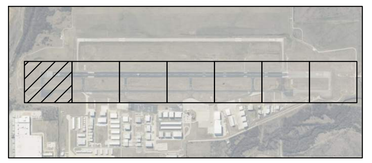
N

0 25' 50' 100' 150'
(IN FEET)

GENERAL NOTES:

1. SEE SHEET EN-001 FOR LEGEND, CONSTRUCTION NOTES, CAUTION NOTES, ELECTRICAL SAFETY NOTES, AND DEMOLITION NOTES.
2. SEE THE EL-200 SERIES FOR LIGHTING INSTALLATION DETAILS.
3. EXISTING CIRCUIT ROUTING IS APPROXIMATE. IF ROUTING DIFFERS IN THE FIELD, COORDINATE WITH ENGINEER.
4. CONTRACTOR SHALL CONNECT LIGHT BASES AND JUNCTION STRUCTURES TO UNDERDRAIN SYSTEM WHERE INDICATED BY 'T'.
5. SEE SHEETS EL-209 AND EL-210 FOR LIGHTING AND SIGNAGE LOCATIONS.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

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REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION PLAN 1

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
EL-101

SHEET NUMBER 110

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-EL-101.dwg Last Save: 8/11/2023 11:22 AM Last saved by: KPaudel
Last plotted by: Paudel, Kushalla Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF pc3

MATCHLINE SHEET EL-101

MATCHLINE SHEET EL-103

INSTALL NEW PAPI POWER AND CONTROL UNIT.

INSTALL NEW L-880(L) PAPI SYSTEM. SEE DETAILS FOR DISTANCE FROM RW 36R END.

INSTALL EXISTING STORED RUNWAY DISTANCE REMAINING SIGN ON NEW FOUNDATION.

INSTALL EXISTING STORED SUPPLEMENTAL WIND CONE ON NEW FOUNDATION.

INSTALL NEW CONCRETE ENCASED 1W-2"C UNDER PAVEMENT WITH NUMBER OF CABLES INDICATED BY HASHMARKS.

INSTALL EXISTING STORED GUIDANCE SIGN ON NEW FOUNDATION.

INSTALL NEW CONCRETE ENCASED 2W-2"C DUCT BANK WITH NUMBER OF CABLES INDICATED BY HASHMARKS.

INSTALL NEW NON-ENCASED 1W-2"C WITH NUMBER OF CABLES AS INDICATED BY HASH MARKS. (TYP.)

INSTALL NEW L-861(L) BASE MOUNTED RUNWAY EDGE LIGHT. (TYP.)

INSTALL NEW L-858(L) BASE MOUNTED GUIDANCE SIGN. (TYP.)

INSTALL EXISTING STORED TAXIWAY EDGE LIGHT ON NEW BASE. (TYP.)

INSTALL NEW L-867D CONCRETE ENCASED JUNCTION STRUCTURE. (TYP.)

CORE-DRILL EXISTING LIGHT BASE FOR CONDUIT ENTRY. CORE DRILL SHALL BE PAID SUBSIDIARY TO THE CONDUIT INSTALLATION PAY ITEM.

COUPLE NEW CONDUIT TO EXISTING CONDUIT IN AREA INDICATED. BOND COUNTERPOISE TO EXISTING UTILIZING EXOTHERMIC WELDS. SPLICE CABLE IN NEAREST LIGHT BASE OR JUNCTION STRUCTURE. (TYP.)

REPLACE PANELS TO EXISTING GUIDANCE SIGN AS INDICATED.

INSTALL EXISTING STORED GUIDANCE SIGN ON NEW FOUNDATION. REPLACE PANELS AS INDICATED.

RUNWAY 18L-36R

TAXIWAY A

TAXIWAY B

TAXIWAY K

TAXIWAY L

TAXIWAY A6

RW 18L-36R(1)

RW 18L-36R(2)

PAPI 36R(3)

TW(1)

TW(2)

TW(1) RW 18L-36R(1)

TW(2) RW 18L-36R(1)

A6 36R - 18L

GENERAL NOTES:

1. SEE SHEET EL-101 FOR LIGHTING INSTALLATION NOTES.

N

0 25' 50' 100' 150'

(IN FEET)

KEYMAP

REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION PLAN 2

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
EL-102

SHEET NUMBER **111**

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Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3

MATCHLINE SHEET EL-102

MATCHLINE SHEET EL-104

RSA

TOFA

TSA

ROFA

RUNWAY 18L-36R

TAXIWAY A

TAXIWAY A5

TAXIWAY B

RW35 RW36 RW37 RW38 RW39 RW40 RW41 RW42 RW43 RW44 RW45 RW46

S21 S22 S04 S05 S10 S18

TW53 TW54 TW55 TW56 TW57 TW58

JS08 JS09 JS10

+00 121+00 122+00 123+00 124+00 125+00 126+00 127+00 128+00 129+00 130+00 131+00

500+00 501+00 502+00 503+00 504+00

INSTALL EXISTING STORED GUIDANCE SIGN ON NEW FOUNDATION.

INSTALL NEW L-861(L) BASE MOUNTED RUNWAY EDGE LIGHT. (TYP.)

INSTALL EXISTING STORED RUNWAY DISTANCE REMAINING SIGN ON NEW FOUNDATION. (TYP.)

RW 18L-36R(2)

RW 18L-36R(1)

RW 18L-36R(1) TW(2)

RW 18L-36R(1) TW(1)

RW 18L-36R(2) TW(1)

RW 18L-36R(2)

INSTALL EXISTING STORED TAXIWAY EDGE LIGHT ON NEW BASE. (TYP.)

TW(1)

COUPLE NEW CONDUIT TO EXISTING CONDUIT IN AREA INDICATED. BOND COUNTERPOISE TO EXISTING UTILIZING EXOTHERMIC WELDS. SPLICE CABLE IN NEAREST LIGHT BASE OR JUNCTION STRUCTURE. (TYP.)

PAPI 36R(3)

INSTALL NEW NON-ENCASED 1W-2"C WITH NUMBER OF CABLES AS INDICATED BY HASH MARKS. (TYP.)

1

INSTALL NEW L-867D CONCRETE ENCASED JUNCTION STRUCTURE. (TYP.)

INSTALL NEW L-858(L) BASE MOUNTED GUIDANCE SIGN.

CORE DRILL EXISTING LIGHT BASE FOR CONDUIT ENTRY. CORE DRILL SHALL BE PAID SUBSIDIARY TO THE CONDUIT INSTALLATION PAY ITEM.

INSTALL EXISTING STORED GUIDANCE SIGN ON NEW FOUNDATION. REPLACE PANELS AS INDICATED.

A5 36R - 18L

N

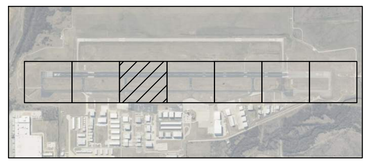
0 25' 50' 100' 150'

(IN FEET)

GENERAL NOTES:

1. SEE SHEET EL-101 FOR LIGHTING INSTALLATION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

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REV	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION PLAN 3

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWING NUMBER
EL-103

SHEET NUMBER 112

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-EL-101.dwg Last Save: 8/11/2023 11:22 AM Last saved by: KPaudel
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3

MATCHLINE SHEET EL-103

MATCHLINE SHEET EL-105

JS16

JS17

RW 18R-36L(2)

INSTALL NEW L-861(L) BASE MOUNTED RUNWAY EDGE LIGHT. (TYP.)

INSTALL NEW NON-ENCASED 1W-2"C WITH NUMBER OF CABLES AS INDICATED BY HASH MARKS. (TYP.)

RW 18L-36R(1)

S23

INSTALL EXISTING STORED GUIDANCE SIGN ON NEW FOUNDATION.

RUNWAY 18L-36R

INSTALL EXISTING STORED RUNWAY DISTANCE REMAINING SIGN ON NEW FOUNDATION.

INSTALL NEW CONCRETE ENCASED 1W-2"C UNDER PAVEMENT WITH NUMBER OF CABLES INDICATED BY HASHMARKS.

