CONTRACT DOCUMENTS
AND
SPECIFICATIONS

FOR

AIP 3-22-0006-128-2023 & H.015713
TAXIWAY LIMA EXTENSION AND DECOMMISSIONING OF GA RUNWAY 4R-22L AND TAXIWAY ECHO
BATON ROUGE METROPOLITAN AIRPORT

ADDENDUM NO. 1

DATE ISSUED: JULY 18, 2024

ORIGINAL BID DATE: JULY 30, 2024

SCOPE:

This Addendum shall be part of the Contract Documents as provided in the Instructions to Bidders.

The following items are issued to add, modify, and clarify the Contract Documents and Specifications. These items shall have full force and effect, as the contract Documents and the cost involved shall be included in the bid prices.

Acknowledge receipt of the addendum by its number and date on page I-48 of the original Bid Form. Failure to do so may subject the bidder to disqualification.

This Addendum No. 1 consists of the following:

REVISIONS TO DIVISION I BID FORMS/CONTRACT FORMS:

The following sections have been added, deleted, or amended in the Specifications and Contract Documents dated July 2024.

- Bid Unit Price Form for Phase I Base Bid (Asphalt Pavement Section)
- Bid Unit Price Form for Phase I Alternate 1 (Concrete Pavement Section)
- Bid Unit Price Form for Phase I Alternate 2 (Asphalt Pavement Section with Scope Reduction)
    - Alternate 2 reduces Taxiway L pavement, earthwork and related work from the Base Bid by terminating at Taxiway B instead of Taxiway F (see revised CSPP plan sheets).

REVISIONS TO DIVISION III SPECIAL PROVISIONS:

The following sections have been added, deleted, or amended in the Specifications and Contract Documents dated July 2024.

- Special Provisions Section 113 Protection of Existing Underground Utilities

REVISIONS TO DIVISION IV TECHNICAL SPECIFICATIONS:

The following sections have been added, deleted, or amended in the Specifications and Contract Documents dated July 2024.

- Specification Section D-705 PIPE UNDERDRAINS FOR AIRPORTS
- Specification Section L-108 UNDERGROUND POWER CABLE FOR AIRPORTS
    - Separate documents for “Signing and Lighting” and “NAVAIDS Relocation”
- Specification Section L-109 AIRPORT TRANSFORMER VAULT AND VAULT EQUIPMENT
- Specification Section L-110 AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS
    - Separate documents for “Signing and Lighting” and “NAVAIDS Relocation”
- Specification Section L-115 ELECTRICAL MANHOLES AND JUNCTION STRUCTURES
    - Separate documents for “Signing and Lighting” and “NAVAIDS Relocation”
- Specification Section P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT
- Specification Section P-154 SUBBASE COURSE
- Specification Section P-401 ASPHALT MIX PAVEMENT
- Specification Section P-403 ASPHALT MIX PAVEMENT SURFACE COURSE
- Specification Section P-407 ASPHALT TREATED PERMEABLE BASE COURSE (ATPB)
- Specification Section P-604 COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS
- Specification Section P-605 JOINT SEALANTS FOR PAVEMENTS

REVISIONS TO CONSTRUCTION PLANS:

To illustrate Phase I Alternate 2, the following plan sheets have been revised:

- Plan Sheet G008 Overall Construction Safety Plan and Airport Safety Plan
- Plan Sheet G009 Construction Safety Plan and Airport Safety Plan Phase I
- Plan Sheet G010 Construction Safety Plan and Airport Safety Plan Phase IA
- Plan Sheet G012 Construction Safety Plan and Airport Safety Plan Phase IC
- Plan Sheet G015 Construction Safety Plan and Airport Safety Plan Phase IF
- Plan Sheet G023 Summary of Estimated Quantities
- Plan Sheet TS2 Typical Section – Taxiway L Extension
- Plan Sheet TS2.5 Typical Section – Taxiway L Extension
- Plan Sheet TS5 Typical Section – Taxiway L Extension
- Plan Sheet CDB2D Proposed Demolition Plan – Area B2D
- Plan Sheet CSB2D Site Plan – Area B2D
- Plan Sheet CSP102 Site Plan Profile
- Plan Sheet CGB2D Proposed Grading Plan – Area B2D
- Plan Sheet DSB2D Drainage Site Plan – Area B2D
- Plan Sheet DSP102 Drainage Site Plan Profile
- Plan Sheet DSP103 Drainage Site Plan Profile
- Plan Sheet SWPB2D Stormwater Protection Plan – Area B2D
- Plan Sheet SMB2D Marking Layout Plan – Area B2D
- Plan Sheet JLB1D Proposed Joint Layout
- Plan Sheet JLB2C Proposed Joint Layout
- Plan Sheet JLB2D Proposed Joint Layout
- Plan Sheet LSDB2C Lighting & Signing Demolition Plan
- Plan Sheet LSDB2D Lighting & Signing Plan Demolition Plan
- Plan Sheet PSM202 Proposed Signage Map

- Plan Sheet PSMAB12 Proposed Signage Map
- Plan Sheet LSB1C Lighting & Signing Plan
- Plan Sheet LSB2C Lighting & Signing Plan
- Plan Sheet LSB2D Lighting & Signing Plan

ADDITIONAL ITEMS:

- Pre-Bid Meeting Agenda, Meeting Notes and Sign-In Sheet
- Contractor Questions and Consultant Answers
- Phase I Base Bid Engineer's Opinion of Probable Construction Cost
- Phase I Alternate 1 Engineer's Opinion of Probable Construction Cost
- Phase I Alternate 2 Engineer's Opinion of Probable Construction Cost

LOUISIANA UNIFORM PUBLIC WORK BID FORM

UNIT PRICE FORM

TO: City of Baton Rouge
Parish of East Baton Rouge
Purchasing Division
Room 826, City Hall
222 St. Louis Street
Baton Rouge, Louisiana 70802

BID FOR: Baton Rouge Metropolitan Airport
Taxiway L Extension and Decommissioning of Runway 4R-22L & Taxiway E

A.I.P. No. 3-22-0006-128-2023
S.P. No. H.015713

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		INSTALLATION AND REMOVAL OF SILT FENCE (CATCH BASIN PROTECTION)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-102-5.1c	2,305	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		INSTALLATION AND REMOVAL OF SILT FENCE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-102-5.1e	3,692	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		MOBILIZATION (5.0%)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-105-5.1	1	LS		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		PAVEMENT REMOVAL (GA RUNWAY 4R-22L, TAXIWAY E)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.1a	17,259	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		COLD MILLING (2" DEPTH) (TAXIWAY L)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.6a	32,028	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		CLEARING AND GRUBBING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-151-4.2	31	AC		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		UNCLASSIFIED EXCAVATION	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-152-4.1	32,244	CY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		EMBANKMENT IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-152-4.2	12,978	CY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		SUBBASE COURSE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-154-5.1	11,143	CY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		LIME TREATED SUBGRADE (10" THICK) (RVR AND GLIDE SLOPE ACCESS DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.1a	381	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		LIME (RVR DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.2a	4	TON		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		CRUSHED AGGREGATE BASE COURSE (10" THICK) (RVR DRIVE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.1a	260	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		CRUSHED AGGREGATE BASE COURSE (6.0" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.1b	22,025	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		SEPARATION GEOTEXTILE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.2	22,286	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ASPHALT SURFACE COURSE (2.0" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-401-8.1a	2,366	TON		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ASPHALT SURFACE COURSE (2" THICK) (OVERLAY)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-401-8.1b	3,524	TON		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ASPHALT MIXTURE BINDER COURSE (2.0" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1a	2,395	TON		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ASPHALT BASE COURSE COURSE (5.0" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1b	6,129	TON		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ASPHALT MIXTURE SURFACE COURSE (2" THICK) (RVR DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1c	29	TON		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ASPHALT MIXTURE BINDER COURSE (2" THICK) (RVR DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1d	36	TON		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ASPHALT TREATED PERMEABLE BASE COURSE (ATPB) (6" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-407-8.1	22,286	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		EMULSIFIED ASPHALT PRIME COAT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-602-5.1	6,530	GAL		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		EMULSIFIED ASPHALT TACK COAT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-603-5.1	8,566	GAL		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		CONCRETE (RVR RELOCATION PAD)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-610-6.1	4	CY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		RUNWAY AND TAXIWAY MARKING (YELLOW)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-1	23,307	SF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		RUNWAY AND TAXIWAY MARKING (WHITE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-2	16,575	SF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		RUNWAY AND TAXIWAY MARKING (RED)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-3	9,589	SF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		RUNWAY AND TAXIWAY MARKING (BLACK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-4	53,835	SF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		REFLECTIVE MEDIA (RUNWAY)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.3c	4,302	LB		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		TEMPORARY RUNWAY AND TAXIWAY MARKING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.4d	1	LS		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-705-5.4	4,702	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		SEEDING (HYDROSEEDING)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
901-5.1	21	AC		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		SODDING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
904-5.2	5,333	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		MULCHING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
T-908-5.1	97,217	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		REMOVAL OF EXISTING PIPES AND STRUCTURES	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.7	1	LS		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		30 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.2	1,527	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		36 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.3	674	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		18 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.7	262	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		24 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.8	285	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		36 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.9	401	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		CATCH BASIN - CB-01 (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-751-5.1	11	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		CATCH BASIN - CB-02 (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-751-5.2	2	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		NO. 8 AWG, 5 KV TYPE C CABLE, INSTALLED IN CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.1	3,200	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		NO. 6 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED, ABOVE THE DUCT BANK OR CONDUIT, INCLUDING CONNECTIONS/TERMINATIONS, INCLUDING GROUND RODS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.2	3,000	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		MODIFICATIONS TO L-854 RADIO CONTROL EQUIPMENT TO INCLUDE PANEL RELABELING, IN PLACE AND OPERATIONAL	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-109-7.2	1	LUMP		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ELECTRICAL CONDUIT, 2" SCHEDULE 40 PVC, TYPE II INSTALLED IN TRENCH	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.1	3,200	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ELECTRICAL CONDUIT, 2" HDPE, JACKED OR BORED UNDER TAXIWAY IN STEEL CASING (STEEL CASING INCLUDED IN THIS ITEM)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2	500	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ELECTRICAL DUCT, 4-WAY, 4" AND 1-WAY, 2" HIGH DENSITY POLYETHYLENE CONDUIT, DIRECTIONAL BORE, INSTALLED	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.3	100	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ELECTRICAL JUNCTION CAN, L-867, SIZE B, CLASS 1, COMPLETE, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-115-5.1	4	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ELECTRICAL JUNCTION CAN, L-867, SIZE D, CLASS 1, COMPLETE, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-115-5.2	6	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		MEDIUM INTENSITY TAXIWAY EDGE LIGHT (L-861T), WITH BLUE LENS, LED LAMP, 10/15 WATT TRANSFORMER, BASE MOUNTED, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.1	43	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		SIGN L-858, SIZE 2, 1-PANEL, REQUIRED CONCRETE BASE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.2	3	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		SIGN L-858, SIZE 2, 2-PANEL, REQUIRED CONCRETE BASE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.3	2	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		REPLACE EXISTING SIGN PANEL, COMPLETE, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.6	5	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		REMOVE EXISTING RUNWAY & TAXIWAY ELECTRICAL SYSTEMS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.7	1	LUMP		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ELECTRICAL TESTING AND UPDATE ALCS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.8	1	LUMP		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		CONNECT TO EXISTING CIRCUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.9	1	LUMP		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		TEMPORARY COMMUNICATION LINE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1004	1	LUMP		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		TRENCHING FOR DIRECT BURIED CABLE, 18-INCH MINIMUM DEPTH	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.1	40	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		NO. 2 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONGS/TERMINATIONS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.3	40	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		NO. 2 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.4a	5,420	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		NO. 6 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.4b	1,980	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		NO. 10 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.4c	21,600	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		NON-ENCASED ELECTRICAL CONDUIT (2" HDPE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2a	1,800	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		NON-ENCASED ELECTRICAL CONDUIT (2" SCHEDULE 80 PVC)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2b	40	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ELECTRICAL JUNCTION STRUCTURE (48"X48"X48" POLYMER CONCRETE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-115-5.2	3	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ROLLOUT RVR DISASSEMBLY	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1001	1	LUMP		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____		ROLLOUT RVR REASSEMBLY	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1002	1	LUMP		

All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

LOUISIANA UNIFORM PUBLIC WORK BID FORM

UNIT PRICE FORM

TO: City of Baton Rouge
Parish of East Baton Rouge
Purchasing Division
Room 826, City Hall
222 St. Louis Street
Baton Rouge, Louisiana 70802

BID FOR: Baton Rouge Metropolitan Airport
Taxiway L Extension and Decommissioning of Runway 4R-22L & Taxiway E

A.I.P. No. 3-22-0006-128-2023
S.P. No. H.015713

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	☐ Base Bid or X Alt.# 1		INSTALLATION AND REMOVAL OF SILT FENCE (CATCH BASIN PROTECTION)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-102-5.1c	2,305	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		INSTALLATION AND REMOVAL OF SILT FENCE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-102-5.1e	3,692	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		MOBILIZATION (5.0%)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-105-5.1	1	LS		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		PAVEMENT REMOVAL (GA RUNWAY 4R-22L, TAXIWAY E)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.1a	17,259	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		COLD MILLING (2" DEPTH) (TAXIWAY L)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.6a	32,028	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		CLEARING AND GRUBBING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-151-4.2	31	AC		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		UNCLASSIFIED EXCAVATION	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-152-4.1	26,557	CY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		EMBANKMENT IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-152-4.2	3,290	CY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		SUBBASE COURSE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-154-5.1	11,143	CY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		LIME TREATED SUBGRADE (10" THICK) (RVR AND GLIDE SLOPE ACCESS DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.1a	381	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		LIME (RVR DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.2a	4	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		CRUSHED AGGREGATE BASE COURSE (10" THICK) (RVR DRIVE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.1a	260	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		CRUSHED AGGREGATE BASE COURSE (6.0" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.1b	22,025	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		SEPARATION GEOTEXTILE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.2	22,286	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		LEAN CONCRETE BASE COURSE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-306-8.1	31,904	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		CEMENT TREATED PERMEABLE BASE COURSE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-307	31,904	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ASPHALT SURFACE COURSE (2" THICK) (OVERLAY)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-401-8.1b	3,524	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ASPHALT MIXTURE SURFACE COURSE (2" THICK) (RVR DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1c	29	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ASPHALT MIXTURE BINDER COURSE (2" THICK) (RVR DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1d	36	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		CEMENT CONCRETE PAVEMENT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-501-8.1	21,502	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-604-6.1	27,408	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		JOINT SEALING FILLER	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-605-5.1	27,408	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		CONCRETE (RVR RELOCATION PAD)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-610-6.1	4	CY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		RUNWAY AND TAXIWAY MARKING (YELLOW)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-1	23,307	SF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		RUNWAY AND TAXIWAY MARKING (WHITE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-2	16,575	SF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		RUNWAY AND TAXIWAY MARKING (RED)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-3	9,589	SF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		RUNWAY AND TAXIWAY MARKING (BLACK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-4	53,835	SF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		REFLECTIVE MEDIA (RUNWAY)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.3c	4,302	LB		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		TEMPORARY RUNWAY AND TAXIWAY MARKING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.4d	1	LS		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-705-5.4	8,678	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		SEEDING (HYDROSEEDING)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
901-5.1	21	AC		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		SODDING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
904-5.2	5,333	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		MULCHING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
T-908-5.1	97,217	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		REMOVAL OF EXISTING PIPES AND STRUCTURES	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.7	1	LS		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		30 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.2	1,527	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		36 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.3	674	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		18 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.7	262	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		24 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.8	285	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		36 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.9	401	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		CATCH BASIN - CB-01 (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-751-5.1	11	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		CATCH BASIN - CB-02 (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-751-5.2	2	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		NO. 8 AWG, 5 KV TYPE C CABLE, INSTALLED IN CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.1	3,200	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		NO. 6 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED, ABOVE THE DUCT BANK OR CONDUIT, INCLUDING CONNECTIONS/TERMINATIONS, INCLUDING GROUND RODS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.2	3,000	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		MODIFICATIONS TO L-854 RADIO CONTROL EQUIPMENT TO INCLUDE PANEL RELABELING, IN PLACE AND OPERATIONAL	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-109-7.2	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ELECTRICAL CONDUIT, 2" SCHEDULE 40 PVC, TYPE II INSTALLED IN TRENCH	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.1	3,200	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ELECTRICAL CONDUIT, 2" HDPE, JACKED OR BORED UNDER TAXIWAY IN STEEL CASING (STEEL CASING INCLUDED IN THIS ITEM)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2	500	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ELECTRICAL DUCT, 4-WAY, 4" AND 1-WAY, 2" HIGH DENSITY POLYETHYLENE CONDUIT, DIRECTIONAL BORE, INSTALLED	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.3	100	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ELECTRICAL JUNCTION CAN, L-867, SIZE B, CLASS 1, COMPLETE, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-115-5.1	4	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ELECTRICAL JUNCTION CAN, L-867, SIZE D, CLASS 1, COMPLETE, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-115-5.2	6	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		MEDIUM INTENSITY TAXIWAY EDGE LIGHT (L-861T), WITH BLUE LENS, LED LAMP, 10/15 WATT TRANSFORMER, BASE MOUNTED, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.1	43	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		SIGN L-858, SIZE 2, 1-PANEL, REQUIRED CONCRETE BASE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.2	3	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		SIGN L-858, SIZE 2, 2-PANEL, REQUIRED CONCRETE BASE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.3	2	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		REPLACE EXISTING SIGN PANEL, COMPLETE, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.6	5	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		REMOVE EXISTING RUNWAY & TAXIWAY ELECTRICAL SYSTEMS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.7	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ELECTRICAL TESTING AND UPDATE ALCS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.8	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		CONNECT TO EXISTING CIRCUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.9	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		TEMPORARY COMMUNICATION LINE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1004	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		TRENCHING FOR DIRECT BURIED CABLE, 18-INCH MINIMUM DEPTH	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.1	40	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		NO. 2 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONGS/TERMINATIONS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.3	40	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		NO. 2 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.4a	5,420	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		NO. 6 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.4b	1,980	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		NO. 10 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.4c	21,600	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		NON-ENCASED ELECTRICAL CONDUIT (2" HDPE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2a	1,800	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		NON-ENCASED ELECTRICAL CONDUIT (2" SCHEDULE 80 PVC)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2b	40	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ELECTRICAL JUNCTION STRUCTURE (48"X48"X48" POLYMER CONCRETE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-115-5.2	3	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ROLLOUT RVR DISASSEMBLY	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1001	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 1		ROLLOUT RVR REASSEMBLY	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1002	1	LUMP		

All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

LOUISIANA UNIFORM PUBLIC WORK BID FORM

UNIT PRICE FORM

TO: City of Baton Rouge
Parish of East Baton Rouge
Purchasing Division
Room 826, City Hall
222 St. Louis Street
Baton Rouge, Louisiana 70802

BID FOR: Baton Rouge Metropolitan Airport
Taxiway L Extension and Decommissioning of Runway 4R-22L & Taxiway E

A.I.P. No. 3-22-0006-128-2023
S.P. No. H.015713

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	☐ Base Bid or X Alt.# 2		INSTALLATION AND REMOVAL OF SILT FENCE (CATCH BASIN PROTECTION)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-102-5.1c	1,383	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		INSTALLATION AND REMOVAL OF SILT FENCE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-102-5.1e	2,637	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		MOBILIZATION (5.0%)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-105-5.1	1	LS		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		PAVEMENT REMOVAL (GA RUNWAY 4R-22L, TAXIWAY E)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.1a	8,883	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		COLD MILLING (2" DEPTH) (TAXIWAY L)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.6a	32,028	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		CLEARING AND GRUBBING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-151-4.2	31	AC		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		UNCLASSIFIED EXCAVATION	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-152-4.1	8,633	CY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		EMBANKMENT IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-152-4.2	12,715	CY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		SUBBASE COURSE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-154-5.1	6,584	CY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		LIME TREATED SUBGRADE (10" THICK) (RVR AND GLIDE SLOPE ACCESS DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.1a	381	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		LIME (RVR DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.2a	4	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		CRUSHED AGGREGATE BASE COURSE (10" THICK) (RVR DRIVE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.1a	260	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		CRUSHED AGGREGATE BASE COURSE (6.0" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.1b	12,999	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		SEPARATION GEOTEXTILE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.2	13,166	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ASPHALT SURFACE COURSE (2.0" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-401-8.1a	1,394	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ASPHALT SURFACE COURSE (2" THICK) (OVERLAY)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-401-8.1b	3,524	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ASPHALT MIXTURE BINDER COURSE (2.0" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1a	1,412	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ASPHALT BASE COURSE COURSE (5.0" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1b	3,621	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ASPHALT MIXTURE SURFACE COURSE (2" THICK) (RVR DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1c	29	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ASPHALT MIXTURE BINDER COURSE (2" THICK) (RVR DRIVES)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1d	36	TON		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ASPHALT TREATED PERMEABLE BASE COURSE (ATPB) (6" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-407-8.1	13,167	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		EMULSIFIED ASPHALT PRIME COAT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-602-5.1	3,850	GAL		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		EMULSIFIED ASPHALT TACK COAT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-603-5.1	5,708	GAL		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		CONCRETE (RVR RELOCATION PAD)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-610-6.1	4	CY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		RUNWAY AND TAXIWAY MARKING (YELLOW)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-1	19,811	SF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		RUNWAY AND TAXIWAY MARKING (WHITE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-2	14,089	SF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		RUNWAY AND TAXIWAY MARKING (RED)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-3	8,151	SF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		RUNWAY AND TAXIWAY MARKING (BLACK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-4	45,760	SF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		REFLECTIVE MEDIA (RUNWAY)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.3c	3,657	LB		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		TEMPORARY RUNWAY AND TAXIWAY MARKING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.4d	1	LS		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-705-5.4	3,007	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		SEEDING (HYDROSEEDING)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
901-5.1	21	AC		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		SODDING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
904-5.2	5,333	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		MULCHING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
T-908-5.1	97,217	SY		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		REMOVAL OF EXISTING PIPES AND STRUCTURES	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.7	1	LS		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		30 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.2	1,527	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		36 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.3	674	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		18 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.7	262	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		24 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.8	285	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		36 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.9	401	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		CATCH BASIN - CB-01 (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-751-5.1	11	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		CATCH BASIN - CB-02 (INCLUDES BEDDING & BACKFILL)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-751-5.2	2	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		NO. 8 AWG, 5 KV TYPE C CABLE, INSTALLED IN CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.1	3,200	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		NO. 6 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED, ABOVE THE DUCT BANK OR CONDUIT, INCLUDING CONNECTIONS/TERMINATIONS, INCLUDING GROUND RODS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.2	3,000	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		MODIFICATIONS TO L-854 RADIO CONTROL EQUIPMENT TO INCLUDE PANEL RELABELING, IN PLACE AND OPERATIONAL	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-109-7.2	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ELECTRICAL CONDUIT, 2" SCHEDULE 40 PVC, TYPE II INSTALLED IN TRENCH	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.1	3,200	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ELECTRICAL CONDUIT, 2" HDPE, JACKED OR BORED UNDER TAXIWAY IN STEEL CASING (STEEL CASING INCLUDED IN THIS ITEM)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2	500	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ELECTRICAL DUCT, 4-WAY, 4" AND 1-WAY, 2" HIGH DENSITY POLYETHYLENE CONDUIT, DIRECTIONAL BORE, INSTALLED	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.3	100	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ELECTRICAL JUNCTION CAN, L-867, SIZE B, CLASS 1, COMPLETE, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-115-5.1	4	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ELECTRICAL JUNCTION CAN, L-867, SIZE D, CLASS 1, COMPLETE, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-115-5.2	6	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		MEDIUM INTENSITY TAXIWAY EDGE LIGHT (L-861T), WITH BLUE LENS, LED LAMP, 10/15 WATT TRANSFORMER, BASE MOUNTED, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.1	43	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		SIGN L-858, SIZE 2, 1-PANEL, REQUIRED CONCRETE BASE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.2	3	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		SIGN L-858, SIZE 2, 2-PANEL, REQUIRED CONCRETE BASE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.3	2	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		REPLACE EXISTING SIGN PANEL, COMPLETE, IN PLACE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.6	5	EA		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		REMOVE EXISTING RUNWAY & TAXIWAY ELECTRICAL SYSTEMS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.7	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ELECTRICAL TESTING AND UPDATE ALCS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.8	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		CONNECT TO EXISTING CIRCUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-125-5.9	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		TEMPORARY COMMUNICATION LINE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1004	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		TRENCHING FOR DIRECT BURIED CABLE, 18-INCH MINIMUM DEPTH	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.1	40	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		NO. 2 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONGS/TERMINATIONS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.3	40	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		NO. 2 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.4a	5,420	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		NO. 6 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.4b	1,980	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		NO. 10 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.4c	21,600	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		NON-ENCASED ELECTRICAL CONDUIT (2" HDPE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2a	1,800	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		NON-ENCASED ELECTRICAL CONDUIT (2" SCHEDULE 80 PVC)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2b	40	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ELECTRICAL JUNCTION STRUCTURE (48"X48"X48" POLYMER CONCRETE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-115-5.2	3	LF		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ROLLOUT RVR DISASSEMBLY	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1001	1	LUMP		

DESCRIPTION:	☐ Base Bid or X Alt.# 2		ROLLOUT RVR REASSEMBLY	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1002	1	LUMP		

All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

11. When construction work is being accomplished adjacent to an active runway during VFR weather conditions, equipment below the VFR 7:1 slope but penetrating the IFR 7:1 slope shall be obstruction marked and lighted for night operations.

12. Men, equipment or other construction related material will be permitted in the approach or departure zones of active runways, provided that the construction activity is conducted below a 20:1 (or 34:1 where visibility minimums are at or below ¾ mile) approach plane originating 200 feet from end of runway. Any construction activity which is contemplated in the approach zones, which would violate these planes will require special consideration (threshold displacement, lighting, etc.)

13. Open trenches, excavation and stockpiled material will normally not be permitted within 250 feet of the centerline of active runways at air carrier airports and for runways having a precision instrument approach.

C. NOTAMS

1. The Contractor will notify the airport Owner through the Program Manager of any hazardous condition resulting from construction activity. The airport Owner will then request issuance of the necessary NOTAM'S to reflect hazardous conditions, or take steps to resolve the hazardous condition. NOTAM'S will be kept current to reflect the actual condition with respect to construction situations. Active NOTAM'S shall be reviewed periodically and revised to reflect the current condition.

2. Men, equipment or other construction related material will be permitted adjacent to an apron or active taxiway provided that such activity is first coordinated with the users and appropriate NOTAM'S issued. Additionally, barricades with flashers or night operations will be required to mark the area to prevent aircraft from inadvertently entering the construction area.

3. Inspection – Frequent inspections should be made by both the Program Manager and agency personnel during critical phases of the work to insure that the Contractor is following the required safety procedures.

Section 113 Protection of Existing Underground Utilities

Before work is started, proper authorities with agencies who have existing utilities within the limits of the work shall be contacted to determine the approximate locations of their utilities. Prior to any digging operations, these utilities shall then be located and staked at ten-foot intervals. Depth of utilities in the area to be dug shall be carefully determined and hand excavation shall be used to locate the utilities. The Architect/Engineer shall inspect existing utilities before backfilling is begun. All existing underground utilities located within the limits of the work, if damaged, shall be repaired or replaced as directed by the Architect/Engineer at no additional cost.

Additionally, verify marked FAA power and control cables by hand digging or hydro-excavation at multiple locations in the construction zone to establish the depth and routing of FAA cables. Replace FAA power and control cables for FAA facilities, systems and equipment impacted by the project activities in accordance with applicable FAA rules, regulations, orders, requirements, and standards.

Section 114 Runway Safety Areas

A. 500 feet wide on the air carrier runways and other precision instrument runways.

B. 250 feet wide on the general aviation runway.

C. 500 feet wide for extended runway safety area.

D. Runway safety areas extend 1000 feet beyond the threshold and are required beyond the displaced threshold.

E. No object may be located in any safety area except objects that must be maintained because of their functions or that is frangible mounted.

F. Construction material or spoils will not be permitted in safety areas of active runways unless threshold displaced to provide required clearances.

Item D-705 Pipe Underdrains for Airports

DESCRIPTION

705-1.1 This item shall consist of the construction of pipe drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

705-2.1 General. Materials shall meet the requirements shown on the plans and specified below.

705-2.2 Pipe. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements.

AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
ASTM F758	Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage

705-2.3 Joint mortar. Pipe joint mortar shall consist of one part by volume of Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

705-2.4 Elastomeric seals. Elastomeric seals shall conform to the requirements of ASTM F477.

705-2.5 Porous backfill. Porous backfill shall be free of clay, humus, or other objectionable matter, and shall conform to the gradation in Table 1 when tested in accordance with ASTM C136.

Table 1. Gradation of Porous Backfill

Sieve Designation (square openings)	Percentage by Weight Passing Sieves	
	Porous Material No. 1	Porous Material No. 2
1-1/2 inch (37.5 mm)		100
1 inch (25.0 mm)		90 - 100
3/8 inch (9.5 mm)	100	25 - 60
No. 4 (4.75 mm)	95 – 100	5 - 40
No. 8 (2.36 mm)		0 - 20
No. 16 (1.18 mm)	45 – 80	
No. 50 (300 µm)	10 – 30	
No. 100 (150 µm)	0 – 10	

When two courses of porous backfill are specified in the plans, the finer of the materials shall conform to particle size tabulated herein for porous material No. 1. The coarser granular material shall meet the gradation given in the tabulation for porous material No. 2.

705-2.6 Granular material. Granular material used for backfilling shall conform to the requirements of ASTM D2321 for Class IA, IB, or II materials.

705-2.7 Filter fabric. The filter fabric shall conform to the requirements of AASHTO M288 Class 2 or equivalent.

Table 2. Fabric Properties

Fabric Property	Test Method	Test Requirement
Grab Tensile Strength, lbs	ASTM D4632	125 min
Grab Tensile Elongation %	ASTM D4632	50 min
Burst Strength, psi	ASTM D3785	125 min
Trapezoid Tear Strength, lbs	ASTM D4533	55 min
Puncture Strength, lbs	ASTM D4833	40 min
Abrasion, lbs	ASTM D4886	15 max loss
Equivalent Opening Size	ASTM D4751	70-100
Permittivity sec^{-1}	ASTM D4491	0.80
Accelerated Weathering (UV Stability) (Strength Retained - %)	ASTM D4355 *(500 hrs exposure)	70

705-2.8 Controlled low-strength material (CLSM). CLSM is not used.

CONSTRUCTION METHODS

705-3.1 Equipment. All equipment required for the construction of pipe underdrains shall be on the project, in good working condition, and approved by the RPR before construction is permitted to start.

705-3.2 Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but shall not be less than the external diameter of the pipe plus 6 inches (150 mm) on each side of the pipe. The trench walls shall be approximately vertical.

Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 4 inches (100 mm). The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 6 inches (150 mm) in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The RPR shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

Excavated material not required or acceptable for backfill shall be disposed of by the Contractor as directed by the RPR. The excavation shall not be carried below the required depth; if this occurs, the trench shall be backfilled at the Contractor's expense with material approved by the RPR and compacted to the density of the surrounding material.

The pipe bedding shall be constructed uniformly over the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 inch when the bedding thickness is less than 6 inches, and 1-1/2 inch when the bedding thickness is greater than 6 inches.Bedding shall be loosely placed, uncompacted material under the middle third of the pipe prior to placement of the pipe.

The Contractor shall do trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to federal, state and local laws. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the backfill has reached at least 12 inches (300 mm) over the top of the pipe. The sheathing or shoring shall be pulled as the granular backfill is placed and compacted to avoid any unfilled spaces between the trench wall and the backfill material. The cost of bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price bid per foot (meter) for the pipe.

705-3.3 Laying and installing pipe.

a. Concrete pipe. The laying of the pipe in the finished trench shall be started at the lowest point and proceed upgrade. When bell and spigot pipe is used, the bells shall be laid upgrade. If tongue and groove pipe is used, the groove end shall be laid upgrade. Holes in perforated pipe shall be placed down, unless otherwise shown on the plans. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. Pipe shall not be laid on frozen ground.

Pipe which is not true in alignment, or which shows any settlement after laying, shall be taken up and re-laid by the Contractor at no additional expense. Making adjustments in grade by exerting force on the barrel of the pipe with excavating equipment, by lifting and dropping the pipe, or by lifting the pipe and packing bedding material under it shall be prohibited. If the installed pipe section is not to grade, the pipe section shall be completely removed, the grade corrected, and the pipe rejoined."

b. Metal pipe. The metal pipe shall be laid with the separate sections joined firmly together with bands, with outside laps of circumferential joints pointing upgrade, and with longitudinal laps on the sides. Any metal in the pipe or bands that is not protected thoroughly by galvanizing shall be coated with a suitable asphaltum paint.

During installation, the asphalt-protected pipe shall be handled without damaging the asphalt coating. Any breaks in the bitumen or treatment of the pipe shall be refilled with the type and kind of bitumen used in coating the pipe originally.

c. PVC, fiberglass, or polyethylene pipe. PVC or polyethylene pipe shall be installed in accordance with the requirements of ASTM D2321. Perforations shall meet the requirements of AASHTO M252 or AASHTO M294 Class 2, unless otherwise indicated on the plans. The pipe shall be laid accurately to line and grade. Fiberglass per ASTM D3839 Standard Guide for Underground Installation of "Fiberglass" (Glass-Fiber Reinforced Thermosetting-Resin) Pipe.

d. All types of pipe. The upgrade end of pipelines, not terminating in a structure, shall be plugged or capped as approved by the RPR.

Unless otherwise shown on the plans, a 4-inch (100 mm) bed of granular backfill material shall be spread in the bottom of the trench throughout the entire length under all perforated pipe underdrains.

Pipe outlets for the underdrains shall be constructed when required or shown on the plans. The pipe shall be laid with tight-fitting joints. Porous backfill is not required around or over pipe outlets for underdrains. All connections to other drainage pipes or structures shall be made as required and in a satisfactory manner. If connections are not made to other pipes or structures, the outlets shall be protected and constructed as shown on the plans.

e. Filter fabric. The filter fabric shall be installed in accordance with the manufacturer's recommendations, or in accordance with the AASHTO M288 Appendix, unless otherwise shown on the plans.

705-3.4 Mortar. The mortar shall be of the desired consistency for caulking and filling the joints of the pipe and for making connections to other pipes or to structures. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted.

705-3.5 Joints in concrete pipe. When open or partly open joints are required or specified, they shall be constructed as indicated on the plans. The pipe shall be laid with the ends fitted together as designed. If bell and spigot pipe is used, mortar shall be placed along the inside bottom quarter of the bell to center the following section of pipe.

The open or partly open joints shall be surrounded with granular material meeting requirements of porous backfill No. 2 in Table 1 or as indicated on the plans. This backfill shall be placed so its thickness will be not less than 3 inches (75 mm) nor more than 6 inches (150 mm), unless otherwise shown on the plans.

When the original material excavated from the trench is impervious, commercial concrete sand or granular material meeting requirements of porous backfill No. 1 shall surround porous backfill No. 2 (Table 1), as shown on the plans or as directed by the RPR.

When the original material excavated from the trench is pervious and suitable, it may be used as backfill in lieu of porous backfill No. 1, when indicated on the plans or as directed by the RPR.

705-3.6 Embedment and Backfill

a. Earth. All trenches and excavations shall be backfilled soon after the pipes are installed, unless additional protection of the pipe is directed. The embedment material shall be select material from excavation or borrow and shall be approved by the RPR. The select material shall be placed on each side of the pipe out to a distance of the nominal pipe diameter and one foot (30 cm) over the top of the pipe and shall be readily compacted. It shall not contain stones 3 inches (75 mm) or larger in size, frozen lumps, chunks of highly plastic clay, or any other material that is objectionable to the RPR. The material shall be moistened or dried, as required to aid compaction. Placement of the embedment material shall not cause displacement of the pipe. Thorough compaction under the haunches and along the sides to the top of the pipe shall be obtained.

The embedment material shall be placed in loose layers not exceeding 6 inches (150 mm) in depth under and around the pipe. Backfill material over the pipe shall be placed in lifts not exceeding 8 inches (200 mm). Successive layers shall be added and thoroughly compacted by hand and pneumatic tampers, approved by the RPR, until the trench is completely filled and brought to the planned elevation. Embedment and backfilling shall be done to avoid damaging top or side of the pipe.

In embankments and other unpaved areas, the backfill shall be compacted per Item P-152 to the density required for embankments in unpaved areas. Under paved areas, the subgrade and any backfill shall be compacted per Item P-152 to the density required for embankments for paved areas.

b. Granular backfill. When granular backfill is required, placement in the trench and about the pipe shall be as shown on the plans. The granular backfill shall not contain an excessive amount of foreign matter, nor shall soil from the sides of the trench or from the soil excavated from the trench be allowed to filter into the granular backfill. When required by the RPR, a template shall be used to properly place and separate the two sizes of backfill. The backfill shall be placed in loose layers not exceeding 6 inches (150 mm) in depth. The granular backfill shall be compacted by hand and pneumatic tampers to the requirements as given for embankment. Backfilling shall be done to avoid damaging top or side pressure on the pipe. The granular backfill shall extend to the elevation of the trench or as shown on the plans.

When perforated pipe is specified, granular backfill material shall be placed along the full length of the pipe. The position of the granular material shall be as shown on the plans. If the original material excavated from the trench is pervious and suitable, it shall be used in lieu of porous backfill No. 1.

If porous backfill is placed in paved or adjacent to paved areas before grading or subgrade operations is completed, the backfill material shall be placed immediately after laying the pipe. The depth of the

granular backfill shall be not less than 12 inches (300 mm), measured from the top of the underdrain. During subsequent construction operations, a minimum depth of 12 inches (300 mm) of backfill shall be maintained over the underdrains. When the underdrains are to be completed, any unsuitable material shall be removed exposing the porous backfill. Porous backfill containing objectionable material shall be removed and replaced with suitable material. The cost of removing and replacing any unsuitable material shall be at the Contractor's expense.

If a granular subbase blanket course is used which extends several feet beyond the edge of paving to the outside edge of the underdrain trench, the granular backfill material over the underdrains shall be placed in the trench up to an elevation of 2 inches (50 mm) above the bottom surface of the granular subbase blanket course. Immediately prior to the placing of the granular subbase blanket course, the Contractor shall blade this excess trench backfill from the top of the trench onto the adjacent subgrade where it can be incorporated into the granular subbase blanket course. Any unsuitable material that remains over the underdrain trench shall be removed and replaced. The subbase material shall be placed to provide clean contact between the subbase material and the underdrain granular backfill material for the full width of the underdrain trench.

c. Controlled low-strength material (CLSM). CLSM is not used.

705-3.7 Flexible Pipe Ring Deflection. The flexible pipe shall be inspected by the Contractor during and after installation to ensure that the internal diameter of the pipe barrel has not been reduced by more than 5 percent. For guidance on properly sizing mandrels, refer to ASTM D3034 and ASTM F679 appendices.

705-3.8Connections. When the plans call for connections to existing or proposed pipe or structures, these connections shall be watertight and made to obtain a smooth uniform flow line throughout the drainage system.

705-3.9 Cleaning and restoration of site. After the backfill is completed, the Contractor shall dispose of all surplus material, soil, and rubbish from the site. Surplus soil may be deposited in embankments, shoulders, or as directed by the RPR. Except for paved areas of the airport, the Contractor shall restore all disturbed areas to their original condition.

METHOD OF MEASUREMENT

705-4.1 The length of pipe shall be the number of linear feet (meters) of pipe underdrains in place, completed, and approved; measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The several classes, types, and sizes shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipeline being measured.

705-4.2 The quantity of porous backfill shall be the number of cubic yards (cubic meters) of porous backfill No. 1 and No. 2, complete in place and accepted, and shall be determined from the dimensions given on the plans by typical trench sections indicating the placement of porous backfill or dimensions directed by the RPR.

705-4.3 The quantity of filter fabric shall be the number of square yards (square meters) of filter fabric in place, completed, and approved; and shall be determined from the dimensions given on the plans by typical trench sections indicating the placement of filter fabric or dimensions directed by the RPR.

705-4.4. The quantity of pipe underdrains shall be made at the contract unit price per linear foot (meter) complete, including porous backfill and filter fabric.

BASIS OF PAYMENT

705-5.1 Payment will be made at the contract unit price per linear foot (meter) for pipe underdrains of the type, class, and size designated.

705-5.2 Porous backfill. Porous backfill shall be included in the unit price of the item below.

705-5.3. Filter fabric. Filter fabric shall be included in the unit price of the item below.

705-5.4 Pipe underdrains, Complete. Pipe underdrains, complete (including porous backfill and filter fabric) shall be made at the contract unit price per linear foot (meter) complete (including porous backfill and filter fabric).

These prices shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item D-705-5.4	6 Inch Pipe (Perforated PVC), Including Porous Backfill and Filter Fabric – per linear foot, complete.

REFERENCES

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

ASTM International (ASTM)

ASTM A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C444	Standard Specification for Perforated Concrete Pipe
ASTM C654	Standard Specification for Porous Concrete Pipe
ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D3262	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe
ASTM D4161	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F758	Standard Specification for Smooth Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage

ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F2562	Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M190	Standard Specification for Bituminous - Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M196	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M288	Standard Specification for Geotextile Specification for Highway Applications
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter
AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
AASHTO MP20	Standard Specification for Steel-Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 900-mm (12- to 36-in.) diameter
AASHTO	Standard Specifications for Highway Bridges

END OF ITEM D-705

ITEM L-108

UNDERGROUND POWER CABLE FOR AIRPORTS

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

EQUIPMENT AND MATERIALS

108-2.1 GENERAL.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format. The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, Maintenance Airport Visual Aid Facilities, paragraph 5.1.3.1, Insulation Resistance Test.

108-2.2 CABLE. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C , 5,000 volts, non-shielded, with, cross-linked polyethylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

108-2.3 BARE COPPER WIRE (COUNTERPOISE, BARE COPPER WIRE GROUND AND GROUND RODS). Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper-clad steel or sectional copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 8 feet (2.4 m) long and 5/8 inch (16 mm) in diameter.

108-2.4 CABLE CONNECTIONS. In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

a. The Cast Splice. A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3MTM Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

b. The Field-Attached Plug-In Splice. Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant

shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

c. The Factory-Molded Plug-In Splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

d. The Taped Or Heat-Shrink Splice. Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

108-2.5 Splicer Qualifications. Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the RPR proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Concrete shall be proportioned, placed, and cured per state department of transportation structural concrete with minimum 25% Type F fly ash, and a minimum allowable compressive strength of 4,000 psi (28 MPa). There will be no separate payment for concrete. Concrete shall be a subsidiary obligation to the appropriate electrical pay item.

108-2.7 FLOWABLE BACKFILL. Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

108-2.8 CABLE IDENTIFICATION TAGS. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 TAPE. Electrical tapes shall be ScotchTM Electrical Tapes –ScotchTM 88 (1-1/2 inch (38 mm) wide) and ScotchTM 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3MTM), or an approved equivalent.

108-2.10 ELECTRICAL COATING. Electrical coating shall be Scotchkote™ as manufactured by 3MTM, or an approved equivalent.

108-2.11 EXISTING CIRCUITS. Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the

circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual. Refer to AC 150/5340-26C, Maintenance of Airport Visual Aid Facilities, for information relating to the measurement of insulation resistance. Insulation resistance on new circuits shall have a minimum value of 100 megaohms.

108-2.12 DETECTABLE WARNING TAPE. Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

CONSTRUCTION METHODS

108-3.1 GENERAL. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet (1 m) of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

108-3.2 INSTALLATION IN DUCT BANKS OR CONDUITS. This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance

that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 INSTALLATION OF DIRECT-BURIED CABLE IN TRENCHES. Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches (75 mm) vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

a. Trenching. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5,

except as follows:

1. When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.

2. Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches (150 mm). Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

Trenching, etc., in cable areas shall then proceed, with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

b. Backfilling. After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables ; be 3 inches (75 mm) deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. This layer shall not be compacted. The second layer shall be 5 inches (125 mm) deep, loose measurement, and shall contain no particles that would be retained on a one inch (25.0 mm) sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches (20 cm) of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches (100 mm) maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557.

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not shown on

the plans, the warning tape shall be located 6 inches (150 mm) above the direct-buried cable or the counterpoise wire if present. A 3-6 inch (75 - 150 mm) wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches (200 mm) minimum below finished grade.

c. Restoration. Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the sodding, topsoiling, and fertilizing as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557 Restoration shall be considered incidental to the pay item of which it is a component part.

108-3.4 CABLE MARKERS FOR DIRECT-BURIED CABLE. The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word “CABLE” and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word “SPLICE” on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR. Furnishing and installation of cable markers is incidental to the respective cable pay item.

108-3.5 SPLICING. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast Splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer’s instructions and to the satisfaction of the RPR.

b. Field-Attached Plug-In Splices. These shall be assembled per the manufacturer’s instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

c. Factory-Molded Plug-In Splices. These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the

joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

d. Taped Or Heat-Shrink Splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer’s instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminates prior to application.

e. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer’s recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces.

Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

108-3.6 BARE COUNTERPOISE WIRE INSTALLATION FOR LIGHTNING PROTECTION AND GROUNDING. If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

a. Equipotential. – The counterpoise size is as shown on the plans. The equipotential method is applicable to all airfield lighting systems; i.e. runway, taxiway, apron – touchdown zone, centerline, edge, threshold and approach lighting systems. The equipotential method is also successfully applied to provide lightning protection for power, signal and communication systems. The light bases, counterpoise, etc. – all components - are bonded together and bonded to the vault power system ground loop/electrode.