INSTALL NEW CONCRETE ENCASED 1W-2"C UNDER PAVEMENT WITH NUMBER OF CABLES INDICATED BY HASHMARKS.

PAPI 18R(3)
PAPI 36L(3)

INSTALL EXISTING STORED GUIDANCE SIGN ON NEW FOUNDATION.

INSTALL EXISTING STORED TAXIWAY EDGE LIGHT ON NEW BASE. (TYP.)

TW(2)
RW 18L-36R(1)

RW 18L-36R(2)

INSTALL NEW CONCRETE ENCASED 2W-2"C DUCT BANK WITH NUMBER OF CABLES INDICATED BY HASHMARKS. SEPARATE CURRENT POWERED CIRCUITS FROM VOLTAGE POWERED WITHIN DIFFERENT CONDUITS.

INSTALL EXISTING STORED GUIDANCE SIGN ON NEW FOUNDATION. REPLACE PANELS AS INDICATED.

A4 36R - 18L

PAPI 18L(3)

INSTALL NEW L-867D CONCRETE ENCASED JUNCTION STRUCTURE. (TYP.)

INSTALL NEW L-858(L) BASE MOUNTED GUIDANCE SIGN.

PAPI 36R(3)

INSTALL EXISTING STORED GUIDANCE SIGN ON NEW FOUNDATION.

TW(1)

COUPLE NEW CONDUIT TO EXISTING CONDUIT IN AREA INDICATED. BOND COUNTERPOISE TO EXISTING UTILIZING EXOTHERMIC WELDS. SPLICE CABLE IN NEAREST LIGHT BASE OR JUNCTION STRUCTURE. (TYP.)

TW(2)

TW(1)
RW 18L-36R(1)
PAPI 18L(3)

TAXIWAY A

MATCHLINE THIS SHEET

PAPI 36R(3)
PAPI 18L(3)

INSTALL NEW CABLE IN EXISTING RUNWAY AND PAPI CONDUIT. NUMBER OF CABLES IS INDICATED BY HASH MARKS. PROTECT EXISTING CIRCUIT(S) TO REMAIN. (TYP.)

RW 18L-36R(2)
PAPI 36R(3)
PAPI 18L(3)

RW 18L-36R(2)

WC2

INSTALL EXISTING STORED PRIMARY WIND CONE ON NEW FOUNDATION. INSTALL NEW SEGMENTED CIRCLE.

CORE-DRILL EXISTING HANDHOLE FOR CONDUIT ENTRY. CORE DRILL SHALL BE PAID SUBSIDIARY TO THE CONDUIT INSTALLATION PAY ITEM. (TYP.)

EXISTING ELECTRICAL VAULT. SEE DETAIL 3, SHEET EL-206 FOR REQUIRED WORK AT VAULT.

MATCHLINE THIS SHEET

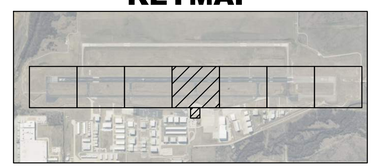
N

0 25' 50' 100' 150'
(IN FEET)

GENERAL NOTES:

1. SEE SHEET EL-101 FOR LIGHTING INSTALLATION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION PLAN 4

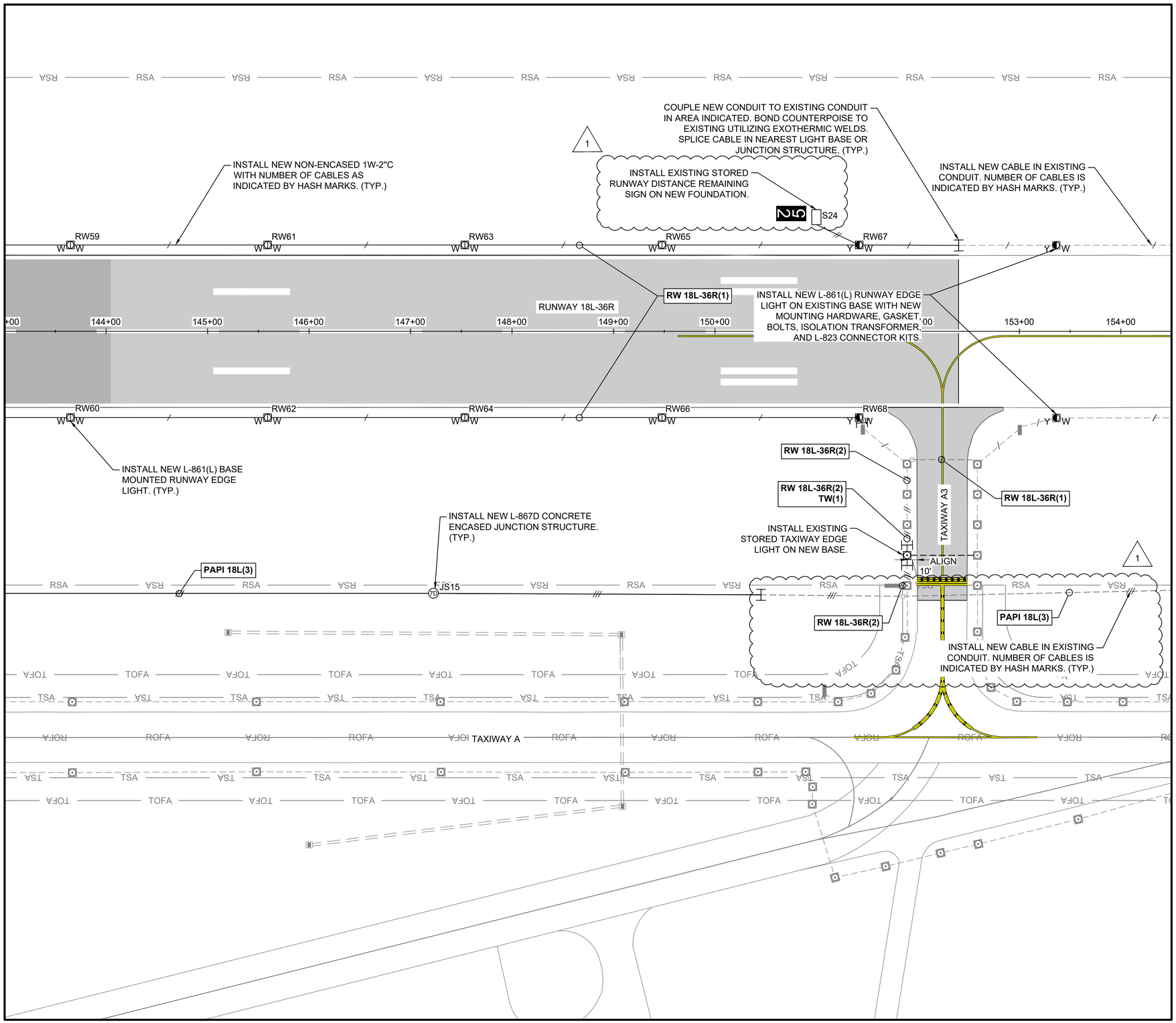
JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

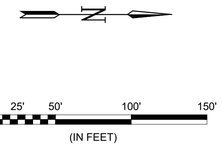
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
EL-104

SHEET NUMBER 113

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-EL-101.dwg Last Save: 8/11/2023 11:22 AM Last saved by: KPaudel
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3

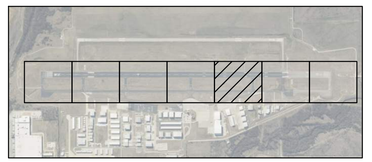




GENERAL NOTES:

1. SEE SHEET EL-101 FOR LIGHTING INSTALLATION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION PLAN 5

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
EL-105

SHEET NUMBER **114**

File: L:\2023\23A11280 - DTO - RW 18L-36R Pvmt Recon\Drawings\DTO_RW_REC-EL-101.dwg Last Save: 8/11/2023 3:36 PM Last saved by: KPaudel
Last plotted by: Paudel, Kushalla Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 3:37 PM Plotter used: DWG To PDF.pc3

MATCHLINE SHEET EL-105

MATCHLINE SHEET EL-107

RW 18L-36R(1)

TAXIWAY A2

RW 18L-36R(2)

INSTALL NEW CABLE IN EXISTING CONDUIT. NUMBER OF CABLES IS INDICATED BY HASH MARKS. (TYP.)