Counterpoise wire shall be installed in the same trench for the entire length of buried cable, conduits and duct banks that are installed to contain airfield cables. The counterpoise is centered over the cable/conduit/duct to be protected.

The counterpoise conductor shall be installed no less than 8 inches (200 mm) minimum or 12 inches (300 mm) maximum above the raceway or cable to be protected, except as permitted below:

(1) The minimum counterpoise conductor height above the raceway or cable to be protected shall be permitted to be adjusted subject to coordination with the airfield lighting and pavement designs.

(2) The counterpoise conductor height above the protected raceway(s) or cable(s) shall be calculated to ensure that the raceway or cable is within a 45-degree area of protection, (45 degrees on each side of vertical creating a 90-degree angle).

The counterpoise conductor shall be bonded to each metallic light base, mounting stake, and metallic airfield lighting component.

All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system.

All components rise and fall at the same potential; with no potential difference, no damaging arcing and no damaging current flow.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Equipotential Method of lightning protection.

Reference FAA STD-019E, Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment, Part 4.1.1.7.

b. Isolation – not used

c. Common Installation requirements. When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

When a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.
Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

d. Parallel Voltage Systems. Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

108-3.7 COUNTERPOISE INSTALLATION ABOVE MULTIPLE CONDUITS AND DUCT BANKS. Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

108-3.8 COUNTERPOISE INSTALLATION AT EXISTING DUCT BANKS. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.9 EXOTHERMIC BONDING. Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3MTM ScotchkoteTM, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.10 TESTING. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

a. Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

b. Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

c. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

d. That all affected circuits (existing and new) are free from unspecified grounds.

e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than 100 megohms. Verify continuity of all series airfield lighting circuits prior to energization.

f. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

g. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

h. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

i. That the impedance to ground of each ground rod does not exceed 10 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved “repair” procedures for items that have failed testing other than complete replacement.

METHOD OF MEASUREMENT

108-4.1 The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

108-4.2 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet (meters) installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall not include additional quantities required for slack.

108-4.3 No separate payment will be made for ground rods.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the RPR. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

Item L-108-5.1	No. 8 AWG, 5 KV Type C Cable, Installed in Conduit - per liner foot (meter)
Item L-108-5.2	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed, Above the Duct Bank or Conduit, Including Connections/Terminations, Including Ground Rods- per linear foot (meter)

REFERENCES

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

Advisory Circulars (AC)

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description

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

ASTM International (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

Mil Spec

MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive National Fire Protection Association (NFPA)

NFPA-70	**National Electrical Code (NEC)**
NFPA-780	Standard for the Installation of Lightning Protection Systems

American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Federal Aviation Administration Standard

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

END OF ITEM L-108

(SPECIFICATIONS FOR NAVAIDS RELOCATION)

Table of Contents

100–1.1 These Specifications cover requirements for all Airport lighting installations in Part XI.

GENERAL REQUIREMENTS

100–2.1 The following General Requirements specifications govern all Contract Documents. Perform all Work in strict accordance with these Specifications. Conform with the latest edition of the applicable FAA advisory circulars and revisions for installation details and material and equipment specifications. Provide airport lighting equipment from the FAA approved equipment list in the latest edition of AC 150/5345–53 Appendix 3. The list is also available through the FAA web page, http://www.faa.gov/.

Furnish all other basic wiring materials and products as listed by Underwriters Laboratories and as suitable for the purpose specified.

All installation shall be in accordance with National Electrical Contractors Association (NECA) "Standard of Installations".

Contractor's workers shall be trained and experienced in installing, testing and repairing Airport lighting systems. Keep a copy of FAA Advisory Circular (AC) 150/5340–26, and be familiar with its contents. Maintain a copy of the AC on site and follow all pertinent aspects as it relates to the Work. The AC is available through the FAA web page, http://www.faa.gov/.

100–2.2 CODES AND REGULATORY REQUIREMENTS. Comply with all ordinances, laws, regulations and codes applicable, in particular, the Wisconsin Administrative Code Chapter ILHR 16 Volumes 1 and 2, and the Life Safety Code. This compliance does not relieve the Contractor from furnishing and installing Work shown or specified which exceeds the requirements of such ordinances, laws, regulations and codes.

NFPA 70 is included by reference in ILHR 16.12. Coincidentally, Chapter ILHR 16 is also inclusive even where NFPA 70 is the only reference mentioned.

Obtain inspections, approvals, and plan and specification reviews required by State Statutes, codes, rules, laws or ordinances. Pay all costs and fees for inspections, approvals, and plan and specification reviews.

Have, as a minimum, one electrician certified by the State of Wisconsin on the project. If there are local regulations relating to licensing or certification, the more stringent requirements will govern.

100–2.3 ELECTRICAL UTILITY SERVICE POINT. Electrical utility power services required by the Contract Documents shall include all Work from the utility point of service to the service main disconnect switch.

"Construction limits" designations that are indicated on Contract Documents shall not apply to Electric Utility Service work necessary to serve the project and occurring outside of the "construction limits" designations. Pay for the cost for all Work by the Utility company.

Definitions:

Throughout the Specification, two terms are used to describe electrical systems that provide power for lighting and control equipment. The terms used are "Power Source" and "Utility Service". "Power Source" refers to products and materials necessary to connect, distribute, protect, and provide an electrical source for the circuits that feed lighting and control equipment. Under most circumstances, this includes circuit breakers, disconnect switches, boxes, building feeder circuits, branch circuits, raceways, splices, connections, and attachments. Depending on the circumstances, it may include outdoor direct burial feeders, control, and branch circuits. Although each project may vary, typically a Power Source is derived from an existing "Utility Service" and Distribution System, and all work to install a "Power Source" is incidental to some other work.

"Electric Utility Service" refers to products and materials necessary to bring a Public Utility electrical source to the point where it connects to a "Power Source". Under most circumstances, this includes permits, fees, utility poles, transmission circuits, service laterals, utility transformers, or provisions for transformers, service metering equipment, main service disconnect switch, and any costs incurred by the Public Utility on and off the project site, inside and outside the construction limits, in order to bring electrical power to a service point. Although each project may vary, typically a "Utility Service" is a new electrical power system and is paid for independently of all other work.

100–2.4 EXCAVATION. Provide excavation for underground Work in accordance with the construction methods and requirements of Part II Earthwork. Compact backfill for trenches to densities required for adjacent embankment and cut areas.

100–2.5 CONCRETE. Concrete shall be in accordance with Specification P–610.

100–2.6 CUTTING AND PATCHING. Perform all cutting and patching necessary in order to do the Work. Obtain special permission from the Engineer before cutting structural members of finished material. Perform all patching to return the part affected to the condition equal to or exceeding the undisturbed Work.

100–2.7 PAINTING AND FINISHING DAMAGE AND TOUCH–UP. Repair all marred or damaged painted finishes with materials and procedures to match original finishes.

100–2.8 ACCEPTANCE OF MATERIALS AND EQUIPMENT. Acceptance of equipment, where applicable, will be based on Section 100–2.10. Be prepared to submit samples of equipment or material for review when requested by the Engineer.

Contractor installed equipment (including FAA approved) shall not generate any electromagnetic interference in the existing and/or new communications, weather, air navigation, and air traffic control equipment. Replace equipment generating interference at no additional cost, with equipment not generating interference and meeting the applicable specifications.

Ascertain that all furnished lighting system components (including FAA approved equipment) are compatible in all respects with each other, and the remainder of new or existing systems. Replace contractor furnished non–compatible components at no additional cost to the Department. Manufactured items furnished shall be the current, cataloged product of the manufacturer. Replacement parts shall be available. There shall be a permanent service organization maintained or trained by the manufacturer to provide repair and replacement services.

Follow the manufacture's installation instructions. Accept full responsibility for their equipment and product selection, cost for materials, effort of installation and the compatibility with airport lighting equipment specified for the project.

Where installation procedures are required to be in accordance with manufacturers' recommendations, have printed copies of the recommendations prior to installation. Do not proceed with installation of the item until recommendations are received. Failure to use recommendations shall be cause for rejection of the equipment or material.

Replace damaged or broken materials or products. Field repair may be authorized in writing by the Engineer instead of replacement on items with long delivery lead times. Repair authorization shall be in written form.

100–2.9 SHOP DRAWINGS. Submit six sets of shop drawings for all electrical equipment. Reference the Specification's article to which each shop drawing is applicable. Include complete catalog information such as product illustrations, ratings, and dimensions as applicable. Submit shop drawings in complete groups of materials (i.e. cables, all lighting fixtures, etc.), and sign each item of material submitted as verification that submittal has been reviewed in detail and is in fact, the Contractor's choice of materials. Bind catalog cuts, plate numbers, descriptive bulletins and drawings (11" x 17" or smaller) in sets with covers showing titles. Verify dimensions of equipment and be satisfied as to code compliance for fit prior to submitting shop drawings for approval. When vendor sheets include more than one product code or catalog data, highlight the data pertinent to the specified material.

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Include with each submitted shop drawing the following paragraph:

"It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into the project, it is in compliance with the Contract Documents and Specifications, and can be installed in the allocated spaces. Failure to add the preceding statement or any departure from the enclosed procedure will result in delay of review of submittal. Electrical equipment subject to shop drawing review will be inspected by the Engineer before installation commences. Equipment that cannot be inspected in place, shall be exposed for inspection upon request of the Engineer. Replace non–conforming equipment at the Contractor's expense.

100–2.10 OPERATING AND MAINTENANCE MANUAL. Prepare Operation and Maintenance (O&M) Manuals for all electrical equipment furnished under the Contract. Provide three copies to the Engineer.

The information included must be the exact equipment installed, not the complete "line" of the manufacturer. Where sheets show the equipment other than the equipment actually installed, neatly and clearly identify the installed equipment on the sheets. Give full ordering information assigned by the original parts manufacturer for listed parts. Relabeled and/or renumbered parts information as reassigned by equipment supplier is not acceptable.

Manuals shall contain shop drawings, wiring diagrams, operating and maintenance instructions, replacement parts, lists, and equipment nameplate data for all control equipment and systems installed under the description information designed to acquaint Sponsor's maintenance personnel with equipment operation in each mode of operation. In addition, each manual shall contain a set of the project record drawings reduced to 11" x 17".

Wiring diagrams for each piece of control equipment and system shall be complete drawings for the specific product installed under the contract. "Typical" line diagrams are not acceptable.

Group the information contained in the manuals in an orderly arrangement by specification Table of Contents. Include a typewritten index and divider sheets between categories with identifying tabs in the manuals. Bound the completed manuals with hard board 3–ring binders. Imprint the name of the job, Sponsor, Contractor, and year of completion on the covers. Imprint the name of the job, Sponsor, Contractor, and year of completion on the back edge.

Submit a preliminary copy to the Engineer prior to completion of the project for review. Deliver the three corrected copies to the Sponsor before final payment is approved.

100–2.11 TESTS. Conduct the acceptance test for equipment in the presence of the Engineer, which includes demonstrations, instructions, and tests as outlined in the respective Shop Drawings, equipment and system specifications, and as required by the Special Provisions.

a. Make available at the site the following test equipment:

(1) Voltmeter/OHM with proper scales.

(2) Clamp–on ammeter with proper scales.

(3) Megger to measure conductor insulation resistance with 100V, 500V and 1000VDC outputs.

(4) Grounding system resistance tester.

(5) High voltage probe for measuring up to 5000 VAC.

Test equipment shall remain the property of the Contractor.

b. Have available a licensed electrician with necessary tools and materials to perform the following:

(1) To open and close equipment enclosures, covers to junction boxes, terminal panels and wireways when directed.

(2) To open and reconnect splices other than the cast type when directed.

(3) To make tests and demonstrate system performance.

100–2.12 FACILITY STARTING AND COMMISSIONING. Do not energize illuminated navigational aid equipment included in the Contract Documents for Sponsor use until the Engineer has inspected and the Department has given written

authorization for use to the Contractor. Prior to the written authorization, the Contractor may energize the equipment for short periods for testing purpose only and as approved by the Engineer. Do not operate unattended equipment, illuminated navigational or otherwise, until it has been fully prepared, connected, tested, and made ready for normal operation. Correct damage to equipment occasioned by improper or ill–timed operation or testing at the Contractor's expense.

Provide a written statement saying the date and time when the navigational aid equipment will be available for testing and operation. Equipment warranties will be in effect on the date of the written authorization by the Department.

All equipment requiring operation during construction shall require operating instructions for systems and equipment indicated in the Contract Documents. Include in the operating instructions wiring diagrams, control diagrams, and operating and control sequence for each principal system and equipment. Post instructions where directed or attach the operating instructions adjacent to each principal system and equipment including start–up, operating, shutdown, safety precautions and procedures in the event of equipment failure. Provide weather–resistant materials or weatherproof enclosures where appropriate for operating instructions exposed to the weather. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal. Prior to project final acceptance and receipt of the O&M Manuals, furnish full instructions for the care, adjustments, and operation and maintenance of all electrical equipment that functions by automation or manual control to the Sponsor's designated representative.

100–2.13 CONTRACT DRAWING. Before roughing–in facilities or installation of equipment, consult all Drawings for obstructions that affect the installation. Verify that field measurements and circuiting arrangements are as shown on Drawings, and that abandoned wiring and equipment serve only abandoned facilities.

The location of the circuits and conductors on the Drawings are diagrammatic, and subject to dimension provided in the details, and as determined by the actual field conditions.

Space requirements and dimensions are nominal and based on typical manufacturer's data, with proper electrical clearances. The Contractor is totally responsible for selecting products that fit the available space, or expanding the given spaces to comply with their bid equipment, plus the necessary NEC code space. The Contractor will not be allowed extra compensation for their bid equipment that does not fit the available space.

100–2.14 CONTRACT DRAWING SYMBOLS AND ABBREVIATIONS. Refer to Symbols and Abbreviations illustrated on Drawings. Other symbols are in common usage, but if uncertainty exists regarding Plan symbols or abbreviation, bring it to the attention of the Engineer for clarification.

100–2.15 CONTRACT DRAWING RECORDS. The Engineer will furnish a newly printed set of Contract Drawings for the Contractor to mark where construction differed from the original Drawings. Keep the set on site at all times and complete this Work and give the Drawings to the Engineer before final payment is approved.

100–2.16 DEMOLITION. Review all the demolition required by the Contract Documents to be removed, relocated, terminated, or extended to accommodate the new construction. As a minimum, the following is required:

a. Remove abandoned wiring to the source of supply.

b. Remove exposed abandoned conduit, including abandoned conduit behind accessible finishes. Cut conduit so that it is recessed with walls and floors, and patch surfaces.

c. Disconnect abandoned electrical outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank covers for abandoned outlets that cannot be removed.

d. Disconnect and remove electrical devices and equipment servicing abandoned outlets that have been removed.

e. Repair adjacent construction and finishes damaged during demolition work.

f. Maintain access to existing electrical installations which remain active. Modify installation or provide access to splices as appropriate.

g. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

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Demolition drawings are schematic and are based on existing record documents. Report discrepancies to the Engineer before disturbing existing installations. Beginning of demolition signifies that the Contractor has investigated existing conditions and accepts the demolition requirement under these specifications.

WIRING METHODS AND MATERIALS

100–3.1 GENERAL. The following Wiring Methods and Materials Specifications govern airside electrical installations that are not otherwise covered by Advisory Circulars or other Parts of the Standard Specifications, and are intended to supplement the Standard Electrical Specifications L–101 through L–125 only.

These Specifications are not intended to govern FAA approved manufactured assemblies tested under ETL, airport landside installations, or Special Provisions, unless they are explicitly mentioned as being included by the Special Provisions.

Definitions:

Airside equipment refers to equipment installed as part of the airfield electrical systems governed or covered by FAA regulations, with restricted access to unauthorized personnel.

Landside equipment is electrical equipment installed as part of public and passenger handling areas, unrestricted.

100–3.2 RACEWAYS. Provide raceways at locations indicated on the Drawings and in accordance with the following specifications. Refer to Specification L-110 for underground electrical duct bank installations.

a. Section Includes.

(1) Rigid Steel and Intermediate Conduit.

(2) Rigid Nonmetallic Conduit.

(3) Liquid–tight Flexible Metal Conduit.

(4) Wireway, Auxiliary Gutters.

(5) Raceway Fittings, Couplings and Connectors.

b. References.

(1) American National Standards Institute (ANSI). Comply with requirements of the following.

ANSI	C80.2	Rigid and Steel Conduit.
ANSI	C80.3	Electrical Metallic Tubing (EMT), Zinc Coated.
ANSI	870	Wireways, Auxiliary Gutters and Associated Fittings.

(2) National Electrical Manufacturers Association (NEMA). Comply with the requirements of the following.

NEMA	TC2	Electrical Plastic Tubing (EPT) and Conduit (EPC–40 and EPC–80).
NEMA	TC3	Fittings for PVC Conduit.
NEMA	TC7	Flexible Polyethylene Duct.

(3) National Fire Protection Association (NFPA). Comply with requirements of the following.

NFPA 70 National Electric Code

(4) Underwriters Laboratories, Inc. (UL). Comply with the requirements of the following.

UL 1 Flexible Metal Conduit.

UL 360 Liquid–Tight Flexible.

UL 514B Fittings for Conduit and Outlet Boxes.

UL 886 Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

UL 1242 Intermediate Metal Conduit. Steel Conduit.

UL 543 Bituminous Fiber Duct.

c. Products.

(1) Rigid Steel Conduit and Intermediate Metal Conduit (IMC).

(a) Use for stub–ups from direct burial and wherever susceptible to severe physical damage.

(b) Use in hazardous (classified) location and Class I, Division 2.

(c) Use for burial in concrete slabs or concrete encasement.

(d) Use for direct contact with earth.

(2) Rigid Nonmetallic Conduit.

(a) Schedule 40–Use for direct burial under driveways and parking lots only. Use under runways, taxiways, and aprons only when encased in concrete.

(b) Schedule 80 – Use for direct burial and stub–ups from direct burial for a distance of two feet maximum. Use as an alternate to Rigid Steel and IMC Conduit, for stub up work only.

(c) High Density Polyethylene (HDPE) conduit – use for directional boring.

(3) Liquid–Tight Flexible Metal Conduit.

(a) Use for exterior and damp locations.

(b) Sizes 1–1/4–inch and smaller, provide with a continuous copper bonding conductor wound spirally between convolutions.

(c) Sizes 1–1/2–inch and larger, provide with an internal grounding conductor and grounding bushings.

(4) Wireways, Auxiliary Gutters.

(a) May be used to facilitate installation and future changes in wiring between panelboards, safety switches in close proximity to each other on same or adjacent walls or in same electrical equipment room or area.

(b) Provide NEMA 4 stainless enclosure where outdoors or subject to moisture and similar elements.

(c) Do not use for constant voltage circuits operating over 100V, unless an equipment grounding conductor is used and bonded to each wireway joint, and bonded to the grounding electrode conductor.

(5) Raceway Fittings, Couplings and Connectors.

(a) Use fittings listed and approved for specific conduit or raceway system used. For threaded rigid steel conduit do not use threadless or compression type fittings. For EMT, provide steel or malleable iron "concrete–tight" or "rain–tight" couplings and connectors, compression type or stainless steel multiple locking type. Do not use indentation or set screw type fittings.

(b) Bushing and connectors shall be insulated type which maintain continuity of conduit grounding system. Mold or lock insulating material into the metallic body of the fitting. Bushing made entirely of nonmetallic material will not be allowed.

(c) Connectors and couplings body shall have wall thickness at least equal to wall thickness of conduit used.

(d) Provide flexible metal conduit fittings made of steel of malleable iron and one of the following types:

Screw type having an angular wedge fitting between the convolutions of the conduit.

Squeeze or clamp type having a bearing surface contoured to wrap around the conduit and clamped by one or more screws.

Steel, multiple point type, for threading into internal wall of the conduit convolutions.

(e) Liquid–tight flexible metal conduit shall incorporate a steel, nylon or equal plastic compression ring and a gland for tightening. The fitting shall be steel, or malleable iron with insulated throat, with male thread and locknut or male bushing with or without "O" ring seal.

(f) Provide expansion fittings for all rigidly fastened conduits spanning a building expansion joint and if not otherwise mentioned, for all runs exceeding 150 feet in length. Fittings shall be hot–dipped galvanized malleable iron with a packing ring to prevent entrance of water, a pressure ring, a grounding ring and a separate external copper bonding jumper.

(g) Do not use material such as "pot metal" for any type of fitting.

d. Installation.

Complete installation of electrical raceways before starting installation of cables/wires within raceways.

Prevent foreign matter from entering raceways; use temporary closure protection.

During construction, protect stub–ups from damage. Arrange so curved portion of bends is not visible above the finished slab or grade.

Make bends and offsets so the inside diameter is not effectively reduced.

Unless otherwise indicated keep the legs of a bend in the same plane and the straight legs of offset parallel.

Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location.

Run concealed raceways with a minimum of bends. All bends shall have the longest possible radii.

Install exposed raceways parallel and perpendicular to nearby surfaces or exposed structural members, and follow the surface contours.

Run exposed, parallel or banked raceways together.

Make bends in parallel or banked runs from the same center line so that the bends are parallel. Factory elbows may be used in banked runs where they can be installed parallel.

Where the installation is such that joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system.

Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the protection shoulder.

Where chase nipples are used, align the raceway and coupling square to the box and tighten the chase nipple so no threads are exposed. Running threads are not allowed.

Install pull wires in empty raceway. Use No. 14 AWG zinc–coated steel or plastic having not less than 200 pounds tensile strength unless indicated otherwise in the Contract Documents. Leave not less than 12 inches of slack at each end of the pull wire.

In slabs and walls, locate raceways in middle third and leave at least 2 inches concrete cover. Lateral spacing of raceways shall be not less than three diameters of the raceway.

Tie raceway to reinforcing rods or support to prevent sagging or disturbing when concrete is placed.

At expansion joints, provide expansion fittings and cross at right angles to joint.

Provide conduits stubbed up through or from concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside.

Provide flexible conduits only for connections to electrical equipment when it is subject to movement, vibration, misalignment, or where noise transmission is to be eliminated or reduced. Install all bonding and grounding conductors for liquid–tight, flexible metallic conduit runs within the conduit. Allow all PVC conduits directly buried to acclimate to the installed temperature before installation commences (one hour minimum). Flexible conduit shall be of the liquid–tight type when installed under any of the following conditions:

(1) Exterior locations (ultra violet light rated)

(2) Moisture or humidity laden atmospheres where it is possible for condensation to accumulate. Corrosive atmospheres.

(3) Wherever there is a possibility of seepage or dripping of oil, grease, or water.

100–3.3 FEEDER AND BRANCH CIRCUIT WIRE AND CABLE.

Provide feeder and branch circuit wire and cable at locations indicated on the Drawings and in accordance with the following Specifications. Refer to Specification L-108 for underground cable installations.

a. Section Includes

(1) Copper conductors.

(2) Tap type connectors.

(3) Split–bolt connectors.

(4) Wire nut connectors.

b. References

(1) American Society for Testing and Materials (ASTM). Comply with requirements of the following:

ASTM	B1	Standard Specification for Hard Drawn Copper Wire
ASTM	B2	Standard Specification for Medium–Hard–Drawn Copper Wire
ASTM	B3	Standard Specification for Soft or Annealed Copper Wire
ASTM	B8	Standard Specification for Concentric–Lay–Stranded Copper Conductors, Hard, medium– Hard, or Soft
ASTM	D753	Standard Specification for General Purpose Polychloroprene Jacket for Wire and Cable.

(2) Institute of Electrical and Electronics Engineers (IEEE). Comply with the following standards which apply to wiring systems:

IEEE	82	Test Procedure for Impulse Voltage Tests on Insulated Conductors
IEEE	241	Recommended Practice for Electric Power Systems in Commercial Buildings.

(3) National Fire Protection Association (NFPA). Comply with NFPA 70 requirements for construction, installation and color coding of electrical wire, cable and connections:

(4) National Electrical Manufacturers Association (NEMA). Comply with requirements of the following:

NEMA	WC 3S–19–81	Rubber–Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
NEMA	WC 5S–61–402	Thermoplastic–Insulated Wire and Cable for the transmission and Distribution of electrical Energy
NEMA	WC 7/S–66–524	Cross–Linked–Thermosetting–Polyethylene–Insulated Wire and Cable for the transmission and Distribution of Electrical Energy.
NEMA	WC 8/S–68–516	Ethylene–Propylene–Rubber–Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

(5) Underwriters Laboratory (UL). Provide Material conforming to the following standards

UL	44	Rubber–insulated Wires and Cables
UL	83	Thermoplastic–Insulated Wires and Cables
UL	486A	Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL	854	Service–Entrance Cables

c. Products

(1) Conductors.

For all constant voltage circuits 600 volts or less, provide wire rated 600 V minimum of the single conductor annealed copper type.

Conductors No. 10 AWG and smaller may be solid, and No. 8 AWG and larger shall be stranded.

Conductivity shall not be less than 98 percent at 20°C (68°F) or resistivity greater than 1.7 micro ohms per centimeter.

For dry and wet locations provide Type THHN/THWN, 75° maximum.

(2) Cable.

For all constant voltage circuits 600 volts or less, provide UL listed cables of sizes, ampacity, temperature ratings and insulating materials as indicated on the drawings. Where no sizes, ampacity, temperature or insulating materials are indicated, use NFPA 70.

(3) Connectors and Splices.

Provide UL listed metal connectors of sizes ampacity temperature ratings, materials, and classes required by NFPA 70 and NEMA standards for applications and services indicated.

For Branch Circuit wires No. 10 AWG and smaller, provide solderless, insulated pressure cable type connectors, 600 V, of the compression or indent type or wire nut connectors. Temperature rating of connectors shall be at least equal to that of the wire on which they are used.

For Branch Circuit wires No. 8 AWG and larger wire, provide socket head cap, hex screw or bolt clamp type connectors, manufactured of high conductivity copper alloy or bronze castings. Select proper connector for each wire size. Retain cable sizes 250 MCM and larger in the connector by twin clamping elements.

(4) Insulating Materials.

Provide plastic electrical insulating tape which is flame retardant, cold and weather resistant. Tape for use in areas subjected to temperatures 40°C, or where the tape will be subjected to an oil splash, use a tape with a minimum thickness of 8.5 mils that consists of an oil–resistant vinyl backing with an oil–resistant acrylic adhesive.

Provide all insulating materials for splices and connections such as glass and synthetic tapes, putties, resins, splice cases, or compositions of the type approved for the particular use, location, voltage and temperature, and apply and install in an approved manner, all in accordance with the manufacturer's recommendations.

(5) Prohibited Products.

The use of non–metallic sheathed cable Types NM to NMC, armored–bushed cable (BX) and armor–clad cable (AC) and service entrance cables (SE and USE) is prohibited.

d. Installation – General.

Deliver wire and cable packaged in factory–sealed containers.

Store wire and cable in a clean dry space in original containers. Protect products form weather, damaging fumes, construction debris and traffic.

Handle wire and cable carefully to avoid abrading, puncturing and tearing wire and cable insulation and sheathing. Ensure that the dielectric resistance integrity of wires and cables is maintained.

Unless otherwise indicated in Contract Documents, install all wiring in conduit, in conformance with NFPA 70.

Provide wire, cables and connectors necessary for a complete installation from point of service connection to all receptacles, lighting fixtures, devices, utilization equipment and outlets.

Do not use wire and cable manufactured more than 12 months prior to date of delivery to the site.

Neatly and securely bundle and tie all individual circuits located in branch circuit panelboards, signal cabinets, signal control boards, switchboards and motor control centers, switchboards, motor control centers and pull boxes. Bundle and tie with either marlin twine 2– or 3–ply lacing or nylon straps made of self–extinguishing nylon having a temperature range of –65°F to +350°F. Each strap shall be constructed with a locking hub of head on one end and a taper on the other.

Securely fasten nonferrous identifying tags or pressure sensitive labels to all cables, feeders, and power circuits in vaults, pull boxes, manholes, and at termination of cables. Stamp or print tags or labels to correspond with markings on drawings or marked so that feeder or cable may be readily identified. If suspended type tags are provided, attach them by approximately 55–pound test monofilament line or slip free plastic cable lacing units.

e. Installation – In Conduit.

Refer to L–100–3.2, RACEWAYS, for the preparation of raceways for wire and cables.

Provide suitable installation equipment to prevent cutting and abrasion of conduits during the pulling of wires and cables, according to the following:

(1) Use ropes for pulling of conductors in raceways with existing circuits made of polyethylene or other suitable nonmetallic material.

(2) Pull conductors simultaneously where more than one is being installed in same raceway.

(3) Use pulling compound or lubricant where necessary; compound shall not deteriorate conductor or insulation.

(4) Use lubricants conforming to UL requirement as applicable.

(5) Attach pulling lines to conductor cables by means of either woven basket grips or pulling eyes attached directly to the conductors. Do not use rope hitches.

(6) Where polyethylene insulation is used, a pulling lubricant is required. Use lubricant non–injurious to the insulation.

Install cable supports for all vertical feeders in accordance with the applicable sections of the NFPA 70. Provide cable supports of the wedge type which firmly clamp each individual cable and tighten due to the cable weight.

Install exposed cable parallel and perpendicular to surfaces or exposed structural members and follow surfaces contours, where applicable.

f. Installation – Above Grade.

(1) In making a splice, bring connectors up securely upon the conductors so that all conductors are equally engaged, the insulation is not ruptured, no bare wires are exposed or have "backed off" due to the application of pressure, and the connection will not loosen due to cycling or vibration, in order the insure an efficient splice.
(2) Follow the number, size, and combinations of conductors permitted as listed on manufacturer's packaging.

(3) Fully insulate connectors by a skirt, or taped to provide an insulation value at least equal to the rating of wires being connected.

Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values or comply with tightening torques specified in UL 486A and 468B.

Color code all secondary service, feeder and branch circuit conductors throughout the project secondary electrical system as follows:

Phase	*208Y/120 Volts*	*240/120*	*480Y/277 Volts*
A	Black	Black	Yellow

B	Red	Red	Brown
C	Blue	—	Orange
Neutral	White	White	Gray
Ground	Green	Green	Green

The colors shall be factory–applied entire length of the conductors by one of the following methods except as noted and limited in the following:

(1) Solid color compound

(2) Solid color coating

(3) Surface printing every 12 inches, maximum spacing of 18 inches.

(4) All grounding and phase conductors No. 10 AWG and smaller shall be solid color compound or solid color coating.

(5) All grounding and phase conductors No. 8 AWG and larger color coded with pressure sensitive tape shall have a background color or shall have field applied color coding methods per UL and NFPA 70.

(6) Apply color pressure–sensitive plastic tape in half overlapping turns for a distance of 6 inches or all terminal points and in all boxes in which splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding.

(7) Use 3/4–inch wide tape in colors as specified.

(8) Do not be obliterated cable identification markings by taping. Tape locations may be adjusted slightly to prevent obliteration of cable markings.

Seal cables and conductors entering from underground between cable and raceway or sleeve, with a waterproof non–hardening sealing compound.

g. Installation – Manholes.

Install and support cables in manholes on steel racks with porcelain or equal insulators. Train cable around manhole walls but do not bend cable to a radius less than the limits in NFPA 70.

Cover constant voltage power cables located in manholes and handholes with arcproof and flameproof tape. Apply the tape in a single layer, one–half lapped, or as recommended by the manufacturer.

h. Installation – Below Grade.

Refer to Specification L-108 for underground cable installations.

Conduct tests with a megger on constant voltage circuits will be performed so as not to harm the conductor insulation. Follow manufacturer's instructions and Subsection 100–2.12.

100–3.4 CONTROL AND SIGNAL WIRE AND CABLE. Provide control wire, signal wire, and cable at locations indicated on the Drawings and in accordance with the following specifications. Refer to Specification L-108 for underground cable installations.

a. Section Includes.

(a) Class 2 and Class 3

b. Reference Standards.

(1) American Society for Testing and Materials (ASTM). Comply with requirements of the following:

ASTM	B3	Standard Specification for Soft or Annealed Copper Wire.
ASTM	B8	Standard Specification for Concentric–Lay–Stranded Copper conductors, Hard, Medium–Hard, or Soft.

(2) Institute of Electrical and Electronics Engineers (IEEE): Comply with the following IEEE Standards:

IEEE	82	Test Procedure for Impulse Voltage Tests on Insulated Conductors.
IEEE	241	Recommended Practice for Electric Power Systems in Commercial Buildings.
Vol. IGA-3		Reducing Electrical Noise in Instruments Circuits.

(3) National Electrical Manufacturers Association (NEMA)/Insulated Cable Engineers Association, Inc. (ICEA): Comply with applicable requirements of the following:

NEMA	WC 3/S–19–81	Rubber–Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
NEMA	WC 5/S–61–402	Thermoplastic–Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
NEMA	WC 7/S–66–524	Cross–linked–thermosetting–Polyethylene–Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
NEMA	WC 8/S–68–516	Ethylene–Propylene–Rubber–Insulated Wire and Cable for the Transmission and Distribution of Electrical energy

(4) National Fire Protection Association (NFPA): Comply with NFPA 70 requirements for construction, installation and color coding of control and signal sire Class 1, Class 2, and Class 3.

(5) Underwriters Laboratories, Inc. (UL): Provide material conforming to the following UL Standards:

UL	44	Rubber–Insulated Wires and Cables.
UL	83	Thermoplastic–insulated Wires and Cables.
UL Labeled:		Provide control and signal wire UL listed and labeled.

c. Products.

Provide control and signal wires and cables single conductor and multiple conductors, shielded and unshielded, as indicated in the Contract Documents.

Wires and cables shall have 75°C rating minimum, designed to provide a clean signal in a high noise level environment, and suitable to reject static magnetic, common mode and cross talk noise.

Use control and signal wire that is coated copper solid or stranded Class B.

Stranded conductors shall be constructed of short lay seven strand minimum concentric bare copper wires.

Use the size of conductors that is suitable for the current required for satisfactory operation of the apparatus controlled and with proper consideration of circuit's length, unless indicated otherwise in the Contract Documents.

Provide conductors with a primary insulation material that is heat, moisture, flame, and chemical, resistant crosslinked polyethylene, or PVC high temperature insulation material.

Cable shall have non hydroscopic fillers and a high temperature non hydroscopic tape shall be applied over the cable code.

Multi–conductor cable shall have conductors color coded.

Control cable for above grade dry locations shall have an outer covering, fabricated of thermoplastic with flame, heat and moisture resisting compounds.

d. Installation.

Deliver wire and cable packaged in factory–sealed containers, or wound on NEMA wire and cable reels. Cable ends shall be sealed with shrinkable self–sealing end caps or by other proper means that protects wires and cables against moisture and dust. Ensure that dielectric resistance integrity of wires and cables is maintained.

Store wire and cable in a clean dry space in original containers. Protect products from weather, damaging fumes, construction debris and traffic.

Handle wire and cable carefully to avoid abrading, puncturing and tearing wire and cable insulation and sheathing. Ensure that the dielectric integrity of wires and cables is maintained.

Wire and cables shall be rated for 600 volts minimum. Where the operating voltage is less than 100 volts, the wire and cables may be insulated for 300 volts.

Do not use wire and cable manufactured more than 12 months prior to date of delivery to the site.

Neatly and securely bundle all conductors in signal cabinets and signal control panels. Bundle and cable with nylon straps made of self–extinguishing nylon having a temperature range of –65°F to +350°F.

Provide pressure sensitive labels, securely fastened to each conductor at each termination of single conductor or multiconductor cables. Stamp or print Tags or labels to correspond with markings on the Contract Documents. Mark conductors so they can be readily identified.

Splices in control wire are not permitted. All control wire shall be continuous from terminal block to terminal block.

Prevent pickup of magnetic and static noise by routing cables and wires away form noise sources such as power cables, generators, motors, and any arc producing equipment. Control wiring subject to noise shall be twisted and provided with a total coverage grounded shield.

Prevent cables and wires from picking up common mode noise by grounding the shield at one point. Locate the ground point at the point where the instrument circuit is grounded and isolated from all other grounds.

Prevent pickup of cross talk noise on multiple pair cable by using cables with individually shielded, isolated pair shields.

100–3.5 ELECTRICAL BOXES AND FITTINGS. Provide electrical box and fittings as shown on the drawings and in accordance with the following specifications.

a. Section Includes.

(1) Pull boxes

(2) Conduit bodies

(3) Bushings

(4) Locknuts

(5) Knockout closures

b. References.

(1) National Electrical Manufacturers Association (NEMA): Comply with applicable requirements of the following.

NEMA	OS 1	Sheet Steel Outlet Boxes, Device Boxes, Covers and Box Supports
NEMA	FB 1	Fittings, Cast Metal Boxes

(2) National Fire Protection Association (NFPA): Comply with NFPA 70, for construction and installation of electrical wiring boxes and fittings.

(3) Underwriters Laboratories Inc. (UL): Comply with applicable requirements of the following.

UL50	Cabinets and Boxes
UL 514A	Metallic Outlet Boxes
UL 514B	Fittings for Conduit and Outlet Boxes, Flush–Device Boxes and Covers
UL 886	Outlet Boxes and Fittings for Hazardous (Classified) Location.

c. Products

Provide galvanized or other approved corrosion resistant finish for all boxes, accessories and fittings.

Provide minimum 4–inch square by 1–1/2–inch deep, one piece, deep–drawn, galvanized steel outlet boxes for general use. Provide 4–inch octagonal concrete boxes and hung ceiling boxes of the folded or welded type where required by project conditions. Construct with stamped knockouts in the back and sides. Provide threaded screw holes with corrosion–resistant screws for securing box covers and wiring devices.

Provide interior outlet box accessories as required for each installation, including covers, mounting brackets, hangers, extension rings, cable clamps, and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used and fulfilling requirements of individual wiring situations.

Provide corrosion–resistant cast–metal weatherproof outlet boxes, of types, shapes and sizes, with threaded conduit ends, cast–metal face plates with spring–hinged waterproof caps suitable configured for each application, including face plate gaskets and corrosion– resistant fasteners.

For Junction and Pull Boxes, provide galvanized sheet steel junction and pull boxes, with screw–on covers and of types, shapes and sizes, to suit each respective location and installation. Provide welded seams and stainless steel nuts, bolts, screws, and washers. Where necessary for boxes to provide a rigid assembly, provide integral structural steel bracing.

Provide galvanized cast–metal conduit bodies, of types, shapes, and sizes, to suit respective locations and installation, construct with threaded–conduit–entrance ends, removable covers, and corrosion–resistant screws.

Provide corrosion–resistant punched–steel box knockout closures, conduit locknuts, malleable iron conduit bushings and offset connectors of types and sizes to suit respective uses and installation.

Provide boxes UL listed for the particular type and class for Hazardous Locations.

Provide outlet boxes conforming to UL 886 for hazardous locations and install in conformance with NFPA 70 Articles 500 through 555 for Hazardous Locations.

d. Installation.

Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.

Provide weatherproof outlets for all interior and exterior locations exposed to weather or moisture.

Provide knockout closures to cap unused knockout holes where blanks have been removed.

Provide boxes of sizes adequate to meet NFPA 70 volume requirements, but in no case smaller than sizes indicated in the Contract Documents.

Protect outlet boxes to prevent entrance of debris. Thoroughly clean foreign material from boxes before conductors are installed.

At the following locations use threaded hub type boxes with gasketed weatherproof covers:

(a) Exterior locations.

(b) Where exposed to moisture laden atmosphere

(c) Where indicated in the Contract Documents.

For installation of junction and pull boxes, conform to the following:

(a) For boxes exposed to rain or installed in wet locations use NEMA 4 stainless steel.
(b) Conductors larger than 3/0 in any pull or junction box including equipment grounding conductors shall not exceed the sizes in Table 1.

TABLE 1. CONDUCTORS

SIZE OF LARGEST CONDUCTORS	*MAXIMUM NUMBER OFCONDUCTORS*
No. 4/0 AWG	30
250 MCM	20
500 MCM	15
Over 500 MCM	10

Provide each box with sufficient clamps, grids, or devices to which cables are secured in neat and orderly fashion permitting ready identification and so that no cable will have an unsupported length of more than 30 inches.

100–3.6 WIRING DEVICES. Provide wiring devices at locations indicated on the Drawings and in accordance with the following Specifications.

a. Section Includes.

(1) Photocells.

b. References.

(1) American National Standards Institute (ANSI): Provide plugs and receptacle devices constructed in accordance with ANSI C73, "Attachment Plugs and Receptacles."

(2) Institute of Electrical and Electronics Engineers (IEEE): Construct and install wiring devices in accordance with requirements of IEEE 241, "Recommended Practice for Electric Power Systems in Commercial Buildings."

(3) National Electrical Manufacturers Association (NEMA): Provide wiring devices constructed and configured in accordance with the requirements of:

NEMA WD 1 General Requirements for Wiring Devices.
NEMA WD 2 Semiconductor Dimmers for Incandescent Lamps.
NEMA WD 6 Wiring Devices – Dimensional Requirements

(4) National Fire Protection Association (NFPA): Comply with NFPA 70, as applicable to construction and installation of electrical wiring devices.

(5) Underwriters Laboratories, Inc. (UL): Provide wiring devices which are UL listed and comply with the requirements of:

UL	5	Surface Metal Raceways and Fittings
UL	20	General–Use Snap Switches
UL	498	Attachment Plugs and Receptacles.
UL	514A	Metallic Outlet Boxes
UL	514B	Fittings for Conduit and Outlet Boxes.
UL	943	Ground–Fault Circuit Interrupters.

c. Products.

For FAA approved lighting and NAVAIDS, provide FAA required photocells with (2) N.O. 20 amp contacts, surge protection, energizing at 35 foot candles and de-energizing at 60 foot candles, in cast aluminum enclosure. For all other lighting provide quick– response, cadmium–sulfide type photocell with 15 to 20 second built–in time delay to prevent response to momentary lightning flashes, car headlights or cloud movements. Photocell will energize when north sky light decreases to 1.5 foot candles and will remain energized until north sky light increases from 3 to 5 footcandles. Provide photocells of voltage and wattage ratings as indicated in the Contract Documents.

d. Installation.

Handle wiring devices carefully to prevent damage. Do not install damaged wiring devices.

Store wiring devices in a clean and dry place. Protect from dirt, construction debris, and physical damage.

Install wiring devices as indicated, in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to fulfill project requirements. Where not indicated, mount switch adjacent to latch jamb of door.

Coordinate with other Work, including painting, electrical boxes and wiring Work, as necessary to integrate installation of wiring devices with other Work.

Install wiring devices only in electrical boxes which are clean; free from building materials, dirt, and debris.

Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A, "Wire connectors and Soldering Lugs for Use with Copper Conductors."

Test wiring devices for electrical continuity, and for short–circuits prior to energizing circuitry. Ensure proper polarity of connections is maintained.

100–3.7 CABINETS AND ENCLOSURES. Provide covers, cabinets, and individual hinged–door enclosures for all electrical systems as indicated on the Drawings and in accordance with the following Specifications.

a. References.

(a) National Electric Manufacturers Association (NEMA). Comply with NEMA 250, "Enclosures for Electrical equipment 1000 Volts Maximum."

(b) National Fire Protection Association (NFPA). Comply with NFPA 70, "National Electrical Code" for application, and installation of electrical cabinets and enclosures.

(c) Underwriters Laboratories, Inc. (UL). Provide electrical cabinets and enclosures which are UL listed and labeled, and constructed in conformance with UL 50 "Cabinets and Boxes."

b. Products.

Provide cabinets and enclosures as follows:

(1) Surface NEMA 1 Cabinets and Enclosures:

(a) Provide a front consisting of a one– piece sheet steel frame and a hinged door with catch and lock.

(b) Provide each cabinet with a combination catch and flat key lock.

(c) Hinge doors directly to cabinet, with 3/4–inch flange around all edges shaped to cover edge of box.

(2) Surface NEMA 12 Cabinets and Enclosures:

(a) Fabricate of minimum 16 MSG steel with continuous welded seams.
(b) Provide removable doors, with neoprene door gasket attached with oil–resistant adhesive, and held in place with steel retaining strips. Provide removable internal mounting panel for component installation.

(c) Provide multiple doors where required. Individual door width shall be no greater than 24 inches.

(d) Provide butt hinges or continuous hinges.

(e) Furnish single door cabinets with padlock and hasp, and double door cabinets with 3–point handle– operated–latch plus hasp.

(3) Surface NEMA 4 Cabinets and Enclosures:

(a) Provide features similar to those for NEMA 12 units except provide NEMA 4 protection against hose directed water. Provide multiple cover clamps instead of handle latches. Provide doors over 36 inches in height with vault handle and a 3–point catch, arrange to fasten door at top, bottom, and center.

NEMA 4 stainless cabinets and enclosures shall maintain a natural finish.

Provide cabinets and enclosures with provision for cabinet grounding without penetrating exterior wall of the enclosure.

c. Installation.

Touch up all scrapes and other mars in the enclosure finish equal to the manufacturer's finish.

Mount cabinets at a uniform height, nominally 6 feet 6 inches to the top of the enclosure above finished floor, except as otherwise noted in the Contract Documents.

Support and fasten all cabinets securely in place.

100–3.8 SUPPORTING DEVICES. Provide all electrical supports, anchors, sleeves, seals, fastenings and other components indicated on the drawings and in accordance with the following specifications.

a. Section Includes.

(1) Clevis hangers.

(2) Riser clamps.

(3) C–clamps.

(4) One–hole conduit straps.

(5) Two–hole conduit straps.
(6) Round steel rods.

(7) Expansion anchors.

b. References.

(a) National Fire Protection Association (NFPA). Comply with NFPA 70 as applicable to construction and installation of electrical supporting devices.

(b) Underwriters Laboratories, Inc (UL). Conform to UL listings and labeling.

c. Products.

Provide supporting devices with manufacturer's standard materials, designed and constructed in accordance with published product information.

Provide all supports, support hardware and fasteners hot dipped galvanized for exterior installations and cadmium plated for interior installations.

Provide manufactured standard supports including clevis hangers, risers clamps, conduit straps, threaded C–clamps with retainers, wall brackets and spring steel clamps.

Provide U–channel strut system for mounting and supporting electrical equipment. Fabricate strut from 16–gauge hot–dip galvanized steel sheet, 9/16–inch diameter holes, 8–inches on center on top surface. Use fittings that are compatible with the U–channel struts.

d. Installation.

Install hangers, sleeves, seals, U–channel supports and fasteners as indicted and in accordance with manufacturer's written instructions. Comply with requirements of NFPA 70 and American National Standards Institute (ANSI)/National Electrical Manufacturers Association (NEMA) for installation of supporting devices.

Coordinate with other electrical work, including raceway and wiring work.

Provide raceway structural support capacity equal to the maximum weight of the raceway plus a safety factor of 200 pounds. Provide additional support strength where required to prevent distortion of raceway during wire pulling.

Space supports for metallic raceways in accordance with the requirements or this Section and the requirements of the NFPA 70, except as otherwise indicated.

In vertical runs provide such support that the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports, with no weight load on raceway termination or conductor terminals.

Provide supports for all miscellaneous electrical components as required to produce the same safety allowances as specified for raceway supports previously mentioned. Provide metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes and junction boxes.

Securely fasten all electrical items and their supporting hardware including, but not limited to, conduits, raceways, cables, busways, cabinets, boxes, switches, and control components to a building structure, or structural fixture, unless otherwise indicated.

Fasten by means of round head full threaded hood screws on wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; by machine screws; welded threaded studs, or spring–tension clamps on steel work. Threaded studs driven in by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts. Do not weld conduits or pipe strap inserts or steel structures. In partitions of light steel construction use sheet metal screws.

Holes cut to a depth of more than–1/2 inches in reinforced concrete or to a depth of more than 3/4–inch in concrete joints shall not cut the main reinforcing bars. Fill holes that are not used.

On loads applied to any fastener do not exceed one–fifth of the proof test load. Use vibration and shock–resistant fasteners, where applicable.

Rawl plugs are not permitted.

100–3.9 ELECTRICAL IDENTIFICATION. Provide electrical identification as indicated on the drawings and in accordance with the following Specifications.

a. Section Includes.

(1) Buried electrical line warnings.

(2) Identification of electrical power, control and communication, cables and conductors.

(3) Operational instruction signs.
(4) Warning and caution signs.

(5) Equipment labels and signs.

b. References.

(a) American National Standards Institute (ANSI). Comply with requirements of ANSI A13.1, "Scheme for the Identification of Piping Systems" with regard to type and size of lettering for raceway and cable labels.

(b) National Fire Protection Association (NFPA). Comply with NFPA 70, "National Electrical Code" requirements for identification and for provision of warning and caution signs for wiring and equipment.

c. Products.

Provide manufacturer's standard products of categories and types required for each application, except as otherwise indicated.

Use pre-printed, flexible, self-adhesive marking labels for raceways with a legend indicating voltage and service. Size: 1–1/8 inches high by 4 inches long for raceway 1–inch diameter and less, 1–1/8 inches high by 8 inches long for raceway over 1–inch diameter. Color: Black legend on orange background.

Use permanent bright-colored continuous-printed plastic Underground Line Marking Tape compounded for all direct–burial signal and communication circuits; not less than 6 inches wide by 4 mils thick. Provide printed legend indicative of general type of underground line below.

Use Vinyl or Vinyl Cloth Wire/Cable Designation Tape Markers that are self adhesive wrap–around cable/conductor markers with pre–printed numbers and letters for designation purposes.

Cut Aluminum Wrap–Around Cable Marker Bands from 0.014–inch thick aluminum sheet and fitted with slots or ears for securing permanently around wire or cable jacket or around groups of conductors. Provide for legend application with stamped letters or numbers.

Engraved Plastic–Laminate Labels, Sign and Instruction Plates shall be engraving stock melamine plastic laminate, 1/16–inch minimum thickness for up to 20 square inch sign or 8–inch length; 1/8 inch thickness for larger sizes. Engrave legend in white letters on black face and punch for mechanical fasteners.

Use Baked Enamel Warning and Caution Signs that are pre–printed aluminum signs appropriate to the location, punched for fasteners, and sized for good visibility.

Use Fasteners for Plastic Laminate and Metal Signs that are self tapping stainless steel screws or No. 10/32 minimum stainless steel machine screws with nuts and flat and lock washers.

Use Cable Ties that are fungus–inert, self–extinguishing, one piece, self locking nylon cable ties, 0.18 inch minimum width, 50 pounds minimum tensile strength and suitable for a temperature range from –50°F to +350°F. Provide ties in specified colors when used for color coding.

d. Installation.

Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations, specified or indicated in the Contract Documents. Provide numbers, lettering and wording as approved in submittals, as required by code, or as recommended by manufacturers.

Install products covered by this Section where indicated on drawings or specified. Install products covered by this Section where required by NFPA 70, whether or not otherwise indicated. Install products in accordance with manufacturer's written instructions and requirements of NFPA 70.

Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

In all areas where inside circuits are routed from a vault through an inhabited space, identify all exposed high voltage feeder conduits (over 600 volts) by words "DANGER–HIGH VOLTAGE" in black letters 2 inches high, stenciled on adhesive labels at 10–foot intervals over continuous painted orange background applied as follows:

(1) On entire floor area directly above conduits running beneath and within 12 inches of basement or ground floor in contact with earth or framed above unexcavated space.

(2) On wall surfaces directly exterior to conduits run concealed within the wall.

(3) On all accessible surfaces of concrete envelope around conduits in vertical shafts exposed at ceilings or concealed above suspended ceilings.

(4) On entire surface of exposed conduits.

(5) Clean surface of dust, loose material and oil films before painting.

(6) Prime unpainted surfaces. For galvanized metal use single component acrylic vehicle coating formulated for galvanized surfaces. For concrete masonry units use heavy duty acrylic resin block–filler. For concrete surfaces use clear alkali–resistant alkyd binder type sealer.

(7) Provide one intermediate and one finish coat of orange silicone alkyd enamel.

(8) Apply all primer and finish materials in accordance with manufacturer's instructions.

Identify Pull and Connection Boxes with pressure sensitive, self–adhesive labels indicating system voltage in black pre–printed on orange background as required by NFPA 70 for caution signs on all electrical power and lighting system boxes. Install on the outside of the box cover. Also label box covers to identify the circuits. Use pressure sensitive plastic labels at exposed locations and similar labels or plasticized card stock tags at concealed boxes.

During backfilling of the trench for each exterior underground communications and control circuit, install continuous underground– type plastic line marker, located directly above line at 6 to 8 inches below finished grade. Where multiple lines are installed in a common trench or concrete envelope and do not exceed and overall width of 16 inches, install a single line marker.

Provide identifying metal tags or aluminum wrap–around marker bands securely fastened to all power circuit cables, feeders, and power circuits in electrical equipment rooms, pull boxes, junction boxes, manholes and hand holes with tags or bands with 1/4–inch steel letter and number stamps with legend to correspond with designations on drawings. If metal tags are provided, attach them with approximately 55–pound test monofilament line or one piece self–locking nylon cable ties.

Tag or label conductors as follows:

(1) Tag or label all conductors with identification indicating source and circuit numbers.

(2) Where Multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure, label each conductor or cable. Provide legend indicating source, voltage, circuit number as applicable. For of the box cover. Also label box covers to identify the circuits. Use pressure sensitive plastic labels at exposed locations and similar labels or plasticized card stock tags at concealed

boxes. Control and communications/signal wiring, use wire/cable marking tape at terminations and at all intermediate locations where conductors appear in wiring boxes, troughs and control cabinets. Use consistent letter/ number conductor designations throughout on wire/cable marking tapes.

(3) Match identification markings with designations used in panelboards, shop drawings, contract documents and similar previously established identification schemes for the facility electrical work.

(4) Where required by NFPA 70, to ensure a safe operation and maintenance of electrical systems and of the items to which they connect, install warning, caution or instruction signs. Where instructions or explanations are needed for system or equipment operation, provide engraved plastic laminated instruction signs with approved legend. For outdoor items provide butyrate signs with metal backing

(5) For emergency instructions or other emergency operations, provide engraved laminated signs with approved white legend on red background with minimum 3/8–inch high lettering.

Provide sign or stenciled legend to identify equipment concealed behind bolted covers of housing for disconnecting switches, transformers and switchboards.

Stencil or provide an equipment identification label of engraved plastic–laminate of each major unit of electrical equipment; including central or master unit of each electrical system. This includes communication /signal systems, unless a unit is specified with its own self–explanatory identification. Except as otherwise indicated, provide a single line of text, and a minimum 1 inch high lettering. Engraved labels shall be 2 inches high black lettering in white field. Provide text that matches terminology and numbering of the contract document and shop drawings. Provide label for each unit of the following categories of electrical work:

(1) Panelboards, electrical cabinets and enclosures.

(2) Access doors and panels for concealed electrical items.

(3) Transformers

For panelboards, provide circuit schedules with explicit description and identification of items controlled by each individual breaker.

Stencil and install labels at locations for best convenience of viewing without interference with operation and maintenance of equipment.

100–3.10 SECONDARY GROUNDING. Provide secondary grounding as indicated on the Drawings and in accordance with the following Specifications.

a. Section Includes.

1) Materials and methods for grounding constant voltage 600V or less electrical systems only.

2) Grounding conductors.

3) Bonding jumpers.

4) Ground bus.

5) Ground rods.

6) Grounding terminations.

b. References.

(1) American National Standards Institute (ANSI). Comply with the requirements of ANSI C2 National Electric Safety Code.

(2) American Society for Testing and Materials (ASTM). Comply with the requirements of ASTM B1 Standard Specification for Hard–Drawn Copper Wire.

c. Products.

Provide insulated equipment grounding conductors that run in the same raceway with circuit wires.

Provide bare ground conductors for grounding of transformers, power/lighting panels, other service equipment, grounding service poles and electrical equipment structures both underground and above ground. Conductors shall be stranded copper conductors.

Provide braided copper tape constructed of No. 30 gauge bare copper wires sized to suit the application.

Ground rods are as indicated by the Contract Documents and NFPA 70. All rods shall have a hard, clean, smooth continuous surface throughout the entire length of the rod.

Where welded connections are required, such welds shall be made by the exothermic process utilizing factory provided molds.

d. Installation.

Deliver grounding materials in factory–sealed containers and with conductors wound on National Electrical Manufacturers Association (NEMA) wire and cable reels.

Store grounding materials in a clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.

Supplement the grounded neutral of the secondary distribution system with an equipment grounding system to properly safeguard equipment and personnel. The system shall, as a minimum, comply with NFPA 70.

Provide the equipment grounding system so that all metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, frames, portable equipment, and other conductive items in close proximity with electrical circuits operate continuously at ground potential and provide a low impedance path for possible ground fault currents.

Drive electrical system ground rods until the top is 6 inches below the final grade.

Interconnect the electrical system ground rods with bare copper grounding electrode conductors buried at least 24 inches below grade.

Size all required equipment grounding and grounding electrode conductors and straps in compliance with NFPA 70. Provide insulated equipment grounding and grounding electrode conductors of the same type and class for the associated phase and neutral conductors of the secondary distribution system.

Provide the proper number and size of pressure connectors required for all equipment grounding bars in panelboards and other electrical equipment for the termination of equipment grounding conductors. Provide pressure connectors for all active and spare circuits.

Where metallic conduits terminate at a metallic housing without mechanical connection, such as locknuts and bushings, provide each conduit with a ground bushing. Connect each ground bushing with a bare copper bonding jumper to the ground lug or bus in the electrical equipment. Size the conductor as required by NFPA 70.

Make all ground connections with UL listed products.

Where an insulated ground wire is connected to ground rods below grade or in wet locations, insulate the connection and seal against moisture penetrating under the insulation.

100–3.11 PANELBOARDS. Provide panelboards as indicated on the drawings and in accordance with the following Specifications.

a. Section Includes.

(1) Lighting and appliance branch circuit panelboards.

b. Section Does Not Include.

(1) Switchboards.

(2) Service entrance equipment.

c. References.

(1) National Electrical Manufacturers Association (NEMA). Provide panelboards and switches constructed and configured in accordance with the following:

NEMA	AB 1	Molded Case Circuit Breakers and Molded Case Switches
NEMA	KS 1	Encloses Switches
NEMA	PB 1	Panelboards

(2) National Fire Protection Association (NFPA). Conform to the requirements of NFPA 70.

(3) Underwriters Laboratories, Inc. (UL): Construct panelboards in accordance with the following UL publications:

UL	50	Cabinets and Boxes
UL	67	Panelboards
UL	310	Electrical Quick–Correct Terminals
UL	486A	Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL	489	Molded–Case Circuit Breakers and Circuit–Breaker Enclosures
UL	943	Ground–Fault Circuit Interrupters
UL	1053	Ground–Fault Sensing and Relaying Equipment

d. Products.

(1) Lighting and Appliance Panelboards.

Provide panelboards with buses constructed of solid copper, minimum conductivity 98 percent and rectangular shape.

(a) Mechanically mount and brace buses in conformance with UL 67.

(b) Provide solderless lugs for copper cable.

(c) Provide ampacity as indicated on the drawings.

Provide bare, uninsulated copper, factory installed grounding bus with ampacity equal to the main bus. Provide copper pressure connected terminations.

Provide bus bar connections to branch circuits of the sequenced phased type.

(a) Mount in accordance with UL 67.

(b) Provide numbered terminals.

(c) Provide pressure connectors for copper.

Construct enclosures in accordance with UL 50 except modify as hereinafter specified.

(a) Construct of minimum 16–gauge galvanized steel NEMA 3R, unless indicated otherwise in the Contract Documents.

(b) Conform to UL 67 for additional enclosure requirements.

(c) Panelboard, back–box and front plate produced from one manufacturer. Factory fit components before shipment.

(d) Provide enclosure type in conformance with UL 50 and NEMA PB 1.

(e) Provide removable front plates of the dead–front type with removable, and flush hinged enclosure door.

(f) Provide a keyed lock for circuit breaker access cover.

In addition to the priming coat, all inside and outside surfaces of trim and doors shall be given a factory finish coat of gray paint.

Provide factory printed directories with a clear plastic directory cover and metal frame attached to the panel door.

Provide Wiring Space that conforms to the requirements of UL 67. Feed–through gutters are not permitted.

(1) Conform to NFPA 70 for maximum gutter fill.

(2) Conform to UL 67 for minimum width of gutter and wire bending space.

Breakers shall have inverse time automatic tripping.

Provide adjustable trip circuit breakers as noted in the Contract Documents.

Use factory assembled bolt-in type circuit breakers, except breakers 225 amperes frame size and larger may be plug–in type if held in place by positive locking device requiring mechanical release for removal.

Integrally fused circuit breakers with inverse time automatic tripping, and fuses shall conform to

UL 198B, 198C, 198D, 198E, 198F, 198G, 198H, 198L, and 198M.

Provide breakers as indicated in the Contract Documents with current interrupting ratings, in RMS symmetrical amps.

(2) Lighting and appliance Branch Circuit Panelboards.

Provide enclosures, bus systems, spacing and knockouts same as for distribution panelboards.

Provide interrupting ratings, circuit arrangements, and trip settings as noted in the Contract Documents.

Provide common trip mechanisms for multi–pole breakers.

Provide instantaneous automatic trips conforming to NEMA AB 1.

Breakers shall be bolt–on type, factory assembled.

Stab–in circuit breaker types are not acceptable.

Provide quick–make and quick–break mechanism.

e. Installation.

Install panelboards in conformance with NEMA PB 1 and NFPA 70.

Torque lug screws in accordance with UL 486A for copper conductors and UL 486B for aluminum conductors. Install connectors, lugs, neutral bus and other field installed components in accordance with manufacturer's published literature.

Verify gutter size conforms to wire bending space requirements of NFPA 70 and UL 67.

Wire wrap branch circuits in gutters after installation. Use approved wire ties.

Verify maximum gutter fill to conform with NFPA 70 and UL 67.

Verify breaker size, trip setting, and breaker type in conformance with Contract Documents.

Complete typewritten panelboard circuit directory prior to project acceptance.

Only wires made of the conductor material for which the panelboard terminals have been marked shall be used.

100–3.12 OVERCURRENT PROTECTIVE DEVICES. Provide overcurrent protective devices as indicated on the drawings and according to these specifications.

a. Section Includes.

(1) Molded case circuit breakers.

b. Section Does Not Include.

(1) Main service switches.

c. References.

(1) National Electrical Manufacturers Association (NEMA). Provide and install fuses and circuit breakers conforming to NEMA, including:

NEMA	AB-1	Molded Case Circuit Breakers and Molded Case Switches.
NEMA	AB-2	Field Inspection and Performance Verification of Molded Case Circuit. Breakers Used in Commercial and Industrial Applications, Procedures for.
NEMA	AB-3	Molded Case Circuit Breakers and Their Application.
NEMA	FU-1	Low Voltage Cartridge Fuses.

(2) National Fire Protection Association (NFPA). Comply with NFPA 70, "National Electrical Code" requirements as applicable to construction and installation of overcurrent devices.

(3) Underwriters Laboratories, Inc. (UL): Provide overcurrent protective devices that are UL–listed and labeled. Provide fuses and circuit breakers conforming to UL including:

UL	512	Fuse holders
UL	198B	Class H Fuses
UL	198C	High–Interrupting–Capacity Fuses, Current–Limiting Types
UL	198D	Class K Fuses
UL	198E	Class R Fuses
UL	198G	Fuses for Supplementary Overcurrent Protection
UL	198H	Class T Fuses
UL	489	Molded–Case Circuit Breakers and Circuit–Breaker Enclosures.

d. Products.

(1) Molded Case Circuit Breakers.

Circuit breakers shall conform to NEMA AB 1.

Use circuit breakers that have a trip rating and number of poles as indicated on the Contract Documents.

Use circuit breakers that have an interrupting current rating equal to or greater than the available fault current at their location in the electrical system, unless otherwise specified. Provide a minimum rating of 10,000 amperes symmetrical, unless a greater rating is shown on the Contract Documents.

Use circuit breakers from the same manufacturer.

Provide circuit breakers with a quick–made and quick–break toggle mechanism with inverse–time trip characteristics.

Automatic release is to be secured by a bimetallic thermal element releasing the mechanism latch.

Automatic tripping shall be indicated by a handle position between the manual OFF and ON position.

(2) Heavy Duty Safety Switches.

Provide quick make, quick break load interrupter enclosed knife switch assemblies.

Provide fuses that conform to UL 198B, 198C, 198D, 198E 198F, 198G, 198H, 198L, and 198M. Provide fuses of the sizes noted on the Contract Documents.

Install current–limiting fuses instead of regular fuses where the fault current exceeds 10,000 RMS amperes.

Fuses rated over 600 amperes shall be NEMA Class L.

Fuses for use with switches rated 600 amperes and less shall be UL Class RK–5 or RK–1 as noted, unless otherwise specified. Class RK–5 and RK–1 fuses shall be dual element type with minimum time–delay of 10 seconds at 500 percent of rating.

Provide one complete set of fuses installed for all switches requiring fuses. Provide one spare fuse of each size and type installed.

e. Installation.

Install overcurrent protective devices as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NFPA 70 and NEMA standards for installation of overcurrent protective devices.

Coordinate with other work, including electrical wiring work, as necessary to interface installation of overcurrent protective devices with other work.

Fasten overcurrent devices without causing mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cabling.

Install fuses and package the spare fuses in an orderly fashion.

Inspect circuit–breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and short–circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

100–3.13 METHOD OF MEASUREMENT AND BASIS OF PAYMENT. Work specified herein will be measured for payment as part of other Pay Items described in other Specifications. The cost of Work required in this Specification will be included in the prices bid for Pay Items included in the Schedule of Prices.

Item L-108 Underground Power Cable for Airports

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

EQUIPMENT AND MATERIALS

108-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. Data shall be electronically submitted in pdf format. The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

108-2.2 Cable.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors,

pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods). Wire for counterpoise or ground installations for airfield lighting systems shall be No. 2 AWG bare solid copper wire for counterpoise and/or No. 2 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire . For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper . The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet (2.54 m) long and 3/4 inch (19 mm) in diameter.

108-2.4 Cable connections

d. The taped or heat-shrink splice. Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

108-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

108-2.7 Flowable backfill. Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

108-2.8 Cable identification tags. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 Tape. Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

108-2.10 Electrical coating. Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

108-2.11 Existing circuits. Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

108-2.12 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

CONSTRUCTION METHODS

108-3.1 General. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Cable shall be run without splices, from fixture to fixture.

108-3.2 Installation in duct banks or conduits. This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the

current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 Splicing. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Taped or heat-shrink splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer's instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminates prior to application.

b. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer's recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

108-3.4 Exothermic bonding. Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.5 Testing. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

a. Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

b. Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

c. That all affected power and control circuits (existing and new) are continuous and free from short circuits.

d. That all affected circuits (existing and new) are free from unspecified grounds.

e. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

f. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

g. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

h. That the impedance to ground of each ground rod does not exceed **5** ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

METHOD OF MEASUREMENT

108-4.1 Trenching shall be measured by the linear feet (meters) of trench, including the excavation, backfill, and restoration, completed, measured as excavated, and accepted as satisfactory. When specified, separate measurement shall be made for trenches of various specified widths.

The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

108-4.2 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet (meters) installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall include additional quantities required for slack.

108-4.3 Ground rods shall be measured by each 10-foot section installed complete.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the RPR. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

Item L-108-5.1	Trenching for direct-buried cable, 18-inch minimum depth - per linear foot (meter)
Item L-108-5.2	No. 2 AWG, #6 AWG, #10, #12 AWG 600V Cable, Installed in Trench, Duct Bank or Conduit - per liner foot (meter)
Item L-108-5.3	No. 2 AWG, Solid, Bare Copper Wire, **ground ring per plans**, Including Connections/Terminations - per linear foot (meter)
Item L-108-5.4a	No. 2 AWG Insulated , Stranded, Installed in or Conduit – per linear foot (meter).
Item L-108-5.4b	No. 6 AWG Insulated , Stranded Equipment Ground , Installed in or Conduit – per linear foot (meter).
Item L-108-5.4c	No. 10 AWG Insulated , Stranded Equipment Ground , Installed in or Conduit – per linear foot (meter).

REFERENCES

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

Advisory Circulars (AC)

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

(SPECIFICATIONS FOR NAVAIDS RELOCATION)

Commercial Item Description

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

ASTM International (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

Mil Spec

MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Federal Aviation Administration Standard

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

END OF ITEM L-108

(SPECIFICATIONS FOR NAVAIDS RELOCATION)

Item L-110 Airport Underground Electrical Duct Banks and Conduits

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits **[** and removal of existing duct banks **]**. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

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

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

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

110-2.2 Steel conduit. Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

110-2.3 Plastic conduit. Plastic conduit and fittings-shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.

- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

a. Type I–Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC suitable for either above ground or underground use.

c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.

d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

110-2.5 Conduit spacers. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

110-2.6 Concrete. Concrete shall be proportioned, placed, and cured per state department of transportation structural concrete with minimum 25% Type F fly ash, and a minimum allowable compressive strength of 4,000 psi (28 MPa).

110-2.7 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

110-2.8 Flowable backfill. Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

110-2.9 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item.

CONSTRUCTION METHODS

110-3.1 General. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in

access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the RPR.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the RPR to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the RPR and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables) cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

110-3.2 Duct banks. Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the RPR shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the RPR.

110-3.3 Conduits without concrete encasement. Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

110-3.4 Markers. The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word "DUCT" or "CONDUIT" on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and

1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

110-3.5 Backfilling for conduits. For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.6 Backfilling for duct banks. After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 "Excavation and Embankment" except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet (76 m) of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.7 Restoration. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include sodding **,** fertilizing **,** seeding **as needed** to restore original conditions to the RPR's satisfaction. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

110-3.8 Ownership of removed cable. All removed cable shall become property of the airport and shall be placed in a lay down area as designated by the RPR.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet (meter) of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Item L-110-5.2a `Non-Encased` Electrical Conduit, **HDPE Conduit ,** `2"` - per linear foot

(SPECIFICATIONS FOR NAVAIDS RELOCATION)

Item L-110-5.2b Non-Encased Electrical Conduit, **Schedule 80 PVC , 2″** - per linear foot

REFERENCES

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

Advisory Circular (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

(SPECIFICATIONS FOR NAVAIDS RELOCATION)

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Item L-115 Electrical Manholes and Junction Structures

DESCRIPTION

115-1.1 This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the RPR. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the RPR including removal of existing manholes and junction structures as shown on the plans .

EQUIPMENT AND MATERIALS

115-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications**.** The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

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

115-2.7 Frames and covers. The frames shall conform to one of the following requirements:

a. ASTM A48 Gray iron castings

b. ASTM A47 Malleable iron castings

c. ASTM A27 Steel castings

d. ASTM A283, Grade D Structural steel for grates and frames

e. ASTM A536 Ductile iron castings

f. ASTM A897 Austempered ductile iron castings

Each cover shall have the word "ELECTRIC" or other approved designation cast on it. Each frame and cover shall be as shown on the plans or approved equivalent. No cable notches are required.

Each manhole shall be provided with a "DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" safety warning sign as detailed in the Contract Documents and in accordance with OSHA 1910.146 (c)(2).

115-2.8 Ladders. Ladders, if specified, shall be galvanized steel or as shown on the plans.

115-2.9 Reinforcing steel. All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

115-2.10 Bedding/special backfill. Bedding or special backfill shall be as shown on the plans.

115-2.11 Flowable backfill. Flowable material used to backfill shall conform to the requirements of Item P-153, Controlled Low Strength Material.

115-2.13 Plastic conduit. Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

115-2.14 Conduit terminators. Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

115-2.15 Pulling-in irons. Pulling-in irons shall be manufactured with 7/8-inch (22 mm) diameter hot-dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2-inch (12 mm) diameter with an ultimate strength of 270,000 psi (1862 MPa)). Where stress-relieved carbon steel roping is used, a rustproof sleeve shall be installed at the hooking point and all exposed surfaces shall be encapsulated with a polyester coating to prevent corrosion.

115-2.16 Ground rods. Ground rods shall be one piece, copper **.** The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 10 feet (3 m) long nor less than 3/4 inch (20 mm) in diameter.

CONSTRUCTION METHODS

115-3.1 Unclassified excavation. It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the RPR without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the RPR. Structures shall be placed after the RPR has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches (150 mm) of sand or a material approved by the RPR as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

115-3.3 Precast unit installations. Precast units shall be installed plumb and true. Joints shall be made watertight by use of sealant at each tongue-and-groove joint and at roof of manhole. Excess sealant shall be removed and severe surface projections on exterior of neck shall be removed.

115-3.4 Placement and treatment of castings, frames and fittings. Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

115-3.7 Backfilling. After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches (150 mm) in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

Backfill shall not be placed against any structure until approval is given by the RPR. In the case of concrete, such approval shall not be given until tests made by the laboratory under supervision of the RPR establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the RPR may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

115-3.8 Connection of duct banks. To relieve stress of joint between concrete-encased duct banks and structure walls, reinforcement rods shall be placed in the structure wall and shall be formed and tied into duct bank reinforcement at the time the duct bank is installed.

115-3.9 Grounding. A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches (150 mm) above the floor. The ground rod shall be installed within one foot (30 cm) of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch (100 mm) diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot (30 cm) above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtails shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

115-3.11 Restoration. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective Item L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

115-3.12 Inspection. Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

METHOD OF MEASUREMENT

115-4.1 Electrical manholes and junction structures shall be measured by each unit completed in place and accepted. The following items shall be included in the price of each unit: All required excavation and dewatering:; sheeting and bracing; all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; temporary cables and connections; and ground rod testing

115-4.2 Manhole elevation adjustments shall be measured by the completed unit installed, in place, completed, and accepted. Separate measurement shall not be made for the various types and sizes.

BASIS OF PAYMENT

115-5.1 The accepted quantity of electrical manholes and junction structures will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials, furnishing and installation of appurtenances and connections to duct banks and other structures as may be required to complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

115-5.2 Payment shall be made at the contract unit price for manhole elevation adjustments. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary, including but not limited to, spacers, concrete, rebar, dewatering, excavating, backfill, topsoil, sodding and pavement restoration, where required, to complete this item as shown in the plans and to the satisfaction of the RPR.

Payment will be made under:

Item L-115-5.2	Electrical Junction Structure 48” X 48” X 48” polymer concrete - Per Each

REFERENCES

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

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Advisory Circular (AC)

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation)

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C206	Standard Specification for Finishing Hydrated Lime

FAA Engineering Brief (EB)

EB #83	In Pavement Light Fixture Bolts

Mil Spec

MIL-P-21035	Paint High Zinc Dust Content, Galvanizing Repair

National Fire Protection Association (NFPA)

NFPA-70 National Electrical Code (NEC)

END OF ITEM L-115

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Item L-109

Airport Transformer Vault and Vault Equipment

DESCRIPTION

109-1.1 This item shall consist of removing existing equipment from an existing airport transformer vault, modifying the existing airport transformer vault, and adding new equipment per these specifications and per the design and dimensions shown in the plans. This work shall also include the installation of conduits in the floor and foundation, painting and lighting of the vault or metal housing, and the furnishing of all incidentals that are necessary to produce a completed unit. Included as a separate part under this item or as a separate item where an existing vault is to be used shall be the furnishing of all vault equipment, wiring, electrical buses, cable, conduit, potheads, and grounding systems. This work shall also include the painting of equipment and conduit; the marking and labeling of equipment and the labeling or tagging of wires; the testing of the installation; and the furnishing of all incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

109-2.1 GENERAL.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be certified in AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be provided in electronic pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final

acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

CONSTRUCTION OF VAULT AND PREFABRICATED METAL HOUSING

109-3.1 ELECTRICAL VAULT BUILDING. Not Used.

109-3.2 CONCRETE. Concrete shall be proportioned, placed, and cured per state department of transportation structural concrete with minimum 25% Type F fly ash, and a minimum allowable compressive strength of 4,000 psi (28 MPa).

109-3.3 PRECAST CONCRETE STRUCTURES. Not Used.

109-3.4 REINFORCING STEEL. Not Used.

109-3.5 BRICK. Not Used.

109-3.6 RIGID STEEL CONDUIT. Rigid steel conduit and fittings shall be per Underwriters Laboratories Standards 6 and 514B.

109-3.7 PLASTIC CONDUIT AND FITTINGS. Plastic Conduit and fittings shall conform to the requirements of UL-651 and UL-654 schedule 40 polyvinyl chloride (PVC) suitable for use above or below ground.

109-3.8 LIGHTING. Not Used.

109-3.9 OUTLETS. Not Used.

109-3.10 SWITCHES. Not Used.

109-3.11 PAINT. Not Used.

109-3.12 GROUND BUS. Ground bus shall be 1/8 x 3/4 inch (3 x 19 mm) minimum copper bus bar.

109-3.13 SQUARE DUCT. Duct shall be square similar to that manufactured by the Square D Company (or equivalent), or the Trumbull Electric Manufacturing Company (or equivalent). The entire front of the duct on each section shall consist of hinged or removable cover for ready access to the interior. The cross- section of the duct shall be not less than 4 x 4 inch (100 x 100 mm) except where otherwise shown in the plans.

109-3.14 GROUND RODS. Ground rods shall be in accordance with Item L-108.

109-3.15 VAULT PREFABRICATED METAL HOUSING. Not Used.

109-3.16 FAA-APPROVED EQUIPMENT. Certain items of airport lighting equipment installed in vaults are covered by individual ACs listed below:

AC 150/5345-3	Specification for L-821, Panels for Remote Control of Airport Lighting AC 150/5345-5 Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors
AC 150/5345-13	Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of

Airport Lighting Circuits.

AC 150/5345-49 Specification for L-854, Radio Control Equipment

AC 150/5345-56 Specification for L-890 Airport Lighting Control and Monitoring System (ALCMS)

109-3.17 OTHER ELECTRICAL EQUIPMENT. Distribution transformers, oil switches, cutouts, relays, terminal blocks, transfer relays, circuit breakers, and all other regularly used commercial items of electrical equipment not covered by FAA equipment specifications and ACs shall conform to the applicable rulings and standards of the Institute of Electrical and Electronic Engineers (IEEE) or the National Electrical Manufacturers Association (NEMA). When specified, test reports from a testing laboratory indicating that the equipment meets the specifications shall be supplied. In all cases, equipment shall be new and a first- grade product. This equipment shall be supplied in the quantities required for the specific project and shall incorporate the electrical and mechanical characteristics specified in the proposal and plans.

Equipment selected and installed by the Contractor shall maintain the interrupting current rating of the existing systems or specified rating whichever is greater.

109-3.18 WIRE. Wire (in conduit) rated up to 5,000 volts shall be per AC 150/5345-7, Specification for L- 824 Underground Electrical Cables for Airport Lighting Circuits. For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item Description A-A-59544A Type THWN-2 shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal.

a. Control circuits. Unless otherwise indicated on the plans, wire shall be not less than No. 12 American wire gauge (AWG) and shall be insulated for 600 volts. If telephone control cable is specified, No. 19 AWG telephone cable per ANSI/Insulated Cable Engineers Association (ICEA) S-85-625 specifications shall be used.

b. Power circuits.

(1) 600 volts maximum – Wire shall be No. 6 AWG or larger and insulated for at least 600 volts.

(2) 3,000 volts maximum – Wire shall be No. 6 AWG or larger and insulated for at least 3,000 volts.

(3) Over 3,000 volts – Wire shall be No. 6 AWG or larger and insulated for at least the circuit voltage.

109-3.19 SHORT CIRCUIT / COORDINATION / DEVICE EVALUATION / ARC FLASH ANALYSIS. The Contractor shall, based upon the equipment provided, include as a part of the submittal process the electrical system "Short Circuit / Coordination / Device evaluation / Arc Flash Analysis". The analysis shall be performed by the equipment manufacturer and submitted in a written report. The analysis shall be signed and sealed by a registered professional Engineer from the state in which the project is located. The analysis shall comply with NFPA-70E and IEEE 1584.

The analysis will include: one line diagrams, short circuit analysis, coordination analysis, equipment evaluation, arc flash analysis and arc flash labels containing at a minimum, equipment name, voltage/current rating, available incident energy and flash protection boundary.

The selected firms field service Engineer shall perform data gathering for analysis completion and device settings, perform device setting as recommended by the analysis and will furnish and install the arc flash labels. The components worst case incident energy will be considered the available arc flash energy at

that specific point in the system. Submit three written copies and one electronic copy of the report.

CONSTRUCTION METHODS

CONSTRUCTION OF VAULT AND PREFABRICATED METAL HOUSING

109-4.1 GENERAL.
The Contractor shall modify the existing transformer vault as indicated in the plans. The installation methods, and equipment placement are shown in the plans.

The Contractor is responsible for contacting the manufacturer of the required equipment to be installed to obtain environmental limitations of the equipment to be installed. Refer to the electrical vault detail plan sheets for construction requirements.

109-4.2 FOUNDATION AND WALLS. Not Used.

109-4.3 ROOF. Not Used.

109-4.4 FLOOR. Not Used.

109-4.5 FLOOR DRAIN. Not Used.

109-4.6 CONDUITS IN FLOOR AND FOUNDATION. Conduits shall be installed in the floor and through the foundation walls per the details shown in the plans. All underground conduit shall be painted with an asphalt compound. Conduit shall be installed with a coupling or metal conduit adapter flush with the top of the floor. All incoming conduit shall be closed with a pipe plug to prevent the entrance of foreign material during construction. Space conduit entrances shall be left closed.

109-4.7 DOORS. Not Used.

109-4.8 PAINTING. Not Used.

109-4.9 LIGHTS AND SWITCHES. Not Used.

INSTALLATION OF EQUIPMENT IN VAULT OR PREFABRICATED METAL HOUSING

109-5.1 GENERAL. The Contractor shall furnish, install, and connect all equipment, equipment accessories, conduit, cables, wires, buses, grounds, and support necessary to ensure a complete and operable electrical distribution center for the airport lighting system as specified herein and shown in the plans. When specified, an emergency power supply and transfer switch shall be provided and installed.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and local code agency having jurisdiction. All electrical work shall comply with the NEC and local code agency having jurisdiction including the separation of under 600V work from 5,000V work."

109-5.2 POWER SUPPLY EQUIPMENT. Transformers, regulators, booster transformers, and other power supply equipment items shall be furnished and installed at the location shown in the plans or as directed by the RPR. The power supply equipment shall be set on steel "H" sections, "I" beams, channels, or concrete blocks to provide a minimum space of 1-1/2 inch (38 mm) between the equipment and the floor. The equipment shall be placed so as not to obstruct the oil-sampling plugs of the oil-filled units; and name-plates shall, so far as possible, not be obscured.

If specified in the plans and specifications, equipment for an alternate power source or an emergency power generator shall be furnished and installed. The alternate power supply installation shall include all equipment, accessories, an automatic changeover switch, and all necessary wiring and connections. The emergency power generator set shall be the size and type specified.

109-5.3 SWITCHGEAR AND PANELS. Oil switches, fused cutouts, relays, transfer switches, panels, panel boards, and other similar items shall be furnished and installed at the location shown in the plans or as directed by the RPR. Wall or ceiling mounted items shall be attached to the wall or ceiling with galvanized bolts of not less than 3/8-inch (9 mm) diameter engaging metal expansion shields or anchors in masonry or concrete vaults.

109-5.4 DUCT AND CONDUIT. The Contractor shall furnish and install square-type exposed metallic ducts with hinged covers for the control circuits in the vault. These shall be mounted along the walls behind all floor-mounted equipment and immediately below all wall-mounted equipment. The hinged covers shall be placed to open from the front side with the hinges at the front bottom.

Wall brackets for square ducts shall be installed at all joints 2 feet (60 cm) or more apart with intermediate brackets as specified. Conduit shall be used between square ducts and equipment or between different items of equipment when the equipment is designed for conduit connection. When the equipment is not designed for conduit connection, conductors shall enter the square-type control duct through insulating bushings in the duct or on the conduit risers.

109-5.5 WIRING AND CONNECTIONS. The Contractor shall make all necessary electrical connections in the vault per the wiring diagrams furnished and as directed by the RPR. In wiring to the terminal blocks, the Contractor shall leave sufficient extra length on each control lead to make future changes in connections at the terminal block. This shall be accomplished by running each control lead the longest way around the box to the proper terminal. Leads shall be neatly laced in place.

109-5.6 MARKING AND LABELING. All equipment, control wires, terminal blocks, etc., shall be tagged, marked, or labeled as specified below:

a. Wire identification. The Contractor shall furnish and install self-sticking wire labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks. Wire labels, if used, shall be of the self-sticking preprinted type and of the manufacturer's recommended size for the wire involved. Identification -markings designated in the plans shall be followed. Tags, if used, shall be of fiber not less than 3/4 inch (19 mm) in diameter and not less than 1/32 inch (1 mm) thick. Identification markings designated in the plans shall be stamped on tags by means of small tool dies. Each tag shall be securely tied to the proper wire by a nonmetallic cord.

b. Labels. The Contractor shall stencil identifying labels on the cases of regulators, breakers, and distribution and control relay cases with white oil paint as designated by the RPR. The letters and numerals shall be not less than one inch (25 mm) in height and shall be of proportionate width. The Contractor shall also mark the correct circuit designations per the wiring diagram on the terminal marking strips, which are a part of each terminal block.

METHOD OF MEASUREMENT

109-6.1 The quantity of vaults to be paid for under this item shall consist of the number of vaults constructed in place and accepted as a complete unit.

109-6.2 The quantity of prefabricated metal housings to be paid for under this item shall consist of the number of housings constructed in place and accepted as a complete unit.

109-6.3 The quantity of equipment to be paid for under this item shall consist of all equipment installed,

connected and accepted as a complete unit ready for operation within an existing vault or prefabricated metal housing.

BASIS OF PAYMENT

109-7.1 Payment will be made at the contract unit price for each completed and accepted vault or prefabricated metal housing equipment installation. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item L-109-7.1	Installation of 2.5 kW Constant Current Regulator in Place and Operational Including 5KV cutouts - per each
Item L-109-7.2	Modifications to L-854 Radio Control Equipment to include panel relabeling, in Place and Operational—per lump sum.

REFERENCES

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

Advisory Circulars (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-3	Specification for L-821, Panels for Remote Control of Airport Lighting
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors
AC 150/5345-13	Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits
AC 150/5345-49	Specification L-854, Radio Control Equipment; AC 150/5345-53 Airport Lighting Equipment Certification Program

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/ICEA S-85-625	Standard for Telecommunications Cable Aircore, Polyolefin Insulated, Copper Conductor Technical Requirements

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C62	Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C90	Standard Specification for Loadbearing Concrete Masonry Units
ASTM D2823	Standard Specification for Asphalt Roof Coatings, Asbestos Containing
ASTM D4479	Standard Specification for Asphalt Roof Coatings – Asbestos-Free

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation) Institute of Electrical and Electronic Engineers (IEEE)
IEEE 1584	Guide for Performing Arc-Flash Hazard Calculations

Master Painter's Institute (MPI)

MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-70E	Standard for Electrical Safety in the Workplace
NFPA-780	Standard for the Installation of Lightning Protection Systems

END OF ITEM L-109

ITEM L-110

AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrel ling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 GENERAL.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

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

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

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

110-2.2 STEEL CONDUIT. Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and

1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

110-2.3 PLASTIC CONDUIT. Plastic conduit and fittings-shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

a. Type I–Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC suitable for either above ground or underground use.

c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.

d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

110-2.4 SPLIT CONDUIT. Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

110-2.5 CONDUIT SPACERS. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

110-2.6 CONCRETE. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

110-2.7 PRECAST CONCRETE STRUCTURES. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

110-2.8 FLOWABLE BACKFILL. Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

110-2.9 DETECTABLE WARNING TAPE. Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Tape shall be red in color with "Electrical" on the tape.

CONSTRUCTION METHODS

110-3.1 GENERAL. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is

disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may alternatively be used.

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the RPR.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the RPR to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.
Any excess excavation shall be filled with suitable material approved by the RPR and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables) cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

110-3.2 DUCT BANKS. Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18

inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.
All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the RPR shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the RPR.

110-3.3 CONDUITS WITHOUT CONCRETE ENCASEMENT. Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

110-3.4 MARKERS. The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word “DUCT” or “CONDUIT” on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

110-3.5 BACKFILLING FOR CONDUITS. For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.6 BACKFILLING FOR DUCT BANKS. After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 “Excavation and Embankment” except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test

per lift shall be made for each 250 linear feet (76 m) of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.
Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.7 RESTORATION. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include sodding, topsoiling, and fertilizing shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD) and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

110-3.8 OWNERSHIP OF REMOVED CABLE. The Contractor shall dispose of all removed cables off airport property.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet (meter) of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

Item L-110-5.1	Electrical Conduit, 2" Schedule 40 PVC, Type II Installed in Trench – linear foot (meter)
Item L-110-5.2	Electrical Conduit, 2" HDPE, Jacked or Bored Under Taxiway In Steel Casing (Steel Casing Included in This Item) - linear foot (meter)
Item L-110-5.3	Electrical Duct, 4-Way, 4" And 1-Way, 2" High Density Polyethylene Conduit, Directional Bore, Installed- linear foot (meter)

REFERENCES

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

Advisory Circular (AC)

AC 150/5340-30 Design and Installation Details for Airport Visual Aids
AC 150/5345-53 Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70 National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

ITEM L-115

ELECTRICAL MANHOLES AND JUNCTION STRUCTURES

DESCRIPTION

115-1.1 This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the RPR. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the RPR

EQUIPMENT AND MATERIALS

115-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

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

115-2.2 CONCRETE STRUCTURES. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Cast-in-place concrete structures shall be as shown on the plans.

115-2.3 PRECAST CONCRETE STRUCTURES. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another engineer approved third party certification program. Provide precast concrete structures where shown on the plans.

Precast concrete structures shall be an approved standard design of the manufacturer. Precast units shall have mortar or bitumastic sealer placed between all joints to make them watertight. The structure shall be designed to withstand 200,000 lb aircraft loads, unless otherwise shown on the plans. Openings or knockouts shall be provided in the structure as detailed on the plans.

Threaded inserts and pulling eyes shall be cast in as shown on the plans.

If the Contractor chooses to propose a different structural design, signed and sealed shop drawings, design calculations, and other information requested by the RPR shall be submitted by the Contractor to allow for a full evaluation by the RPR. The RPR shall review per the process defined in the General Provisions.

115-2.4 JUNCTION BOXES. Junction boxes shall be L-867 Class 1 (non-load bearing) or L-868 Class 1 (load bearing) airport light bases that are encased in concrete. The light bases shall have a L-894 blank cover, gasket, and stainless steel hardware. All bolts, studs, nuts, lock washers, and other similar fasteners used for the light fixture assemblies must be fabricated from 316L (equivalent to EN 1.4404), 18-8, 410, or 416 stainless steel. If 18-8, 410, or 416 stainless steel is utilized it shall be passivated and be free from any discoloration. Covers shall be 3/8-inch (9-mm) thickness for L-867 and 3/4-inch (19-mm) thickness for L-868. All junction boxes shall be provided with both internal and external ground lugs.

115-2.5 MORTAR. The mortar shall be composed of one part of cement and two parts of mortar sand, by volume. The cement shall be per the requirements in ASTM C150, Type I. The sand shall be per the requirements in ASTM C144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C206. Water shall be potable, reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product.

115-2.6 CONCRETE. All concrete used in structures shall conform to the requirements of Item P-610, Concrete for Miscellaneous Structures. No direct payment will be made for required concrete. It shall be considered subsidiary obligation to the appropriate pay item.