RW 18L-36R(1)

RW 18L-36R(1)

155+00 156+00 157+00 158+00 159+00 RUNWAY 18L-36R 161+00 162+00 163+00 164+00 165+00 166

INSTALL NEW L-861(L) RUNWAY EDGE LIGHT ON EXISTING BASE WITH NEW MOUNTING HARDWARE, GASKET, BOLTS, ISOLATION TRANSFORMER, AND L-823 CONNECTOR KITS. (TYP.)

INSTALL NEW L-880(L) PAPI SYSTEM. SEE DETAILS FOR DISTANCE FROM RW 36R END.

TAXIWAY A2

RW 18L-36R(2)

RW 18L-36R(1)

INSTALL NEW NON-ENCASED 1W-2"C WITH NUMBER OF CABLES AS INDICATED BY HASH MARKS. (TYP.)

INSTALL NEW CABLE IN EXISTING CONDUIT. NUMBER OF CABLES IS INDICATED BY HASH MARKS. (TYP.)

PAPI 18L(3)

INSTALL NEW PAPI POWER AND CONTROL UNIT.

COUPLE NEW CONDUIT TO EXISTING CONDUIT IN AREA INDICATED. BOND COUNTERPOISE TO EXISTING UTILIZING EXOTHERMIC WELDS.

TAXIWAY A

RSA TOFA TSA ROFA

1

N

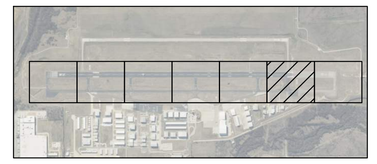
0 25' 50' 100' 150'

(IN FEET)

GENERAL NOTES:

1. SEE SHEET EL-101 FOR LIGHTING INSTALLATION NOTES.

KEYMAP



REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION PLAN 6

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWING NUMBER
EL-106

SHEET NUMBER **115**

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Last plotted by: Paudel, Kushalla Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3

EXISTING STORED GUIDANCE SIGN									
SIGN NO.	SIGN DESC.	SIDE 1	SIDE 2	SIZE	STYLE	CLASS	MODE	ARROW ANGLE	NOTES
1	LEGEND	←A7	[redacted]	1	2	2	2	270°	1
	TYPE	Y Y	* *						
2	LEGEND	A6→	[redacted]	1	2	2	2	90°	2
	TYPE	Y Y	* *						
3	LEGEND	←A6	[redacted]	1	2	2	2	270°	1
	TYPE	Y Y	* *						
4	LEGEND	A5→	[redacted]	1	2	2	2	90°	2
	TYPE	Y Y	* *						
5	LEGEND	←A5	[redacted]	1	2	2	2	270°	1
	TYPE	Y Y	* *						
6	LEGEND	A4→	[redacted]	1	2	2	2	90°	2
	TYPE	Y Y	* *						
7	LEGEND	←A4	[redacted]	1	2	2	2	270°	1
	TYPE	Y Y	* *						
8	LEGEND	←A4 A	[redacted]	1	2	2	2	270°	2
	TYPE	Y Y L	* * *						

1 EL-204 **EXISTING STORED GUIDANCE SIGN**
SCALE: NONE

EXISTING STORED RUNWAY DISTANCE REMAINING SIGN								
SIGN NO.	SIGN DESC.	SIDE 1	SIDE 2	SIZE	STYLE	CLASS	MODE	ARROW ANGLE
20	LEGEND	6	1	5	2	2	2	-
	TYPE	B	B					
21	LEGEND	5	2	5	2	2	2	-
	TYPE	B	B					
22	LEGEND	4	3	5	2	2	2	-
	TYPE	B	B					
23	LEGEND	3	4	5	2	2	2	-
	TYPE	B	B					
24	LEGEND	2	5	5	2	2	2	-
	TYPE	B	B					

4 EL-204 **EXISTING STORED RDR SIGN**
SCALE: NONE

GUIDANCE SIGN PANEL REPLACEMENT INDEX									
SIGN NO.	SIGN DESC.	EXISTING SIDE 1	EXISTING SIDE 2	UTILIZE EXISTING PANELS FOR SIDE 1	ULTIMATE SIDE 2	SIZE	STYLE	CLASS	MODE	ARROW ANGLE
9	LEGEND	A6 36R - 18L	↖B A6 ← A →	A6 36R - 18L	A6	1	2	2	2	-
	TYPE	L R R R	Y L Y Y	L R R R	Y Y L *					
10	LEGEND	A5 36R - 18L	←A A5↑ A→	A5 36R - 18L	A5	1	2	2	2	-
	TYPE	L R R R	Y Y Y Y	L R R R	Y Y L *					
11	LEGEND	A4 36R - 18L	←A A4 A→	A4 36R - 18L	A4	1	2	2	2	-
	TYPE	L R R R	Y L Y *	L R R R	Y Y L *					
11A	LEGEND	A B ↗	←A A4 A→	A B ↗	←L ↘B A	1	2	2	2	-
	TYPE	* L Y Y	Y L Y *	L Y Y *	* Y Y L					

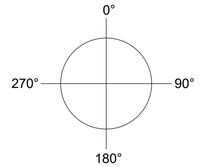
1

2 EL-204 **SIGN PANEL REPLACEMENT INDEX**
SCALE: NONE

NEW GUIDANCE SIGN INDEX									
SIGN NO.	SIGN DESC.	SIDE 1	SIDE 2	SIZE	STYLE	CLASS	MODE	ARROW ANGLE	NOTES
12	LEGEND	A7 36R	A7	1	2	2	2	-	4
	TYPE	L R R	Y Y L						
13	LEGEND	←A A7	[redacted]	1	2	2	2	270°	3
	TYPE	Y L	* *						
14	LEGEND	←A6 A	[redacted]	1	2	2	2	270°	2
	TYPE	Y Y L	* * *						
15	LEGEND	←A ↖B ↑L A6 A→	[redacted]	1	2	2	2	270° 245° 225° 90°	3
	TYPE	Y Y Y L Y	* * * * *						
16	LEGEND	A A6→	[redacted]	1	2	2	2	90°	1
	TYPE	L Y Y	* * *						
17	LEGEND	A B↗ L→	[redacted] A	1	2	2	2	45° 90°	2
	TYPE	L Y Y	* * L						
18	LEGEND	← A → A5	[redacted]	1	2	2	2	270° 90°	3
	TYPE	Y Y L	* * *						
19	LEGEND	← A → A4	[redacted]	1	2	2	2	270° 90°	3
	TYPE	Y Y L	* * *						

3 EL-204 **NEW GUIDANCE SIGN INDEX**
SCALE: NONE

ARROW ANGLES



INDEX NOTES:

1. SIGN SIDE 1 SHALL FACE NORTH.
2. SIGN SIDE 1 SHALL FACE SOUTH.
3. SIGN SIDE 1 SHALL FACE WEST.
4. SIGN SIDE 1 SHALL FACE EAST.

LEGEND:

L L-858L LOCATION
Y L-858Y DIRECTION / DESTINATION / BOUNDARY
R L-858R MANDATORY INSTRUCTION
B L-858B DISTANCE REMAINING
* BLANK PANEL

GENERAL NOTES:

1. NUMBER OF SIGN LEGEND LETTERS UNDERNEATH EACH SIGN ON NEW GUIDANCE SIGN INDEX INDICATES APPROXIMATE NUMBER OF MODULES ON DESIGNATED SIGN. SIGNS SHALL BE BID ACCORDING TO MODULES SHOWN ABOVE, IF MANUFACTURER UTILIZES LESS MODULES THAN SHOWN ABOVE, INDICATE ON SUBMITTAL OF SIGN LEGEND AS REQUIRED BY THE SPECIFICATIONS.

REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION DETAILS 4

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER **EL-204**

SHEET NUMBER **120**

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-EL-201.dwg Last Save: 8/11/2023 11:18 AM Last saved by: KPaudel
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1

MODIFY OUTPUT RATING OF EXISTING RW 18L-36R REGULATOR TO 7.5kW. INSTALL NEW RUNWAY 18L-36R CIRCUIT TO FIELD.