115-2.7 FRAMES AND COVERS. The frames shall conform to one of the following requirements:

a. ASTM A48 Gray iron castings
b. ASTM A47 Malleable iron castings
c. ASTM A27 Steel castings
d. ASTM A283, Grade D Structural steel for grates and frames
e. ASTM A536 Ductile iron castings
f. ASTM A897 Austempered ductile iron castings

All castings specified shall withstand a maximum tire pressure of 200 psi and maximum load of 200,000 lbs.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings specified.

Each frame and cover unit shall be provided with fastening members to prevent it from being dislodged by traffic, but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

Each cover shall have the word "ELECTRIC" or other approved designation cast on it. Each frame and cover shall be as shown on the plans or approved equivalent. No cable notches are required.

Each manhole shall be provided with a "DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" safety warning sign as detailed in the Contract Documents and in accordance with OSHA 1910.146 (c)(2).

115-2.8 LADDERS. Ladders, if specified, shall be galvanized steel or as shown on the plans.

115-2.9 REINFORCING STEEL. All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

115-2.10 BEDDING/SPECIAL BACKFILL. Bedding or special backfill shall be as shown on the plans.

115-2.11 FLOWABLE BACKFILL. Flowable material used to backfill shall conform to the requirements of Item P-153, Controlled Low Strength Material.

115-2.12 CABLE TRAYS. Cable trays are existing, to be reused as needed.

115-2.13 PLASTIC CONDUIT. Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

115-2.14 CONDUIT TERMINATORS. Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

115-2.15 PULLING-IN IRONS. Pulling-in irons shall be manufactured with 7/8-inch (22 mm) diameter hot- dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2-inch (12 mm) diameter with an ultimate strength of 270,000 psi (1862 MPa)). Where stress-relieved carbon steel roping is used, a rustproof sleeve shall be installed at the hooking point and all exposed surfaces shall be encapsulated with a polyester coating to prevent corrosion.

115-2.16 GROUND RODS. Ground rods shall be one piece, copper clad steel . The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 8 feet (2.4 m) long nor less than 5/8 inch (16 mm) in diameter.

CONSTRUCTION METHODS

115-3.1 UNCLASSIFIED EXCAVATION. It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the RPR without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the RPR. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the RPR. Structures shall be placed after the RPR has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches (150 mm) of sand or a material approved by the RPR as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

115-3.2 CONCRETE STRUCTURES. Concrete structures shall be built on prepared foundations conforming to the dimensions and form indicated on the plans. The concrete and construction methods shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

115-3.3 PRECAST UNIT INSTALLATIONS. Precast units shall be installed plumb and true. Joints shall be made watertight by use of sealant at each tongue-and-groove joint and at roof of manhole. Excess sealant shall be removed and severe surface projections on exterior of neck shall be removed.

115-3.4 PLACEMENT AND TREATMENT OF CASTINGS, FRAMES AND FITTINGS. All castings, frames and fittings shall be placed in the positions indicated on the Plans or as directed by the RPR and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all

anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

Field connections shall be made with bolts, unless indicated otherwise. Welding will not be permitted unless shown otherwise on the approved shop drawings and written approval is granted by the casting manufacturer. Erection equipment shall be suitable and safe for the workman. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and fitting of parts shall be reported immediately to the RPR and approval of the method of correction shall be obtained. Approved corrections shall be made at Contractor's expense.

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

115-3.5 INSTALLATION OF LADDERS. Ladders shall be installed such that they may be removed if necessary. Mounting brackets shall be supplied top and bottom and shall be cast in place during fabrication of the structure or drilled and grouted in place after erection of the structure.

115-3.6 REMOVAL OF SHEETING AND BRACING. In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than 6 inches (150 mm) of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The RPR may direct the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

115-3.7 BACKFILLING. After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches (150 mm) in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

Backfill shall not be placed against any structure until approval is given by the RPR. In the case of concrete, such approval shall not be given until tests made by the laboratory under supervision of the RPR establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the RPR may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

115-3.8 CONNECTION OF DUCT BANKS. To relieve stress of joint between concrete-encased duct banks and structure walls, reinforcement rods shall be placed in the structure wall and shall be formed and tied into

duct bank reinforcement at the time the duct bank is installed.

115-3.9 GROUNDING. A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches (150 mm) above the floor. The ground rod shall be installed within one foot (30 cm) of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch (100 mm) diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot (30 cm) above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtails shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

115-3.10 CLEANUP AND REPAIR. After erection of all galvanized items, damaged areas shall be repaired by applying a liquid cold-galvanizing compound per MIL-P-21035. Surfaces shall be prepared and compound applied per the manufacturer's recommendations.

Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

115-3.11 RESTORATION. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective Item L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD) and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

115-3.12 INSPECTION. Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per

American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

115-3.13 MANHOLE ELEVATION ADJUSTMENTS. The Contractor shall adjust the tops of existing manholes in areas designated in the Contract Documents to the new elevations shown. The Contractor shall be responsible for determining the exact height adjustment required to raise or lower the top of each manhole to the new elevations. The existing top elevation of each manhole to be adjusted shall be determined in the field and subtracted/added from the proposed top elevation.

The Contractor shall remove/extend the existing top section or ring and cover on the manhole structure or manhole access. The Contractor shall install precast concrete sections or grade rings of the required dimensions to adjust the manhole top to the new proposed elevation or shall cut the existing manhole walls to shorten the existing structure, as required by final grades. The Contractor shall reinstall the manhole top section or ring and cover on top and check the new top elevation.

The Contractor shall construct a concrete slab around the top of adjusted structures located in graded areas that are not to be paved. The concrete slab shall conform to the dimensions shown on the plans.

115-3.14 DUCT EXTENSION TO EXISTING DUCTS. Where existing concrete encased ducts are to be extended, the duct extension shall be concrete encased plastic conduit. The fittings to connect the ducts together shall be standard manufactured connectors designed and approved for the purpose. The duct extensions shall be installed according to the concrete encased duct detail and as shown on the plans.

METHOD OF MEASUREMENT

115-4.1 Electrical manholes and junction structures shall be measured by each unit completed in place and accepted. The following items shall be included in the price of each unit: All required excavation and dewatering:; sheeting and bracing; all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; temporary cables and connections; and ground rod testing.

115-4.2 Manhole elevation adjustments shall be measured by the completed unit installed, in place, completed, and accepted. Separate measurement shall not be made for the various types and sizes.

BASIS OF PAYMENT

115-5.1 The accepted quantity of electrical manholes and junction structures will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials, furnishing and installation of appurtenances and connections to duct banks and other structures as may be required to complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

115-5.2 Payment shall be made at the contract unit price for manhole elevation adjustments. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary, including but not limited to, spacers, concrete, rebar, dewatering, excavating, backfill, topsoil, sodding and pavement restoration, where required, to complete this item as shown in the plans and to the satisfaction of the RPR.

Payment will be made under:

Item L-115-5.1	Electrical Junction Can, L-867, Size B, Class 1, Complete, In Place- Per Each
Item L-115-5.2	Electrical Junction Can, L-867, Size D, Class 1, Complete, In Place - Per Each

REFERENCES

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

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Advisory Circular (AC)

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation)

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C206	Standard Specification for Finishing Hydrated Lime

FAA Engineering Brief (EB)

EB #83	In Pavement Light Fixture Bolts

Mil Spec

MIL-P-21035	Paint High Zinc Dust Content, Galvanizing Repair

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

END OF ITEM L-115

Item P-152 Excavation, Subgrade, and Embankment

DESCRIPTION

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

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

a. Unclassified excavation. Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature.

152-1.3 Unsuitable excavation. Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

152-1.4 Embankment Properties. Embankment shall have a maximum Plasticity Index (PI) of 25 and a maximum organic content of 5.0%. Soils with a silt content of 50% or greater and a Plasticity Index (PI) of 10 or less will not be allowed. Embankment shall be compacted to at least 98% of maximum dry density at optimum moisture content according to ASTM D1557. In-place density measurements should be taken to assure this degree of compaction

Embankment shall have a Subgrade Modulus (k) of 125 psi/inch and a CBR of 3.5 (per Final Geotechnical Report).

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

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

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

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (100 mm), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 12 inches (150 mm) of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary

precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

a. Blasting. Blasting shall not be allowed.

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

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

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

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

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

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

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

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

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

There are no borrow sources within the boundaries of the airport property. The Contractor shall locate and obtain borrow sources, subject to the approval of the RPR. The Contractor shall notify the RPR at least 15 days prior to beginning the excavation so necessary measurements and tests can be made by the RPR. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

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

152-2.5 Preparation of cut areas or areas where existing pavement has been removed. In those areas on which a subbase or base course is to be placed, the top 12 inches (300 mm) of subgrade shall be compacted to not less than 100 % of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D1557. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

152-2.6 Preparation of embankment area. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches (150 mm) and shall then be compacted per paragraph 152-2.10.

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

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

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

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

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

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

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

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

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

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

The [contractor] will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with D 1557. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the [contractor] for every 3,000 square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

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

Rolling operations shall be continued until the embankment is compacted to not less than 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D 1557. Under all areas to be paved, the embankments shall be compacted to a depth of 12” and to a density of not less than 95% percent of the maximum density as determined by ASTM D1557. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

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

The in-place field density shall be determined in accordance with ASTM 6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. The Contractor’s laboratory shall perform all density tests in the RPR’s presence and provide the test results upon completion to the RPR for acceptance. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

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

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion

of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

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

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

Payment for compacted embankment will be made under embankment in-place and no payment will be made for excavation, borrow, or other items.

152-2.9 Proof rolling. The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. After compaction is completed, the subgrade area shall be proof rolled with a 20 ton (18.1 metric ton) Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to100 psi in the presence of the RPR. Apply a minimum of 25% coverage, or as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch (25 mm) or show permanent deformation greater than 1 inch (25 mm) shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

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

The material to be compacted shall be within ±2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, follow the methods in ASTM D698 and ASTM D1557 Tests for moisture content and compaction will be taken at a minimum of 3,000 S.Y. of subgrade. All quality assurance testing shall be done by the Contractor's laboratory in the presence of the RPR, and density test results shall be furnished upon completion to the RPR for acceptance determination.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

METHOD OF MEASUREMENT

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

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

152-3.2 The quantity of embankment in place shall be the number of cubic yards (cubic meters) measured in its final position.

BASIS OF PAYMENT

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

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

Payment will be made under:

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

Item P-152-4.2 Embankment in place - per cubic yard (cubic meter)

REFERENCES

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

American Association of State Highway and Transportation Officials (AASHTO)

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

ASTM International (ASTM)

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

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

Advisory Circulars (AC)

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

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

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

END OF ITEM P-152

Item P-154 Subbase Course

DESCRIPTION

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

MATERIALS

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

The subbase material shall exhibit a **California Bearing Ratio (CBR) value of at least 3.5** when tested in accordance with ASTM D1883. The subbase material shall meet the minimum requirements specified in the below:

Subbase Gradation Requirements

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

Sieve designation	Percentage by weight passing sieves		Contractor's Final Gradation	Job Control Grading Band Tolerances[1] (Percent)
	Subbase Aggregate	Recycled pavement (RAP or RCO)		
No. 200 (75 µm)	[0-15]	[0-15]		±5

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

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

The Subbase Material should have a maximum PI of 25 and a maximum Organic Content of 5percent. Soils with a silt content of 50 percent or greater and also a Plasticity Index (PI) of 10 or less will not be allowed. It should be compacted to at least 98 percent of Maximum Dry Density at Optimum Moisture Content according to ASTM D-698. In-Place density measurements should be taken to assure that this degree of compaction is achieved.

154-2.2 Sampling and testing.

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

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

154-2.3 Separation Geotextile. Separation geotextile shall be Class 2; 0.02 sec-1 permittivity per ASTM D4491; Apparent opening size per ASTM D4751 with 0.60 mm maximum average roll value.

154-2.4 Geogrid. Not used.

CONSTRUCTION METHODS

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

Granular subbases which, due to grain sizes or shapes, are not sufficiently stable to support the construction equipment without movement, shall be mechanically modified to the depth necessary to provide stability as directed by the RPR. The mechanical modification shall include the addition of a fine-

grained medium to bind the particles of the subbase material sufficiently to furnish a bearing strength, so the course will not deform under construction equipment traffic.

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

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

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

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

154-3.4 Placement. The material shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted. The material shall not be placed when the underlying course is soft or yielding.

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

The material shall be deposited in lifts of 8 inches of loose material and compacted per section 154-3.5 Compaction.

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

154-3.5 Compaction. The subbase material shall be compacted, adjusting moisture as necessary, to be within ±2% of optimum moisture. The field density of the compacted material shall be at least 98% of the

maximum density as specified in paragraph 154-3.9a. If the specified density is not attained, the area of the lift represented by the test shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

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

154-3.7 Maintenance. No base or surface course shall be placed on the subbase until the subbase has been accepted by the RPR. The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, the Contractor shall verify that materials still meet all specification requirements before placement of additional material. Equipment may be routed over completed sections of subbase course, provided the equipment does not damage the subbase course and the equipment is routed over the full width of the completed subbase course. Any damage to the subbase course from routing equipment over the subbase course shall be repaired by the Contractor at their expense.

154-3.8 Surface tolerance. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

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

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

154-3.9 Acceptance sampling and testing. The aggregate base course shall be accepted for density and thickness on an area basis. Two test shall be made for density and thickness for each 1200 square yards. Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance.

Each area shall be accepted for density when the field density is at least 98% of the maximum density of laboratory specimens compacted and tested per ASTM D1557. The in-place field density shall be determined per ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the area represented by the failed test shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, use methods in ASTM D1557 and the procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized particles.

b. Thickness. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for

each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

METHOD OF MEASUREMENT

154-4.1 Subbase course shall be measured by the number of cubic yards of subbase course material placed and compacted to specified density and plan thickness requirements in the completed course. The quantity of subbase course material shall be measured in final position based survey provided by the contractor of the finished subgrade and compacted and finished subbase work computed from elevations to the nearest 0.01 foot. On individual depth measurements, thicknesses more than 1/2 inch (12 mm) in excess of that shown on the plans shall be considered as the specified thickness plus 1/2 inch (12 mm) in computing the yardage for payment. Subbase materials shall not be included in any other excavation quantities.

BASIS OF PAYMENT

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

Payment will be made under:

Item P-154-5.1	Subbase Course - per `cubic yard (cubic meter)`

REFERENCES

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

ASTM International (ASTM)

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

ASTM D4759	Practice for Determining the Specification Conformance of Geosynthetics
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

American Association of State Highway and Transportation Officials (AASHTO)

M 288	Geotextile Specification for Highway Applications

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Item P-401 Asphalt Mix Pavement

DESCRIPTION

401-1.1 This item shall consist of pavement courses composed of mineral aggregate and asphalt binder mixed in a central mixing plant and placed on a prepared base or stabilized course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

401-2.1 Aggregate. Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand, and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. Coarse aggregate is the material retained on the No. 4 (4.75 mm) sieve. Fine aggregate is the material passing the No. 4 (4.75 mm) sieve.

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

Coarse Aggregate Material Requirements

Material Test	Requirement	Standard
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	1.0 % maximum	ASTM C142
Percentage of Fractured Particles	For pavements designed for aircraft gross weights of 60,000 pounds (27200 kg) 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 (27200 kg): 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 at 5:1 [2]	ASTM D4791
Bulk density of slag [3]	Weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter)	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 fine aggregate blend or to improve the workability of the mix. Fine aggregate material requirements are listed in the table below.

Fine Aggregate Material Requirements

Material Test	Requirement	Standard
Liquid limit	25 maximum	ASTM D4318
Plasticity Index	4 maximum	ASTM D4318
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	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.

401-2.2 Mineral filler. Mineral filler (baghouse fines) may be added in addition to material naturally present in the aggregate. Mineral filler shall meet the requirements of ASTM D242.

Mineral Filler Requirements

Material Test	Requirement	Standard
Plasticity Index	4 maximum	ASTM D4318

401-2.3 Asphalt binder. Asphalt binder shall conform to ASTM D6373 Performance Grade (PG) 76-22m.

Asphalt Binder PG Plus Test Requirements

Material Test	Requirement	Standard
Elastic Recovery	[75%] minimum	ASTM D60841

[1] Follow procedure B on RTFO aged binder.

401-2.4 Anti-stripping agent. Any anti-stripping agent or additive (anti-strip) shall be heat stable and shall not change the asphalt binder grade beyond specifications. Anti-strip shall be an approved material of the Department of Transportation of the State in which the project is located.

COMPOSITION

401-3.1 Composition of mixture(s). The asphalt mix shall be composed of a mixture of aggregates, filler and anti-strip agent if required, and asphalt binder. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

401-3.2 Job mix formula (JMF) laboratory. The laboratory used to develop the JMF shall possess a current certificate of accreditation, listing D3666 from a national accrediting authority and all test methods required for developing the JMF; and be listed on the accrediting authority's website. A copy of

the laboratory's current accreditation and accredited test methods shall be submitted to the Resident Project Representative (RPR) prior to start of construction.

401-3.3 Job mix formula (JMF). No asphalt mixture shall be placed until an acceptable mix design has been submitted to the RPR for review and accepted in writing. The RPR's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

When the project requires asphalt mixtures of differing aggregate gradations and/or binders, a separate JMF shall be submitted for each mix. Add anti-stripping agent to meet tensile strength requirements.

The JMF shall be prepared by an accredited laboratory that meets the requirements of paragraph 401-3.2. The asphalt mixture shall be designed using procedures contained in Asphalt Institute MS-2 Mix Design Manual, 7th Edition. Samples shall be prepared and compacted using the gyratory compactor in accordance with ASTM D6925.

Should a change in sources of materials be made, a new JMF must be submitted to the RPR for review and accepted in writing before the new material is used. After the initial production JMF has been approved by the RPR and a new or modified JMF is required for whatever reason, the subsequent cost of the new or modified JMF, including a new control strip when required by the RPR, will be borne by the Contractor.

The RPR may request samples at any time for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

The JMF shall be submitted in writing by the Contractor at least 30 days prior to the start of paving operations. The JMF shall be developed within the same construction season using aggregates proposed for project use.

The JMF shall be dated, and stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

- Manufacturer's Certificate of Analysis (COA) for the asphalt binder used in the JMF in accordance with paragraph 401-2.3. Certificate of asphalt performance grade is with modifier already added, if used and must indicate compliance with ASTM D6373. For plant modified asphalt binder, certified test report indicating grade certification of modified asphalt binder.
- Manufacturer's Certificate of Analysis (COA) for the anti-stripping agent if used in the JMF in accordance with paragraph 401-2.4.
- Certified material test reports for the course and fine aggregate and mineral filler in accordance with paragraphs 401-2.1.
- Percent passing each sieve size for individual gradation of each aggregate cold feed and/or hot bin; percent by weight of each cold feed and/or hot bin used; and the total combined gradation in the JMF.
- Specific Gravity and absorption of each coarse and fine aggregate.
- Percent natural sand.
- Percent fractured faces.
- Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).
- Percent of asphalt.
- Number of blows or gyrations
- Laboratory mixing and compaction temperatures.

- Supplier-recommended field mixing and compaction temperatures.
- Plot of the combined gradation on a 0.45 power gradation curve.
- Graphical plots of air voids, voids in the mineral aggregate (VMA), and unit weight versus asphalt content. To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.
- Tensile Strength Ratio (TSR).
- Type and amount of Anti-strip agent when used.
- Asphalt Pavement Analyzer (APA) results.
- Date the JMF was developed. Mix designs that are not dated or which are from a prior construction season shall not be accepted.

Table 1. Asphalt Design Criteria

Test Property	Value	Test Method
Number of blows or gyrations	75	
Air voids (%)	3.5	ASTM D3203
Percent voids in mineral aggregate (VMA), minimum	See Table 2	ASTM D6995
Tensile Strength Ratio (TSR)[1]	not less than 80 at a saturation of 70-80%	ASTM D4867
Asphalt Pavement Analyzer (APA)[2,3]	Less than 10 mm @ 4000 passes	AASHTO T340 at 250 psi hose pressure at 64°C test temperature

[1] Test specimens for TSR shall be compacted at 7 ± 1.0 % air voids. In areas subject to freeze-thaw, use freeze-thaw conditioning in lieu of moisture conditioning per ASTM D4867.

[2] AASHTO T340 at 100 psi hose pressure at 64°C test temperature may be used in the interim. If this method is used the required Value shall be less than 5 mm @ 8000 passes

[3] Where APA not available , use Hamburg Wheel test (AASHTO T-324) 10mm @ 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 (Gradation 2)
1 inch (25.0 mm)	--
3/4 inch (19.0 mm)	100
1/2 inch (12.5 mm)	90-100
3/8 inch (9.5 mm)	72-88
No. 4 (4.75 mm)	53-73
No. 8 (2.36 mm)	38-60
No. 16 (1.18 mm)	26-48
No. 30 (600 µm)	18-38
No. 50 (300 µm)	11-27
No. 100 (150 µm)	6-18
No. 200 (75 µm)	3-6
Minimum Voids in Mineral Aggregate (VMA)[1]	15.0
Asphalt Percent:	
Stone or gravel	5.0-7.5
Slag	6.5-9.5
Recommended Minimum Construction Lift Thickness	2 inch

[1]To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition.

401-3.4 Reclaimed asphalt pavement (RAP). RAP shall not be used.

401-3.5 Control Strip. Full production shall not begin until an acceptable control strip has been constructed and accepted in writing by the RPR. The Contractor shall prepare and place a quantity of asphalt according to the JMF. The underlying grade or pavement structure upon which the control strip is to be constructed shall be the same as the remainder of the course represented by the control strip.

The Contractor will not be allowed to place the control strip until the Contractor quality control program (CQCP), showing conformance with the requirements of paragraph 401-5.1, has been accepted, in writing, by the RPR.

The control strip will consist of at least 250 tons (227 metric tons) or 1/2 sublot, whichever is greater. The control strip shall be placed in two lanes of the same width and depth to be used in production with a longitudinal cold joint. The cold joint must be cut back in accordance with paragraph 401-4.14 using the same procedure that will be used during production. The cold joint for the control strip will be an exposed construction joint at least four (4) hours old or when the mat has cooled to less than 160°F (71°C). The

equipment used in construction of the control strip shall be the same type, configuration and weight to be used on the project.

The control strip will be considered acceptable by the RPR if the gradation, asphalt content, and VMA are within the action limits specified in paragraph 401-5.5a; and Mat density greater than or equal to 94.5%, air voids 3.5% +/- 1%, and joint density greater than or equal to 92.5%.

If the control strip is unacceptable, necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made and another control strip shall be placed. Unacceptable control strips shall be removed at the Contractor's expense.

The control strip will be considered one lot for payment based upon the average of a minimum of 3 samples (no sublots required for control strip). Payment will only be made for an acceptable control strip in accordance with paragraph 401-8.1 using a lot pay factor equal to 100.

CONSTRUCTION METHODS

401-4.1 Weather limitations. The asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the RPR, if requested; however, all other requirements including compaction shall be met.

Table 4. Surface Temperature Limitations of Underlying Course

Mat Thickness	Base Temperature (Minimum)	
	°F	°C
3 inches (7.5 cm) or greater	40 [1]	4
Greater than 2 inches (50 mm) but less than 3 inches (7.5 cm)	45	7

401-4.2 Asphalt plant. Plants used for the preparation of asphalt shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 including the following items.

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

b. Storage bins and surge bins. The asphalt mixture stored in storage and/or surge bins shall meet the same requirements as asphalt mixture loaded directly into trucks. Asphalt mixture shall not be stored in storage and/or surge bins for a period greater than twelve (12) hours. If the RPR determines there is an excessive heat loss, segregation, or oxidation of the asphalt mixture due to temporary storage, temporary storage shall not be allowed.

401-4.3 Aggregate stockpile management. Aggregate stockpiles shall be constructed in a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the asphalt batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used.

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

401-4.4 Hauling equipment. Trucks used for hauling asphalt shall have tight, clean, and smooth metal beds. To prevent the asphalt from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the RPR. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

401-4.4.1 Material transfer vehicle (MTV). Material transfer vehicles used to transfer the material from the hauling equipment to the paver, shall 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.

401-4.5 Asphalt pavers. Asphalt pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of asphalt that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface. The asphalt paver shall be equipped with a control system capable of automatically maintaining the specified screed grade and elevation.

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

The paver shall be capable of paving to a minimum width specified in paragraph 401-4.12.

401-4.6 Rollers. The number, type, and weight of rollers shall be sufficient to compact the asphalt to the required density while it is still in a workable condition without crushing of the aggregate, depressions or other damage to the pavement surface. Rollers shall be in good condition, clean, and capable of operating at slow speeds to avoid displacement of the asphalt. All rollers shall be specifically designed and suitable for compacting asphalt concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used.

401-4.7 Density device. The Contractor shall have on site a density gauge during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall supply a qualified technician during all paving operations to calibrate the gauge and obtain accurate density readings for all new asphalt. These densities shall be supplied to the RPR upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

401-4.8 Preparation of asphalt binder. The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt binder to the mixer at a uniform temperature. The temperature of unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F (160°C) when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F (175°C) when added to the aggregate.

401-4.9 Preparation of mineral aggregate. The aggregate for the asphalt shall be heated and dried. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F (175°C) when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

401-4.10 Preparation of Asphalt mixture. The aggregates and the asphalt binder shall be weighed or metered and mixed in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all asphalt upon discharge shall not exceed 0.5%.

401-4.11 Application of Prime and Tack Coat. Immediately before placing the asphalt mixture, the underlying course shall be cleaned of all dust and debris.

A prime coat in accordance with Item P-602 shall be applied to aggregate base prior to placing the asphalt mixture.

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

401-4.12 Laydown plan, transporting, placing, and finishing. Prior to the placement of the asphalt, the Contractor shall prepare a laydown plan with the sequence of paving lanes and width to minimize the number of cold joints; the location of any temporary ramps; laydown temperature; and estimated time of completion for each portion of the work (milling, paving, rolling, cooling, etc.). The laydown plan and any modifications shall be approved by the RPR.

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

Contractor shall survey each lift of asphalt surface course and certify to RPR that every lot of each lift meets the grade tolerances of paragraph 401-6.2d before the next lift can be placed.

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

The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Placement of the asphalt mix shall begin along the centerline of a crowned section or on the high side of areas with a one way slope unless shown otherwise on the laydown plan as accepted by the RPR. The asphalt mix shall be placed in consecutive adjacent lanes having a minimum width of 12.5 feet (m) except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least one foot (30 cm); however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet (3 m) from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m).On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt

mixture. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet (3 m) long.

401-4.13 Compaction of asphalt mixture. After placing, the asphalt mixture shall be thoroughly and uniformly compacted by self-propelled rollers. The surface shall be compacted as soon as possible when the asphalt has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any surface defects and/or displacement occurring as a result of the roller, or from any other cause, shall be corrected at the Contractor's expense.

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

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

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

401-4.14 Joints. The formation of all joints shall be made to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

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

Longitudinal joints which have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F (80°C); or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches (75 mm) to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. Asphalt tack coat in accordance with P-603 shall be applied to the clean, dry joint prior to placing any additional fresh asphalt against the joint. The cost of this work shall be considered incidental to the cost of the asphalt.

401-4.15 Saw-cut grooving. Saw-cut grooving is not required.

401-4.16 Diamond grinding. Diamond grinding shall be completed prior to pavement grooving. Diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive.

Diamond grinding shall be performed with a machine designed specifically for diamond grinding capable of cutting a path at least 3 feet (0.9 m) wide. The saw blades shall be 1/8-inch (3-mm) wide with a sufficient number of blades to create grooves between 0.090 and 0.130 inches (2 and 3.5 mm) wide; and peaks and ridges approximately 1/32 inch (1 mm) higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that cause ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted. Contractor shall demonstrate to the RPR that the grinding equipment will produce satisfactory results prior to making corrections to surfaces. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. The Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

401-4.17 Nighttime paving requirements. The Contractor shall provide adequate lighting during any nighttime construction. A lighting plan shall be submitted by the Contractor and approved by the RPR prior to the start of any nighttime work. All work shall be in accordance with the approved CSPP and lighting plan.

CONTRACTOR QUALITY CONTROL (CQC)

401-5.1 General. The Contractor shall develop a Contractor Quality Control Program (CQCP) in accordance with Item C-100. No partial payment will be made for materials without an approved CQCP.

401-5.2 Contractor quality control (QC) facilities. The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The RPR shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

401-5.3 Contractor QC testing. The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved CQCP. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A QC Testing Plan shall be developed as part of the CQCP.

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

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

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

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

e. Temperatures. Temperatures shall be checked, at least four times per day, at necessary locations to determine the temperatures of the dryer, the asphalt binder in the storage tank, the asphalt at the plant, and the asphalt at the job site.

f. In-place density monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D2950.

g. Smoothness for Contractor Quality Control.

The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than ¼ inch in 12 feet, identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues

The Contractor may use a 12-foot (3.7 m) "straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot (3.7m) 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 shall be taken perpendicular to the pavement centerline each 50 feet (15 m) or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

(2) Longitudinal measurements. Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests shall be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet (6 m); and at the third points of paving lanes when widths of paving lanes are 20 ft (6 m) or greater. 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 (6 mm) shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 401-6.1d(3). Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

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

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

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch (12 mm) vertically and 0.1 feet (30 mm) laterally. The documentation will be provided by the Contractor to the RPR within 24 hours.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch (12 mm) less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 401-4.16.

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

401-5.4 Sampling. When directed by the RPR, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

401-5.5 Control charts. The Contractor shall maintain linear control charts for both individual measurements and range (i.e. difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each day will be calculated and monitored by the QC laboratory.

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

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

Control Chart Limits for Individual Measurements

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

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

Control Chart Limits Based on Range

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

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

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

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

401-5.6 QC reports. The Contractor shall maintain records and shall submit reports of QC activities daily, in accordance with Item C-100**.**

MATERIAL ACCEPTANCE

401-6.1 Acceptance sampling and testing. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be

performed by the RPR at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor.

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

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

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

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

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

(2) Testing. Air voids will be determined for each sublot in accordance with ASTM D3203 for a set of three compacted specimens prepared in accordance with ASTM D6926.

d. In-place asphalt mat and joint density. Each sublot will be tested for in-place mat and joint density as a percentage of the theoretical maximum density (TMD).

(1) Sampling. The Contractor will cut minimum 5 inch (125 mm) diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

(2) Bond. Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as directed by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as directed by the RPR.

(3) Thickness. Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch (6 mm) less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the RPR to circumscribe the deficient area.

(4) Mat density. One core shall be taken from each sublot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot (30 cm) from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the TMD for that sublot.

(5) Joint density. One core centered over the longitudinal joint shall be taken for each sublot that has a longitudinal joint. Core locations will be determined by the RPR in accordance with ASTM D3665.

The bulk specific gravity of each core sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each joint density sample by the average TMD for the lot. The TMD used to determine the joint density at joints formed between lots will be the lower of the average TMD values from the adjacent lots.

401-6.2 Acceptance criteria.

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

b. Air Voids and Mat density. Acceptance of each lot of plant produced material for mat density and air voids will be based on the percentage of material within specification limits (PWL). If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment will be determined in accordance with paragraph 401-8.1.

c. Joint density. Acceptance of each lot of plant produced asphalt for joint density will be based on the PWL. If the PWL of the lot is equal to or exceeds 90%, the lot will be considered acceptable. If the PWL is less than 90%, the Contractor shall evaluate the reason and act accordingly. If the PWL is less than 80%, the Contractor shall cease operations and until the reason for poor compaction has been determined. If the PWL is less than 71%, the pay factor for the lot used to complete the joint will be reduced by five (5) percentage points. This lot pay factor reduction will be incorporated and evaluated in accordance with paragraph 401-8.1.

d. Grade. The final finished surface of the pavement shall be surveyed to verify that the grade elevations and cross-sections shown on the plans do not deviate more than 1/2 inch (12 mm) vertically or 0.1 feet (30 mm) laterally.

Cross-sections of the pavement shall be taken at a minimum 50-foot (15-m) longitudinal spacing, at all longitudinal grade breaks, and at start and end of each lane placed. Minimum cross-section grade points shall include grade at centerline, ± 10 feet of centerline, and edge of taxiway pavement.

The survey and documentation shall be stamped and signed by a licensed surveyor. Payment for sublots that do not meet grade for over 25% of the sublot shall not be more than 95%.

e. Profilograph roughness for QA Acceptance. The final profilograph shall be the full length of the project to facilitate testing of roughness between lots. The Contractor, in the presence of the RPR shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within 48 hrs of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate "must grind" bumps and the Profile Index for the pavement using a 0.2-inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). Profilograph shall be performed one foot right and left of project centerline and 15 feet (4.5 m) right and left of project centerline. Any areas that indicate "must grind" shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing full depth of surface course. as directed by the RPR. Where corrections are necessary, a second profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

401-6.3 Percentage of material within specification limits (PWL). The PWL will be determined in accordance with procedures specified in Item C-110. The specification tolerance limits (L) for lower and (U) for upper are contained in Table 5.

Table 5. Acceptance Limits for Air Voids and Density

Test Property	Pavements Specification Tolerance Limits	
	L	**U**
Air Voids Total Mix (%)	2.0	5.0
Surface Course Mat Density (%)	92.8	-
Base Course Mat Density (%)	92.0	-
Joint density (%)	90.5	--

a. Outliers. All individual tests for mat density and air voids will be checked for outliers (test criterion) in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded, and the PWL will be determined using the remaining test values. The criteria in Table 5 is based on production processes which have a variability with the following standard deviations: Surface Course Mat Density (%), 1.30; Base Course Mat Density (%), 1.55; Joint Density (%), 1.55.

The Contractor should note that (1) 90 PWL is achieved when consistently producing a surface course with an average mat density of at least 94.5% with 1.30% or less variability, (2) 90 PWL is achieved when consistently producing a base course with an average mat density of at least 94.0% with 1.55% or less variability, and (3) 90 PWL is achieved when consistently producing joints with an average joint density of at least 92.5% with 1.55% or less variability.

401-6.4 Resampling pavement for mat density.

a. General. Resampling of a lot of pavement will only be allowed for mat density, and then, only if the Contractor requests same, in writing, within 48 hours after receiving the written test results from the RPR. A retest will consist of all the sampling and testing procedures contained in paragraphs 401-6.1d and 401-6.2b. Only one resampling per lot will be permitted.

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

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

b. Payment for resampled lots. The redefined PWL for a resampled lot will be used to calculate the payment for that lot in accordance with Table 6.

c. Outliers. Check for outliers in accordance with ASTM E178, at a significance level of 5%.

METHOD OF MEASUREMENT

401-7.1 Measurement. Asphalt shall be measured by the number of tons kg of asphalt used in the accepted work. Batch weights or truck scale weights will be used to determine the basis for the tonnage.

BASIS OF PAYMENT

401-8.1 Payment. Payment for a lot of asphalt meeting all acceptance criteria as specified in paragraph 401-6.2 shall be made based on results of tests for mat density and air voids. Payment for acceptable lots

shall be adjusted according to paragraph 401-8.1c format density and air voids; and paragraph 401-6.2c for joint density, subject to the limitation that:

a. The total project payment for plant mix asphalt pavement shall not exceed 100% of the product of the contract unit price and the total number of tons (kg) of asphalt used in the accepted work.

b. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

c. Basis of adjusted payment. The pay factor for each individual lot shall be calculated in accordance with Table 6. A pay factor shall be calculated for both mat density and air voids. The lot pay factor shall be the higher of the two values when calculations for both mat density and air voids are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either mat density or air voids is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both mat density and air voids are less than 100%. If PWL for joint density is less than 71% then the lot pay factor shall be reduced by 5% but be no higher than 95%.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 401-8.1a. Payment in excess of 100% for accepted lots of asphalt shall be used to offset payment for accepted lots of asphalt pavement that achieve a lot pay factor less than 100%.

Payment for sublots which do not meet grade in accordance with paragraph 401-6.2d after correction for over 25% of the sublot shall be reduced by 5%.

Table 6. Price adjustment schedule[1]

Percentage of material within specification limits (PWL)	Lot pay factor (percent of contract unit price)
96 – 100	106
90 – 95	PWL + 10
75 – 89	0.5 PWL + 55
55 – 74	1.4 PWL – 12
Below 55	Reject [2]

[1] Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment above 100% shall be subject to the total project payment limitation specified in paragraph 401-8.1a.

[2] The lot shall be removed and replaced. However, the RPR may decide to allow the rejected lot to remain. In that case, if the RPR and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50% of the contract unit price and the total project payment shall be reduced by the amount withheld for the rejected lot.

d. Profilograph Roughness. The Contractor will receive full payment when the profilograph average profile index is in accordance with paragraph 401-6.2e. When the final average profile index for the entire length of pavement does not exceed 15 inches per mile per 1/10 mile, payment will be made at the contract unit price for the completed pavement.

401-8.1 Payment.

Payment will be made under:

Item P-401-8.1 Asphalt Surface Course - per ton (kg)

REFERENCES

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

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D242	Standard Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D946	Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D979	Standard Practice for Sampling Asphalt Paving Mixtures
ASTM D1073	Standard Specification for Fine Aggregate for Asphalt Paving Mixtures
ASTM D1188	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
ASTM D2172	Standard Test Method for Quantitative Extraction of Bitumen from Asphalt Paving Mixtures
ASTM D1461	Standard Test Method for Moisture or Volatile Distillates in Asphalt Paving Mixtures
ASTM D2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2489	Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures

ASTM D2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3203	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D3381	Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4552	Standard Practice for Classifying Hot-Mix Recycling Agents
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D4867	Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D5361	Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing
ASTM D5444	Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6084	Standard Test Method for Elastic Recovery of Bituminous Materials by Ductilometer
ASTM D6307	Standard Test Method for Asphalt Content of Hot Mix Asphalt by Ignition Method
ASTM D6373	Standard Specification for Performance Graded Asphalt Binder
ASTM D6752	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
ASTM D6925	Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor.
ASTM D6926	Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus
ASTM D6927	Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM D6995	Standard Test Method for Determining Field VMA based on the Maximum Specific Gravity of the Mix (Gmm)

ASTM E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
ASTM E178	Standard Practice for Dealing with Outlying Observations
ASTM E1274	Standard Test Method for Measuring Pavement Roughness Using a Profilograph
ASTM E950	Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference
ASTM E2133	Standard Test Method for Using a Rolling Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M156	Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
AASHTO T329	Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method
AASHTO T324	Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures
AASHTO T 340	Standard Method of Test for Determining the Rutting Susceptibility of Hot Mix Asphalt (APA) Using the Asphalt Pavement Analyzer (APA)

Asphalt Institute (AI)

Asphalt Institute Handbook MS-26, Asphalt Binder

Asphalt Institute MS-2 Mix Design Manual, 7th Edition

AI State Binder Specification Database

Federal Highway Administration (FHWA)

Long Term Pavement Performance Binder Program

Advisory Circulars (AC)

AC 150/5320-6	Airport Pavement Design and Evaluation

FAA Orders

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

Software

FAARFIELD

END OF ITEM P-401

Item P-403 Asphalt Mix Pavement Surface 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 (27200 kg) 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 (27200 kg): 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 (1.12 Mg/cubic meter)	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) 76-22m.

Asphalt Binder PG Plus Test Requirements

Material Test	Requirement	Standard
Elastic Recovery	75% minimum	ASTM D60841

[1] Follow procedure B on RTFO aged binder.**]**

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
Asphalt Pavement Analyzer (APA)[2,3]	Less than 10 mm @ 4000 passes	AASHTO T340 at 250 psi hose pressure at 64°C test temperature

[1] Test specimens for TSR shall be compacted at 7 ± 1.0 % air voids. In areas subject to freeze-thaw, use freeze-thaw conditioning in lieu of moisture conditioning per ASTM D4867.

[2] AASHTO T340 at 100 psi hose pressure at 64°C test temperature may be used in the interim. If this method is used the required Value shall be less than 5 mm @ 8000 passes

[3] Where APA not available, use Hamburg wheel test (AASHTO T 324) 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 (Gradation 2)
1 inch (25.0 mm)	--
3/4 inch (19.0 mm)	100
1/2 inch (12.5 mm)	90-100
3/8 inch (9.5 mm)	72-88
No. 4 (4.75 mm)	53-73
No. 8 (2.36 mm)	38-60
No. 16 (1.18 mm)	26-48
No. 30 (600 µm)	18-38
No. 50 (300 µm)	11-27
No. 100 (150 µm)	6-18
No. 200 (75 µm)	3-6
Voids in Mineral Aggregate (VMA)[1]	15
Asphalt Percent:	
Stone or gravel	5.0-7.5
Slag	6.5-9.5
Recommended Minimum Construction Lift Thickness	2 inch

[1]To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition.

RAP shall not be used.

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 (227 metric tons) or 1/2 sublot, whichever is greater. The control strip shall be placed in two lanes of the same width and depth to be used in production with a longitudinal cold joint. The cold joint must be cut back in accordance with paragraph 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 (71°C). The equipment used in construction of the control strip shall be the same type, configuration and weight to be used on the project.

The control strip 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 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	Degrees C
3 inches (7.5 cm) or greater	40	4
Greater than 2 inches (50 mm) but less than 3 inches (7.5 cm)	45	7

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 401-4.11.

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 (160°C) when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F (175°C) when added to the aggregate.

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 (175°C) when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

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 prime coat in accordance with Item P-602 shall be applied to aggregate base prior to placing the asphalt mixture.

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

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 401-6.2e 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 12.5 feet (m) except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot (30 cm); however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet (3 m) from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m).On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the asphalt may be spread and luted by hand tools.

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

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet (3 m) long.

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 (80°C); or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches (75 mm) to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. 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 (0.9 m) wide. The saw blades shall be 1/8-inch (3-mm) wide with a minimum of 55 to 60 blades per 12 inches (300 mm) of cutting head width; grooves between 0.090 and 0.130 inches (2 and 3.5 mm) wide; and peaks and ridges approximately 1/32 inch (1 mm) higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that 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.

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 (3.7 m) "straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot (3.7m) 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 the FAA profile program, ProFAA, 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 and between the start and stop of lanes place 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 (6 m); and at the third points of paving lanes when widths of paving lanes are 20 ft (6 m) 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 (6 mm) 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 401-6.1d(3) Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need

corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

h. Grade. Grade shall be evaluated daily to allow adjustments to paving operations when grade measurements do not meet specifications. As a minimum, grade shall be evaluated prior to 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 (12 mm) vertically and 0.1 feet (30 mm) laterally. The documentation will be provided by the Contractor to the RPR within 24 hours.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch (12 mm) less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 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 (125 mm) diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

(2) Bond. Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as directed by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as directed by the RPR.

(3) Thickness. Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch (6 mm) less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the RPR to circumscribe the deficient area.

(4) Mat density. One core shall be taken from each sublot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot (30 cm) from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the TMD for that sublot.

(5) Joint density. One core centered over the longitudinal joint shall be taken for each sublot 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 (12 mm) vertically or 0.1 feet (30 mm) laterally.

Cross-sections of the pavement shall be taken at a minimum 50-foot (15-m) longitudinal spacing and at all longitudinal grade breaks. Minimum cross-section grade points shall include grade at centerline, ± 10 feet of centerline, and edge of 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 shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within 48 hrs of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate "must grind" bumps and the Profile Index for the pavement using a 0.2-inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). Profilograph shall be performed one foot right and left of project centerline and 15 feet (4.5 m) right and left of project centerline. Any areas that indicate "must grind" shall be corrected with diamond grinding per paragraph 401-4.15 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.

METHOD OF MEASUREMENT

403-7.1 Measurement. Plant mix asphalt mix pavement shall be measured by the number of tons (kg) 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 (kg) 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 Mixture Binder Leveling Course - per ton (kg)

REFERENCES

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

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate

ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM 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

END OF ITEM P-403

Item P-407 Asphalt Treated Permeable Base Course (ATPB)

DESCRIPTION

407-1.1 This item shall consist of an asphalt treated permeable base composed of mineral aggregate, and asphalt cement mixed in a central mixing plant and placed on a prepare subgrade or subbase course in accordance with these specifications and shall conform to the lines, grades, thickness, and typical cross sections shown in the plans.

MATERIALS

407-2.1 Aggregate. The aggregate shall consist of clean, sound, hard, durable, angular particles of crushed gravel or crushed stone and shall meet the gradation requirements of ASTM D448 Size 78, ASTM C33 Size 67 or ASTM C33 Size 57. Fine aggregate shall consist of natural sand or manufactured sand meeting the requirements of ASTM C33. The aggregate shall meet the material requirements in the table below.

Aggregate Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate		
Resistance to Degradation	Loss: 40% maximum	ASTM C131
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
Fractured Faces	90% by weight of particles with at least 2 fractured faces	ASTM D5821
Flat Particles, Elongated Particles, or Flat and Elongated Particles[1]	10% maximum, by weight, for fraction retained on the 3/8 inch (9.5mm) sieve and 10% maximum, by weight, for the fraction passing the 3/8-inch (9.5 mm) sieve	ASTM D4791
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Fine Aggregate		
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
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

[1] 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).

407-2.2 Sampling and testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base stockpile in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraph 407-2.1. This sampling and testing will be the basis for approval of the aggregate base quality requirements.

407-2.3 Asphalt binder. Asphalt binder shall conform to ASTM D6373 Performance Grade (PG) 76-22m.

4**07-2.4 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.

407-2.5 Bond Breaker. Not Used.

407-2.6 Separation Geotextile. Separation geotextile shall be Class 2, **[** 0.05 sec^{-1} **]** permittivity per ASTM D4491, Apparent opening size per ASTM D4751 with 0.60 mm maximum average roll value.

COMPOSITION OF MIXTURE

407-3.1 Mix design. The Mix Design shall be composed of a mixture of open graded aggregate, a minimum of 0.5% antistrip agent and asphalt binder. An acceptable mix will have between 2 – 3.5% asphalt, sufficient to cover 95% of mixture with a shiny black appearance with minimal draindown at 200°F, and will bind the compacted mix. When the aggregates are blended and mixed with the asphalt cement at [250°F (121°C)] and compacted at [150°F (65°C)] with 35 blows of a standard Marshall hammer, the JMF shall have a permeability of not less than 500 ft/day (150 m/day) nor more than 1,500 ft/day (455 m/day) when tested with constant head permeability test ASTM D 2434/AASHTO T 215.

407-3.2 Submittals. At least 30 days prior to the placement of the ATPB, the Contractor shall submit certified test reports to the RPR for those materials proposed for use during construction, as well as the mix design information for the material. The submittal package shall include the following:

a. Sources of materials, including aggregate, asphalt binder, additives, and bond-breaking materials (if used).

b. Physical properties of the aggregates, asphalt binder, antistrip agent and bond-breaking materials.

c. Percent of asphalt

d. Amount of antistrip agent

e. Permeability of JMF

No drainable ATPB material shall be placed until the submittal is accepted in writing by the RPR. During production, the Contractor shall submit batch tickets for each delivered load.

CONSTRUCTION METHODS

407-4.1 Control strip. The contractor shall produce, place and compact a control strip of at least 250 ft (75-m). The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and

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

When additional effort beyond that provided by the paver is required to seat the aggregate, additional compaction shall not be initiated until mixture has cooled to below 175°F (or lower as determined during construction of the test strip). One to two passes of a self-propelled, steel-wheel static roller with weight between 5 and 12 tons (4.5 to 10.9 metric tons) is usually sufficient. The roller shall be in good condition and shall be capable of reversing without backlash and of compacting the ATPB without undue displacement or excessive crushing of the aggregate. The actual rolling pattern and sequence shall be established during placement of the control strip and approved by the RPR. In areas inaccessible to the paver and roller, hand operated vibrator-plate compactors may be used to seat the aggregate.

The control strip ATPB layer shall be considered acceptable when aggregate is completely coated with asphalt cement with minimal evidence of crushing; the surface is firm, unyielding and stable under construction traffic; and the layer meets the field permeability per paragraph 407-3.1.

407-4.2 Weather limitations. The ATPB material shall not be mixed or placed while the air temperature is below 40°F (4°C). The ATPB shall not be placed on frozen underlying courses or mixed when aggregate is frozen. The ATPB may not be placed when rainfall is occurring or where rain is imminent.

407-4.3 Equipment. All equipment necessary to mix, transport, place, compact, and finish the ATPB material shall be furnished by the Contractor and approved by the RPR. The equipment will be inspected by the RPR prior to the start of construction operations.

407-4.4 Preparation of the underlying course. The underlying course shall be checked and accepted by the RPR before placing operations begin. Prior to placing the material, the final grade should be firm, moist and free of frost. Use of chemicals to eliminate frost will not be permitted.

407-4.5 Mixing. The batch plant site, layout, equipment, and provisions for transporting material shall assure a continuous supply of material to the work. Stockpiles shall be constructed in a manner that prevents segregation and intermixing of deleterious materials. Free access to the plant must be provided to the RPR at all times for inspection of the plant's equipment and operation and for sampling the ATPB mixture and its components.

407-4.6 Hauling. The ATPB mixture shall be transported from the plant to the job site in trucks or other hauling equipment having beds that are smooth and clean. Truck bed covers shall be provided to protect the ATPB during transport from rain.

407-4.7 Placing. The ATPB material shall be placed using an asphalt paver. The ATPB shall be installed in a single 6 inch (150 mm) lift.

407-4.8 Compaction. The ATPB material shall be compacted using the approved compaction equipment and roller pattern/sequence, as determined in the approved control strip. Sufficient rollers shall be furnished to handle the output of the plant. If the rolling pattern/sequence results in undue displacement of the surface, or causes crushing of the aggregate, work shall be stopped until the cause(s) can be determined and corrections are made. The roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a transverse joint.

407-4. 9 Joints. The formation of all joints shall be made in such a manner as to ensure a continuous

bond between old and new sections of the course. All joints shall present the same texture and smoothness as other sections of the course. Transverse joints shall be formed by placement of a bulkhead or by tapering the mixture. Tapered joints shall be cut back full depth and width creating a vertical joint before placing additional mixture against the joint. Joints which are irregular, damaged shall be cut back to expose a clean, sound surface for full depth of course.

407-4.10 Quality Control. The Contractor shall perform tests for smoothness, grade, gradation and asphalt content daily. Asphalt content and gradation must be within job tolerances or appropriate steps taken to maintain production control within tolerances. Any area not meeting smoothness and grade shall be corrected by the Contractor at the Contractor's expense. The Contractor shall provide gradation, asphalt content, smoothness and grade data to the RPR on a daily basis.

a. Asphalt Content. Determine asphalt content a minimum of two times per day in accordance with ASTM D6307 or ASTM D2172.

b. Gradation. Determine aggregate gradation a minimum of two times per day from mechanical analysis of extracted aggregate in accordance with ASTM D5444, ASTM C136 and ASTM C117.

c. Smoothness. The finished surface shall not vary more than ±3/8-inch (9 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline, and. moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid. The Contractor shall correct any high spots more than 3/8 inch (9 mm) in 12-foot (3.7-m) with a grinding machine or remove and replace the material at the Contractor's expense. Any areas that have been ground shall have curing compound reapplied.

0.05 **Grade.** The grade shall be measured on a 50-foot (15-m) grid and shall be within +/- feet (15 mm) of the specified grade. When the surface is more than 1/2 inch (12 mm) above the grade shown in the plans, the surface shall be corrected at the Contractor's expense to an elevation that falls within a tolerance of 1/4 inch (6 mm).

407-4.11 Field Permeability. One test shall be performed by the Contractor in the presence of the RPR for 1200 square yards (1000 square meters). Test locations will be determined on a random basis in accordance with ASTM D3665. The permeability of the base will be determined in accordance with ASTM C1701. If it can be demonstrated that a 1 gallon container of water will flow through the layer within approximately 1 minute the RPR can waive additional permeability testing.

407-4.12 Bond breaker. Not used.

407-4.13 Maintenance. The completed drainable base shall be maintained by the Contractor in a condition to meet all specification requirements until the pavement has been placed. Placement of the next higher pavement layer shall be made as soon as practicable but no more than thirty (30) calendar days after placement of the drainage layer. The ATPB shall not be opened to traffic until the mixture has cooled to ambient temperature. Traffic on ATPB should be kept to a minimum to avoid rutting or displacement of the ATPB. Limit traffic on ATPB to equipment needed to construct next higher pavement layer.

MATERIAL ACCEPTANCE

407-5.1 Sampling and testing. All acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the RPR for each 1200 square yards (1000 square meters). Sampling locations will be determined by the RPR on a random basis per ASTM D3665. The Contractor shall bear the cost of providing curing facilities for the strength specimens.

a. Thickness. One core shall be drilled by the Contractor for thickness determination for each 1200 square yards (1000 square meters). Thickness will be determined by measuring the depth of core hole or thickness will be determined by survey on a 25-foot by 25- foot grid by discretion of the RPR.

METHOD OF MEASUREMENT

407-6.1 Measurement. The quantity of ATPB to be paid for shall be the number of square yards (m^2) of material placed, and accepted in the completed base course.

BASIS OF PAYMENT

407-7.1 Payment. Payment will be made at the contract unit price per square yard (m^2) for ATPB as measured by RPR. This price shall be full compensation for furnishing all materials, for all preparation, mixing, placing, compacting curing and placement of overlaying bond breaker; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-407	Asphalt treated permeable base course (ATPB) - per square yard (m^2).

REFERENCES

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

ASTM International (ASTM)

ASTM C33	Standard Specification for Concrete Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM D448	Standard Classification for Sizes of Aggregate for Road and Bridge Construction
ASTM D2434	Standard Test Method for Permeability of Granular Soils (Constant Head)
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM C1701	Standard Test Method for Infiltration Rate of In Place Pervious Concrete

	American Association of State Highway and Transportation Officials (AASHTO)
M288	Standard Specification for Geosynthetic Specification for Highway Applications
T215	Standard Method of Test for Permeability of Granular Soils (Constant Head),

END ITEM P-407

Item P-604 Compression Joint Seals for Concrete Pavements

DESCRIPTION

604-1.1 This item shall consist of preformed polychloroprene compression seals used for sealing joints of rigid pavements.

MATERIALS

604-2.1 Compression seals. Compression joint seal materials shall be a vulcanized elastomeric compound using polychloroprene as the only base polymer. The material and the manufactured seal shall conform to ASTM D2628 and Corps of Engineers Concrete Research Division (CRD) C548 where jet fuel and/or heat blast resistance is required.

The joint seal shall be a labyrinth type seal. The uncompressed depth of the face of the compression seal (that is to be bonded to the joint wall) shall be greater than the uncompressed width of the seal, except that for seals one inch (25 mm) or greater in width, the depth need be only one inch (25 mm) or greater. The actual width of the uncompressed seal shall be as recommended by the joint seal manufacturer for the type and width of joints as shown on the plans. The tolerance on the seal shall be +1/8 inch or -1/16 inch **(**+3 mm or −2 mm)**,** below the top of the pavement surface or bottom of groove for grooved pavement.

The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the joint seal material delivered to the project. The COA shall be provided to and approved by the RPR before the material is installed. The furnishing of the vendor's certified test report shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

Materials delivered to the job site shall be inspected for defects, unloaded, and stored with a minimum of handling to avoid damage. Storage facilities shall be provided at the job site to protect materials from weather and maintain materials at temperatures recommended by the manufacturer.

Representative sample of joint seal material will be sampled and retained by the RPR for possible testing.

604-2.2 Lubricant/adhesive. Lubricant/adhesive used for the compression elastomeric joint seal shall be a one-component compound conforming to ASTM D2835.

CONSTRUCTION METHODS

604-3.1 Equipment. Machines, tools, and equipment used in the performance of the work required by this section shall be approved by the RPR before the work starts and shall be maintained by the Contractor in satisfactory condition at all times.

a. Joint cleaning equipment.

(**1) Concrete saw.** A self-propelled power saw with water-cooled diamond saw blades shall be provided for cutting joints to the depths and widths specified and for removing filler, existing old joint seal or other material embedded in the joints or adhered to the joint faces.

(2) Waterblasting equipment. Waterblasting equipment shall include a trailer-mounted water tank, pumps, high-pressure hose, a wand with safety release cutoff controls, nozzle, and auxiliary water resupply equipment. The water tank and auxiliary water resupply equipment shall be of sufficient capacity to permit continuous operations. The pumps, hoses, wand, and nozzle shall be of sufficient capacity to permit the cleaning of both walls of the joint and the pavement surface for a width of at least 1/2 inch (12 mm) on either side of the joint. The pump shall be capable of supplying a pressure of at least 3,000 psi (20.7 MPa). A pressure gauge mounted at the pump shall show at all times the pressure in pounds per square inch (psi) (kPa) at which the equipment is operating.

(**3) Sandblasting equipment.** Sandblasting equipment shall include an air compressor, hose, and a long-wearing venturi-type nozzle of proper size, shape, and opening. The maximum nozzle opening should not exceed 1/4 inch (6 mm). The air compressor shall be portable and shall be capable of furnishing not less than 150 cubic feet (4200 liters) per minute and maintaining a line pressure of not less than 90 psi (620 kPa) at the nozzle while in use. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint about one inch (25 mm) above the pavement surface and will direct the blast to clean the joint walls. The height, angle of inclination, and the size of the nozzle shall be adjusted as necessary to ensure satisfactory results.

b. Sealing equipment. Equipment used to install the compression seal shall place the compression seal to the prescribed depths within the specified tolerances without cutting, nicking, twisting, or otherwise damaging the seal. The equipment shall not stretch or compress the seal more than 2.0% longitudinally during installation. The machine shall be an automatic self-propelled joint seal application equipment and shall be engine powered. The machine shall include a reservoir for the lubricant/adhesive, a device for conveying the lubricant/adhesive in the proper quantities to the sides the preformed seal or the sidewalls of the joint, a reel capable of holding one full spool of compression seal, and a power-driven apparatus for feeding the joint seal through a compression device and inserting the seal into the joint. The equipment shall also include a guide to maintain the proper course along the joint being sealed. The machine shall at all times be operated by an experienced operator.

Hand operated joint seal application equipment may be used for localized areas and for projects less than 500 square yards (450 square meters). The equipment shall be a two-axle, four-wheel machine that includes means for compressing and inserting the compression seal into the joint and a reel capable of holding one full spool of compression seal material.

CONSTRUCTION METHODS

604-4.1 Environmental conditions. The ambient temperature and the pavement temperature within the joint wall shall be at least 35°F (2°C) and rising at the time of installation of the materials. Sealant application will not be permitted if moisture or any foreign material is observed in the joint.

604-4.2 Trial joint seal and lubricant/adhesive installation. Prior to the cleaning and sealing of the joints for the entire project, a control strip at least 200 feet (69 meters) long shall be prepared at a location designated by the RPR using the specified materials and the approved equipment, to demonstrate the materials and construction processes for joint preparation and sealing of all types of joints included in the project. No other joints shall be sealed until the test installation has been approved by the RPR.

If materials or installation do not meet requirements, the materials shall be removed, and the joints shall be cleaned and a new trial joint seal installation shall be performed at the Contractor's expense. The RPR approved trial section will be incorporated into the permanent work.

604-4.3 Preparation of joints. Immediately before installation of the compression joint seal, the joints shall be thoroughly cleaned to remove all laitance, filler, existing sealer, foreign material and protrusions of hardened concrete from the sides and upper edges of the joint space to be sealed. Cleaning shall extend

along pavement surfaces at least 1/2 inch (12 mm) on either side of the joint. After final cleaning and immediately prior to sealing, the joints shall be blown out with compressed air and left free of debris and water. Any irregularity in the joint face that would prevent uniform contact between the joint seal and the joint face shall be corrected prior to the installation of the joint seal.

a. Sawing. Joints shall be sawed to clean and to open them to the full specified width and depth. Immediately following the sawing operation, the joint faces and opening shall be thoroughly cleaned using a water jet to remove all saw cuttings or debris remaining on the faces or in the joint opening. Compression seal shall be installed within three (3) calendar days of the time the joint cavity is sawed. Depth of the joint cavity shall be in accordance with manufacturer's instructions. Submit printed copies of manufacturers' instructions 60 days prior to use on the project. The saw cut for the joint seal cavity shall at all locations be centered over the joint line. The nominal width of the sawed joint seal cavity shall be as follows; the actual width shall be within a tolerance of ±1/16 inch (2 mm):

(**1)** If a nominal 13/16 inch (21 mm) wide compression seal is furnished, the nominal width of the saw cut shall be **8/16** inches when the pavement temperature at the time of sawing is between **30** and **110**°F . If the pavement temperature at the time of sawing is above this range, the nominal width of the saw cut shall be decreased 1/16 inch (2 mm). If the pavement temperature at the time of sawing is below this range, the nominal width of the saw cut shall be increased 1/16 inch (2 mm).

(**2)** If a nominal one inch (25 mm) wide compression seal is furnished, the nominal width of the saw cut shall be **9/16** inches when the pavement temperature at the time of sawing is between **30** and **170**°F . If the pavement temperature at the time of sawing is above this range, the nominal width of the saw cut shall be decreased 1/16 inch (2 mm). If the pavement temperature at the time of sawing is below this range, the nominal width of the saw cut shall be increased 1/16 inch (2 mm).

(3) The pavement temperature shall be measured and recorded in the presence of the RPR. Measurement shall be made each day before commencing sawing and at any other time during the day when the temperature appears to be moving out of the allowable sawing range.

b. Waterblast cleaning. The concrete joint faces and pavement surfaces extending at least 1/2 inch (12 mm) from the joint edges shall be waterblasted clean. A multiple pass technique shall be used until the surfaces are free of dust, dirt, curing compound, or any residue that might prevent ready insertion or uniform contact of the seal and bonding of the lubricant/adhesive to the concrete. After final cleaning and immediately prior to sealing, the joints shall be blown out with compressed air and left completely free of debris and water.

c. Sandblast cleaning. The concrete joint faces and pavement surfaces extending at least 1/2 inch (12 mm) from the joint edges shall be sandblasted clean. A multiple pass technique shall be used until the surfaces are free of dust, dirt, curing compound, or any residue that might prevent ready insertion or uniform contact of the seal and bonding of the lubricant/adhesive to the concrete. After final cleaning and immediately prior to sealing, the joints shall be blown out with compressed air and left completely free of debris and water.

d. Rate of progress. Cleaning of the joint faces shall be limited to the linear footage of joint that can be sealed during the same workday.

604-4.4 Installation of the compression seal.

a. Time of installation. Joints shall be sealed within **3** calendar days of sawing the joint seal cavity and the final cleaning of the joint walls, or a temporary seal shall be installed to prevent infiltration of foreign material. If rain interrupts the sealing operations, the joints shall be washed, cleaned with air and be dry before proceeding with installing of the lubricant/adhesive and compression seal.

b. Installation Sequence. Longitudinal joints shall be sealed first, then seal the transverse joints. Transverse joint seals will be continuous from edge to edge of the pavement. Intersections shall be made

monolithic by use of joint seal adhesive and care in fitting the intersection parts together. Seals which do not reach an intersection shall be removed and replaced with new seal as directed by the RPR at the Contractor's Expense. Seal extender pieces shall not be used at intersections.

c. Sealing joints. The sides of the joint seal or the sides of the joint shall be covered with a coating of lubricant/adhesive and the seal installed as specified. Butt joints and seal intersections shall be coated with liberal applications of lubricant/adhesive. Lubricant/adhesive spilled on the pavement shall be removed immediately to prevent setting on the pavement.

The joint seal shall be placed at a uniform depth within the tolerances specified. The compression joint seal shall be placed to a depth of 3/16 inch (5 mm), ±1/8 inch (3 mm), below the pavement surface or below the depth of the groove unless otherwise directed by the RPR.

The seal shall be installed in the longest practicable lengths in longitudinal joints and shall be cut at the joint intersections to provide continuous installation of the seal in the transverse joints. The joint seal shall be installed in an upright position, free from twisting, distortion, and cuts. If stretch of installed joint seal exceeds 1%, adjustments shall be made to the installation equipment and procedure. Stretch of installed joint seals exceeding 2% stretch shall be removed and replaced.

After installation of the longitudinal joint seals, it shall set for a minimum of one (1) hour prior to cutting the seal at the joint intersections. For all transverse joints, the minimum length of the preformed joint seal shall be the pavement width from edge to edge.

604-4.5 Clean-up. Upon completion of the project, all unused materials shall be removed from the site, all lubricant/adhesive on the pavement surface shall be removed, and the pavement shall be left in clean condition.

604-4.6 Quality Control and Quality Assurance.

a. Quality Control The application equipment shall be inspected to assure uniform application of lubricant/adhesive to the sides of the compression joint seal or the walls of the joint. Equipment causing cutting, twisting, nicking, excessive stretching or compressing of the compression seal, or improper application of the lubricant/adhesive, shall not be used until causes of the deficiencies are determined and corrected by the Contractor.

The seal shall be inspected by the Contractor a minimum of once per 400 feet (120 m) of seal for compliance to the shrinkage or compression requirements. Measurements shall be made at the same interval to determine conformance with depth and width installation requirements.

b. Quality Assurance. Cleaned joints shall be approved by the RPR prior to installation of the lubricant/adhesive and compression joint seal.

Conformance to stretching and compression limitations shall be determined by the RPR using the following procedures:

(1) Mark the top surface of the compression seal at one foot (30 cm) intervals in a manner clear and durable to enable length determinations of the seal.

(2) After installation, the distance between the marks on the seal shall be measured by the Contractor.

(3) If the stretching or compression exceeds the specified limit, the seal shall be removed and replaced with new joint seal at the Contractor's Expense. The seal shall be removed up to the last correct measurement.

604-4.7 Acceptance. The joint sealing system (compression seal and lubricant/adhesive) shall be inspected by the RPR for proper rate of cure and bonding to the concrete, cuts, twists, nicks, and other deficiencies. Seals exhibiting any defects prior to final acceptance of the project, shall be removed from

the joint, wasted, and replaced with new material in a satisfactory manner, at the Contractor's expense, as determined by the RPR.

METHOD OF MEASUREMENT

604-5.1 Measurement. The quantity of compression joint seals installed and accepted, will be determined by the linear feet (meter).

BASIS OF PAYMENT

604-6.1 Payment. Payment will be made at the contract unit bid prices per linear foot (meter) for the compression joint seals. The unit bid prices shall include the cost of all labor, materials, the use of all equipment, and tools required to complete the work.

Item 604-6.1 Compression Joint Seals for Concrete Pavements –per linear feet (meter)

REFERENCES

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

ASTM International (ASTM)

ASTM D2628	Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D2835	Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements

Corps of Engineers

CRD C548	Standard Specification for Jet-Fuel and Heat Resistant Preformed Polychloroprene Elastomeric Joint Seals for Rigid Pavements

Unified Facilities Criteria (UFC)

UFC 3-250-08FA	Standard Practice for Sealing Joints and Cracks in Rigid and Flexible Pavements

END ITEM P-604

Item P-605 Joint Sealants for Pavements

DESCRIPTION

605-1.1 This item shall consist of providing and installing a resilient and adhesive joint sealing material capable of effectively sealing joints in pavement; joints between different types of pavements; and cracks in existing pavement.

MATERIALS

605-2.1 Joint sealants. Joint sealant materials shall meet the requirements of **:**

- ASTM D5893 Standard Specifications for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.
- ASTM D6690 Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
- ASTM D7116 Standard Specification for Joint Sealants, Hot Applied, Jet Fuel Resistant Types for Portland Cement Concrete Pavements

Each lot or batch of sealant shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, the safe heating temperature, and shall be accompanied by the manufacturer's certification stating that the sealant meets the requirements of this specification.

605-2.2 Backer rod. The material furnished shall be a compressible, non-shrinking, non-staining, non-absorbing material that is non-reactive with the joint sealant in accordance with ASTM D5249. The backer-rod material shall be 25% ± 5 % larger in diameter than the nominal width of the joint.

605-2.3 Bond breaking tapes. Provide a bond breaking tape or separating material that is a flexible, non-shrinkable, non-absorbing, non-staining, and non-reacting adhesive-backed tape. The material shall have a melting point at least 5°F (3°C) greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. The bond breaker tape shall be approximately 1/8 inch (3 mm) wider than the nominal width of the joint and shall not bond to the joint sealant.

CONSTRUCTION METHODS

605-3.1 Time of application. Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be 50°F (10°C) and rising at the time of application of the poured joint sealing material. Do not apply sealant if moisture is observed in the joint.

605-3.2 Equipment. Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and maintained in satisfactory condition at all times. Submit a list of proposed equipment to be used in performance of construction work including descriptive data, **[___]** days prior to use on the project.

a. Tractor-mounted routing tool. Provide a routing tool, used for removing old sealant from the joints, of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks.

b. Concrete saw. Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified.

c. Sandblasting equipment. The Contractor must demonstrate sandblasting equipment including the air compressor, hose, guide and nozzle size, under job conditions, before approval in accordance with paragraph 605-3.3. The Contractor shall demonstrate, in the presence of the Resident Project Representative (RPR), that the method cleans the joint and does not damage the joint.

d. Waterblasting equipment. The Contractor must demonstrate waterblasting equipment including the pumps, hose, guide and nozzle size, under job conditions, before approval in accordance with paragraph 605-3.3. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans

e. Hand tools. Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces. Hand tools should be carefully evaluated for potential spalling effects prior to approval for use.

f. Hot-poured sealing equipment. The unit applicators used for heating and installing ASTM D6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

g. Cold-applied, single-component sealing equipment. The equipment for installing ASTM D5893 single component joint sealants shall consist of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. The dimension of the nozzle shall be such that the tip of the nozzle will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Small hand-held air-powered equipment (i.e., caulking guns) may be used for small applications.

605-3.3 Preparation of joints. Pavement joints for application of material in this specification must be dry, clean of all scale, dirt, dust, curing compound, and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

a. Sawing. All joints shall be sawed in accordance with specifications and plan details. Immediately after sawing the joint, the resulting slurry shall be completely removed from joint and adjacent area by flushing with a jet of water, and by use of other tools as necessary.

b. Sealing. Immediately before sealing, the joints shall be thoroughly cleaned of all remaining laitance, curing compound, filler, protrusions of hardened concrete, old sealant and other foreign material from the sides and upper edges of the joint space to be sealed. Cleaning shall be accomplished by sandblasting, tractor-mounted routing equipment**,** concrete saw**,** and/or waterblaster as specified in paragraph 605-3.2. The newly exposed concrete joint faces and the pavement surface extending a minimum of 1/2 inch (12 mm) from the joint edge shall be sandblasted clean. Sandblasting shall be accomplished in a minimum of two passes. One pass per joint face with the nozzle held at an angle directly toward the joint face and not more than 3 inches (75 mm) from it. After final cleaning and

immediately prior to sealing, blow out the joints with compressed air and leave them completely free of debris and water. The joint faces shall be surface dry when the seal is applied.

c. Backer Rod. When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a backer rod in accordance with paragraph 605-2.2 to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backer rod is placed at the specified depth and is not stretched or twisted during installation.

d. Bond-breaking tape. Where inserts or filler materials contain bitumen, or the depth of the joint opening does not allow for the use of a backup material, insert a bond-separating tape breaker in accordance with paragraph 605-2.3 to prevent incompatibility with the filler materials and three-sided adhesion of the sealant. Securely bond the tape to the bottom of the joint opening so it will not float up into the new sealant.

605-3.4 Installation of sealants. Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the RPR before sealing is allowed. Sealants shall be installed in accordance with the following requirements:

Immediately preceding, but not more than 50 feet (15 m) ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/8 to 1/4 inch (3 to 6 mm) ±1/16 inch (2 mm) below the top of pavement surface; or bottom of groove for grooved pavement. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the RPR. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

605-3.5 Inspection. The Contractor shall inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified at no additional cost to the airport.

605-3.6 Clean-up. Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

METHOD OF MEASUREMENT

605-4.1 Joint sealing material shall be measured by the linear foot (meter) of sealant in place, completed, and accepted.

BASIS OF PAYMENT

605-5.1 Payment for joint sealing material shall be made at the contract unit price per linear foot (meter). The price shall be full compensation for furnishing all materials, for all preparation, delivering, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-605-5.1	Joint Sealing Filler per linear foot (meter)

REFERENCES

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

ASTM International (ASTM)

ASTM D789	Standard Test Method for Determination of Relative Viscosity of Polyamide (PA)
ASTM D5249	Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
ASTM D5893	Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt
ASTM D7116	Standard Specification for Joint Sealants, Hot Applied, Jet Fuel Resistant Types for Portland Cement Concrete Pavements

Advisory Circulars (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids

END ITEM P-605

Stanley Consultants INC.

MEETING NOTES

No.

Date: July 15th 2024

Place: Baton Rouge Airport, 1st Floor Conference Room

Project/Purpose: Taxiway Lima Extension Pre-Bid Meeting

Attendees: See Sign-In Sheet

Notes By: Aidan Carter

The following meeting notes set forth our understanding of the discussions and decisions made at this meeting. If no objections, questions, additions, or comments are received within 5 working days from issuance of the meeting notes, we will assume that our understandings are correct. We are proceeding based on the contents of these meeting notes.

- Meeting attendees were provided with the meeting agenda
  - Inspector – Dennis St. Romaine (GOTECH)
  - QA Lab - Southern Earth Sciences
- Security
  - 4:1 Escort Privileges
  - 10 FBI Background Check Required
    - Should take roughly 2 weeks
  - Security badges will be required
- DBE Info
  - Isaiah Marshal (SJB Group) introduction
  - SJB Group has resources to help contractors reach the DBE requirements
- Contractor Introductions
- General Type of Work
  - As shown on meeting agenda
    - Construct new asphalt Taxiway L pavement from existing Taxiway L to south edge of Taxiway B
    - Relocate Runway 4L-22R Rollout RVR
    - Decommission General Aviation Runway 4R-22L
    - Decommission portions of Taxiway E from Taxiway L to Taxiway F (Taxiway B will remain in use from Taxiway F to its northern terminus).
    - Mill and overlay existing Taxiway L from 4L end of Runway 4L-22R to west of Taxiway B
    - Signing, edge lighting, pavement markings, subsurface drainage
    - Existing Taxiway L adjacent to the South Ramp will be renamed Taxiway P.
    - Taxiway Connections L1, L2 and L3 to be renamed P1, P2 and P3.
  - Work Items to be done first
    - Relocation of the Runway 4L-22R Rollout RVR (see plans)
    - Decommission General Aviation Runway 4R-22L
    - This will necessitate renaming and remarking existing Runway 4L-22R, changing the designation markings from “4L” and “22R” to “4” and “22”.
    - Remark the dashed centerline of Runway 4-22.
  - This bid is for phase 1 only
  - Work type includes:

        - Earthwork
        - Pavement
            - Asphalt Base Bid
            - PCC Alternate
                - PCC alternate shall include all other items contained within the base bid
        - Subsurface drainage
        - Pavement edge drain
        - Relocation of security fence
        - Perimeter road realignment
        - Airport sign updates
        - Pavement marking removal
        - Relocation of 22R Rollout Runway Visual Range
        - Taxiway Edge Lighting
        - 4R-22L to be repainted after GA runway closure
    - Plans and specs are available digitally at centralbidding.com
    - Contractors may review the hard copy of the plans at the office of Stanley Consultants.
        - Stanley address on business cards are wrong, address on meeting agenda is correct
- Bid opening
    - 10AM, Tuesday, July 30th, 2024
    - City/Parish Purchasing Office, Room 826, City Hall
- Addendum
    - An addendum may be issued to shorten the limits of phase 1
- Work within safety areas
    - Any work within the safety areas will require the closure of the runway/taxiway
    - Coordination will be crucial when work is being done within the safety areas
- Q&A Adjourned at 10:46 AM. The field visit began immediately after
- Due to party size and airport activity, we were unable to go out onto the runway/taxiways
- Utilities
    - FAA will locate all of their cables
    - BTR will locate all other utilities
    - All utilities must be positively located before any digging occurs
    - Digging shall be via HydroVAC until cables are exposed
        - Hand/machine digging will be permitted after cable is exposed
        - This needs to be included in the specs
            - Earthwork or Electrical Items
- Site Visit Adjourned at 10:59 AM
- Contractor Questions
    - Need specs for
        - Asphalt-Treated Permeable Base Course
        - Liquid Membrane-Forming Compounds for Curing Concrete
    - Question about DBE Requirements
        - How to satisfy requirements for bid alternates
        - Wording in DBE provision is unclear
    - Was a section with ACP Base and PCC Surfacing considered?
        - No, sections are either all ACP or all PCCP
    - Joint Layout for PCCP alternate requested
        - Joint Layout plans would help contractors more accurately bid the alternate
    - Will there be work hour restrictions?
        - No, contractor will work at whatever hours they choose. No noise restrictions either.
    - How will low bid be selected?
        - State law will dictate
        - Alternate will be selected after bidding is closed
- Additional questions are to be emailed to Project Engineers by Friday, July 19th, 2024

Distribution:

PRE-BID CONFERENCE AGENDA

Taxiway L Extension and Decommissioning of Runway 4R-22L & Taxiway E

10:00 AM Monday, July 15, 2024

Meeting Location: Airport Terminal Conference Room – First Floor
Project Location: Baton Rouge Metropolitan Airport

AIP No.: 3-22-0006-128-2023
SP No.: H.015713

SPONSOR: Greater Baton Rouge Airport District

SPONSOR REPRESENATITIVE: Alan Krouse, Program Manager, AMG
Phone: 225-358-4240

PROJECT ENGINEER: Blake Roussel, Stanley Consultants, Inc.
Phone: (225) 936-1604

Adam Fields, Stanley Consultants, Inc.
Phone: (225) 388-4219

INTRODUCTIONS:

1. **Baton Rouge Metropolitan Airport (Owner)**
   a. Mike Edwards, Director of Aviation
   b. Louis Hubbard, Assistant Director of Aviation
   c. Chief Anthony Williams, Airport Police/ARFF
   d. Jerry Webber, Construction Superintendent
   e. Craig Alford, Airport Operations

2. **Program Managers (Owner's Representatives): AMG**
   a. Alan Krouse, Program Manager
   b. Tim Murray, Construction Project Manager

3. **Project Engineers: Stanley Consultants, Inc.**
   a. Blake Roussel, Project Engineer
   b. Adam Fields, Project Engineer
   c. Subconsultants
      i. PEC – Drainage, Perimeter Road, Fencing
      ii. Volkert – Taxiway Edge Lighting, Signage
      iii. MCA – Navaids
      iv. Forte and Tablada – Survey
      v. APS – Geotechnical Investigation

4. **Inspection/Testing Services: TBD**
   a. Project Inspector TBD

b. Quality Assurance Laboratory, TBD

5. **DBE Instructions – AMG - 14%**

6. **Security Badging and Access – AMG – Tim Murray**

7. **Contractors**

8. **Others**

GENERAL CONTRACT REQUIREMENTS:

1. **General Type of Work –** This contract includes Phase I work for the Extension of Taxiway Lima & Decommissioning of Runway 4R-22L and Taxiway E. Work types include earthwork, asphalt pavement with an alternate bid typical section being concrete pavement, subsurface drainage, pavement edge drains, relocation of security fence, perimeter road realignment, airport sign updates, pavement markings and marking removal, relocation of the Runway 22R Rollout Runway Visual Range (RVR), and taxiway edge lighting.

2. **Contract Provisions**

a. Plans and Specifications are available online at www.centralbidding.com:

b. Links to the plans and specs can also be provided for download via an email request to both Project Engineers from Stanley Consultants.

Blake Roussel, Stanley Consultants, Inc.
RousselBlake@stanleygroup.com
Phone: (225) 936-1604

Adam Fields, Stanley Consultants, Inc.
FieldsAdam@stanleygroup.com
Phone: (225) 388-4219

c. A full-size set of plans is available for review only at the office of Stanley Consultants, Inc. To obtain a digital copy please request via email.

Stanley Consultants, Inc.
700 Main Street, Ste 405
Baton Rouge, LA 70802

d. Bid Opening
Time & Date: 10:00 am, Tuesday, July 30, 2024
Location: City/Parish Purchasing Office, Room 826, City Hall

e. Addendums
Addendum 1 will be issued, if necessary, in the days following the Pre-Bid Meeting.

3. **Project Detail:**

a. Overall Project Scope is to extend Taxiway L as a parallel taxiway to Runway 4L-22R, decommission General Aviation Runway 4R-22L and portions of Taxiway E.
b. The Overall Project is broken out into two phases, or contracts—Phase I (this contract) and Phase II (future contract).
c. Phase I—Base Bid
    1. Limits—Existing Taxiway L to existing Taxiway B
    2. Scope
        - Construct new asphalt Taxiway L pavement from existing Taxiway L to south edge of Taxiway B
        - Relocate Runway 4L-22R Rollout RVR
        - Decommission General Aviation Runway 4R-22L
        - Decommission portions of Taxiway E from Taxiway L to Taxiway F (Taxiway B will remain in use from Taxiway F to its northern terminus).
        - Mill and overlay existing Taxiway L from 4L end of Runway 4L-22R to west of Taxiway B
        - Signing, edge lighting, pavement markings, subsurface drainage
    3. Construction Sequencing—First Work Items
        - Relocation of the Runway 4L-22R Rollout RVR (see plans)
        - Decommission General Aviation Runway 4R-22L
            - This will necessitate renaming and remarking existing Runway 4L-22R, changing the designation markings from “4L” and “22R” to “4” and “22”.
            - Remark the dashed centerline of Runway 4-22.
    4. Existing Taxiway L adjacent to the South Ramp will be renamed Taxiway P.
        - Taxiway Connections L1, L2 and L3 to be renamed P1, P2 and P3.
d. Phase I—Alternate 1
    1. Concrete typical section alternate to the Base Bid (above).
    2. All other items from Base Bid are present in Alternate 1.
e. Work in Runway/Taxiway Safety Areas—Brief Overview
    1. Work is phased such that all work outside of safety areas do not require closing of a taxiway or runway.
    2. When work is required within runway or taxiway safety areas, coordination between the Contractor and BTR Operations is required, and runways/taxiways shall be closed.
f. Security
    1. No workers can enter any safety areas of active runways or taxiways.
    2. Access locations, haul routes and laydown areas are as shown in the plans.

Questions

a. Please submit all questions in written email format to the Project Engineers as listed above by 5:00pm Friday, July 19, 2024. They will be reviewed and responded to in an addendum, if applicable.

Pre-Bid Conference Adjourned and Site Visit

SIGN-IN SHEET

NAME	AGENCY/COMPANY	CONTACT
Isaiah Marshall	SJB Group	isaiah@thewconsultinggroup.com
DENNIS St. Romain	GOTECH	
Douglas Olson	Barriere Co.	dougo@barriere.co
Melissa Falvey	CCI	Michelle@commandmastries.com
Brent Rodrigue	LA Contracting	bidding@la-coat.co
Chad Tygres	Southern Synergy	C.Tygres@southernsynergyllc.com
HILLARD BARKER	BARKER BROS.	HB@BARKERBROS.com
Robbin Dufour	Siema construction, LLC	rdufour@siemaconstruction.com
Rebekah Vernon	Johnson Bros.	rvernon@southlandholdings.com
Trent Greco	Cycle Construction	estimating@cycleconstruction.com
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Trevor Warner	Lemoine	trevor.warner@Lemoinc.com
Barney Boyd	LA Wood	LAWOOD25338@BELLSOUTH.NET
Lee Bond	21 Construction	lori@21const.com
Joshua Blouin	Preferred Electric	jblouin@preferredelectric.net
Grant Mitchell	BIC	Grant@Brown-Ind.com
Tim Lewellen	BIC	Tim.Lewellen@Brown-Ind.com
Jason Aubin	Bon Bros	JAubin@BonBros.com

Sign-IN Sleet

NAME	AGENCY/COMPANY	CONTACT
Dillon Lee	Barriere Construction	(985)217-855 Dillonl@barriere com
Justin Hendrick	Hendrick Construction INC	(225) 933-6826 Justin@HCLADevelopment.com
Craig Alford	BTR	CraigFord@Flybtr.c
Dustin Bouey	Boone Services LLC	dustin@booneservices.com

CONTRACTOR Q&A

Taxiway L Extension & Decommissioning of Runway 4R/22L and Taxiway E
Non-mandatory Pre-Bid Meeting Date - 7/15/2024
Bid Opening Date - 7/30/2024

Date	Name	Contractor	Question	Response Date	Response	Respondent Name
7/3/2024		Lemoine	What is the engineer's estimate?	7/3/2024	Approximately $11 Million for Phase I work.	Blake Roussel
7/9/2024	Michelle France	Command	1.) What is the engineer's estimate? 2.) Are TWIC cards required on this project?	7/9/2024	1.) Approximately $11 Million for Phase I Base Bid and $16 Million for Phase I Alternate 1. 2.) TWIC cards are not required, but there is a separate badging process through BTR Airport Security that must be followed.	Blake Roussel
7/9/2024	Michelle France	Command	Is the $16M for both the base bid and Alternate #1?	7/9/2024	So, the $16M is the engineer's opinion of cost for the Alternate to the Base Bid. The main difference in the Base Bid and Alternate 1 are taxiway surface material (asphalt for Base Bid, PCCP for Alternate 1). We're estimating approximately $11M for the asphalt option (Base Bid) and $16M for the concrete alternate (Alternate 1). Please refer to the typical sections in the plans for the differences in these two pavement designs.	Adam Fields
7/12/2024	**Steve Shaw**	**Airport Lighting Company**	**L-109-7.1 Indicates Installation of 10kW CCR. Plan LS205 Indicates INSTALL REQUIRED 2.5KW L-829 CONSTANT CURRENT REGULATOR (CCR) FOR PHASE I. PHASE II WORK, ONCE COMPLETE, REQUIRES THIS CCR TO BE REPLACED WITH A 5KW L-829 CCR. Is the correct regulator 10kW or 5kW? Is the 2.5kW a spare already owned by the airport? Is the new CCR a 2.5kW in Phase I then a 5kW in Phase II? This is confusing as the Bid Schedule indicates 10kW in the Base Bid and 10kW in the Alternate Bid without mention of phasing.**	**7/12/2024**	Phase 1 requires a new 2.5kW CCR. When Phase 2 is constructed, the 2.5kW CCR will become a spare for the airport and will be replaced by a new 5kW CCR. Description in Spec / Pay Item L-109-7.1 will be revised.	**Ken Powers**
7/13/2024	**Steve Shaw**	**Airport Lighting Company**	**L-109-7.2 Indicates New Relay Interface Panel but there is nothing outlining function within the documents.**	**7/12/2024**	Existing radio and relay panel will be reused; pay item description to be revised	**Ken Powers**
7/14/2024	**Steve Shaw**	**Airport Lighting Company**	**There are more NEW signs in the Sign Schedule (PSM202) than what is indicated in the Bid Schedule (L-125-5.2, L-125-5.3, L-125-5.4)**	**7/12/2024**	We found no discrepancies - some signs are shown more than once since the sign panels will change in Phase 2 construction.	**Ken Powers**
7/15/2024	**Steve Shaw**	**Airport Lighting Company**	**Who is the manufacturer of the signs that require replacement panels (L-125-5.6).**	**7/12/2024**	ADB Safegate	**Ken Powers**
7/16/2024	**Steve Shaw**	**Airport Lighting Company**	**L-115-5.2 Indicates Junction Can L868 Size D with nothing outlined within the documents. L868D is not a recognized Junction Can. Is this to be L868C? L867D?**	**7/12/2024**	L867D is required. Spec/Pay item description to be revised.	**Ken Powers**
7/16/2024	**Steve Shaw**	**Airport Lighting Company**	**In regards to this project, L-125-5.8 states UPDATE ALCS with no additional information provided in the bid documents. Any hardware/software/interface & controls/components are proprietary/sole source to the control system and will need to be procured outside of this AIP Funded Project per AIP Guidelines, AIP Handbook 5100-38D Change 1, 3-36 Limited Noncompetitive Proposal Situations (ALCMS Modifications···). I look forward to your removal of this via addendum.**	**7/12/2024**	This was discussed and the pay item is to remain in the plans.	**Ken Powers**
7/15/2024	Grant Mitchell	Brown Industrial Construction	How will the low bidder be selected--Base Bid Only or Base Bid + Alternate?	7/15/2024	The Base Bid will be considered and selected on the lowest bid. Alternate 1 (same as Base Bid, but with a concrete alternate pavement section) will be considered if lower compared to the asphalt (Base Bid) lowest bid. Alternate 2 (reduced scope) is an option for the Owner if the Base and Alternate Bids are above budget. There will be no Base Bid + Alternate. The Alternates are options for the Owner.	Adam Fields
7/15/2024	Hilliard Barber	Barber Brothers	I don't see the specification for P-407.	7/15/2024	The specification for P-407 ASPHALT TREATED PERMEABLE BASE will be added via Addendum.	Adam Fields
7/15/2024	Hilliard Barber	Barber Brothers	Asphalt liquid was not specified.	7/15/2024	The asphalt binder (cement) performance grade (PG) will be specified via Addendum.	Adam Fields
7/15/2024	Hilliard Barber	Barber Brothers	Will the airport supply the lighted X's?	7/15/2024	Yes, the Airport will supply the lighted X's.	Alan Krouse
7/15/2024	Hilliard Barber	Barber Brothers	There are 0 quantities even in the base bid. Impossible to bid items like this.	7/15/2024	The 0 quantity items will be removed from the Bid Form via Addendum.	Adam Fields
7/15/2024	Hilliard Barber	Barber Brothers	Cost of security badges and background check?	7/15/2024	Security badges and background check will be $80/each.	Alan Krouse
7/15/2024	Hilliard Barber	Barber Brothers	Will subcontractors have to meet the same insurance requirements as does the General Contractor?	7/15/2024	No, just the General Contractor. The Airport and City-Parish will be named as additionally insured.	Alan Krouse
7/15/2024	Chris Decuir	J. B. James Construction, LLC	For the concrete paving alternate, is there a typical joint detail sheet and joint layout information that can be provided?		At this time typical joint spacing will be 12.5 FT wide X 15.0 FT long. We are working toward putting joint layout sheets into Addendum 1.	Adam Fields
7/16/2024	Douglas Olson	Barriere Construction Co., LLC	The proposal form includes 30 items with zero quantity. Please remove the zero quantity items.	7/16/2024	The 0 quantity items will be removed from the Bid Form via Addendum.	Adam Fields
7/16/2024	Douglas Olson	Barriere Construction Co., LLC	The project includes an asphalt alternative and a concrete alternative are the contractors required to bid both alternatives or only their	7/16/2024	Contractor shall bid on all bid alternates.	Alan Krouse
7/16/2024	Grant Mitchell	Brown Industrial Construction	I did not see any pay items for the pavement underdrain. Will this be added in an Addendum?	7/16/2024	Yes, the specification for D-705 PIPE UNDERDRAINS FOR AIRPORTS will be added via Addendum.	Adam Fields