1 EL-207

VAULT MODIFICATIONS

SCALE: NONE

VAULT NOTE:

1. ALL WORK IN THE VAULT SHALL BE PAID UNDER THE "ELECTRICAL VAULT MODIFICATIONS" PAY ITEM.

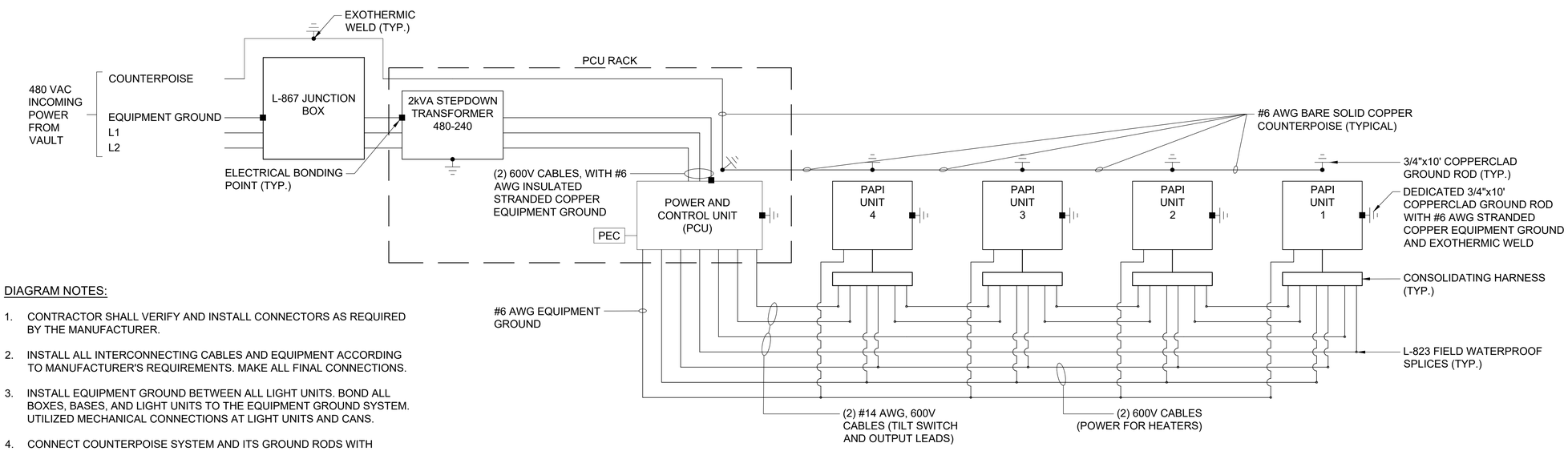

DIAGRAM NOTES:

1. CONTRACTOR SHALL VERIFY AND INSTALL CONNECTORS AS REQUIRED BY THE MANUFACTURER.
2. INSTALL ALL INTERCONNECTING CABLES AND EQUIPMENT ACCORDING TO MANUFACTURER'S REQUIREMENTS. MAKE ALL FINAL CONNECTIONS.
3. INSTALL EQUIPMENT GROUND BETWEEN ALL LIGHT UNITS. BOND ALL BOXES, BASES, AND LIGHT UNITS TO THE EQUIPMENT GROUND SYSTEM. UTILIZED MECHANICAL CONNECTIONS AT LIGHT UNITS AND CANS.
4. CONNECT COUNTERPOISE SYSTEM AND ITS GROUND RODS WITH EXOTHERMIC WELDS. UTILIZE MECHANICAL CONNECTIONS AT LIGHT UNIT AND CAN EXTERNAL GROUND LUGS.

2 EL-207

L-880 PAPI WIRING DIAGRAM (STYLE A - VOLTAGE POWERED)

SCALE: NONE

GARVER

REGISTRATION NO. F-5713

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134453
LICENSED PROFESSIONAL ENGINEER

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DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION DETAILS 7

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
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DRAWING NUMBER
EL-207

SHEET NUMBER **123**

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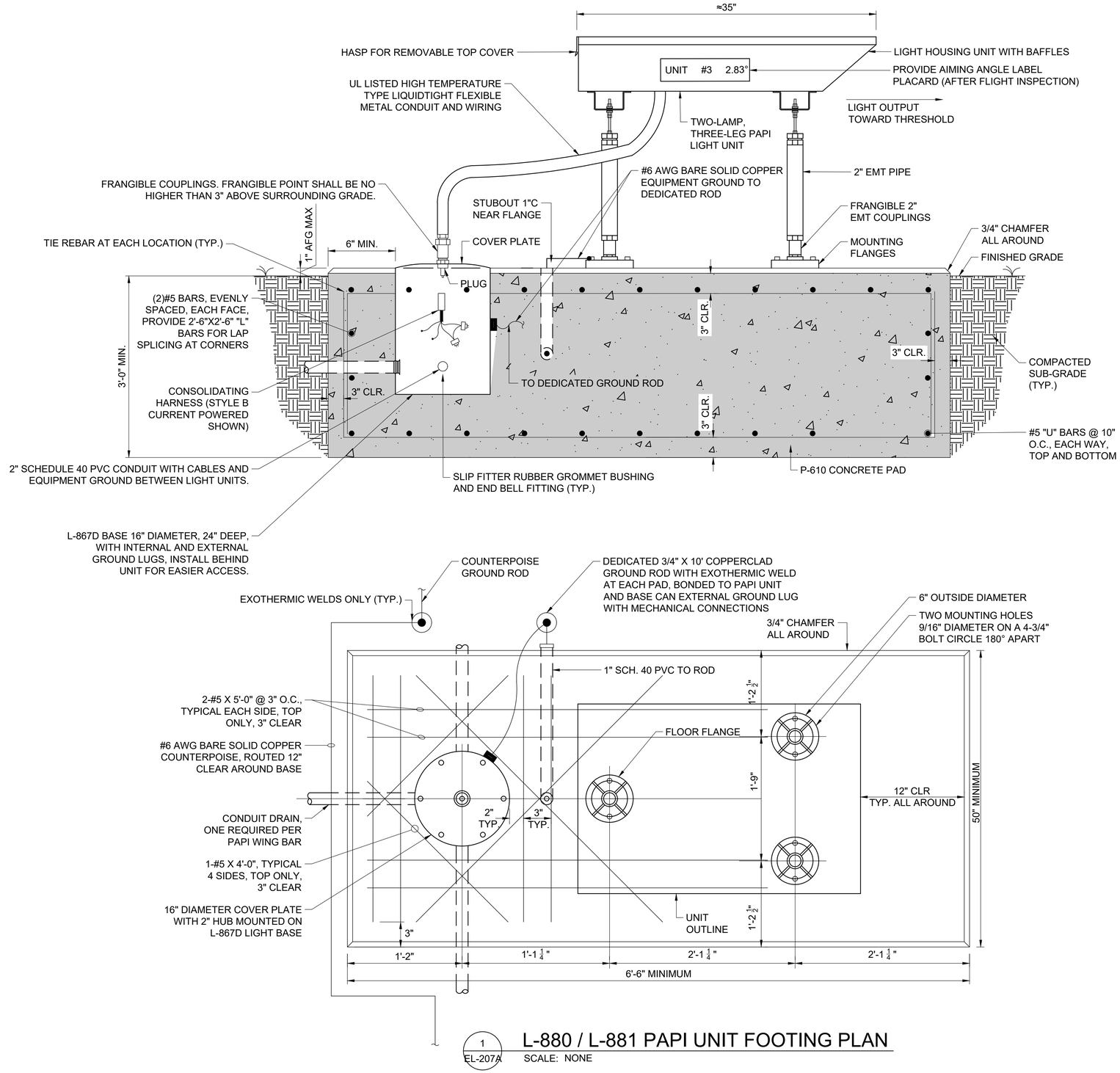
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3



1 EL-207A

L-880 / L-881 PAPI UNIT FOOTING PLAN

SCALE: NONE

INSTALLATION NOTES:

1. L-867D BASE SHALL BE LOCATED BEHIND THE UNIT WITHIN REACH OF THE CABLE ASSEMBLY.
2. MANUFACTURER SHALL SUPPLY DIMENSIONS ON SHOP DRAWINGS; CONTRACTOR SHALL VERIFY AND COORDINATE IN ADVANCE PRIOR TO ANY WORK.
3. UTILIZE STAINLESS STEEL MOUNTING HARDWARE ONLY WITH ANTI-SEIZE COMPOUND.
4. COORDINATE EXACT LIGHT BASE AND CONDUIT DRAINING LOCATION WITH ENGINEER PRIOR TO WORK. INSTALL ONE PAPI WING BAR LIGHT BASE WITH T-CONFIGURED CAN WITH A 2" CONDUIT AWAY FROM RUNWAY, INCLUDING 45 DEGREE DOWN ELBOW INTO MINIMUM 1 CUBIC FOOT OPEN GRADED, DRAINABLE AGGREGATE, TOP OF AGGREGATE MINIMUM 36" BELOW GRADE.
5. SLOPE PAD TO DRAIN AWAY FROM PAPI UNIT AND BASE.
6. BOND LAMP HOUSING AND BOX TO BASE INTERNAL GROUND LUG.
7. STENCIL VERTICAL AIMING ANGLES ON EACH PAPI UNIT, BLACK NUMERALS 1" MINIMUM HEIGHT.
8. DEDICATED GROUND ROD SHALL NOT BE BONDED TO SEPARATE COUNTERPOISE SYSTEM.
9. VERIFY PAPI FOUNDATION WITH MANUFACTURER MOUNTING REQUIREMENTS PRIOR TO CONSTRUCTION.
10. ALL CONCRETE SHALL HAVE 28-DAY COMPRESSIVE STRENGTH OF 3500 PSI AND SHALL BE PLACED ACCORDING TO THE LATEST EDITIONS OF ACI 301 AND ACI 117.
11. ALL REINFORCING BARS SHALL CONFORM TO ASTM A 615, GRADE 60.
12. ALL CONCRETE SHALL BE AIR-ENTRAINED WITH AN AIR CONTENT OF APPROXIMATELY 5-1/2 PERCENT AND HAVING A 1-1/2-INCH NOMINAL MAXIMUM AGGREGATE SIZE.
13. DO NOT ALLOW FLEXIBLE LIQUID-TIGHT CONDUIT TO LAY ON THE GROUND.
14. CAP UNUSED CONDUITS.
15. FOR CURRENT POWERED SYSTEMS, TWO CONDUITS SHALL BE REQUIRED FOR CONNECTING THE LIGHT BASES, ONE FOR POWER AND ONE FOR CONTROL.

REGISTRATION NO. F-5713

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REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

DENTON ENTERPRISE AIRPORT

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION DETAILS 7A

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

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0 1"
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DRAWING NUMBER
EL-207A

SHEET NUMBER **123A**

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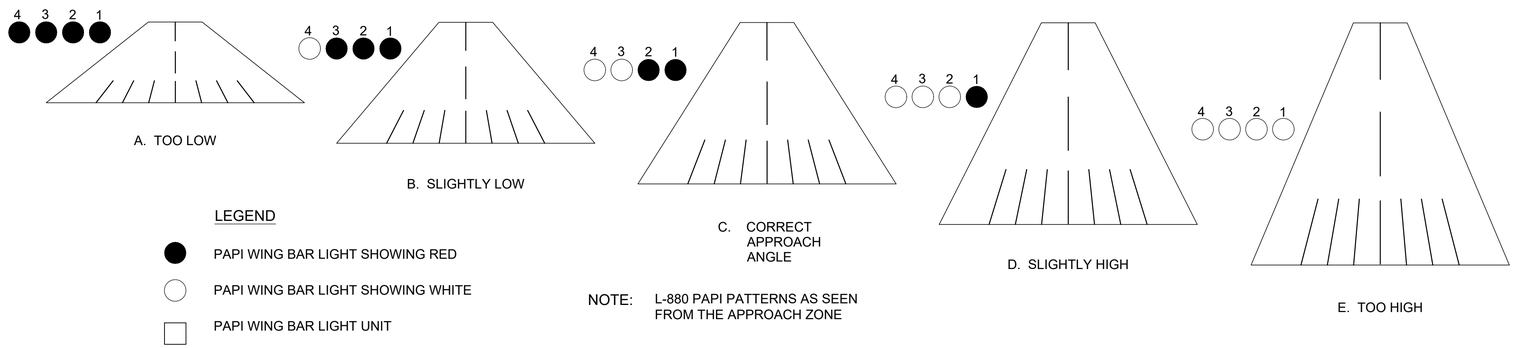
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3



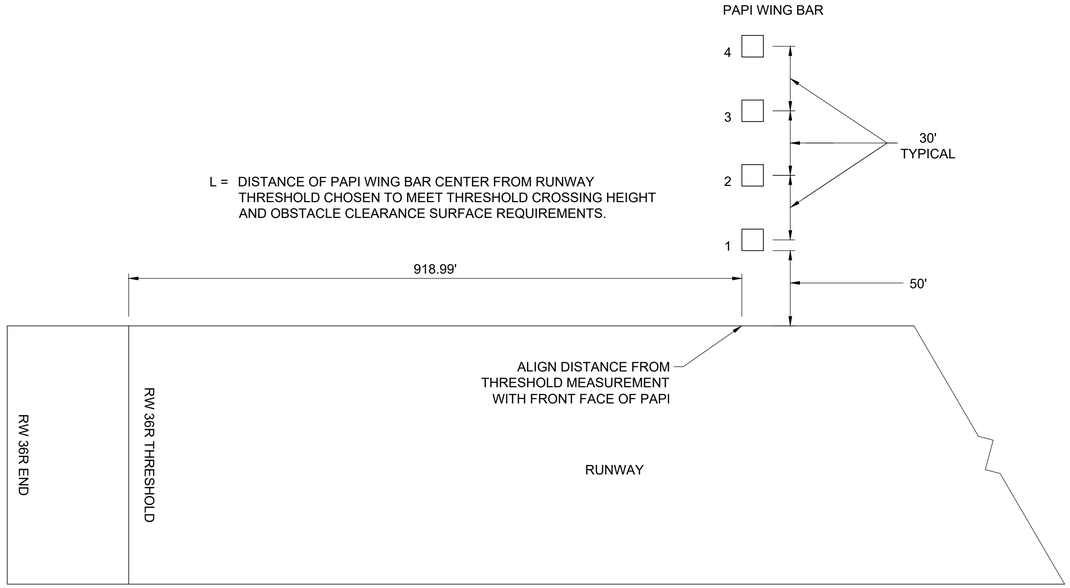
LEGEND

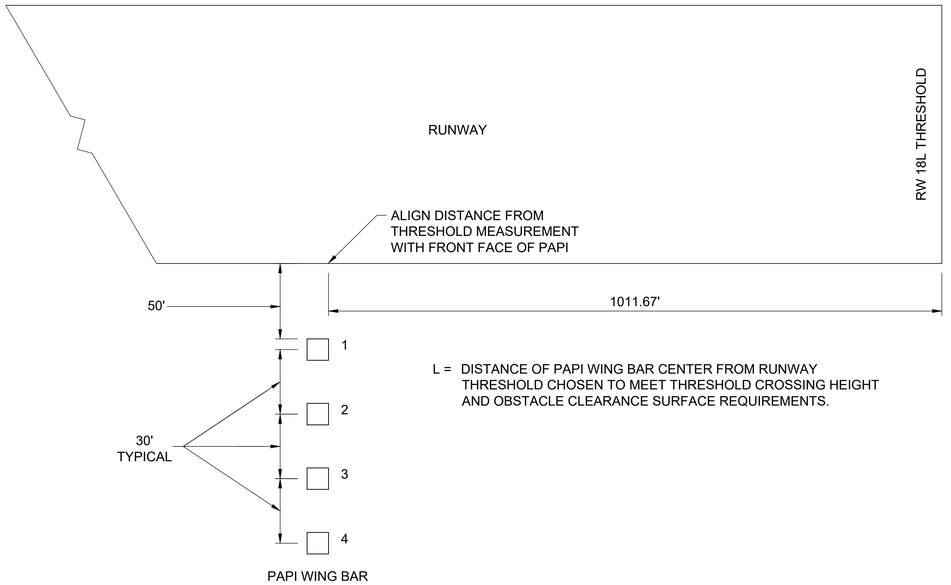
- PAPI WING BAR LIGHT SHOWING RED
- PAPI WING BAR LIGHT SHOWING WHITE
- PAPI WING BAR LIGHT UNIT