7/16/2024	Christian Valencia	Construct Connect	Is there an estimated budget or value you were willing or able to share with me at this time?	7/16/2024	Yes. Base Bid, appx. $11M; Alternate 1, appx. $16.5M.	Adam Fields
7/16/2024	Christian Valencia	Construct Connect	Have start and end dates for the actual work on the project been established yet?	7/17/2024	Bid opening is 10:00 AM on July 30. All bids will be reviewed and a recommendation made to the Owner, then on to Commission and Council for approval. This is within 60 days.	Adam Fields
7/16/2024	Timothy Lewellen	Brown Industrial Construction	The sections for the asphalt and Concrete sections appear to be built with completely different design life requirements. Will this be taken into consideration in the proposal review? (ie. Lifesycle analysis of the pavement sections)	7/16/2024	The life cycle benefits of the PCCP alternative will be considered when making the selection.	Blake Roussel
7/16/2024	Timothy Lewellen	Brown Industrial Construction	P306 is used as a working platform most of the time and 11.5" seems to be excessive. As the design criteria for the FAA utilizes either p304, p306 or p 307 there seems to be advantages to utilizing the asphalt base section. Would that be considered if the airport is looking for a concrete surface?	7/16/2024	No changes will be made to the pavement sections.	Blake Roussel
7/16/2024	Timothy Lewellen	Brown Industrial Construction	Are there any Joint layout plans available?	7/16/2024	We are working toward putting joint layout sheets into Addendum 1.	Adam Fields
7/16/2024	Timothy Lewellen	Brown Industrial Construction	Per advisory circular any odd-shaped panels for concrete requires reinforcement can the engineer provide quantities of drawings for these and reinforcing required?	7/16/2024	Reinforcing steel will be inclusive to Item P-501-8.1 CEMENT CONCRETE PAVEMENT. For spacing, see FAA AC/150/5320-6G and Sample PCC Joint Plans at https://www.faa.gov/airports/engineering/pavement_design.	Adam Fields
7/16/2024	Timothy Lewellen	Brown Industrial Construction	What are the pavement joint requirements? (Dowels, Dummy, Re-steel or thickened edges per circular wand where are they located?)	7/16/2024	Dummy joints will be allowed. Joints shall adhere to FAA AC 150/5320-6G and Sample PCC Joint Plans (https://www.faa.gov/airports/engineering/pavement_design).	Adam Fields
7/16/2024	Timothy Lewellen	Brown Industrial Construction	Are 25 foot panels for concrete acceptable?	7/16/2024	At this time typical joint spacing will be 12.5 FT wide X 15.0 FT long.	Adam Fields
7/16/2024	Timothy Lewellen	Brown Industrial Construction	Are interlocking (Dummy) joints acceptable in the pavements or are dowels required in contraction joints?	7/16/2024	Dummy joints will be allowed.	Blake Roussel
7/16/2024	Timothy Lewellen	Brown Industrial Construction	With the nature of the bid form how is the job going to be evaluated? Suggestion is to base bid all items but paving and alt 1 asphalt, alt 2 concrete so the evaluation can be base bid plus alt 1 of alt 2 to get to the award.	7/16/2024	The Base Bid will be considered and selected on the lowest bid. Alternate 1 (same as Base Bid, but with a concrete alternate pavement section) will be considered if lower compared to the asphalt (Base Bid) lowest bid. Alternate 2 (reduced scope) is an option for the Owner if the Base and Alternate Bids are above budget. There will be no Base Bid + Alternate. The Alternates are options for the Owner. There will be no changes to the bid forms or how the items are displayed other than removing 0 quantity items.	Adam Fields
7/16/2024	Douglas Olson	Barriere Construction Co., LLC	Plan sheet TS1 shows 2” Milling, Plan sheet TS3 shows ½” Milling, the proposal form shows 4” milling please clarify the milling depth	7/16/2024	These typical sections are for the perimeter road. This work is not included in Phase I. We will document this, investigate and make any necessary changes for the Phase II Advertisement. To clarify, the mill and overlay of existing Taxiway L is included in Phase I and is intended to be 2” mill with 2” P-401 overlay. The 4” milling item in the Summary of Estimated Quantities will be revised via Addendum.	Adam Fields
7/16/2024	Chirs Decuir	J. B. James Construction, LLC	Sheet CD100, Note 5 references asphalt pavement removal and concrete airfield pavement removal. These items do not exist. Is all pavement removal paid for under P-101-5.1a?	7/16/2024	P-101-5.1a PAVEMENT REMOVAL ([DESCRIPTION]) is the item used to estimate all full-depth pavement removal.	Adam Fields
7/16/2024	Chirs Decuir	J. B. James Construction, LLC	Is there somewhere on the plans that shows the depths of asphalt pavement that is to be removed? Also, is there a depth of base below pavement that will need to be removed? If so, what is the type of this base material?	7/16/2024	P-101-5.1a PAVEMENT REMOVAL ([DESCRIPTION]) is the item used to estimate all full-depth pavement removal.	Adam Fields
7/16/2024	Chirs Decuir	J. B. James Construction, LLC	Is the pavement removal quantity included with the excavation quantity?	7/16/2024	No, excavation is not included in pavement removal.	Adam Fields

7/17/2024	Douglas Olson	Barriere Construction Co., LLC	Plan Sheet TS2 Typical section shows Geosynthetic Fabric between the P-154 Subbase and the P-407 Asphalt Treated Permeable Base. Plan Sheet TS2 Note 3 Geosynthetic Fabric shall be included in with cost P-154 Subbase Course. Proposal form has a pay item P-209-5.2 Separation Fabric 22,286 sy Section P-209 Crushed Aggregate base includes section. 209-2.4 Separation Geotextile. Separation geotextile shall be Class 2, 0.02 sec-1 permittivity per ASTM D4491, Apparent opening size per ASTM D4751 with 0.60 mm maximum average roll value. The section clearly states payment under item P-209-5.2 Section 154-2 Subbase Course includes section 154-2.3 Separation Geotextile. Separation geotextile shall be Class 2; 0.02 sec-1 permittivity per ASTM D4491; Apparent opening size per ASTM D4751 with 0.60 mm maximum average roll value. Please clarify the location of the Geotextile fabric and that it is paid under item P-209-5.2	7/16/2024	Note 3 will be removed from the applicable typical sections. Fabric will be paid under Item P-209-5.2.	Adam Fields
7/17/2024	Douglas Olson	Barriere Construction Co., LLC	Proposal Item P-403-8.1c asphalt mixture binder course (overlay) should this be a (surface) wearing course?	7/17/2024	P-403-8.1Cc for overlay has been changed to P-401-8.1b. It is intended as the 2" overlay surface course of existing Taxiway L.	Adam Fields
7/17/2024	Douglas Olson	Barriere Construction Co., LLC	Is there a technical specification for Item P-407-8.1 Asphalt Treated Permeable Base (ATPB) (6” Thick)?	7/17/2024	The specification for P-407 ASPHALT TREATED PERMEABLE BASE will be added via Addendum.	Adam Fields
7/17/2024	Douglas Olson	Barriere Construction Co., LLC	Section P-154 Subbase Course calls for gradation testing is there a specified gradation?	7/17/2024	Yes. The gradation requirements table has been added to specification P-154 SUBBASE COURSE and will be provided via Addendum.	Adam Fields
7/17/2024	Douglas Olson	Barriere Construction Co., LLC	Is there a pay item for the under drain shown on plan sheet TS5? What is the depth below the subbase required?	7/17/2024	The specification for D-705 6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC will be added via Addendum.	Adam Fields
7/17/2024	Brent Rodrigue	BrentR@la-cont.com	On the unit bid form included there are 30 bid items on base bid and alternate 1 bid forms.will these bid items have any quantities attached to them eventually?	7/17/2024	The 0 quantity items will be removed from the Bid Form via Addendum.	Adam Fields
7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Has 100% of funding for this project been obtained? If not, what funding sources are anticipated and when is funding anticipated to be fully obtained?	7/17/2024	It's expected that Phase I will be fully funded through FAA Grant money and State funds.	Adam Fields
7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	What is the anticipated award date for this project?	7/17/2024	Bid opening is 10:00 AM on July 30. All bids will be reviewed and a recommendation made to the Owner, then on to Commission and Council for approval. This is within 60 days.	Adam Fields
7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	What is the anticipated NTP date for this project?	7/17/2024	Bid opening is 10:00 AM on July 30. All bids will be reviewed and a recommendation made to the Owner, then on to Commission and Council for approval. This is within 60 days.	Adam Fields
7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Please provide any/all jointing and reinforcing details for the P-501-8.1 Cement Concrete Pavement item within Alt 1.	7/18/2024	Joint layouts will be provided via Addendum. Reinforcement will be per FAA AC 150/5320-6G and Sample PCC Joint Plans (https://www.faa.gov/airports/engineering/pavement_design). We are going to provide joint layout sheets via Addendum. Steel will be included in the cost of Item P-501-8.1 CEMENT CONCRETE PAVEMENT. However, the following guidance is provided in FAA AC 150/5320-6G. Steel design will not be provided in joint layout sheets, however this will give you something to estimate from.	Adam Fields
7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Typically, P-306 is placed directly beneath the P-501 layer, with a bond breaker applied between the 2 layers. Would the engineer reconsider the placement of the drainage layer similar to that of the Base Bid, beneath the P-209 layer?	7/17/2024	No changes will be made to the pavement sections.	Adam Fields
7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Spec. 307 states that a Type 2, Class B Curing Compound should be used as curing material and as a bond breaker for the overlaying surface. Please specify at what rate the compound is to be applied for each application.	7/17/2024	There is no specified application rate. However, ASTM C309 may provide guidance.	Adam Fields
7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Specification P-501 section 501-2.4 Joint Seal states "The joint seal for the joints in the concrete pavement shall meet the requirements of Item P-604 and Item P-605 and shall be of the type specified in the plans." There does not appear to be a P-604 or P-605 specification included in the project manual nor is there a type specified in the plans.	7/17/2024	Specifications P-604 COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS and P-605 JOINT SEALANTS FOR PAVEMENTS will be provided via Addendum.	Adam Fields
7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Is the thickness for the P-306 layer correct at 11.5"? Typically, this material is placed in a 5-7" thick section as it is essentially a working platform for the P-501 placements.	7/17/2024	No changes will be made to the pavement sections. Pavement thickness was determined using FAA's FAARFIELD 2.0 pavement design software.	Adam Fields

7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Please clarify the widths of the P-307, P-306, and P-209 layers as this will be necessary to determine whether sufficient track line will be provided for concrete paving equipment. Typically, a 3-foot offset is used for each underlying layer.	7/17/2024	Widths of P-306, P-307 and P-209 on TS2.5 are per the top detail labeled "Proposed Taxiway Grading Section". (26.5 FT on either side of the centlerline or a 1.5 FT offset beyond the surface layer).	Adam Fields
7/17/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Due to the lack of information provided in regard to the concrete pavement section, would the owner please consider an extension to the question deadline as well as the bid submission date to allow time for a thorough review and the potential for follow up questions to the responses regarding questions asked?	7/17/2024	The Owner is under FAA Grant deadline. Joint Layout Sheets will be provided via Addendum.	Adam Fields
7/17/2024	Grant Mitchell	Brown Industrial Construction	For the P-152 “Embankment In Place”, is there a specification for the material?	7/17/2024	Yes. Specification P-152 EMBANKMENT IN PLACE was provided in the Project Manual PDF.	Adam Fields
7/17/2024	Grant Mitchell	Brown Industrial Construction	For P-152, P-154 & P-209 installation methods, can a dozer be utilized to install the material?	7/17/2024	If there is no restriction in the applicable specifications, then yes. This may need to be confirmed with the RPR.	Adam Fields
7/17/2024	Grant Mitchell	Brown Industrial Construction	For the Pavement Removal (17,259SY) bid item, how thick is the asphalt pavement in for this item?	7/17/2024	As-builts may be requested from the airport.	Adam Fields
7/17/2024	Grant Mitchell	Brown Industrial Construction	For the Pavement Removal (17,259SY) bid item , is there any concrete included in this item? If so, how thick?	7/17/2024	No.	Adam Fields
7/17/2024	Grant Mitchell	Brown Industrial Construction	Are the base layers underneath the Asphalt/Concrete to be removed included in the Pavement Removal Item or are they captured in the excavation item? If they are included in the Pavement Removal Item can you outline the layers and thickness?	7/17/2024	Base layer is included in P101-5.1 PAVEMENT REMOVAL. As-builts for existing pavement sections can be requested from the airport. (As-builts sent via email 07/18/2024).	Adam Fields
7/17/2024	Grant Mitchell	Brown Industrial Construction	Can we get clarification on what drainage structures is being removed/abandoned in phase 1?	7/17/2024	Clarification will be provided via Addendum.	Adam Fields
7/17/2024	Grant Mitchell	Brown Industrial Construction	What bid item will be used to price the Existing Catch Basin Removals shown in plans?	7/17/2024	P-101-5.7 REMOVAL OF EXISTING PIPES AND STRUCTURES (LUMP SUM).	Hardy Bathea
7/17/2024	Grant Mitchell	Brown Industrial Construction	Is all of the existing pipe shown to be abandoned in place going to be flow filled or is some going to be removed? If so, what bid item will this cost fall under?	7/17/2024	All of the pipe is to be removed, except for the pipes that are under the remaining taxiways, these will be filled with flowable fill. The spec for the flowable fill says “No payment will be made separately or directly for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract for Item P-101-5.7.” which is the bid item for Removal of Existing Pipes and Structures.	Hardy Bathea
7/18/2024	Chris Decuir	J. B. James Construction, LLC	Are the clearing and grubbing limits shown anywhere? The 31 acres is a large area without any indication of what will need to be cleared and grubbed.	7/18/2024	Area to be cleared and grubbed is estimated to be surface area touched by grading plans, less pavement areas.	Adam Fields
7/18/2024	Chris Decuir	J. B. James Construction, LLC	Can a material type be specified for the P-154 Subbase Course? The specifications indicate either a granular material or a soil material with PI less than 25.	7/18/2024	A revised Specification P-154 SUBBASE COURSE will be provided via Addendum. See the "MATERIALS" section of the specification for more information, including gradation.	Adam Fields
7/18/2024	Robbin Dufour	Siema Construction	Can a suggested joint layout be provided for bidding purposes on alternate No.1 P-501 concrete paving option including areas to be reinforced and thickened panels?	7/18/2024	Joint layouts will be provided via Addendum. Reinforcement will be per FAA AC 150/5320-6G and Sample PCC Joint Plans (https://www.faa.gov/airports/engineering/pavement_design). We are going to provide joint layout sheets via Addendum. Steel will be included in the cost of Item P-501-8.1 CEMENT CONCRETE PAVEMENT. However, the following guidance is provided in FAA AC 150/5320-6G. Steel design will not be provided in joint layout sheets, however this will give you something to estimate from.	Adam Fields
7/18/2024	Robbin Dufour	Siema Construction	Will the deadline for the submission of DBE paperwork begin immediately after bid opening, or will it begin once a selection of options has been chosen by the owner? The 2 low bid contractors would need to know which option to submit paperwork on, as submitting options for all three would be confusing for the subcontractors, as well as time consuming. More importantly, it may not be clear at the time of bid opening who the 2 low bidders are. Please advise.	7/18/2024	Per the specifications on Page I-8, two apparent low bidders have three days to submit along with other items listed.	Alan Krouse
7/18/2024	Chris Decuir	J. B. James Construction, LLC	How is the pavement edge drain paid? What item should cost be included?	7/18/2024	The specification for D-705 PIPE UNDERDRAINS FOR AIRPORTS will be added via Addendum.	Adam Fields
7/18/2024	Chris Decuir	J. B. James Construction, LLC	Qty for item P-153-6.1 CLSM appears to be high. Sheet CDB2D shows one 24” Pipe to be abandoned in place. Where is other quantity located?	7/18/2024	CLSM will be removed from the bid forms via Addendum. Flow fill is inclusive to Item P-101-5.7.	Adam Fields
7/18/2024	Chris Decuir	J. B. James Construction, LLC	All other pipe shows to be removed, where is this paid?	7/18/2024	P-101-5.7 REMOVAL OF EXISTING PIPES AND STRUCTURES (LUMP SUM). This will be added to the Bid Forms via Addendum.	Adam Fields

7/18/2024	Chris Decuir	J. B. James Construction, LLC	Is there an engineer's estimate for this project?	7/18/2024	Yes. See below: •Phase I Base Bid approximately $11M. •Phase I Alternate 1 approximately $17M. •Phase I Alternate 2 approximately $8M.	Adam Fields
7/18/2024	Chris Decuir	J. B. James Construction, LLC	Will Phase I Alternate 2 be addressed in addendum? I do not see any information on this alternate.	7/18/2024	Yes.	Adam Fields
7/18/2024	Chris Decuir	J. B. James Construction, LLC	When do you plan to send out addendum?	7/18/2024	Addendum documentation will be sent to the Airport no later than Friday, July 19.	Adam Fields
7/18/2024	Chris Decuir	J. B. James Construction, LLC	Would a bid extension be possible?	7/18/2024	The Airport is under FAA Grant deadline. I am not sure if a time extension is possible. All bids have to be in hand by the bid opening of July 30 at 10:00 AM (City Hall).	Adam Fields
7/18/2024	Grant Mitchell	Brown Industrial Construction	I was able to locate the specification for the P-154 Subbase Course but was not able to locate the specification for the P-152 embankment. Can you point me in the right direction?	7/18/2024	P-152 should start on page 218 of the Project Manual.	Adam Fields
7/18/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Does your design require the pavement to be fully reinforced or should the AC standard for odd-shaped panels and/or length-to-width ratio exceeding 25% apply?	7/18/2024	The AC standard will apply; reinforcement will be required in irregular shaped panels.	Adam Fields
7/18/2024	Jason Aubin	Boh Bros. Construction Co., LLC	Additional detail will need to be provided in regard to size and spacing requirements of the rebar or WWF mats. Without providing enough detail, you may be exposing the owner to unnecessary change orders and/or maintenance concerns in the future. The section referenced in the AC section (3.16) is mostly provided to be utilized during pavement design.	7/18/2024	We are preparing joint layout sheets and they will be provided via Addendum. The joint layout sheets will show types of joints, typical spacing of joints, bugs indicating panels that will require reinforcement, details for construction joints and joint seals, and edge details. 6x6-8/8 WWF will be required in non-standard sized slabs.	Adam Fields
7/18/2024	Jason Aubin	Boh Bros. Construction Co., LLC	3.16.3.8 Best construction practice is to offset the stabilized base, base and subbase layers 12 to 36 inches from the edge of the concrete layer to create a solid platform for the paver or forms. The amount of the offset is related to the manner of construction, e.g. slip form pavers require from 24-36" to create a stable path for the paver.	7/18/2024	We currently show a 1.50 FT offset from edge of PCCP surface on either side of the taxiway pavement section.	Adam Fields
7/18/2024	Grant Mitchell	Brown Industrial Construction	I read through the entire section and was not able to locate the dirt spec. Can you provide the specification that is required?	7/18/2024	Soil properties are at the discretion of the Geotechnical Engineer and the Final Geotechnical Engineering Report. Specification P-152 will be revised per this recommendation and issued via Addendum.	Adam Fields
7/18/2024	Michelle France	Command	What are the specific insurance requirements for this project?	7/18/2024	Insurance requirements are covered in Divisions I and II of the Project Manual (access here: https://app.box.com/s/j8gnrjus6mwebszqyur386zkzbiojwkf). Also, the Airport and City-Parish will be named as additionally insured.	Adam Fields
7/18/2024	Shaun Morein	Bernhard	Item Ref. No. L-110-5.2 discusses a steel casing. There is no description of the steel casing required or the size as they say the hdpe conduit is 2". Please provide more information.	7/18/2024	Typical casing is 4".	Ken Powers
7/18/2024	Dusty Dysart	Ferguson Waterworks	Ref Sheet No's TS2, TS2.5, and TS5, Typical Sections. Note 3 on each of these sheets states that Geosynthetic Fabric shall be included with cost of P-154 Subbase Course. The bid form appears to have a separate bid items for the Separation Geotextile in REF No. P-209-5.2.	7/18/2024	Note 3 will be removed from the applicable typical sections. Fabric will be paid under Item P-209-5.2.	Adam Fields
7/18/2024	Dusty Dysart	Ferguson Waterworks	•Ref Sheet No's TS3, TS4, TS4.1, and TS4.2, Typical Sections. Note 3 on these sheets states that Geosynthetic Fabric shall be included with cost of P-407. The bid form appears to have a separate bid item for the separation geotextile in Ref No. P-209-5.2. ols the geotextile referenced in these section details paid for separately in Ref No. P-209-5.2?	7/18/2024	Note 3 will be removed from the applicable typical sections. Fabric will be paid under Item P-209-5.2.	Adam Fields
7/18/2024	Dusty Dysart	Ferguson Waterworks	•Ref Sheet TS5, Detail 4 – This detail shows an underdrain system to be installed at the shoulder of pavement. Note 6 refers to pay items for underdrain systems, but I could not find any pay items for underdrain systems in the bid form. Are these underdrains to be installed as part of this project? If so, is the perforated pipe to be installed for full length of runway on each side, with outlets per note 5?	7/18/2024	Yes, the specification for D-705 PIPE UNDERDRAINS FOR AIRPORTS will be added via Addendum.	Adam Fields
7/18/2024	Chris Decuir	J. B. James Construction, LLC	There are multiple items on the bid form with "0" quantity. Do these items require a unit price? Can we leave the item blank, or $0 unit price?	7/18/2024	The 0 quantity items will be removed from the Bid Form via Addendum.	Adam Fields

7/18/2024	Shaun Morein	Bernhard	Are there any special steel requirements, carbon galvanized? Thickness of the steel or schedule? Will it have to be welded on each end? I have never seen a steel casing needed on an airport for electrical work.	7/18/2024	Spec L-110 offers general guidance, but I don't know if it specifically answers their questions. Spec L-108 indicates to ground all metallic components of the airfield lighting system on the load side of the regulator. I point that out because there could be exothermic welding to connect ground rods/conductors, typically on each end of duct banks, etc. From L-108: All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system. L-110-2.2 does require galvanized steel. The spec doesn't specifically call out thickness.	Ken Powers

PHASE I--ENGINEER'S OPINION OF PROBABLE COST--BASE BID
TAXIWAY L EXTENSION AND DECOMMISSIONING OF RUNWAY 4R-22L AND TAXIWAY E
ADDENDUM 1

ITEM	DESCRIPTION	UNIT	TOTAL QUANTITY	UNIT PRICE	PHASE I COST
	TAXIWAY PAVEMENT AND EARTHWORK				
C-102-5.1c	INSTALLATION AND REMOVAL OF SILT FENCE (CATCH BASIN PROTECTION)	LF	2,305	$2.75	$6,338.75
C-102-5.1e	INSTALLATION AND REMOVAL OF SILT FENCE	LF	3,692	$2.75	$10,153.00
C-105-5.1	MOBILIZATION (5.0%)	LS	1	$530,000.00	$530,000.00
P-101-5.1a	PAVEMENT REMOVAL (GA RUNWAY 4R-22L, TAXIWAY E)	SY	17,259	$14.00	$241,626.00
P-101-5.6a	COLD MILLING (2" DEPTH) (TAXIWAY L)	SY	32,028	$8.00	$256,225.53
P-151-4.2	CLEARING AND GRUBBING	AC	31	$10,000.00	$310,000.00
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	32,244	$19.00	$612,636.00
P-152-4.2	EMBANKMENT IN PLACE	CY	12,978	$40.00	$519,120.00
P-154-5.1	SUBBASE COURSE	CY	11,143	$75.00	$835,725.00
P-155-8.1a	LIME TREATED SUBGRADE (10" THICK) (RVR AND GLIDE SLOPE ACCESS DRIVES)	SY	381	$5.25	$2,000.25
P-155-8.2a	LIME (RVR DRIVES)	TON	4	$450.00	$1,800.00
P-209-5.1a	CRUSHED AGGREGATE BASE COURSE (10" THICK) (RVR DRIVE)	SY	260	$52.00	$13,520.00
P-209-5.1b	CRUSHED AGGREGATE BASE COURSE (6.0" THICK)	SY	22,025	$40.00	$881,000.00
P-209-5.2	SEPARATION GEOTEXTILE	SY	22,286	$4.00	$89,144.00
P-401-8.1a	ASPHALT SURFACE COURSE (2.0" THICK)	TON	2,366	$200.00	$473,200.00
P-401-8.1b	ASPHALT SURFACE COURSE (2" THICK) (OVERLAY)	TON	3,524	$120.00	$422,880.00
P-403-8.1a	ASPHALT MIXTURE BINDER COURSE (2.0" THICK)	TON	2,395	$175.00	$419,125.00
P-403-8.1b	ASPHALT BASE COURSE COURSE (5.0" THICK)	TON	6,129	$155.00	$949,995.00
P-403-8.1c	ASPHALT MIXTURE SURFACE COURSE (2" THICK) (RVR DRIVES)	TON	29	$120.00	$3,480.00
P-403-8.1d	ASPHALT MIXTURE BINDER COURSE (2" THICK) (RVR DRIVES)	TON	36	$120.00	$4,320.00
P-407-8.1	ASPHALT TREATED PERMEABLE BASE COURSE (ATPB) (6" THICK)	SY	22,286	$40.00	$891,440.00
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	6,530	$5.00	$32,650.00
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	8,566	$5.00	$42,829.45
P-610-6.1	CONCRETE (RVR RELOCATION PAD)	CY	4	$1,500.00	$6,000.00
P-620-5.2b-1	RUNWAY AND TAXIWAY MARKING (YELLOW)	SF	23,307	$17.00	$396,210.50
P-620-5.2b-2	RUNWAY AND TAXIWAY MARKING (WHITE)	SF	16,575	$17.00	$281,775.00
P-620-5.2b-3	RUNWAY AND TAXIWAY MARKING (RED)	SF	9,589	$17.00	$163,013.00
P-620-5.2b-4	RUNWAY AND TAXIWAY MARKING (BLACK)	SF	53,835	$17.00	$915,195.00
P-620-5.3c	REFLECTIVE MEDIA (RUNWAY)	LB	4,302	$2.00	$8,604.00
P-620-5.4d	TEMPORARY RUNWAY AND TAXIWAY MARKING	LS	1	$100,000.00	$100,000.00
D-705-5.4	6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC	LF	4,702	$50.00	$235,100.00
901-5.1	SEEDING (HYDROSEEDING)	AC	21	$2,500.00	$52,500.00
904-5.2	SODDING	SY	5,333	$10.00	$53,333.33
T-908-5.1	MULCHING	SY	97,217	$0.25	$24,304.25
	DRAINAGE, PERIMETER ROAD, PERIMETER FENCE				
P-101-5.1a	ASPHALT PAVEMENT AND BASE REMOVAL	SY	0	$30.00	$0.00
P-101-5.1b	CONCRETE PAVEMENT REMOVAL	SY	0	$30.00	$0.00
P-101-5.6	COLD MILLING (DEPTH VARIES)	SY	0	$5.00	$0.00
P-101-5.7	REMOVAL OF EXISTING PIPES AND STRUCTURES	LS	1	$50,000.00	$50,000.00
P-151-4.1	CLEARING (REMOVAL OF EXISTING FENCE AND CONCRETE MAINTENANCE PAD)	LS	0	$30,780.00	$0.00
P-151-4.2	CLEARING AND GRUBBING (REMOVAL OF GRASS)	AC	0	$1,500.00	$0.00
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	0	$20.00	$0.00
P-152-4.2	MUCK EXCAVATION	CY	0	$23.00	$0.00
P-152-4.3	EMBANKMENT IN PLACE - GENERAL	CY	0	$40.00	$0.00
P-152-4.4	EMBANKMENT IN PLACE - SELECT FILL	CY	0	$50.00	$0.00
P-153-6.1	CONTROLLED LOW-STRENGTH MATERIAL (CLSM)	CY	0	$100.00	$0.00
P-155-8.1	LIME TREATED SUBGRADE	SY	0	$12.00	$0.00
P-155-8.2	LIME	TON	0	$350.00	$0.00
P-209-5.1c	CRUSHED AGGREGATE BASE COURSE (8" THICK)	SY	0	$40.00	$0.00
P-209-5.2	SEPERATION GEOTEXTILE	SY	0	$3.00	$0.00
P-403-8.1a	ASPHALT MIXTURE SURFACE COURSE	TON	0	$160.00	$0.00
P-403-8.1b	ASPHALT MIXTURE BINDER COURSE	TON	0	$160.00	$0.00
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	0	$4.50	$0.00
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	0	$4.50	$0.00
P-620-5.2b	PAINTED TRAFFIC STRIPING	SF	0	$4.00	$0.00
P-620-5.2c	REFLECTIVE MEDIA	LBS	0	$2.00	$0.00
D-701-5.1	15 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0	$145.00	$0.00
D-701-5.2	30 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	1,527	$235.00	$358,845.00
D-701-5.3	36 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	674	$295.00	$198,830.00
D-701-5.4	42 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0	$345.00	$0.00
D-701-5.5	48 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0	$380.00	$0.00
D-701-5.6	15 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0	$160.00	$0.00
D-701-5.7	18 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	262	$175.00	$45,850.00
D-701-5.8	24 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	285	$195.00	$55,575.00
D-701-5.9	36 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	401	$275.00	$110,275.00
D-701-5.10	42 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0	$340.00	$0.00
D-751-5.1	CATCH BASIN - CB-01 (INCLUDES BEDDING & BACKFILL)	EA	11	$6,000.00	$66,000.00
D-751-5.2	CATCH BASIN - CB-02 (INCLUDES BEDDING & BACKFILL)	EA	2	$7,500.00	$15,000.00

D-751-5.3	CATCH BASIN - CB-SD02 (INCLUDES BEDDING & BACKFILL)	EA	0	$11,600.00	$0.00
F-162-5.1	CHAIN-LINK FENCE (6 FT HT. W/ 3 STRANDS BARBED WIRE)	LF	0	$80.00	$0.00
F-162-5.3	CONCRETE MAINTENANCE PAD	LF	0	$20.00	$0.00
LA-731-02	REFLECTORIZED RAISED PAVEMENT MARKERS (WHITE / WHITE)	EA	0	$10.00	$0.00
S-1003	SECURITY SIGNS	LS	0	$7,500.00	$0.00
	TAXIWAY EDGE LIGHTING AND SIGNING				
L-108-5.1	NO. 8 AWG, 5 KV TYPE C CABLE, INSTALLED IN CONDUIT	LF	3,200	$5.00	$16,000.00
L-108-5.2	NO. 6 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED, ABOVE THE DUCT BANK OR CONDUIT, INCLUDING CONNECTIONS/TERMINATIONS, INCLUDING GROUND RODS	LF	3,000	$5.00	$15,000.00
L-109-7.2	MODIFICATIONS TO L-854 RADIO CONTROL EQUIPMENT TO INCLUDE PANEL RELABELING, IN PLACE AND OPERATIONAL	LUMP	1	$5,000.00	$5,000.00
L-110-5.1	ELECTRICAL CONDUIT, 2" SCHEDULE 40 PVC, TYPE II INSTALLED IN TRENCH	LF	3,200	$4.00	$12,800.00
L-110-5.2	ELECTRICAL CONDUIT, 2" HDPE, JACKED OR BORED UNDER TAXIWAY IN STEEL CASING (STEEL CASING INCLUDED IN THIS ITEM)	LF	500	$20.00	$10,000.00
L-110-5.3	ELECTRICAL DUCT, 4-WAY, 4" AND 1-WAY, 2" HIGH DENSITY POLYETHYLENE CONDUIT, DIRECTIONAL BORE, INSTALLED	LF	100	$125.00	$12,500.00
L-115-5.1	ELECTRICAL JUNCTION CAN, L-867, SIZE B, CLASS 1, COMPLETE, IN PLACE	EA	4	$2,000.00	$8,000.00
L-115-5.2	ELECTRICAL JUNCTION CAN, L-867, SIZE D, CLASS 1, COMPLETE, IN PLACE	EA	6	$2,700.00	$16,200.00
L-125-5.1	MEDIUM INTENSITY TAXIWAY EDGE LIGHT (L-861T), WITH BLUE LENS, LED LAMP, 10/15 WATT TRANSFORMER, BASE MOUNTED, IN PLACE	EA	43	$1,200.00	$51,600.00
L-125-5.2	SIGN L-858, SIZE 2, 1-PANEL, REQUIRED CONCRETE BASE	EA	3	$6,000.00	$18,000.00
L-125-5.3	SIGN L-858, SIZE 2, 2-PANEL, REQUIRED CONCRETE BASE	EA	2	$6,000.00	$12,000.00
L-125-5.6	REPLACE EXISTING SIGN PANEL, COMPLETE, IN PLACE	EA	5	$1,000.00	$5,000.00
L-125-5.7	REMOVE EXISTING RUNWAY & TAXIWAY ELECTRICAL SYSTEMS	LUMP	1	$3,000.00	$3,000.00
L-125-5.8	ELECTRICAL TESTING AND UPDATE ALCS	LUMP	1	$4,000.00	$4,000.00
L-125-5.9	CONNECT TO EXISTING CIRCUIT	LUMP	1	$2,000.00	$2,000.00
S-1004	TEMPORARY COMMUNICATION LINE	LUMP	1	$35,000.00	$35,000.00
	NAVAIDS (RVR RELOCATION)				
L-108-5.1	TRENCHING FOR DIRECT BURIED CABLE, 18-INCH MINIMUM DEPTH	LF	40	$172.50	$6,900.00
L-108-5.3	NO. 2 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONGS/TERMINATIONS	LF	40	$2.65	$106.00
L-108-5.4a	NO. 2 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	5,420	$3.38	$18,319.60
L-108-5.4b	NO. 6 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	1,980	$1.58	$3,128.40
L-108-5.4c	NO. 10 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	21,600	$0.65	$14,040.00
L-110-5.2a	NON-ENCASED ELECTRICAL CONDUIT (2" HDPE)	LF	1,800	$22.63	$40,734.00
L-110-5.2b	NON-ENCASED ELECTRICAL CONDUIT (2" SCHEDULE 80 PVC)	LF	40	$9.82	$392.80
L-115-5.2	ELECTRICAL JUNCTION STRUCTURE (48"X48"X48" POLYMER CONCRETE)	LF	3	$8,613.44	$25,840.32
S-1001	ROLLOUT RVR DISASSEMBLY	LUMP	1	$4,554.00	$4,554.00
S-1002	ROLLOUT RVR REASSEMBLY	LUMP	1	$28,874.50	$28,874.50
PHASE I CONSTRUCTION TOTAL =					$11,054,607.68

PHASE I--ENGINEER'S OPINION OF PROBABLE COST--ALTERNATE #1
TAXIWAY L EXTENSION AND DECOMMISSIONING OF RUNWAY 4R-22L AND TAXIWAY E
ADDENDUM 1

ITEM	DESCRIPTION	UNIT	TOTAL QUANTITY	UNIT PRICE	PHASE I COST
	TAXIWAY PAVEMENT AND EARTHWORK				
C-102-5.1c	INSTALLATION AND REMOVAL OF SILT FENCE (CATCH BASIN PROTECTION)	LF	2,305	$2.75	$6,338.75
C-102-5.1e	INSTALLATION AND REMOVAL OF SILT FENCE	LF	3,692	$2.75	$10,153.00
C-105-5.1	MOBILIZATION (5.0%)	LS	1	$800,000.00	$800,000.00
P-101-5.1a	PAVEMENT REMOVAL (GA RUNWAY 4R-22L, TAXIWAY E)	SY	17,259	$14.00	$241,626.00
P-101-5.6a	COLD MILLING (2" DEPTH) (TAXIWAY L)	SY	32,028	$8.00	$256,225.53
P-151-4.2	CLEARING AND GRUBBING	AC	31	$10,000.00	$310,000.00
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	26,557	$19.00	$504,583.00
P-152-4.2	EMBANKMENT IN PLACE	CY	3,290	$40.00	$131,600.00
P-154-5.1	SUBBASE COURSE	CY	11,143	$75.00	$835,725.00
P-155-8.1a	LIME TREATED SUBGRADE (10" THICK) (RVR AND GLIDE SLOPE ACCESS DRIVES)	SY	381	$5.25	$2,000.25
P-155-8.2a	LIME (RVR DRIVES)	TON	4	$450.00	$1,800.00
P-209-5.1a	CRUSHED AGGREGATE BASE COURSE (10" THICK) (RVR DRIVE)	SY	260	$52.00	$13,520.00
P-209-5.1b	CRUSHED AGGREGATE BASE COURSE (6.0" THICK)	SY	22,025	$40.00	$881,000.00
P-209-5.2	SEPARATION GEOTEXTILE	SY	22,286	$4.00	$89,144.00
P-306-8.1	LEAN CONCRETE BASE COURSE	SY	31,904	$45.00	$1,435,680.00
P-307	CEMENT TREATED PERMEABLE BASE COURSE	SY	31,904	$85.00	$2,711,840.00
P-401-8.1b	ASPHALT SURFACE COURSE (2" THICK) (OVERLAY)	TON	3,524	$120.00	$422,880.00
P-403-8.1c	ASPHALT MIXTURE SURFACE COURSE (2" THICK) (RVR DRIVES)	TON	29	$120.00	$3,480.00
P-403-8.1d	ASPHALT MIXTURE BINDER COURSE (2" THICK) (RVR DRIVES)	TON	36	$120.00	$4,320.00
P-501-8.1	CEMENT CONCRETE PAVEMENT	SY	21,502	$200.00	$4,300,400.00
P-604-6.1	COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS	LF	27,408	$4.00	$109,632.00
P-605-5.1	JOINT SEALING FILLER	LF	27,408	$2.00	$54,816.00
P-610-6.1	CONCRETE (RVR RELOCATION PAD)	CY	4	$1,500.00	$6,000.00
P-620-5.2b-1	RUNWAY AND TAXIWAY MARKING (YELLOW)	SF	23,307	$17.00	$396,210.50
P-620-5.2b-2	RUNWAY AND TAXIWAY MARKING (WHITE)	SF	16,575	$17.00	$281,775.00
P-620-5.2b-3	RUNWAY AND TAXIWAY MARKING (RED)	SF	9,589	$17.00	$163,013.00
P-620-5.2b-4	RUNWAY AND TAXIWAY MARKING (BLACK)	SF	53,835	$17.00	$915,195.00
P-620-5.3c	REFLECTIVE MEDIA (RUNWAY)	LB	4,302	$2.00	$8,604.00
P-620-5.4d	TEMPORARY RUNWAY AND TAXIWAY MARKING	LS	1	$100,000.00	$100,000.00
D-705-5.4	6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC	LF	8,678	$50.00	$433,900.00
901-5.1	SEEDING (HYDROSEEDING)	AC	21	$2,500.00	$52,500.00
904-5.2	SODDING	SY	5,333	$10.00	$53,333.33
T-908-5.1	MULCHING	SY	97,217	$0.25	$24,304.25
	DRAINAGE, PERIMETER ROAD, PERIMETER FENCE				
P-101-5.1a	ASPHALT PAVEMENT AND BASE REMOVAL	SY	0	$30.00	$0.00
P-101-5.1b	CONCRETE PAVEMENT REMOVAL	SY	0	$30.00	$0.00
P-101-5.6	COLD MILLING (DEPTH VARIES)	SY	0	$5.00	$0.00
P-101-5.7	REMOVAL OF EXISTING PIPES AND STRUCTURES	LS	1	$50,000.00	$50,000.00
P-151-4.1	CLEARING (REMOVAL OF EXISTING FENCE AND CONCRETE MAINTENANCE PAD)	LS	0	$30,780.00	$0.00
P-151-4.2	CLEARING AND GRUBBING (REMOVAL OF GRASS)	AC	0	$1,500.00	$0.00
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	0	$20.00	$0.00
P-152-4.2	MUCK EXCAVATION	CY	0	$23.00	$0.00
P-152-4.3	EMBANKMENT IN PLACE - GENERAL	CY	0	$40.00	$0.00
P-152-4.4	EMBANKMENT IN PLACE - SELECT FILL	CY	0	$50.00	$0.00
P-153-6.1	CONTROLLED LOW-STRENGTH MATERIAL (CLSM)	CY	0	$100.00	$0.00
P-155-8.1	LIME TREATED SUBGRADE	SY	0	$12.00	$0.00
P-155-8.2	LIME	TON	0	$350.00	$0.00
P-209-5.1c	CRUSHED AGGREGATE BASE COURSE (8" THICK)	SY	0	$40.00	$0.00
P-209-5.2	SEPERATION GEOTEXTILE	SY	0	$3.00	$0.00
P-403-8.1a	ASPHALT MIXTURE SURFACE COURSE	TON	0	$160.00	$0.00
P-403-8.1b	ASPHALT MIXTURE BINDER COURSE	TON	0	$160.00	$0.00
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	0	$4.50	$0.00
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	0	$4.50	$0.00
P-620-5.2b	PAINTED TRAFFIC STRIPING	SF	0	$4.00	$0.00
P-620-5.2c	REFLECTIVE MEDIA	LBS	0	$2.00	$0.00
D-701-5.1	15 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0	$145.00	$0.00
D-701-5.2	30 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	1,527	$235.00	$358,845.00
D-701-5.3	36 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	674	$295.00	$198,830.00
D-701-5.4	42 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0	$345.00	$0.00
D-701-5.5	48 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0	$380.00	$0.00
D-701-5.6	15 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0	$160.00	$0.00
D-701-5.7	18 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	262	$175.00	$45,850.00
D-701-5.8	24 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	285	$195.00	$55,575.00
D-701-5.9	36 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	401	$275.00	$110,275.00
D-701-5.10	42 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0	$340.00	$0.00
D-751-5.1	CATCH BASIN - CB-01 (INCLUDES BEDDING & BACKFILL)	EA	11	$6,000.00	$66,000.00
D-751-5.2	CATCH BASIN - CB-02 (INCLUDES BEDDING & BACKFILL)	EA	2	$7,500.00	$15,000.00
D-751-5.3	CATCH BASIN - CB-SD02 (INCLUDES BEDDING & BACKFILL)	EA	0	$11,600.00	$0.00
F-162-5.1	CHAIN-LINK FENCE (6 FT HT. W/ 3 STRANDS BARBED WIRE)	LF	0	$80.00	$0.00

F-162-5.3	CONCRETE MAINTENANCE PAD	LF	0	$20.00	$0.00
LA-731-02	REFLECTORIZED RAISED PAVEMENT MARKERS (WHITE / WHITE)	EA	0	$10.00	$0.00
S-1003	SECURITY SIGNS	LS	0	$7,500.00	$0.00
	TAXIWAY EDGE LIGHTING AND SIGNING				
L-108-5.1	NO. 8 AWG, 5 KV TYPE C CABLE, INSTALLED IN CONDUIT	LF	3,200	$5.00	$16,000.00
L-108-5.2	NO. 6 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED, ABOVE THE DUCT BANK OR CONDUIT, INCLUDING CONNECTIONS/TERMINATIONS, INCLUDING GROUND RODS	LF	3,000	$5.00	$15,000.00
L-109-7.2	MODIFICATIONS TO L-854 RADIO CONTROL EQUIPMENT TO INCLUDE PANEL RELABELING, IN PLACE AND OPERATIONAL	LUMP	1	$5,000.00	$5,000.00
L-110-5.1	ELECTRICAL CONDUIT, 2" SCHEDULE 40 PVC, TYPE II INSTALLED IN TRENCH	LF	3,200	$4.00	$12,800.00
L-110-5.2	ELECTRICAL CONDUIT, 2" HDPE, JACKED OR BORED UNDER TAXIWAY IN STEEL CASING (STEEL CASING INCLUDED IN THIS ITEM)	LF	500	$20.00	$10,000.00
L-110-5.3	ELECTRICAL DUCT, 4-WAY, 4" AND 1-WAY, 2" HIGH DENSITY POLYETHYLENE CONDUIT, DIRECTIONAL BORE, INSTALLED	LF	100	$125.00	$12,500.00
L-115-5.1	ELECTRICAL JUNCTION CAN, L-867, SIZE B, CLASS 1, COMPLETE, IN PLACE	EA	4	$2,000.00	$8,000.00
L-115-5.2	ELECTRICAL JUNCTION CAN, L-867, SIZE D, CLASS 1, COMPLETE, IN PLACE	EA	6	$2,700.00	$16,200.00
L-125-5.1	MEDIUM INTENSITY TAXIWAY EDGE LIGHT (L-861T), WITH BLUE LENS, LED LAMP, 10/15 WATT TRANSFORMER, BASE MOUNTED, IN PLACE	EA	43	$1,200.00	$51,600.00
L-125-5.2	SIGN L-858, SIZE 2, 1-PANEL, REQUIRED CONCRETE BASE	EA	3	$6,000.00	$18,000.00
L-125-5.3	SIGN L-858, SIZE 2, 2-PANEL, REQUIRED CONCRETE BASE	EA	2	$6,000.00	$12,000.00
L-125-5.6	REPLACE EXISTING SIGN PANEL, COMPLETE, IN PLACE	EA	5	$1,000.00	$5,000.00
L-125-5.7	REMOVE EXISTING RUNWAY & TAXIWAY ELECTRICAL SYSTEMS	LUMP	1	$3,000.00	$3,000.00
L-125-5.8	ELECTRICAL TESTING AND UPDATE ALCS	LUMP	1	$4,000.00	$4,000.00
L-125-5.9	CONNECT TO EXISTING CIRCUIT	LUMP	1	$2,000.00	$2,000.00
S-1004	TEMPORARY COMMUNICATION LINE	LUMP	1	$35,000.00	$35,000.00
	NAVAIDS (RVR RELOCATION)				
L-108-5.1	TRENCHING FOR DIRECT BURIED CABLE, 18-INCH MINIMUM DEPTH	LF	40	$172.50	$6,900.00
L-108-5.3	NO. 2 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONGS/TERMINATIONS	LF	40	$2.65	$106.00
L-108-5.4a	NO. 2 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	5,420	$3.38	$18,319.60
L-108-5.4b	NO. 6 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	1,980	$1.58	$3,128.40
L-108-5.4c	NO. 10 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	21,600	$0.65	$14,040.00
L-110-5.2a	NON-ENCASED ELECTRICAL CONDUIT (2" HDPE)	LF	1,800	$22.63	$40,734.00
L-110-5.2b	NON-ENCASED ELECTRICAL CONDUIT (2" SCHEDULE 80 PVC)	LF	40	$9.82	$392.80
L-115-5.2	ELECTRICAL JUNCTION STRUCTURE (48"X48"X48" POLYMER CONCRETE)	LF	3	$8,613.44	$25,840.32
S-1001	ROLLOUT RVR DISASSEMBLY	LUMP	1	$4,554.00	$4,554.00
S-1002	ROLLOUT RVR REASSEMBLY	LUMP	1	$28,874.50	$28,874.50
PHASE I CONSTRUCTION TOTAL =					$16,830,963.23