NOTE: L-880 PAPI PATTERNS AS SEEN FROM THE APPROACH ZONE

DIAGRAM NOTES:

1. THE INBOARD LIGHT UNIT MUST NOT BE LESS THAN 50 FEET FROM THE RUNWAY EDGE OR TO OTHER RUNWAYS OR TAXIWAYS.
2. THE PAPI LIGHT UNIT MUST HAVE A LATERAL SEPARATION OF 30 FEET FOR L-880 SYSTEMS. NOTE: THE DISTANCE BETWEEN LIGHT UNITS IS MEASURED CENTER TO CENTER.
3. FOR THE L-880, THE DISTANCE BETWEEN LIGHT UNITS MAY NOT VARY BY MORE THAN ±1 FOOT.
4. EACH LIGHT UNIT MUST BE AIMED OUTWARD INTO THE APPROACH ZONE ON A LINE PARALLEL TO THE RUNWAY CENTERLINE WITHIN A TOLERANCE OF ±1/2 DEGREE.
5. THE BEAM CENTERS OF ALL LIGHT UNITS MUST BE WITHIN ±1 INCH OF A HORIZONTAL PLANE.
6. THE PAPI HORIZONTAL PLANE MUST BE WITHIN 1 FOOT OF THE ELEVATION OF THE RUNWAY CENTERLINE AT THE INTERCEPT POINT OF THE VISUAL GLIDE PATH WITH THE RUNWAY.
7. THE FRONT FACE OF EACH LIGHT UNIT IN A BAR MUST BE LOCATED ON A LINE PERPENDICULAR TO THE RUNWAY CENTERLINE WITHIN ±6 INCHES.





1 EL-207B

L-880 PAPI SYSTEM CONFIGURATION (FAA REQUIREMENTS)

SCALE: NONE

REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION DETAILS 7B

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
EL-207B

SHEET NUMBER **123B**

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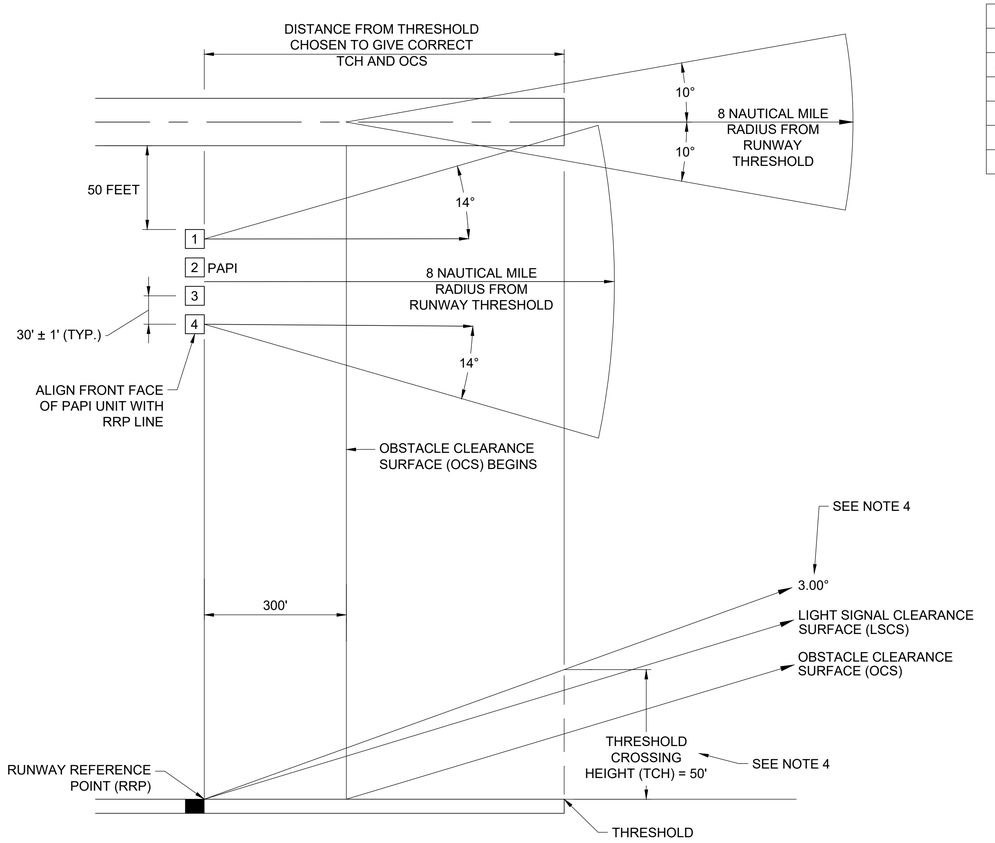
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3



NOTE: THE PAPI OCS AND LSCS ARE THE LOWEST ON-COURSE AIMING ANGLE (02.83°) MINUS 1 DEGREE.

1 EL-207C

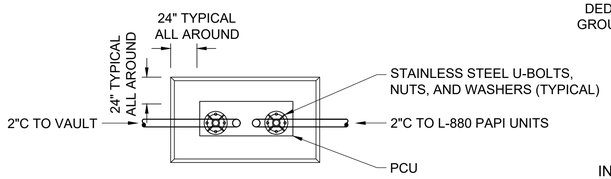
L-880 PAPI SYSTEM AIMING DIAGRAM (FAA REQUIREMENTS)

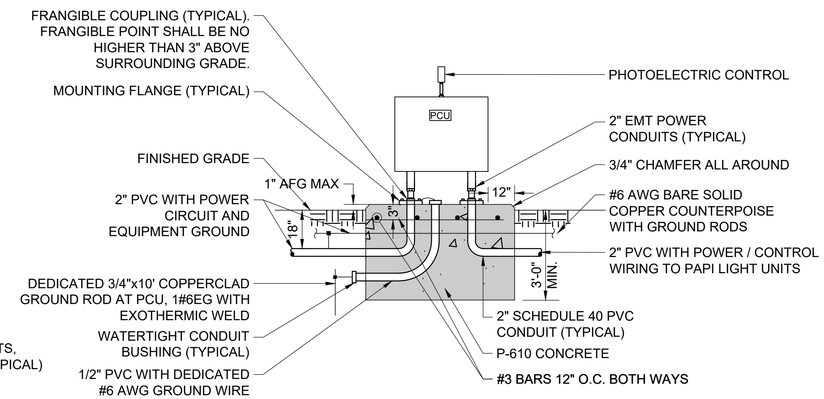
SCALE: NONE

L-880 PAPI SYSTEM AIMING		
	3° VISUAL GLIDE PATH	
PAPI UNIT	AIMING ANGLE FROM HORIZONTAL (DEG-MIN-SEC)	AIMING ANGLE FROM HORIZONTAL (DECIMAL)
1	03° 30'	03.50°
2	03° 10'	03.17°
3	02° 50'	02.83°
4	02° 30'	02.50°

AIMING NOTES:

1. THIS VISUAL GLIDE PATH ANGLE IS THE CENTER OF THE ON-COURSE ZONE, AND IS A NORMAL 3 DEGREES WHEN MEASURED FROM THE HORIZONTAL SURFACE OF THE RUNWAY.
2. PAPI OBSTACLE CLEARANCE SURFACE (OCS).
   A. THE PAPI OCS PROVIDES THE PILOT WITH A MINIMUM APPROACH CLEARANCE.
   B. THE PAPI MUST BE POSITIONED AND AIMED SO NO OBSTACLES PENETRATE ITS SURFACE.
      (1) THE OCS BEGINS 300 FEET IN FRONT OF THE PAPI SYSTEM.
      (2) THE OCS IS PROJECTED INTO THE APPROACH ZONE AT AN ANGLE ONE DEGREE LESS THAN THE AIMING ANGLE OF THE THIRD LIGHT UNIT FROM THE RUNWAY FOR AN L-880 SYSTEM.
3. PAPI LIGHT SIGNAL CLEARANCE SURFACE (LSCS)
   A. THE PAPI LSCS ENSURES THAT OBSTACLES THAT MAY BE PRESENT WHERE THE PAPI LIGHT SIGNAL IS VISIBLE ARE IDENTIFIED AND MITIGATED.
      (1) THE LSCS IS PROJECTED INTO THE APPROACH ZONE AT AN ANGLE ONE DEGREE LESS THAN THE AIMING ANGLE OF THE THIRD LIGHT UNIT FROM THE RUNWAY FOR AN L-880 SYSTEM.
4. RUNWAY 36R PAPI SHALL BE SITED WITH LPV (TCH = 50' AND GP = 3.00°) AND RUNWAY 18L PAPI SHALL BE SITED COINCIDENTALLY WITH GLIDE SLOPE TOWER.





INSTALLATION NOTES:

1. MANUFACTURER SHALL SUPPLY DIMENSIONS ON SHOP DRAWINGS; CONTRACTOR SHALL VERIFY AND COORDINATE IN ADVANCE PRIOR TO ANY WORK.
2. UTILIZE STAINLESS STEEL MOUNTING HARDWARE ONLY WITH ANTI-SEIZE COMPOUND.
3. SLOPE PAD TO DRAIN AWAY FROM PAPI UNIT AND BASE.
4. BOND BOX TO THE EQUIPMENT GROUND SYSTEM.
5. STENCIL VERTICAL AIMING ANGLES ON EACH PAPI UNIT, BLACK NUMERALS 1" MINIMUM HEIGHT.

2 EL-207C

L-880 POWER CONTROL UNIT FOOTING PLAN

SCALE: NONE

REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION DETAILS 7C

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
EL-207C

SHEET NUMBER **123C**

File: I:\2023\23a11280 - dto - rw 18l-36r pvmt recon\Drawings\DTO_RW_REC-EL-201.dwg Last Save: 8/11/2023 11:18 AM Last saved by: KPaudel
Last plotted by: Paudel, Kushalla Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:19 PM Plotter used: DWG To PDF.pc3

EDGE LIGHT LOCATION

FIXTURE ID	ALIGNMENT	STATION	OFFSET	FIXTURE TYPE
RW01	RW 18L-36R	100+90.00	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW02	RW 18L-36R	100+90.00	75.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW03	RW 18L-36R	100+90.00	65.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW04	RW 18L-36R	100+90.00	55.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW05	RW 18L-36R	100+90.00	55.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW06	RW 18L-36R	100+90.00	65.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW07	RW 18L-36R	100+90.00	75.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW08	RW 18L-36R	100+90.00	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW09	RW 18L-36R	102+00.00	115.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW10	RW 18L-36R	102+00.00	105.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW11	RW 18L-36R	102+00.00	95.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW12	RW 18L-36R	102+00.00	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW13	RW 18L-36R	102+00.00	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW14	RW 18L-36R	102+00.00	95.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW15	RW 18L-36R	102+00.00	105.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW16	RW 18L-36R	102+00.00	115.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW17	RW 18L-36R	102+84.31	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW18	RW 18L-36R	102+84.31	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW19	RW 18L-36R	104+78.62	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW20	RW 18L-36R	104+78.62	85.00' RT	L-861(L) RUNWAY EDGE LIGHT

EDGE LIGHT LOCATION

FIXTURE ID	ALIGNMENT	STATION	OFFSET	FIXTURE TYPE
RW21	RW 18L-36R	106+72.94	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW22	RW 18L-36R	106+72.94	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW23	RW 18L-36R	108+67.25	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW24	RW 18L-36R	108+67.25	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW25	RW 18L-36R	110+61.56	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW26	RW 18L-36R	110+61.56	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW27	RW 18L-36R	112+55.88	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW28	RW 18L-36R	112+55.88	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW29	RW 18L-36R	114+50.19	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW30	RW 18L-36R	114+50.19	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW31	RW 18L-36R	116+44.51	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW32	RW 18L-36R	116+44.51	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW33	RW 18L-36R	118+38.82	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW34	RW 18L-36R	118+38.82	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW35	RW 18L-36R	120+33.13	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW36	RW 18L-36R	120+33.13	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW37	RW 18L-36R	122+27.45	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW38	RW 18L-36R	122+27.45	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW39	RW 18L-36R	124+21.76	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW40	RW 18L-36R	124+21.76	85.00' RT	L-861(L) RUNWAY EDGE LIGHT

GUIDANCE SIGN LOCATION

FIXTURE ID	ALIGNMENT	STATION	OFFSET	SIGN TYPE / SIZE
S01	TW A7	201+95.00	64.26' LT	EXISTING STORED GUIDANCE SIGN
S02	TW A6	301+95.00	63.83' RT	EXISTING STORED GUIDANCE SIGN
S03	TW A6	301+95.00	63.82' LT	EXISTING STORED GUIDANCE SIGN
S04	TW A5	500+95.00	69.37' RT	EXISTING STORED GUIDANCE SIGN
S05	TW A5	500+95.24	69.55' LT	EXISTING STORED GUIDANCE SIGN
S06	TW A4	600+95.00	63.82' RT	EXISTING STORED GUIDANCE SIGN
S07	TW A4	600+95.00	63.82' LT	EXISTING STORED GUIDANCE SIGN
S08	TW A4	603+55.38	166.46' RT	EXISTING STORED GUIDANCE SIGN
S09	TW A6	303+50.00	51.49' RT	EXISTING STORED GUIDANCE SIGN WITH PANEL REPLACEMENT
S10	TW A5	502+50.20	45.05' RT	EXISTING STORED GUIDANCE SIGN WITH PANEL REPLACEMENT
S11	TW A4	602+50.00	51.47' RT	EXISTING STORED GUIDANCE SIGN WITH PANEL REPLACEMENT
S12	TW A7	203+50.00	45.00' RT	NEW L-858(L) GUIDANCE SIGN
S13	TW A7	203+61.36	53.22' LT	NEW L-858(L) GUIDANCE SIGN
S14	TW A6	304+55.20	166.64' RT	NEW L-858(L) GUIDANCE SIGN
S15	TW A6	303+61.50	52.29' LT	NEW L-858(L) GUIDANCE SIGN
S16	TW A6	304+55.13	166.65' LT	NEW L-858(L) GUIDANCE SIGN
S17	TW A6	305+45.45	54.82' LT	NEW L-858(L) GUIDANCE SIGN
S18	TW A5	502+98.35	47.32' LT	NEW L-858(L) GUIDANCE SIGN
S19	TW A4	602+60.26	51.89' LT	NEW L-858(L) GUIDANCE SIGN
S20	RW 18L-36R	111+00.00	105.00' LT	EXISTING STORED RDR SIGN
S21	RW 18L-36R	121+00.00	105.00' LT	EXISTING STORED RDR SIGN
S22	RW 18L-36R	131+00.00	105.00' LT	EXISTING STORED RDR SIGN
S23	RW 18L-36R	141+00.00	105.00' LT	EXISTING STORED RDR SIGN
S24	RW 18L-36R	151+00.00	105.00' LT	EXISTING STORED RDR SIGN

EDGE LIGHT LOCATION

FIXTURE ID	ALIGNMENT	STATION	OFFSET	FIXTURE TYPE
RW41	RW 18L-36R	126+16.07	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW42	RW 18L-36R	126+16.07	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW43	RW 18L-36R	128+10.39	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW44	RW 18L-36R	128+10.39	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW45	RW 18L-36R	130+04.70	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW46	RW 18L-36R	130+04.70	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW47	RW 18L-36R	131+99.01	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW48	RW 18L-36R	131+99.01	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW49	RW 18L-36R	133+93.33	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW50	RW 18L-36R	133+93.33	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW51	RW 18L-36R	135+87.64	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW52	RW 18L-36R	135+87.64	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW53	RW 18L-36R	137+81.95	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW54	RW 18L-36R	137+81.95	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW55	RW 18L-36R	139+76.27	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW56	RW 18L-36R	139+76.27	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW57	RW 18L-36R	141+70.58	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW58	RW 18L-36R	141+70.58	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW59	RW 18L-36R	143+64.89	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW60	RW 18L-36R	143+64.89	85.00' RT	L-861(L) RUNWAY EDGE LIGHT

EDGE LIGHT LOCATION

FIXTURE ID	ALIGNMENT	STATION	OFFSET	FIXTURE TYPE
RW61	RW 18L-36R	145+59.21	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW62	RW 18L-36R	145+59.21	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW63	RW 18L-36R	147+53.52	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW64	RW 18L-36R	147+53.52	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW65	RW 18L-36R	149+47.83	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW66	RW 18L-36R	149+47.83	85.00' RT	L-861(L) RUNWAY EDGE LIGHT
RW67	RW 18L-36R	151+42.15	85.00' LT	L-861(L) RUNWAY EDGE LIGHT
RW68	RW 18L-36R	151+42.15	85.00' RT	L-861(L) RUNWAY EDGE LIGHT

JUNCTION STRUCTURE LOCATION

	FIXTURE ID	ALIGNMENT	STATION	OFFSET	TYPE
	JS01	TW A7	203+20.28	45.00' RT	L-867D
	JS02	TW A7	203+20.31	49.68' LT	L-867D
	JS03	TW A6	302+01.12	91.22' RT	L-867D
	JS04	TW A6	303+20.09	50.24' RT	L-867D
	JS05	TW A6	303+20.08	50.24' LT	L-867D
1	JS06	RW 18L-36R	111+49.48	259.15' RT	L-867D
	JS07	RW 18L-36R	116+27.28	259.15' RT	L-867D
	JS08	TW A5	502+59.15	44.41' RT	L-867D
	JS09	TW A5	502+58.78	47.70' LT	L-867D
1	JS10	RW 18L-36R	127+12.19	258.78' RT	L-867D
	JS11	TW A4	602+20.09	50.23' RT	L-867D
	JS12	TW A4	602+20.09	50.25' LT	L-867D
	JS13	TW A4	602+63.90	128.38' LT	L-867D
	JS14	RW 18L-36R	142+22.74	258.12' RT	L-867D
	JS15	RW 18L-36R	147+22.74	258.12' RT	L-867D
	JS16	RW 18L-36R	133+07.77	269.67' LT	L-867D
1	JS17	RW 18L-36R	138+51.51	269.67' LT	L-867D
	JS18	RW 18L-36R	132+27.19	258.78' RT	L-867D

REGISTRATION NO. F-5713

STATE OF TEXAS
JARED PARR
134453
LICENSED PROFESSIONAL ENGINEER

Digitally Signed on 8/11/23

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	JRP

DENTON ENTERPRISE AIRPORT
DENTON, TX

DENTON ENTERPRISE AIRPORT

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

LIGHTING INSTALLATION DETAILS 9

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: JRP
DRAWN BY: KP

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
EL-209

SHEET NUMBER **125**

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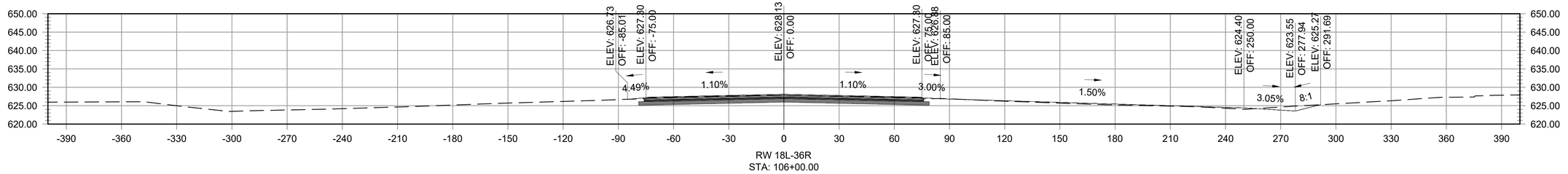
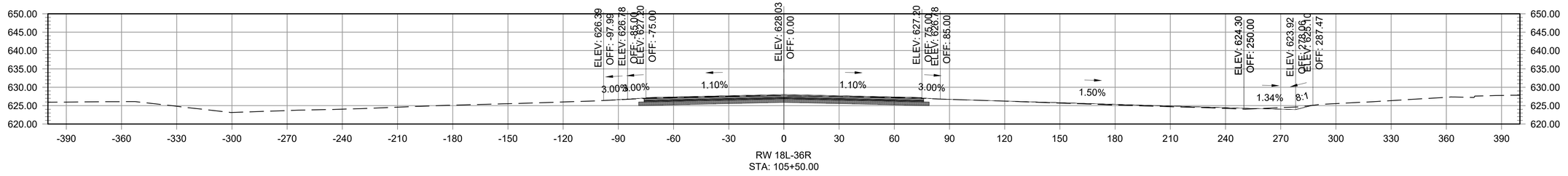
Last plotted by: Paudel, Kushalta Plot Style: AECmono.ctb Plot Scale: 1:1 Plot Date: 8/11/2023 2:20 PM Plotter used: DWG To PDF.pc3

0 15' 30' 60' 90'

(IN FEET)

VERTICAL EXAGGERATION = 2





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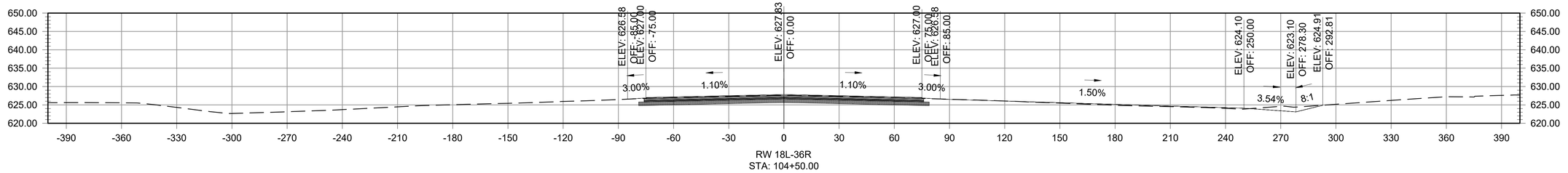

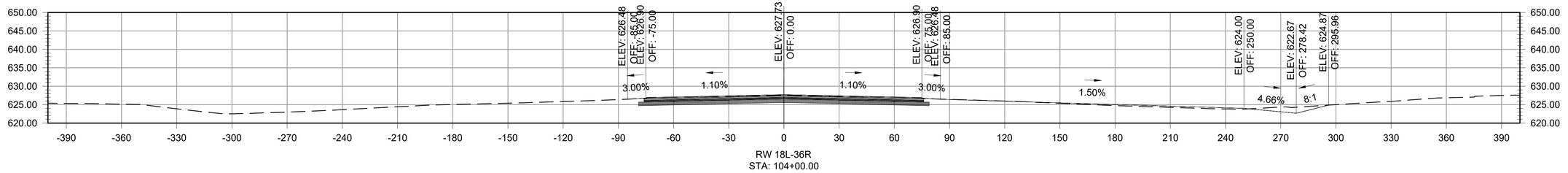

REGISTRATION NO.
F-5713

STATE OF TEXAS
MITCHELL R. McANALLY
114422
PROFESSIONAL ENGINEER
Digitally Signed 08/11/2023

REV.	DATE	DESCRIPTION	BY
1	08/11/23	ADDENDUM NO. 1	MRM

DENTON ENTERPRISE AIRPORT
DENTON, TX

DENTON ENTERPRISE AIRPORT

RUNWAY 18L-36R PAVEMENT RECONSTRUCTION

RUNWAY CROSS SECTIONS 3

JOB NO.: 23A11280
DATE: JULY 2023
DESIGNED BY: GJT
DRAWN BY: DJD

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWING NUMBER
XS-103

SHEET NUMBER 129

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