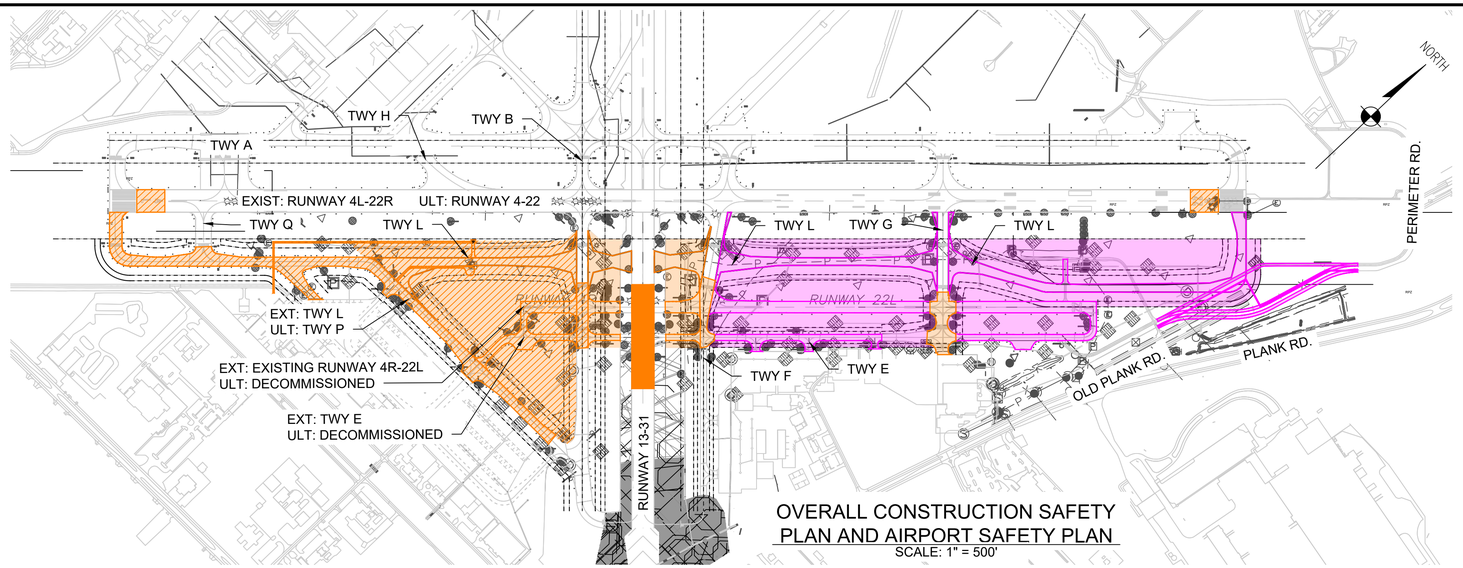
PHASE I--ENGINEER'S OPINION OF PROBABLE COST--ALTERNATE #2
TAXIWAY L EXTENSION AND DECOMMISSIONING OF RUNWAY 4R-22L AND TAXIWAY E
ADDENDUM 1

ITEM	DESCRIPTION	UNIT	TOTAL QUANTITY	UNIT PRICE	PHASE I COST
	TAXIWAY PAVEMENT AND EARTHWORK				
C-102-5.1c	INSTALLATION AND REMOVAL OF SILT FENCE (CATCH BASIN PROTECTION)	LF	1,383	$2.75	$3,803.25
C-102-5.1e	INSTALLATION AND REMOVAL OF SILT FENCE	LF	2,637	$2.75	$7,251.75
C-105-5.1	MOBILIZATION (5.0%)	LS	1	$390,000.00	$390,000.00
P-101-5.1a	PAVEMENT REMOVAL (GA RUNWAY 4R-22L, TAXIWAY E)	SY	8,883	$14.00	$124,362.00
P-101-5.6a	COLD MILLING (2" DEPTH) (TAXIWAY L)	SY	32,028	$8.00	$256,225.53
P-151-4.2	CLEARING AND GRUBBING	AC	31	$10,000.00	$310,000.00
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	8,633	$19.00	$164,017.50
P-152-4.2	EMBANKMENT IN PLACE	CY	12,715	$40.00	$508,610.40
P-154-5.1	SUBBASE COURSE	CY	6,584	$75.00	$493,800.00
P-155-8.1a	LIME TREATED SUBGRADE (10" THICK) (RVR AND GLIDE SLOPE ACCESS DRIVES)	SY	381	$5.25	$2,000.25
P-155-8.2a	LIME (RVR DRIVES)	TON	4	$450.00	$1,800.00
P-209-5.1a	CRUSHED AGGREGATE BASE COURSE (10" THICK) (RVR DRIVE)	SY	260	$52.00	$13,520.00
P-209-5.1b	CRUSHED AGGREGATE BASE COURSE (6.0" THICK)	SY	12,999	$40.00	$519,960.00
P-209-5.2	SEPARATION GEOTEXTILE	SY	13,166	$4.00	$52,664.00
P-401-8.1a	ASPHALT SURFACE COURSE (2.0" THICK)	TON	1,394	$200.00	$278,800.00
P-401-8.1b	ASPHALT SURFACE COURSE (2" THICK) (OVERLAY)	TON	3,524	$120.00	$422,880.00
P-403-8.1a	ASPHALT MIXTURE BINDER COURSE (2.0" THICK)	TON	1,412	$175.00	$247,100.00
P-403-8.1b	ASPHALT BASE COURSE COURSE (5.0" THICK)	TON	3,621	$155.00	$561,255.00
P-403-8.1c	ASPHALT MIXTURE SURFACE COURSE (2" THICK) (RVR DRIVES)	TON	29	$120.00	$3,480.00
P-403-8.1d	ASPHALT MIXTURE BINDER COURSE (2" THICK) (RVR DRIVES)	TON	36	$120.00	$4,320.00
P-407-8.1	ASPHALT TREATED PERMEABLE BASE COURSE (ATPB) (6" THICK)	SY	13,167	$40.00	$526,680.00
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	3,850	$5.00	$19,250.00
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	5,708	$5.00	$28,539.85
P-610-6.1	CONCRETE (RVR RELOCATION PAD)	CY	4	$1,500.00	$6,000.00
P-620-5.2b-1	RUNWAY AND TAXIWAY MARKING (YELLOW)	SF	19,811	$17.00	$336,787.00
P-620-5.2b-2	RUNWAY AND TAXIWAY MARKING (WHITE)	SF	14,089	$17.00	$239,513.00
P-620-5.2b-3	RUNWAY AND TAXIWAY MARKING (RED)	SF	8,151	$17.00	$138,567.00
P-620-5.2b-4	RUNWAY AND TAXIWAY MARKING (BLACK)	SF	45,760	$17.00	$777,920.00
P-620-5.3c	REFLECTIVE MEDIA (RUNWAY)	LB	3,657	$2.00	$7,314.00
P-620-5.4d	TEMPORARY RUNWAY AND TAXIWAY MARKING	LS	1	$100,000.00	$100,000.00
D-705-5.4	6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC	LF	3,007	$50.00	$150,350.00
901-5.1	SEEDING (HYDROSEEDING)	AC	21	$2,500.00	$52,500.00
904-5.2	SODDING	SY	5,333	$10.00	$53,333.33
T-908-5.1	MULCHING	SY	97,217	$0.25	$24,304.25
	DRAINAGE, PERIMETER ROAD, PERIMETER FENCE				
P-101-5.1a	ASPHALT PAVEMENT AND BASE REMOVAL	SY	0	$30.00	$0.00
P-101-5.1b	CONCRETE PAVEMENT REMOVAL	SY	0	$30.00	$0.00
P-101-5.6	COLD MILLING (DEPTH VARIES)	SY	0	$5.00	$0.00
P-101-5.7	REMOVAL OF EXISTING PIPES AND STRUCTURES	LS	1	$50,000.00	$50,000.00
P-151-4.1	CLEARING (REMOVAL OF EXISTING FENCE AND CONCRETE MAINTENANCE PAD)	LS	0	$30,780.00	$0.00
P-151-4.2	CLEARING AND GRUBBING (REMOVAL OF GRASS)	AC	0	$1,500.00	$0.00
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	0	$20.00	$0.00
P-152-4.2	MUCK EXCAVATION	CY	0	$23.00	$0.00
P-152-4.3	EMBANKMENT IN PLACE - GENERAL	CY	0	$40.00	$0.00
P-152-4.4	EMBANKMENT IN PLACE - SELECT FILL	CY	0	$50.00	$0.00
P-153-6.1	CONTROLLED LOW-STRENGTH MATERIAL (CLSM)	CY	0	$100.00	$0.00
P-155-8.1	LIME TREATED SUBGRADE	SY	0	$12.00	$0.00
P-155-8.2	LIME	TON	0	$350.00	$0.00
P-209-5.1c	CRUSHED AGGREGATE BASE COURSE (8" THICK)	SY	0	$40.00	$0.00
P-209-5.2	SEPERATION GEOTEXTILE	SY	0	$3.00	$0.00
P-403-8.1a	ASPHALT MIXTURE SURFACE COURSE	TON	0	$160.00	$0.00
P-403-8.1b	ASPHALT MIXTURE BINDER COURSE	TON	0	$160.00	$0.00
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	0	$4.50	$0.00
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	0	$4.50	$0.00
P-620-5.2b	PAINTED TRAFFIC STRIPING	SF	0	$4.00	$0.00
P-620-5.2c	REFLECTIVE MEDIA	LBS	0	$2.00	$0.00
D-701-5.1	15 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0	$145.00	$0.00
D-701-5.2	30 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	1,527	$235.00	$358,845.00
D-701-5.3	36 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	674	$295.00	$198,830.00
D-701-5.4	42 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0	$345.00	$0.00
D-701-5.5	48 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0	$380.00	$0.00
D-701-5.6	15 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0	$160.00	$0.00
D-701-5.7	18 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	262	$175.00	$45,850.00
D-701-5.8	24 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	285	$195.00	$55,575.00
D-701-5.9	36 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	401	$275.00	$110,275.00
D-701-5.10	42 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0	$340.00	$0.00
D-751-5.1	CATCH BASIN - CB-01 (INCLUDES BEDDING & BACKFILL)	EA	11	$6,000.00	$66,000.00
D-751-5.2	CATCH BASIN - CB-02 (INCLUDES BEDDING & BACKFILL)	EA	2	$7,500.00	$15,000.00
D-751-5.3	CATCH BASIN - CB-SD02 (INCLUDES BEDDING & BACKFILL)	EA	0	$11,600.00	$0.00

F-162-5.1	CHAIN-LINK FENCE (6 FT HT. W/ 3 STRANDS BARBED WIRE)	LF	0	$80.00	$0.00
F-162-5.3	CONCRETE MAINTENANCE PAD	LF	0	$20.00	$0.00
LA-731-02	REFLECTORIZED RAISED PAVEMENT MARKERS (WHITE / WHITE)	EA	0	$10.00	$0.00
S-1003	SECURITY SIGNS	LS	0	$7,500.00	$0.00
	TAXIWAY EDGE LIGHTING AND SIGNING				
L-108-5.1	NO. 8 AWG, 5 KV TYPE C CABLE, INSTALLED IN CONDUIT	LF	3,200	$5.00	$16,000.00
L-108-5.2	NO. 6 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED, ABOVE THE DUCT BANK OR CONDUIT, INCLUDING CONNECTIONS/TERMINATIONS, INCLUDING GROUND RODS	LF	3,000	$5.00	$15,000.00
L-109-7.2	MODIFICATIONS TO L-854 RADIO CONTROL EQUIPMENT TO INCLUDE PANEL RELABELING, IN PLACE AND OPERATIONAL	LUMP	1	$5,000.00	$5,000.00
L-110-5.1	ELECTRICAL CONDUIT, 2" SCHEDULE 40 PVC, TYPE II INSTALLED IN TRENCH	LF	3,200	$4.00	$12,800.00
L-110-5.2	ELECTRICAL CONDUIT, 2" HDPE, JACKED OR BORED UNDER TAXIWAY IN STEEL CASING (STEEL CASING INCLUDED IN THIS ITEM)	LF	500	$20.00	$10,000.00
L-110-5.3	ELECTRICAL DUCT, 4-WAY, 4" AND 1-WAY, 2" HIGH DENSITY POLYETHYLENE CONDUIT, DIRECTIONAL BORE, INSTALLED	LF	100	$125.00	$12,500.00
L-115-5.1	ELECTRICAL JUNCTION CAN, L-867, SIZE B, CLASS 1, COMPLETE, IN PLACE	EA	4	$2,000.00	$8,000.00
L-115-5.2	ELECTRICAL JUNCTION CAN, L-867, SIZE D, CLASS 1, COMPLETE, IN PLACE	EA	6	$2,700.00	$16,200.00
L-125-5.1	MEDIUM INTENSITY TAXIWAY EDGE LIGHT (L-861T), WITH BLUE LENS, LED LAMP, 10/15 WATT TRANSFORMER, BASE MOUNTED, IN PLACE	EA	43	$1,200.00	$51,600.00
L-125-5.2	SIGN L-858, SIZE 2, 1-PANEL, REQUIRED CONCRETE BASE	EA	3	$6,000.00	$18,000.00
L-125-5.3	SIGN L-858, SIZE 2, 2-PANEL, REQUIRED CONCRETE BASE	EA	2	$6,000.00	$12,000.00
L-125-5.6	REPLACE EXISTING SIGN PANEL, COMPLETE, IN PLACE	EA	5	$1,000.00	$5,000.00
L-125-5.7	REMOVE EXISTING RUNWAY & TAXIWAY ELECTRICAL SYSTEMS	LUMP	1	$3,000.00	$3,000.00
L-125-5.8	ELECTRICAL TESTING AND UPDATE ALCS	LUMP	1	$4,000.00	$4,000.00
L-125-5.9	CONNECT TO EXISTING CIRCUIT	LUMP	1	$2,000.00	$2,000.00
S-1004	TEMPORARY COMMUNICATION LINE	LUMP	1	$35,000.00	$35,000.00
	NAVAIDS (RVR RELOCATION)				
L-108-5.1	TRENCHING FOR DIRECT BURIED CABLE, 18-INCH MINIMUM DEPTH	LF	40	$172.50	$6,900.00
L-108-5.3	NO. 2 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONGS/TERMINATIONS	LF	40	$2.65	$106.00
L-108-5.4a	NO. 2 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	5,420	$3.38	$18,319.60
L-108-5.4b	NO. 6 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	1,980	$1.58	$3,128.40
L-108-5.4c	NO. 10 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	21,600	$0.65	$14,040.00
L-110-5.2a	NON-ENCASED ELECTRICAL CONDUIT (2" HDPE)	LF	1,800	$22.63	$40,734.00
L-110-5.2b	NON-ENCASED ELECTRICAL CONDUIT (2" SCHEDULE 80 PVC)	LF	40	$9.82	$392.80
L-115-5.2	ELECTRICAL JUNCTION STRUCTURE (48"X48"X48" POLYMER CONCRETE)	LF	3	$8,613.44	$25,840.32
S-1001	ROLLOUT RVR DISASSEMBLY	LUMP	1	$4,554.00	$4,554.00
S-1002	ROLLOUT RVR REASSEMBLY	LUMP	1	$28,874.50	$28,874.50
PHASE I CONSTRUCTION TOTAL =					$8,096,272.73

ADDENDUM 1

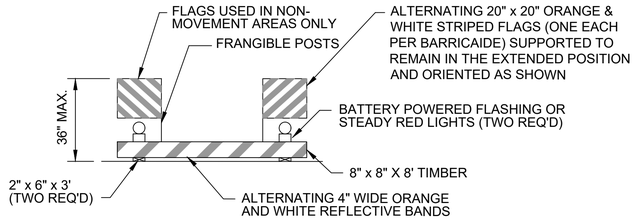
REVISED PLAN SHEETS



OVERALL CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN
SCALE: 1" = 500'

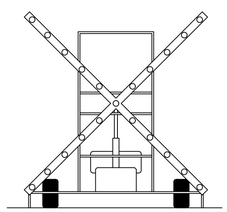
LEGEND:

- 1 / G008 — LOW PROFILE BARRICADE
- 2 / G008 — PORTABLE LIGHTED "X" RUNWAY CLOSURE MARKER
- 3 / G008 — CLOSED RUNWAY MARKING
- 4 / G008 — CONTRACTOR TRAFFIC DO NOT ENTER SIGNAGE
- 5 / G008 — CONSTRUCTION TRAFFIC STOP SIGN
- PHASE I
- PHASE I (ALTERNATE 2)
- PHASE II (NOT IN CONTRACT)



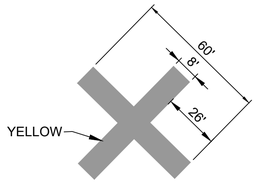
1 / G008 LOW PROFILE BARRICADE
N.T.S.

(TO BE PLACED AS REQUIRED BY PROJECT ENGINEER)



2 / G008 PORTABLE LIGHTED "X" RUNWAY CLOSURE MARKER
N.T.S.

1. THE CONTRACTOR SHALL FURNISH TWO (2) LIGHTED RUNWAY CLOSURE MARKERS, SHERWIN INDUSTRIES OR EQUAL, THAT MEETS OR EXCEEDS FAA TECHNICAL REPORT DOT/FAA/CT-TN87/3, OR LATEST UPDATE, FOR THE DURATION OF THE PROJECT.
2. CONTRACTOR SHALL OPERATE AND MAINTAIN THE RUNWAY MARKERS IN GOOD CONDITION AND PROVIDE ALL FUEL, LUBRICANTS AND REPLACEMENT BULB (UL TESTED AND APPROVED) FOR THE DURATION OF THE PROJECT.

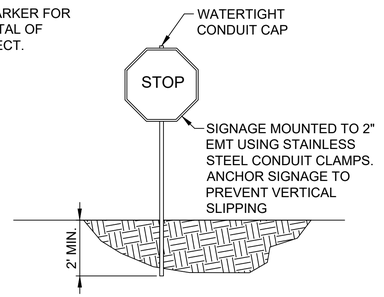


3 / G008 CLOSED RUNWAY MARKING DETAIL
N.T.S.

1. CROSS TO BE DESIGNED TO BE SUBMITTED FOR APPROVAL.
2. CONTRACTOR TO PROVIDE ONE (1) MARKER FOR EACH END OF THE RUNWAY FOR A TOTAL OF TWO(2). FOR DURATION OF THE PROJECT.

4 / G008 TEMPORARY CONSTRUCTION SIGNAGE
N.T.S.

1. SIGNAGE DIMENSIONS SHALL COMPLY WITH THE MOST CURRENT EDITION OF THE MUTCD.
2. ALL COSTS ASSOCIATED WITH SIGN INSTALLATION AND MAINTENANCE WILL NOT BE MEASURED FOR SEPARATE PAVEMENT BUT SHALL BE SUBSIDIARY TO ITEM SS-120 CONSTRUCTION SAFETY AND SECURITY.
3. SIGNS SHALL BE INSTALLED AT THE BEGINNING OF EACH WORK SHIFT AND REMOVED AT THE END OF EACH WORK SHIFT.



5 / G008 CONSTRUCTION TRAFFIC STOP SIGN
N.T.S.

1. STOP SIGN SHALL BE RETROREFLECTIVE.
2. CONTRACTOR SHALL SUBMIT SIGN DIMENSIONS FOR APPROVAL PRIOR TO CONSTRUCTION.
3. CONSTRUCTION TRAFFIC STOP SIGN WILL BE CONSIDERED SUBSIDIARY TO ITEM SS-120 CONSTRUCTION SAFETY AND SECURITY.
4. CONSTRUCTION VEHICULAR TRAFFIC AT THE STOP SIGN SHALL YIELD TO AIRCRAFT TRAFFIC AT ALL TIMES.
5. SIGN SHALL CONFIRM TO THE MOST RECENT EDITION OF FHWA'S MUTCD

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
Blake S. Roussel
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

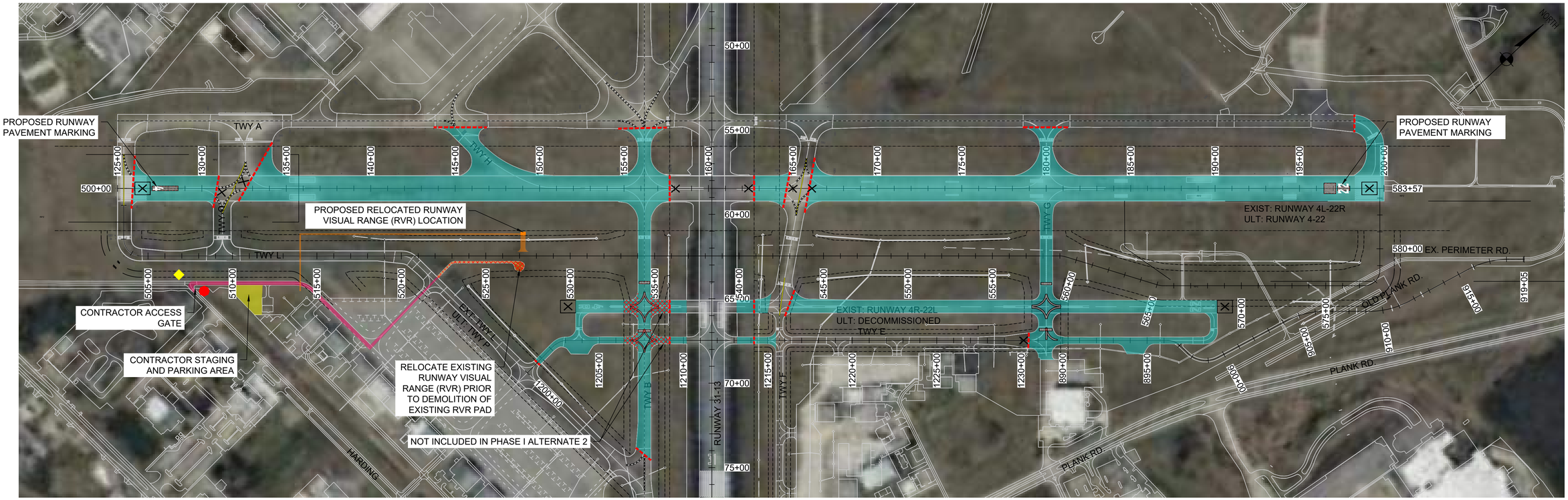
OVERALL CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN

DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	DATE

SCALE: N.T.S.

NO. 30757.02.00	REV.
G008	0

CADD D3-R4



CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN

SCALE: 1" = 300'

PHASE NOTES

GENERAL NOTES:

1. THE WORK AREAS SHOWN ARE DIVIDED TO OUTLINE THE RESTRICTIONS THAT APPLY WHEN CONSTRUCTION IS ONGOING IN EACH AREA.
2. THE CONTRACTOR SHALL SUBMIT A DETAILED CONSTRUCTION PROGRESS SCHEDULE TO THE PROGRAM MANAGER A MINIMUM OF FOUR WEEKS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACT DOCUMENTS PROVIDE CONSTRUCTION SEQUENCE AND SAFETY REQUIREMENTS WHICH MUST BE INCORPORATED INTO THE PROGRESS SCHEDULE.
3. **CONSTRUCTION OPERATIONS SHALL NOT PENETRATE THOSE SURFACES SHOWN ON THE TAXIWAY "OBSTACLE FREE ZONE" OR RUNWAY SAFETY AREA. ANY EQUIPMENT OR PERSONNEL OR PART THERE OF PENETRATING THE OFZ OR RSA WILL BE DEEMED A TAXIWAY OR RUNWAY INCURSION. A PENALTY OF $10,000 MAY BE CHARGED TO THE CONTRACTOR PER OCCURRENCE AT THE DESECRATION OF THE FAA.**
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE EXISTING LEVEL OF SECURITY AT THE PROJECT SITE. TEMPORARY FENCING SHALL CONFORM TO THE EXISTING SECURITY FENCING IN PLACE.
5. CONTRACTOR SHALL REMOVE EXISTING RUNWAY/TAXIWAY MARKINGS AND ALL TEMPORARY MARKINGS (AFTER COMPLETION OF PHASE) PER FAA ADVISORY CIRCULAR 150/5340-1M REQUIREMENTS. NEW TEMPORARY STRIPING SHALL BE MARKED AS SHOWN IN THE CSPP SHEETS.
6. MARKINGS DESIGNATED FOR TEMPORARY REMOVALS SHALL BE REPLACED AT THE END OF THE PHASE AT THEIR ORIGINAL LOCATIONS.
7. CONTRACTOR SHALL COVER THE INDICATED EXISTING GUIDANCE SIGN WITH OPAQUE BLACK COVERING. COVERING SHALL BE SECURED TO ENSURE SIGN DOES NOT UNCOVER DURING CONSTRUCTION ACTIVITY. SIGN SHALL REMAIN COVERED FOR THE DURATION OF THE PHASE AND SHALL NOT BE UNCOVERED UNTIL PHASE IS COMPLETE AND AREA IS REOPENED. UPON UNCOVERING THE SIGN, THE CONTRACTOR SHALL INSPECT THE SIGN FOR DAMAGE OR COVERING RESIDUE. ANY RESIDUE SHALL BE CLEANED OFF AND ANY DAMAGE TO THE SIGN SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

PHASE I - RELOCATE RVR, RESTRIPE EXISTING RUNWAY 4L-22R/TAXIWAY B/TAXIWAY G, DECOMMISSION RUNWAY 4R-22L AND TAXIWAY E FROM TAXIWAY L TO TAXIWAY F

1. ISSUE NOTAM STATING:
   - 1.1. "RUNWAY 4R-22L PERMANENTLY CLOSED FOR ARRIVALS AND DEPARTURES"
   - 1.2. "RUNWAY 4L-22R PERMANENTLY REDESIGNATED TO 4-22"
   - 1.3. "RUNWAY 4-22 CLOSED"
   - 1.4. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY L TO TAXIWAY F"
   - 1.5. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY G TO RUNWAY 4R-22L"
   - 1.6. "TAXIWAY G CLOSED"
   - 1.7. "TAXIWAY H CLOSED"
   - 1.8. "TAXIWAY B CLOSED FROM TAXIWAY L TO TAXIWAY A"
   - 1.9. "MEN AND EQUIPMENT AT WORK NEAR:
     - 1.9.1. TAXIWAY L"
     - 1.9.2. TAXIWAY E FROM TAXIWAY L TO RUNWAY 4R-22L"
     - 1.9.3. TAXIWAY B FROM TAXIWAY L TO TAXIWAY A"
     - 1.9.4. RUNWAY 4-22"
     - 1.9.5. RUNWAY 13-31"
2. INSTALL CONSTRUCTION SIGNAGE
3. INSTALL LIGHTED BARRICADES, TAXIWAY AND RUNWAY CLOSURE MARKERS AND RUNWAY AND TAXIWAY LIGHT COVERS
4. PERFORM PHASE I RUNWAY VISUAL RANGE RELOCATION WORK:
   - 4.1. CONSTRUCT RELOCATED RUNWAY VISUAL RANGE'S (RVR'S) EARTHWORK/ GRADING, CONCRETE FOUNDATION, PAVED ACCESS ROAD, AND OTHER ASSOCIATED NEW WORKS RELATED TO THE RELOCATION OF THE RVR
   - 4.2. CONSTRUCT RELOCATED RVR'S NEW PULL BOXES, CONDUIT, AND CONTROL PANEL
   - 4.3. RELOCATE RVR TO NEW LOCATION
5. PERFORM PHASE I PAVEMENT MARKING REMOVAL WORK:
   - 5.1. REMOVE "4L" MARKER FROM SOUTHERN END OF RUNWAY 4-22 AND REPLACE WITH PROPOSED "4" MARKER
   - 5.2. REMOVE "22R" MARKER FROM NORTHERN END OF RUNWAY 4-22 AND REPLACE WITH PROPOSED "22" MARKER
   - 5.3. REMOVE SURFACE PAINTED SIGNS AND CENTERLINES ON TAXIWAY B FOR RUNWAY 4R-22L
   - 5.4. REMOVE SURFACE PAINTED SIGNS AND CENTERLINES ON TAXIWAY B FOR TAXIWAY E
   - 5.5. REMOVE TAXIWAY CENTERLINES FROM EXISTING L TO DECOMMISSIONED TAXIWAY E
   - 5.6. REMOVE TAXIWAY CENTERLINES FROM TAXIWAY G AT THE INTERSECTIONS OF RUNWAY 4R-22L AND TAXIWAY E
6. PERFORM PHASE I PAVEMENT REMOVAL WORK (REMOVAL NORTH OF TAXIWAY B NOT INCLUDED IN PHASE I ALTERNATE 2):
   - 6.1. REMOVE PAVEMENT ON TAXIWAY E FROM WITHIN THE TAXIWAY B TOFA
   - 6.2. REMOVE PAVEMENT ON RUNWAY 4R-22L FROM WITHIN THE TAXIWAY B TOFA
7. PERFORM CLEANUP
8. REMOVAL OF CONSTRUCTION SIGNAGE, LIGHTED BARRICADES, TAXIWAY CLOSURE MARKERS, AND RUNWAY AND TAXIWAY LIGHT COVERS EXCEPT FOR THOSE RELATED TO THE CLOSURE OF RUNWAY 4R-22L AND TAXIWAY E
9. REMOVE NOTAM EXCEPT THE FOLLOWING:
   - 9.1. "RUNWAY 4R-22L PERMANENTLY CLOSED FOR ARRIVALS AND DEPARTURES"
   - 9.2. "RUNWAY 4L-22R PERMANENTLY REDESIGNATED TO 4-22"
   - 9.3. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY L TO TAXIWAY F"
   - 9.4. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY G TO RUNWAY 4R-22L"

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER IN ENGINEERING

Blake S. Roussel
07/18/2024

LEGEND:

- * WORK PERFORMED IN PREVIOUS PHASE
- PAVEMENT REMOVAL THIS PHASE
- * PAVEMENT REMOVED IN PREVIOUS PHASE
- WORK PERFORMED THIS PHASE
- CONTRACTOR STAGING AREA
- * CONTRACTOR PARKING
- CONTRACTOR ACCESS ROAD
- * PROPOSED TAXIWAY
- REMOVAL OF EXISTING PAVEMENT MARKING THIS PHASE
- * PAVEMENT MARKING REMOVED IN PREVIOUS PHASE
- RUNWAY/TAXIWAY CLOSED FOR ARRIVALS AND DEPARTURES THIS PHASE
- ******** PAVEMENT MARKING TO BE REMOVED AND REPLACED THIS PHASE
- TEMPORARY YELLOW CENTERLINE STRIPING
- 1 / G008 LOW PROFILE BARRICADE
- 2 / G008 PORTABLE LIGHTED "X" RUNWAY CLOSURE MARKER
- 3 / G008 CLOSED RUNWAY MARKING
- 4 / G008 CONTRACTOR TRAFFIC DO NOT ENTER SIGNAGE
- 5 / G008 CONSTRUCTION TRAFFIC STOP SIGN
- * NOT USED THIS SHEET

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN PHASE I

DESIGNED	W.T.B.
DRAWN	G.T.H.
CHECKED	B.S.R.
APPROVED	
APPROVED	
DATE	12/22/23

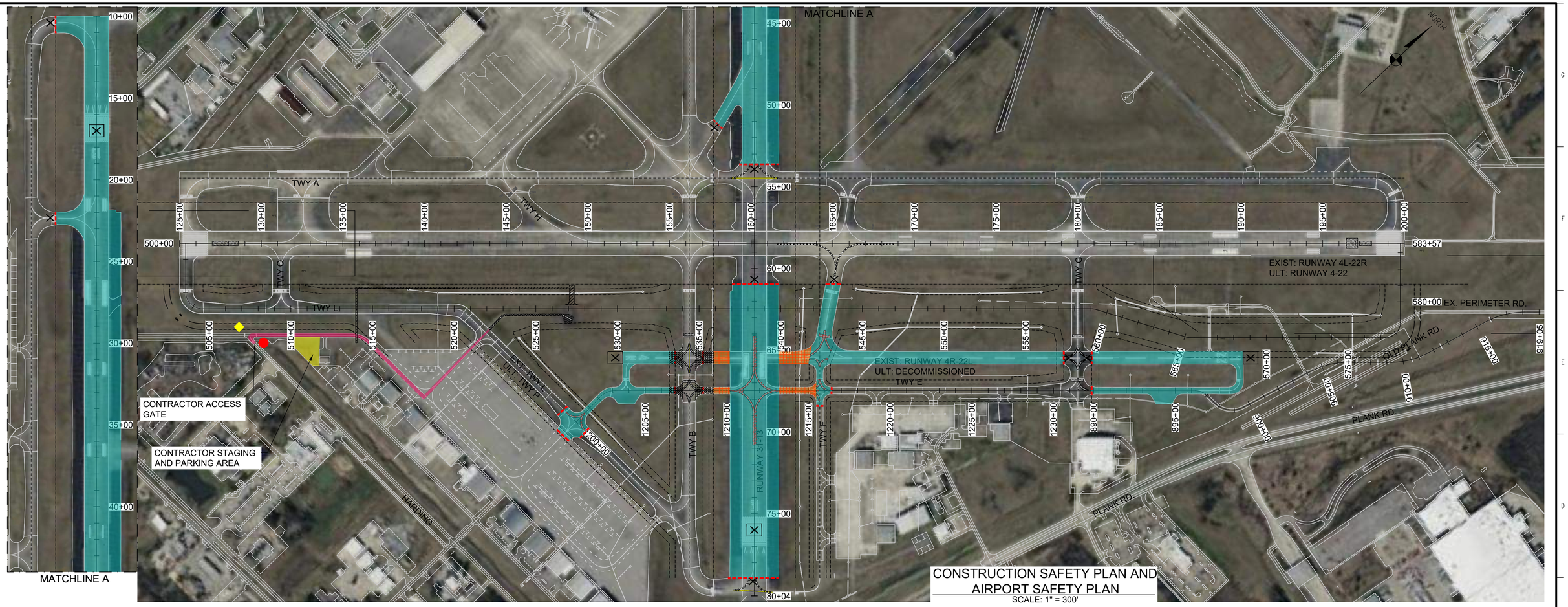
SCALE: 1" = 300'

NO. 30757.02.00

REV. 0

G009

CADD D3-R4



CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN
SCALE: 1" = 300'

PHASE NOTES

GENERAL NOTES:

1. THE WORK AREAS SHOWN ARE DIVIDED TO OUTLINE THE RESTRICTIONS THAT APPLY WHEN CONSTRUCTION IS ONGOING IN EACH AREA.
2. THE CONTRACTOR SHALL SUBMIT A DETAILED CONSTRUCTION PROGRESS SCHEDULE TO THE PROGRAM MANAGER A MINIMUM OF FOUR WEEKS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACT DOCUMENTS PROVIDE CONSTRUCTION SEQUENCE AND SAFETY REQUIREMENTS WHICH MUST BE INCORPORATED INTO THE PROGRESS SCHEDULE.
3. **CONSTRUCTION OPERATIONS SHALL NOT PENETRATE THOSE SURFACES SHOWN ON THE TAXIWAY "OBSTACLE FREE ZONE" OR RUNWAY SAFETY AREA. ANY EQUIPMENT OR PERSONNEL OR PART THERE OF PENETRATING THE OFZ OR RSA WILL BE DEEMED A TAXIWAY OR RUNWAY INCURSION. A PENALTY OF $10,000 MAY BE CHARGED TO THE CONTRACTOR PER OCCURRENCE AT THE DESECRATION OF THE FAA.**
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE EXISTING LEVEL OF SECURITY AT THE PROJECT SITE. TEMPORARY FENCING SHALL CONFORM TO THE EXISTING SECURITY FENCING IN PLACE.
5. CONTRACTOR SHALL REMOVE EXISTING RUNWAY/TAXIWAY MARKINGS AND ALL TEMPORARY MARKINGS (AFTER COMPLETION OF PHASE) PER FAA ADVISORY CIRCULAR 150/5340-1M REQUIREMENTS. NEW TEMPORARY STRIPING SHALL BE MARKED AS SHOWN IN THE CSPP SHEETS.
6. MARKINGS DESIGNATED FOR TEMPORARY REMOVALS SHALL BE REPLACED AT THE END OF THE PHASE AT THEIR ORIGINAL LOCATIONS.
7. CONTRACTOR SHALL COVER THE INDICATED EXISTING GUIDANCE SIGN WITH OPAQUE BLACK COVERING. COVERING SHALL BE SECURED TO ENSURE SIGN DOES NOT UNCOVER DURING CONSTRUCTION ACTIVITY. SIGN SHALL REMAIN COVERED FOR THE DURATION OF THE PHASE AND SHALL NOT BE UNCOVERED UNTIL PHASE IS COMPLETE AND AREA IS REOPENED. UPON UNCOVERING THE SIGN, THE CONTRACTOR SHALL INSPECT THE SIGN FOR DAMAGE OR COVERING RESIDUE. ANY RESIDUE SHALL BE CLEANED OFF AND ANY DAMAGE TO THE SIGN SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

PHASE IA - DECOMMISSION RUNWAY 4R-22L AND TAXIWAY E WITHIN RUNWAY 13-31 RSA AND TAXIWAY F TSA

1. ISSUE NOTAM STATING:
   - 1.1. "RUNWAY 13-31 CLOSED FOR ARRIVALS AND DEPARTURES"
   - 1.2. "RUNWAY 4R-22L PERMANENTLY CLOSED FOR ARRIVALS AND DEPARTURES"
   - 1.3. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY L TO TAXIWAY F"
   - 1.4. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY G TO RUNWAY 4R-22L"
   - 1.5. "TAXIWAY F CLOSED FROM INTERSECTION OF TAXIWAY E TO RUNWAY 4-22 RSA"
   - 1.6. "TAXIWAY L CLOSED AT INTERSECTION OF TAXIWAY E"
   - 1.7. MEN AND EQUIPMENT AT WORK NEAR:
     - 1.7.1. RUNWAY 13-31"
     - 1.7.2. TAXIWAY L AT INTERSECTION OF TAXIWAY E"
     - 1.7.3. RUNWAY 4R-22L AND TAXIWAY E FROM TAXIWAY L TO RUNWAY 13-31"
     - 1.7.4. RUNWAY 4R-22L AND TAXIWAY E FROM RUNWAY 13-31 THROUGH TAXIWAY F INTERSECTION"
     - 1.7.5. TAXIWAY F"
2. INSTALL CONSTRUCTION SIGNAGE
3. INSTALL LIGHTED BARRICADES, TAXIWAY AND RUNWAY CLOSURE MARKERS AND RUNWAY AND TAXIWAY LIGHT COVERS
4. PERFORM PHASE IA PAVEMENT REMOVAL WORK (NOT INCLUDED IN PHASE I ALTERNATE 2):
   - 4.1. REMOVE PAVEMENT ON TAXIWAY E FROM TAXIWAY B NORTHERN TOFA LIMIT TO TAXIWAY F SOUTHERN TOFA LIMIT, EXCLUDING RUNWAY 13-31
   - 4.2. REMOVE PAVEMENT ON RUNWAY 4R-22L FROM TAXIWAY B NORTHERN TOFA LIMIT TO TAXIWAY F SOUTHERN TOFA LIMIT, EXCLUDING RUNWAY 13-31
5. PERFORM PHASE IA PAVEMENT MARKING REMOVAL WORK:
   - 5.1. REMOVE RUNWAY LEAD IN LINES AT THE INTERSECTION OF TAXIWAY L AND TAXIWAY E
   - 5.2. REMOVE LEAD IN LINES ON RUNWAY 13-31 AT THE INTERSECTION OF TAXIWAY E (NOT INCLUDED IN PHASE I ALTERNATE 2).
   - 5.3. REMOVE SURFACE PAINTED SIGNS AND CENTERLINES ON TAXIWAY F AT THE INTERSECTION OF TAXIWAY E WHERE PAVEMENT REMAINS (NOT INCLUDED IN PHASE I ALTERNATE 2).
   - 5.4. REMOVE SURFACE PAINTED SIGNS AND CENTERLINES ON TAXIWAY F AT THE INTERSECTION OF THE RUNWAY 4R-22L WHERE PAVEMENT REMAINS
6. PERFORM CLEANUP
7. REMOVAL OF CONSTRUCTION SIGNAGE, LIGHTED BARRICADES, TAXIWAY CLOSURE MARKERS, AND RUNWAY AND TAXIWAY LIGHT COVERS EXCEPT FOR THOSE RELATED TO THE CLOSURE OF RUNWAY 4R-22L AND TAXIWAY E
8. REMOVE NOTAMS EXCEPT THE FOLLOWING:
   - 8.1. "RUNWAY 4R-22L PERMANENTLY CLOSED FOR ARRIVALS AND DEPARTURES"
   - 8.2. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY L TO TAXIWAY F"
   - 8.3. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY G TO RUNWAY 4R-22L"

LEGEND:

- * WORK PERFORMED IN PREVIOUS PHASE
- PAVEMENT REMOVAL THIS PHASE
- PAVEMENT REMOVED IN PREVIOUS PHASE
- WORK PERFORMED THIS PHASE
- CONTRACTOR STAGING AREA
- * CONTRACTOR PARKING
- CONTRACTOR ACCESS ROAD
- * PROPOSED TAXIWAY
- REMOVAL OF EXISTING PAVEMENT MARKING THIS PHASE
- PAVEMENT MARKING REMOVED IN PREVIOUS PHASE
- RUNWAY/TAXIWAY CLOSED FOR ARRIVALS AND DEPARTURES THIS PHASE
- ********* PAVEMENT MARKING TO BE REMOVED AND REPLACED THIS PHASE
- TEMPORARY YELLOW CENTERLINE STRIPING
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STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

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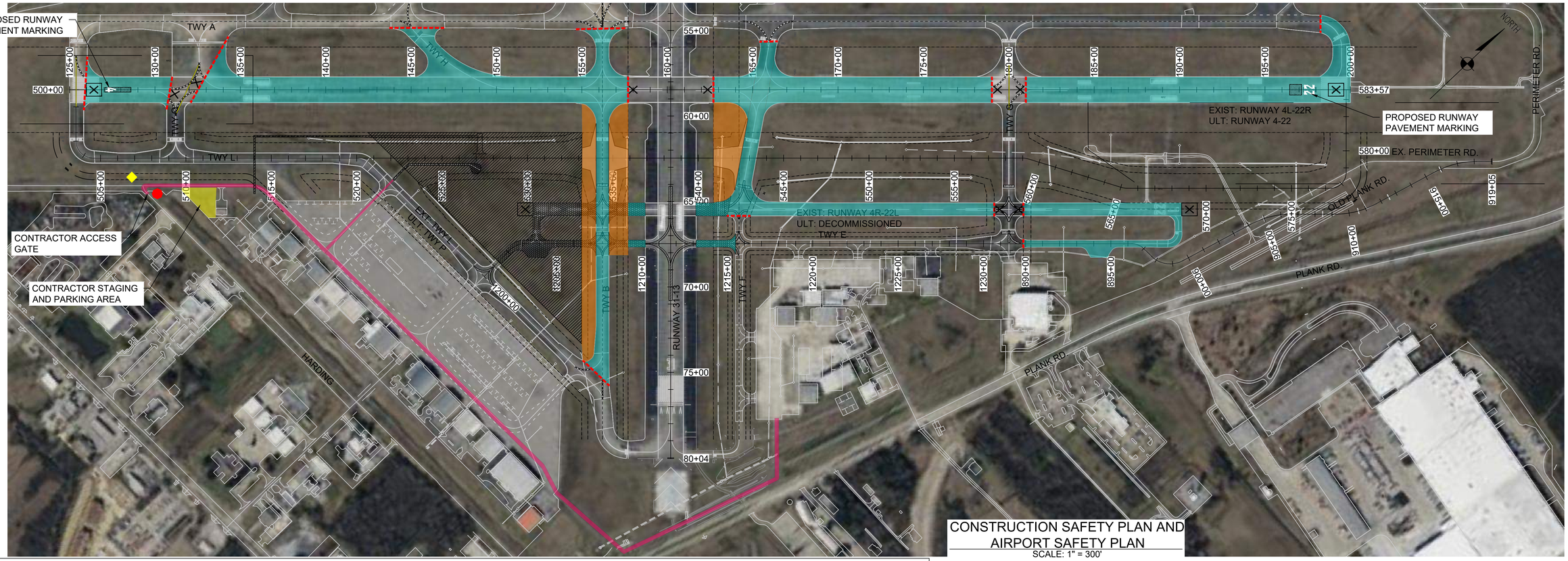
TAXIWAY LIMA EXTENSION

CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETEY PLAN PHASE IA

DESIGNED	W.T.B.
DRAWN	R.B.
CHECKED	B.S.R.
APPROVED	
APPROVED	
DATE	12/22/23

SCALE: 1" = 300'
NO. 30757.02.00
REV. 0
G010

CADD D3—R4



CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN
SCALE: 1" = 300'

PHASE NOTES

GENERAL NOTES:

1. THE WORK AREAS SHOWN ARE DIVIDED TO OUTLINE THE RESTRICTIONS THAT APPLY WHEN CONSTRUCTION IS ONGOING IN EACH AREA.
2. THE CONTRACTOR SHALL SUBMIT A DETAILED CONSTRUCTION PROGRESS SCHEDULE TO THE PROGRAM MANAGER A MINIMUM OF FOUR WEEKS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACT DOCUMENTS PROVIDE CONSTRUCTION SEQUENCE AND SAFETY REQUIREMENTS WHICH MUST BE INCORPORATED INTO THE PROGRESS SCHEDULE.
3. **CONSTRUCTION OPERATIONS SHALL NOT PENETRATE THOSE SURFACES SHOWN ON THE TAXIWAY "OBSTACLE FREE ZONE" OR RUNWAY SAFETY AREA. ANY EQUIPMENT OR PERSONNEL OR PART THERE OF PENETRATING THE OFZ OR RSA WILL BE DEEMED A TAXIWAY OR RUNWAY INCURSION. A PENALTY OF $10,000 MAY BE CHARGED TO THE CONTRACTOR PER OCCURRENCE AT THE DESECRATION OF THE FAA.**
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE EXISTING LEVEL OF SECURITY AT THE PROJECT SITE. TEMPORARY FENCING SHALL CONFORM TO THE EXISTING SECURITY FENCING IN PLACE.
5. CONTRACTOR SHALL REMOVE EXISTING RUNWAY/TAXIWAY MARKINGS AND ALL TEMPORARY MARKINGS (AFTER COMPLETION OF PHASE) PER FAA ADVISORY CIRCULAR 150/5340-1M REQUIREMENTS. NEW TEMPORARY STRIPING SHALL BE MARKED AS SHOWN IN THE CSPP SHEETS.
6. MARKINGS DESIGNATED FOR TEMPORARY REMOVALS SHALL BE REPLACED AT THE END OF THE PHASE AT THEIR ORIGINAL LOCATIONS.
7. CONTRACTOR SHALL COVER THE INDICATED EXISTING GUIDANCE SIGN WITH OPAQUE BLACK COVERING. COVERING SHALL BE SECURED TO ENSURE SIGN DOES NOT UNCOVER DURING CONSTRUCTION ACTIVITY. SIGN SHALL REMAIN COVERED FOR THE DURATION OF THE PHASE AND SHALL NOT BE UNCOVERED UNTIL PHASE IS COMPLETE AND AREA IS REOPENED. UPON UNCOVERING THE SIGN, THE CONTRACTOR SHALL INSPECT THE SIGN FOR DAMAGE OR COVERING RESIDUE. ANY RESIDUE SHALL BE CLEANED OFF AND ANY DAMAGE TO THE SIGN SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

PHASE IC - DEMO, GRADING, DRAINAGE, PAVING WITHIN TAXIWAYS B AND F TOFA

1. ISSUE NOTAM STATING:
   - 1.1. "RUNWAY 4R-22L PERMANENTLY CLOSED FOR ARRIVALS AND DEPARTURES"
   - 1.2. "RUNWAY 4L-22R PERMANENTLY REDESIGNATED TO 4-22"
   - 1.3. "RUNWAY 4-22 CLOSED"
   - 1.4. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY L TO TAXIWAY F"
   - 1.5. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY G TO RUNWAY 4R-22L"
   - 1.6. "SECTION OF TAXIWAY L THAT PARALLELS THE NORTHERN LIMIT OF THE SOUTH APRON PERMANENTLY REDESIGNATED TO TAXIWAY P"
   - 1.7. "TAXIWAY B CLOSED FROM TAXIWAY P TO TAXIWAY A"
   - 1.8. "TAXIWAY F CLOSED FROM TAXIWAY E TO THE INTERSECTION OF TAXIWAY A"
   - 1.9. "RUNWAY 4-22 CLOSED"
   - 1.10. "MEN AND EQUIPMENT AT WORK NEAR:
     - 1.10.1. TAXIWAY B FROM TAXIWAY E TO TAXIWAY A"
     - 1.10.2. TAXIWAY E FROM RUNWAY 4R-22L TO RUNWAY 4-22"
     - 1.10.3. RUNWAY 13-31"
     - 1.10.4. RUNWAY 4-22"
2. INSTALL CONSTRUCTION SIGNAGE
3. INSTALL LIGHTED BARRICADES, TAXIWAY AND RUNWAY CLOSURE MARKERS, AND RUNWAY AND TAXIWAY LIGHT COVERS
4. PERFORM PHASE IC SITE WORK:
   - 4.1. CONSTRUCT EARTHWORK, GRADING, AND DRAINAGE ALONG TAXIWAY B:
     - 4.1.1. FROM TAXIWAY B SOUTHERN TOFA TO TAXIWAY B SOUTHERN EOP.
     - 4.1.2. FROM TAXIWAY B NORTHERN EOP TO RUNWAY 13-31 SOUTHERN RSA (NOT IN PHASE I ALTERNATE 2).
   - 4.2. CONSTRUCT EARTHWORK, GRADING, AND DRAINAGE ALONG THE SOUTH SIDE OF TAXIWAY F FROM DECOMMISSIONED RUNWAY 4R-22L TO RUNWAY 4-22 WHILE REMAINING OUTSIDE OF THE RUNWAY 13-31 RSA (NOT IN PHASE I ALTERNATE2).
5. PERFORM PHASE IC NEW TAXIWAY L WORK:
   - 5.1. CONSTRUCT REMAINING WORK INCLUDING SUBGRADE, BASE COURSE, PAVEMENT, LIGHTING, PAVEMENT MARKINGS, SIGNAGE, AND OTHER ANCILLARY ITEMS TO MAKE A COMPLETE AND FUNCTIONING TAXIWAY FOR NEW TAXIWAY L ALONG TAXIWAY B:
     - 5.1.1. FROM TAXIWAY B SOUTHERN TOFA TO TAXIWAY B SOUTHER EOP.
     - 5.1.2. FROM TAXIWAY B NORTHERN EOP TO RUNWAY 13-31 SOUTHERN RSA (NOT IN PHASE I ALTERNATE2).
   - 5.2. CONSTRUCT REMAINING WORK INCLUDING SUBGRADE, BASE COURSE, PAVEMENT, LIGHTING, PAVEMENT MARKINGS, SIGNAGE, AND OTHER ANCILLARY ITEMS TO MAKE A COMPLETE AND FUNCTIONING TAXIWAY FOR NEW TAXIWAY L ALONG THE SOUTH SIDE OF TAXIWAY F FROM DECOMMISSIONED RUNWAY 4R-22L TO RUNWAY 4-22 WHILE REMAINING OUTSIDE OF THE RUNWAY 13-31 RSA (NOT IN PHASE I ALTERNATE 2).
6. PERFORM CLEANUP
7. REMOVAL OF CONSTRUCTION SIGNAGE, LIGHTED BARRICADES, TAXIWAY CLOSURE MARKERS, AND RUNWAY AND TAXIWAY LIGHT COVERS EXCEPT FOR THOSE RELATED TO THE CLOSURE OF RUNWAY 4R-22L AND TAXIWAY E
8. REMOVE NOTAMS EXCEPT THE FOLLOWING:
   - 8.1. "RUNWAY 4R-22L PERMANENTLY CLOSED FOR ARRIVALS AND DEPARTURES"
   - 8.2. "RUNWAY 4L-22R PERMANENTLY REDESIGNATED TO 4-22"
   - 8.3. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY P TO TAXIWAY F"
   - 8.4. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY G TO RUNWAY 4R-22L"
   - 8.5. "SECTION OF TAXIWAY L THAT PARALLELS THE NORTHERN LIMIT OF THE SOUTH APRON PERMANENTLY REDESIGNATED TO TAXIWAY P"

LEGEND:

- WORK PERFORMED IN PREVIOUS PHASE
- * PAVEMENT REMOVAL THIS PHASE
- PAVEMENT REMOVED IN PREVIOUS PHASE
- WORK PERFORMED THIS PHASE
- CONTRACTOR STAGING AREA
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- CONTRACTOR ACCESS ROAD
- PROPOSED TAXIWAY
- * REMOVAL OF EXISTING PAVEMENT MARKING THIS PHASE
- PAVEMENT MARKING REMOVED IN PREVIOUS PHASE
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- 1 / G008 — LOW PROFILE BARRICADE
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- 4 / G008 — CONTRACTOR TRAFFIC DO NOT ENTER SIGNAGE
- 5 / G008 — CONSTRUCTION TRAFFIC STOP SIGN

* NOT USED THIS SHEET

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

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TAXIWAY LIMA EXTENSION

CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PHASE IC

DESIGNED W.T.B.
DRAWN R.B.
CHECKED B.S.R.
APPROVED
APPROVED
DATE 12/22/23

SCALE: 1" = 300'
NO. 30757.02.00
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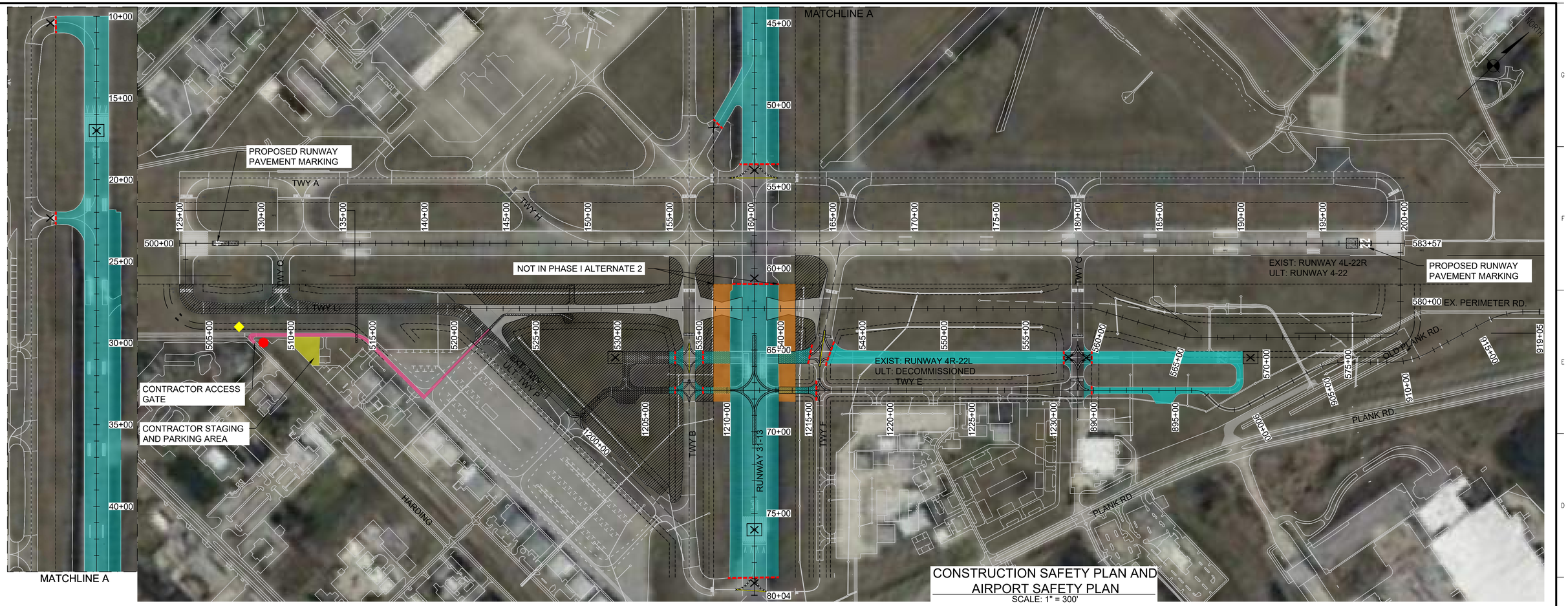
CADD D3-R4



CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN
SCALE: 1" = 300'

PHASE NOTES

GENERAL NOTES:

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PHASE IF TAXIWAY L PAVING WITHIN RUNWAY 13-31 RSA

1. ISSUE NOTAM STATING:
   - 1.1. "RUNWAY 4R-22L PERMANENTLY CLOSED FOR ARRIVALS AND DEPARTURES"
   - 1.2. "RUNWAY 4L-22R PERMANENTLY REDESIGNATED TO 4-22"
   - 1.3. "RUNWAY 13-31 CLOSED"
   - 1.4. "SECTION OF TAXIWAY L THAT PARALLELS THE NORTHERN LIMIT OF THE SOUTH APRON PERMANENTLY REDESIGNATED TO TAXIWAY P"
   - 1.5. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY P TO TAXIWAY F"
   - 1.6. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY G TO RUNWAY 4R-22L"
   - 1.7. "MEN AND EQUIPMENT AT WORK NEAR:
     - 1.7.1. RUNWAY 4-22"
     - 1.7.2. RUNWAY 13-31"
     - 1.7.3. TAXIWAY B"
     - 1.7.4. TAXIWAY F"
2. INSTALL CONSTRUCTION SIGNAGE
3. INSTALL LIGHTED BARRICADES, TAXIWAY AND RUNWAY CLOSURE MARKERS, AND TAXIWAY LIGHT COVERS
4. PERFORM PHASE IF NEW TAXIWAY L WORK:
   - 4.1. CONSTRUCT REMAINING WORK INCLUDING SUBGRADE, BASE COURSE, PAVEMENT, LIGHTING, PAVEMENT MARKINGS, SIGNAGE, AND OTHER ANCILLARY ITEMS TO MAKE A COMPLETE AND FUNCTIONING TAXIWAY FOR NEW TAXIWAY L ALONG RUNWAY 13-31 WITHIN THE RSA LIMIT (NOT IN PHASE I ALTERNATE 2).
   - 4.2. CONSTRUCT EARTHWORK, GRADING, AND DRAINAGE ALONG TAXIWAY B WITHIN RUNWAY 13-31 RSA (NOT IN PHASE I ALTERNATE 2).
5. PERFORM CLEANUP
6. CONSTRUCTION SIGNAGE, LIGHTED BARRICADES, TAXIWAY CLOSURE MARKERS, AND RUNWAY AND TAXIWAY LIGHT COVERS EXCEPT FOR THOSE REALTED TO THE CLOSURE OF RUNWAY 4R-22L AND TAXIWAY E
7. RETRACT NOTAM EXCEPT THE FOLLOWING:
   - 7.1. "RUNWAY 4R-22L PERMANENTLY CLOSED FOR ARRIVALS AND DEPARTURES"
   - 7.2. "RUNWAY 4L-22R PERMANENTLY REDESIGNATED TO 4-22"
   - 7.3. "SECTION OF TAXIWAY L THAT PARALLELS THE NORTHERN LIMIT OF THE SOUTH APRON PERMANENTLY REDESIGNATED TO TAXIWAY P"
   - 7.4. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY P TO TAXIWAY F"
   - 7.5. "TAXIWAY E PERMANENTLY CLOSED FROM TAXIWAY G TO RUNWAY 4R-22L"

LEGEND:

- WORK PERFORMED IN PREVIOUS PHASE
- * PAVEMENT REMOVAL THIS PHASE
- PAVEMENT REMOVED IN PREVIOUS PHASE
- WORK PERFORMED THIS PHASE
- CONTRACTOR STAGING AREA
- * CONTRACTOR PARKING
- CONTRACTOR ACCESS ROAD
- PROPOSED TAXIWAY
- * REMOVAL OF EXISTING PAVEMENT MARKING THIS PHASE
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BLAKE S. ROUSSEL
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PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
Blake S. Roussel
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NO.	REVISIONS	DSGN	CHKD	APVD	DATE

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TAXIWAY LIMA EXTENSION

CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN PHASE IF

DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	DATE

SCALE: 1" = 300'
NO. 30757.02.00
REV. 0
G015

CADD D3-R4

SUMMARY OF ESTIMATED QUANTITIES--PHASE I BASE BID

ITEM	DESCRIPTION	UNIT	TOTAL QUANTITY
TAXIWAY PAVEMENT AND EARTHWORK			
C-102-5.1c	INSTALLATION AND REMOVAL OF SILT FENCE (CATCH BASIN PROTECTION)	LF	2,305
C-102-5.1e	INSTALLATION AND REMOVAL OF SILT FENCE	LF	3,692
C-105-5.1	MOBILIZATION (5.0%)	LS	1
P-101-5.1a	PAVEMENT REMOVAL (GA RUNWAY 4R-22L, TAXIWAY E)	SY	17,259
P-101-5.6a	COLD MILLING (2" DEPTH) (TAXIWAY L)	SY	32,028
P-151-4.2	CLEARING AND GRUBBING	AC	31
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	32,244
P-152-4.2	EMBANKMENT IN PLACE	CY	12,978
P-154-5.1	SUBBASE COURSE	CY	11,143
P-155-8.1a	LIME TREATED SUBGRADE (10" THICK) (RVR AND GLIDE SLOPE ACCESS DRIVES)	SY	381
P-155-8.2a	LIME (RVR DRIVES)	TON	4
P-209-5.1a	CRUSHED AGGREGATE BASE COURSE (10" THICK) (RVR DRIVE)	SY	260
P-209-5.1b	CRUSHED AGGREGATE BASE COURSE (6.0" THICK)	SY	22,025
P-209-5.2	SEPARATION GEOTEXTILE	SY	22,286
P-401-8.1a	ASPHALT SURFACE COURSE (2.0" THICK)	TON	2,366
P-403-8.1a	ASPHALT MIXTURE BINDER COURSE (2.0" THICK)	TON	2,395
P-403-8.1b	ASPHALT BASE COURSE COURSE (5.0" THICK)	TON	6,129
P-403-8.1c	ASPHALT MIXTURE SURFACE COURSE (2" THICK) (RVR DRIVES)	TON	29
P-401-8.1b	ASPHALT SURFACE COURSE (2" THICK) (OVERLAY)	TON	3,524
P-403-8.1d	ASPHALT MIXTURE BINDER COURSE (2" THICK) (RVR DRIVES)	TON	36
P-407-8.1	ASPHALT TREATED PERMEABLE BASE COURSE (ATPB) (6" THICK)	SY	22,286
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	6,530
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	8,566
P-610-6.1	CONCRETE (RVR RELOCATION PAD)	CY	4
P-620-5.2b-1	RUNWAY AND TAXIWAY MARKING (YELLOW)	SF	23,307
P-620-5.2b-2	RUNWAY AND TAXIWAY MARKING (WHITE)	SF	16,575
P-620-5.2b-3	RUNWAY AND TAXIWAY MARKING (RED)	SF	9,589
P-620-5.2b-4	RUNWAY AND TAXIWAY MARKING (BLACK)	SF	53,835
P-620-5.3c	REFLECTIVE MEDIA (RUNWAY)	LB	4,302
P-620-5.4d	TEMPORARY RUNWAY AND TAXIWAY MARKING	LS	1
D-705-5.4	6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC	LF	4,702
901-5.1	SEEDING (HYDROSEEDING)	AC	21
904-5.2	SODDING	SY	5,333
T-908-5.1	MULCHING	SY	97,217
DRAINAGE, PERIMETER ROAD, PERIMETER FENCE			
P-101-5.1a	ASPHALT PAVEMENT AND BASE REMOVAL	SY	0
P-101-5.1b	CONCRETE PAVEMENT REMOVAL	SY	0
P-101-5.6	COLD MILLING (DEPTH VARIES)	SY	0
P-101-5.7	REMOVAL OF EXISTING PIPES AND STRUCTURES	LS	1
P-151-4.1	CLEARING (REMOVAL OF EXISTING FENCE AND CONCRETE MAINTENANCE PAD)	LS	0
P-151-4.2	CLEARING AND GRUBBING (REMOVAL OF GRASS)	AC	0
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	0
P-152-4.2	MUCK EXCAVATION	CY	0
P-152-4.3	EMBANKMENT IN PLACE - GENERAL	CY	0
P-152-4.4	EMBANKMENT IN PLACE - SELECT FILL	CY	0
P-153-6.1	CONTROLLED LOW-STRENGTH MATERIAL (CLSM)	CY	0
P-155-8.1	LIME TREATED SUBGRADE	SY	0
P-155-8.2	LIME	TON	0
P-209-5.1c	CRUSHED AGGREGATE BASE COURSE (8" THICK)	SY	0
P-209-5.2	SEPERATION GEOTEXTILE	SY	0
P-403-8.1a	ASPHALT MIXTURE SURFACE COURSE	TON	0
P-403-8.1b	ASPHALT MIXTURE BINDER COURSE	TON	0
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	0
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	0
P-620-5.2b	PAINTED TRAFFIC STRIPING	SF	0
P-620-5.2c	REFLECTIVE MEDIA	LBS	0
D-701-5.1	15 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.2	30 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	1,527
D-701-5.3	36 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	674
D-701-5.4	42 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.5	48 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.6	15 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.7	18 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	262
D-701-5.8	24 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	285
D-701-5.9	36 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	401
D-701-5.10	42 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-751-5.1	CATCH BASIN - CB-01 (INCLUDES BEDDING & BACKFILL)	EA	11
D-751-5.2	CATCH BASIN - CB-02 (INCLUDES BEDDING & BACKFILL)	EA	2
D-751-5.3	CATCH BASIN - CB-SD02 (INCLUDES BEDDING & BACKFILL)	EA	0
F-162-5.1	CHAIN-LINK FENCE (6 FT HT. W/ 3 STRANDS BARBED WIRE)	LF	0
F-162-5.3	CONCRETE MAINTENANCE PAD	LF	0
LA-731-02	REFLECTORIZED RAISED PAVEMENT MARKERS (WHITE / WHITE)	EA	0
S-1003	SECURITY SIGNS	LS	0
TAXIWAY EDGE LIGHTING AND SIGNING			
L-108-5.1	NO. 8 AWG, 5 KV TYPE C CABLE, INSTALLED IN CONDUIT	LF	3,200
L-108-5.2	NO. 6 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED, ABOVE THE DUCT BANK OR CONDUIT, INCLUDING CONNECTIONS/TERMINATIONS, INCLUDING GROUND RODS	LF	3,000
L-109-7.2	MODIFICATIONS TO L-854 RADIO CONTROL EQUIPMENT TO INCLUDE PANEL RELABELING, IN PLACE AND OPERATIONAL	LUMP	1
L-110-5.1	ELECTRICAL CONDUIT, 2" SCHEDULE 40 PVC, TYPE II INSTALLED IN TRENCH	LF	3,200
L-110-5.2	ELECTRICAL CONDUIT, 2" HDPE, JACKED OR BORED UNDER TAXIWAY IN STEEL CASING (STEEL CASING INCLUDED IN THIS ITEM)	LF	500
L-110-5.3	ELECTRICAL DUCT, 4-WAY, 4" AND 1-WAY, 2" HIGH DENSITY POLYETHYLENE CONDUIT, DIRECTIONAL BORE, INSTALLED	LF	100
L-115-5.1	ELECTRICAL JUNCTION CAN, L-867, SIZE B, CLASS 1, COMPLETE, IN PLACE	EA	4
L-115-5.2	ELECTRICAL JUNCTION CAN, L-867, SIZE D, CLASS 1, COMPLETE, IN PLACE	EA	6
L-125-5.1	MEDIUM INTENSITY TAXIWAY EDGE LIGHT (L-861T), WITH BLUE LENS, LED LAMP, 10/15 WATT TRANSFORMER, BASE MOUNTED, IN PLACE	EA	43
L-125-5.2	SIGN L-858, SIZE 2, 1-PANEL, REQUIRED CONCRETE BASE	EA	3
L-125-5.3	SIGN L-858, SIZE 2, 2-PANEL, REQUIRED CONCRETE BASE	EA	2
L-125-5.6	REPLACE EXISTING SIGN PANEL, COMPLETE, IN PLACE	EA	5
L-125-5.7	REMOVE EXISTING RUNWAY & TAXIWAY ELECTRICAL SYSTEMS	LUMP	1
L-125-5.8	ELECTRICAL TESTING AND UPDATE ALCS	LUMP	1
L-125-5.9	CONNECT TO EXISTING CIRCUIT	LUMP	1
S-1004	TEMPORARY COMMUNICATION LINE	LUMP	1
NAVAIDS (RVR RELOCATION)			
L-108-5.1	TRENCHING FOR DIRECT BURIED CABLE, 18-INCH MINIMUM DEPTH	LF	40
L-108-5.3	NO. 2 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONGS/TERMINATIONS	LF	40
L-108-5.4a	NO. 2 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	5,420
L-108-5.4b	NO. 6 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	1,980
L-108-5.4c	NO. 10 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	21,600
L-110-5.2a	NON-ENCASED ELECTRICAL CONDUIT (2" HDPE)	LF	1,800
L-110-5.2b	NON-ENCASED ELECTRICAL CONDUIT (2" SCHEDULE 80 PVC)	LF	40
L-115-5.2	ELECTRICAL JUNCTION STRUCTURE (48"X48"X48" POLYMER CONCRETE)	LF	3
S-1001	ROLLOUT RVR DISASSEMBLY	LUMP	1
S-1002	ROLLOUT RVR REASSEMBLY	LUMP	1

SUMMARY OF ESTIMATED QUANTITIES--PHASE I ALTERNATE 1

ITEM	DESCRIPTION	UNIT	TOTAL QUANTITY
TAXIWAY PAVEMENT AND EARTHWORK			
C-102-5.1c	INSTALLATION AND REMOVAL OF SILT FENCE (CATCH BASIN PROTECTION)	LF	2,305
C-102-5.1e	INSTALLATION AND REMOVAL OF SILT FENCE	LF	3,692
C-105-5.1	MOBILIZATION (5.0%)	LS	1
P-101-5.1a	PAVEMENT REMOVAL (GA RUNWAY 4R-22L, TAXIWAY E)	SY	17,259
P-101-5.6a	COLD MILLING (2" DEPTH) (TAXIWAY L)	SY	32,028
P-151-4.2	CLEARING AND GRUBBING	AC	31
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	26,557
P-152-4.2	EMBANKMENT IN PLACE	CY	3,290
P-154-5.1	SUBBASE COURSE	CY	11,143
P-155-8.1a	LIME TREATED SUBGRADE (10" THICK) (RVR AND GLIDE SLOPE ACCESS DRIVES)	SY	381
P-155-8.2a	LIME (RVR DRIVES)	TON	4
P-209-5.1a	CRUSHED AGGREGATE BASE COURSE (10" THICK) (RVR DRIVE)	SY	260
P-209-5.1b	CRUSHED AGGREGATE BASE COURSE (6.0" THICK)	SY	22,025
P-209-5.2	SEPARATION GEOTEXTILE	SY	22,286
P-306-8.1	LEAN CONCRETE BASE COURSE	SY	31,904
P-307	CEMENT TREATED PERMEABLE BASE COURSE	SY	31,904
P-403-8.1c	ASPHALT MIXTURE SURFACE COURSE (2" THICK) (RVR DRIVES)	TON	29
P-401-8.1b	ASPHALT SURFACE COURSE (2" THICK) (OVERLAY)	TON	3,524
P-403-8.1d	ASPHALT MIXTURE BINDER COURSE (2" THICK) (RVR DRIVES)	TON	36
P-501-8.1	CEMENT CONCRETE PAVEMENT	SY	21,502
P-604-6.1	COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS	LF	27,408
P-605-5.1	JOINT SEALING FILLER	LF	27,408
P-610-6.1	CONCRETE (RVR RELOCATION PAD)	CY	4
P-620-5.2b-1	RUNWAY AND TAXIWAY MARKING (YELLOW)	SF	23,307
P-620-5.2b-2	RUNWAY AND TAXIWAY MARKING (WHITE)	SF	16,575
P-620-5.2b-3	RUNWAY AND TAXIWAY MARKING (RED)	SF	9,589
P-620-5.2b-4	RUNWAY AND TAXIWAY MARKING (BLACK)	SF	53,835
P-620-5.3c	REFLECTIVE MEDIA (RUNWAY)	LB	4,302
P-620-5.4d	TEMPORARY RUNWAY AND TAXIWAY MARKING	LS	1
D-705-5.4	6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC	LF	8,678
901-5.1	SEEDING (HYDROSEEDING)	AC	21
904-5.2	SODDING	SY	5,333
T-908-5.1	MULCHING	SY	97,217
DRAINAGE, PERIMETER ROAD, PERIMETER FENCE			
P-101-5.1a	ASPHALT PAVEMENT AND BASE REMOVAL	SY	0
P-101-5.1b	CONCRETE PAVEMENT REMOVAL	SY	0
P-101-5.6	COLD MILLING (DEPTH VARIES)	SY	0
P-101-5.7	REMOVAL OF EXISTING PIPES AND STRUCTURES	LS	1
P-151-4.1	CLEARING (REMOVAL OF EXISTING FENCE AND CONCRETE MAINTENANCE PAD)	LS	0
P-151-4.2	CLEARING AND GRUBBING (REMOVAL OF GRASS)	AC	0
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	0
P-152-4.2	MUCK EXCAVATION	CY	0
P-152-4.3	EMBANKMENT IN PLACE - GENERAL	CY	0
P-152-4.4	EMBANKMENT IN PLACE - SELECT FILL	CY	0
P-153-6.1	CONTROLLED LOW-STRENGTH MATERIAL (CLSM)	CY	0
P-155-8.1	LIME TREATED SUBGRADE	SY	0
P-155-8.2	LIME	TON	0
P-209-5.1c	CRUSHED AGGREGATE BASE COURSE (8" THICK)	SY	0
P-209-5.2	SEPERATION GEOTEXTILE	SY	0
P-403-8.1a	ASPHALT MIXTURE SURFACE COURSE	TON	0
P-403-8.1b	ASPHALT MIXTURE BINDER COURSE	TON	0
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	0
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	0
P-620-5.2b	PAINTED TRAFFIC STRIPING	SF	0
P-620-5.2c	REFLECTIVE MEDIA	LBS	0
D-701-5.1	15 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.2	30 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	1,527
D-701-5.3	36 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	674
D-701-5.4	42 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.5	48 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.6	15 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.7	18 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	262
D-701-5.8	24 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	285
D-701-5.9	36 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	401
D-701-5.10	42 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-751-5.1	CATCH BASIN - CB-01 (INCLUDES BEDDING & BACKFILL)	EA	11
D-751-5.2	CATCH BASIN - CB-02 (INCLUDES BEDDING & BACKFILL)	EA	2
D-751-5.3	CATCH BASIN - CB-SD02 (INCLUDES BEDDING & BACKFILL)	EA	0
F-162-5.1	CHAIN-LINK FENCE (6 FT HT. W/ 3 STRANDS BARBED WIRE)	LF	0
F-162-5.3	CONCRETE MAINTENANCE PAD	LF	0
LA-731-02	REFLECTORIZED RAISED PAVEMENT MARKERS (WHITE / WHITE)	EA	0
S-1003	SECURITY SIGNS	LS	0
TAXIWAY EDGE LIGHTING AND SIGNING			
L-108-5.1	NO. 8 AWG, 5 KV TYPE C CABLE, INSTALLED IN CONDUIT	LF	3,200
L-108-5.2	NO. 6 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED, ABOVE THE DUCT BANK OR CONDUIT, INCLUDING CONNECTIONS/TERMINATIONS, INCLUDING GROUND RODS	LF	3,000
L-109-7.2	MODIFICATIONS TO L-854 RADIO CONTROL EQUIPMENT TO INCLUDE PANEL RELABELING, IN PLACE AND OPERATIONAL	LUMP	1
L-110-5.1	ELECTRICAL CONDUIT, 2" SCHEDULE 40 PVC, TYPE II INSTALLED IN TRENCH	LF	3,200
L-110-5.2	ELECTRICAL CONDUIT, 2" HDPE, JACKED OR BORED UNDER TAXIWAY IN STEEL CASING (STEEL CASING INCLUDED IN THIS ITEM)	LF	500
L-110-5.3	ELECTRICAL DUCT, 4-WAY, 4" AND 1-WAY, 2" HIGH DENSITY POLYETHYLENE CONDUIT, DIRECTIONAL BORE, INSTALLED	LF	100
L-115-5.1	ELECTRICAL JUNCTION CAN, L-867, SIZE B, CLASS 1, COMPLETE, IN PLACE	EA	4
L-115-5.2	ELECTRICAL JUNCTION CAN, L-867, SIZE D, CLASS 1, COMPLETE, IN PLACE	EA	6
L-125-5.1	MEDIUM INTENSITY TAXIWAY EDGE LIGHT (L-861T), WITH BLUE LENS, LED LAMP, 10/15 WATT TRANSFORMER, BASE MOUNTED, IN PLACE	EA	43
L-125-5.2	SIGN L-858, SIZE 2, 1-PANEL, REQUIRED CONCRETE BASE	EA	3
L-125-5.3	SIGN L-858, SIZE 2, 2-PANEL, REQUIRED CONCRETE BASE	EA	2
L-125-5.6	REPLACE EXISTING SIGN PANEL, COMPLETE, IN PLACE	EA	5
L-125-5.7	REMOVE EXISTING RUNWAY & TAXIWAY ELECTRICAL SYSTEMS	LUMP	1
L-125-5.8	ELECTRICAL TESTING AND UPDATE ALCS	LUMP	1
L-125-5.9	CONNECT TO EXISTING CIRCUIT	LUMP	1
S-1004	TEMPORARY COMMUNICATION LINE	LUMP	1
NAVAIDS (RVR RELOCATION)			
L-108-5.1	TRENCHING FOR DIRECT BURIED CABLE, 18-INCH MINIMUM DEPTH	LF	40
L-108-5.3	NO. 2 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONGS/TERMINATIONS	LF	40
L-108-5.4a	NO. 2 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	5,420
L-108-5.4b	NO. 6 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	1,980
L-108-5.4c	NO. 10 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	21,600
L-110-5.2a	NON-ENCASED ELECTRICAL CONDUIT (2" HDPE)	LF	1,800
L-110-5.2b	NON-ENCASED ELECTRICAL CONDUIT (2" SCHEDULE 80 PVC)	LF	40
L-115-5.2	ELECTRICAL JUNCTION STRUCTURE (48"X48"X48" POLYMER CONCRETE)	LF	3
S-1001	ROLLOUT RVR DISASSEMBLY	LUMP	1
S-1002	ROLLOUT RVR REASSEMBLY	LUMP	1

SUMMARY OF ESTIMATED QUANTITIES--PHASE I ALTERNATE 2

ITEM	DESCRIPTION	UNIT	TOTAL QUANTITY
TAXIWAY PAVEMENT AND EARTHWORK			
C-102-5.1c	INSTALLATION AND REMOVAL OF SILT FENCE (CATCH BASIN PROTECTION)	LF	1,383
C-102-5.1e	INSTALLATION AND REMOVAL OF SILT FENCE	LF	2,637
C-105-5.1	MOBILIZATION (5.0%)	LS	1
P-101-5.1a	PAVEMENT REMOVAL (GA RUNWAY 4R-22L, TAXIWAY E)	SY	8,883
P-101-5.6a	COLD MILLING (2" DEPTH) (TAXIWAY L)	SY	32,028
P-151-4.2	CLEARING AND GRUBBING	AC	31
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	8,633
P-152-4.2	EMBANKMENT IN PLACE	CY	12,715
P-154-5.1	SUBBASE COURSE	CY	6,584
P-155-8.1a	LIME TREATED SUBGRADE (10" THICK) (RVR AND GLIDE SLOPE ACCESS DRIVES)	SY	381
P-155-8.2a	LIME (RVR DRIVES)	TON	4
P-209-5.1a	CRUSHED AGGREGATE BASE COURSE (10" THICK) (RVR DRIVE)	SY	260
P-209-5.1b	CRUSHED AGGREGATE BASE COURSE (6.0" THICK)	SY	12,999
P-209-5.2	SEPARATION GEOTEXTILE	SY	13,166
P-401-8.1a	ASPHALT SURFACE COURSE (2.0" THICK)	TON	1,394
P-403-8.1a	ASPHALT MIXTURE BINDER COURSE (2.0" THICK)	TON	1,412
P-403-8.1b	ASPHALT BASE COURSE COURSE (5.0" THICK)	TON	3,621
P-403-8.1c	ASPHALT MIXTURE SURFACE COURSE (2" THICK) (RVR DRIVES)	TON	29
P-401-8.1b	ASPHALT SURFACE COURSE (2" THICK) (OVERLAY)	TON	3,524
P-403-8.1d	ASPHALT MIXTURE BINDER COURSE (2" THICK) (RVR DRIVES)	TON	36
P-407-8.1	ASPHALT TREATED PERMEABLE BASE COURSE (ATPB) (6" THICK)	SY	13,167
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	3,850
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	5,708
P-610-6.1	CONCRETE (RVR RELOCATION PAD)	CY	4
P-620-5.2b-1	RUNWAY AND TAXIWAY MARKING (YELLOW)	SF	19,811
P-620-5.2b-2	RUNWAY AND TAXIWAY MARKING (WHITE)	SF	14,089
P-620-5.2b-3	RUNWAY AND TAXIWAY MARKING (RED)	SF	8,151
P-620-5.2b-4	RUNWAY AND TAXIWAY MARKING (BLACK)	SF	45,760
P-620-5.3c	REFLECTIVE MEDIA (RUNWAY)	LB	3,657
P-620-5.4d	TEMPORARY RUNWAY AND TAXIWAY MARKING	LS	1
D-705-5.4	6 INCH PIPE (PERFORATED PVC), INCLUDING POROUS BACKFILL AND FILTER FABRIC	LF	3,007
901-5.1	SEEDING (HYDROSEEDING)	AC	21
904-5.2	SODDING	SY	5,333
T-908-5.1	MULCHING	SY	97,217
DRAINAGE, PERIMETER ROAD, PERIMETER FENCE			
P-101-5.1a	ASPHALT PAVEMENT AND BASE REMOVAL	SY	0
P-101-5.1b	CONCRETE PAVEMENT REMOVAL	SY	0
P-101-5.6	COLD MILLING (DEPTH VARIES)	SY	0
P-101-5.7	REMOVAL OF EXISTING PIPES AND STRUCTURES	LS	1
P-151-4.1	CLEARING (REMOVAL OF EXISTING FENCE AND CONCRETE MAINTENANCE PAD)	LS	0
P-151-4.2	CLEARING AND GRUBBING (REMOVAL OF GRASS)	AC	0
P-152-4.1	UNCLASSIFIED EXCAVATION	CY	0
P-152-4.2	MUCK EXCAVATION	CY	0
P-152-4.3	EMBANKMENT IN PLACE - GENERAL	CY	0
P-152-4.4	EMBANKMENT IN PLACE - SELECT FILL	CY	0
P-153-6.1	CONTROLLED LOW-STRENGTH MATERIAL (CLSM)	CY	0
P-155-8.1	LIME TREATED SUBGRADE	SY	0
P-155-8.2	LIME	TON	0
P-209-5.1c	CRUSHED AGGREGATE BASE COURSE (8" THICK)	SY	0
P-209-5.2	SEPERATION GEOTEXTILE	SY	0
P-403-8.1a	ASPHALT MIXTURE SURFACE COURSE	TON	0
P-403-8.1b	ASPHALT MIXTURE BINDER COURSE	TON	0
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	GAL	0
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	GAL	0
P-620-5.2b	PAINTED TRAFFIC STRIPING	SF	0
P-620-5.2c	REFLECTIVE MEDIA	LBS	0
D-701-5.1	15 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.2	30 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	1,527
D-701-5.3	36 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	674
D-701-5.4	42 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.5	48 INCH RCP (CLASS IV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.6	15 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-701-5.7	18 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	262
D-701-5.8	24 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	285
D-701-5.9	36 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	401
D-701-5.10	42 INCH RCPA (CLASS AIV) (INCLUDES BEDDING & BACKFILL)	LF	0
D-751-5.1	CATCH BASIN - CB-01 (INCLUDES BEDDING & BACKFILL)	EA	11
D-751-5.2	CATCH BASIN - CB-02 (INCLUDES BEDDING & BACKFILL)	EA	2
D-751-5.3	CATCH BASIN - CB-SD02 (INCLUDES BEDDING & BACKFILL)	EA	0
F-162-5.1	CHAIN-LINK FENCE (6 FT HT. W/ 3 STRANDS BARBED WIRE)	LF	0
F-162-5.3	CONCRETE MAINTENANCE PAD	LF	0
LA-731-02	REFLECTORIZED RAISED PAVEMENT MARKERS (WHITE / WHITE)	EA	0
S-1003	SECURITY SIGNS	LS	0
TAXIWAY EDGE LIGHTING AND SIGNING			
L-108-5.1	NO. 8 AWG, 5 KV TYPE C CABLE, INSTALLED IN CONDUIT	LF	3,200
L-108-5.2	NO. 6 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED, ABOVE THE DUCT BANK OR CONDUIT, INCLUDING CONNECTIONS/TERMINATIONS, INCLUDING GROUND RODS	LF	3,000
L-109-7.2	MODIFICATIONS TO L-854 RADIO CONTROL EQUIPMENT TO INCLUDE PANEL RELABELING, IN PLACE AND OPERATIONAL	LUMP	1
L-110-5.1	ELECTRICAL CONDUIT, 2" SCHEDULE 40 PVC, TYPE II INSTALLED IN TRENCH	LF	3,200
L-110-5.2	ELECTRICAL CONDUIT, 2" HDPE, JACKED OR BORED UNDER TAXIWAY IN STEEL CASING (STEEL CASING INCLUDED IN THIS ITEM)	LF	500
L-110-5.3	ELECTRICAL DUCT, 4-WAY, 4" AND 1-WAY, 2" HIGH DENSITY POLYETHYLENE CONDUIT, DIRECTIONAL BORE, INSTALLED	LF	100
L-115-5.1	ELECTRICAL JUNCTION CAN, L-867, SIZE B, CLASS 1, COMPLETE, IN PLACE	EA	4
L-115-5.2	ELECTRICAL JUNCTION CAN, L-867, SIZE D, CLASS 1, COMPLETE, IN PLACE	EA	6
L-125-5.1	MEDIUM INTENSITY TAXIWAY EDGE LIGHT (L-861T), WITH BLUE LENS, LED LAMP, 10/15 WATT TRANSFORMER, BASE MOUNTED, IN PLACE	EA	43
L-125-5.2	SIGN L-858, SIZE 2, 1-PANEL, REQUIRED CONCRETE BASE	EA	3
L-125-5.3	SIGN L-858, SIZE 2, 2-PANEL, REQUIRED CONCRETE BASE	EA	2
L-125-5.6	REPLACE EXISTING SIGN PANEL, COMPLETE, IN PLACE	EA	5
L-125-5.7	REMOVE EXISTING RUNWAY & TAXIWAY ELECTRICAL SYSTEMS	LUMP	1
L-125-5.8	ELECTRICAL TESTING AND UPDATE ALCS	LUMP	1
L-125-5.9	CONNECT TO EXISTING CIRCUIT	LUMP	1
S-1004	TEMPORARY COMMUNICATION LINE	LUMP	1
NAVAIDS (RVR RELOCATION)			
L-108-5.1	TRENCHING FOR DIRECT BURIED CABLE, 18-INCH MINIMUM DEPTH	LF	40
L-108-5.3	NO. 2 AWG, SOLID, BARE COPPER COUNTERPOISE WIRE, INSTALLED IN TRENCH, INCLUDING CONNECTIONGS/TERMINATIONS	LF	40
L-108-5.4a	NO. 2 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	5,420
L-108-5.4b	NO. 6 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	1,980
L-108-5.4c	NO. 10 AWG, INSULATED, STRANDED EQUIPMENT GROUND, INSTALLED IN DUCT BANK OR CONDUIT	LF	21,600
L-110-5.2a	NON-ENCASED ELECTRICAL CONDUIT (2" HDPE)	LF	1,800
L-110-5.2b	NON-ENCASED ELECTRICAL CONDUIT (2" SCHEDULE 80 PVC)	LF	40
L-115-5.2	ELECTRICAL JUNCTION STRUCTURE (48"X48"X48" POLYMER CONCRETE)	LF	3
S-1001	ROLLOUT RVR DISASSEMBLY	LUMP	1
S-1002	ROLLOUT RVR REASSEMBLY	LUMP	1

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

Blake S. Roussel
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

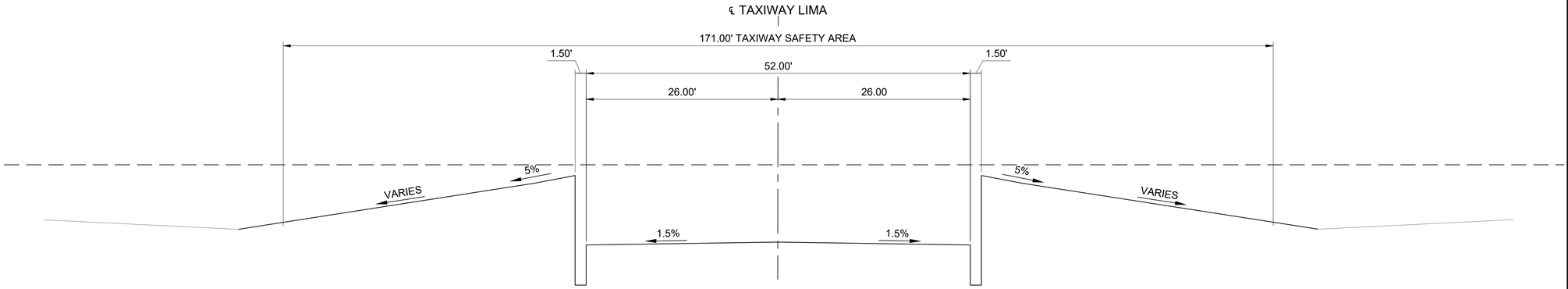
TAXIWAY LIMA EXTENSION

SUMMARY OF ESTIMATED QUANTITIES

DESIGNED W.T.B.
DRAWN G.T.H.
CHECKED B.S.R.
APPROVED N/A.
APPROVED N/A
DATE 12/22/2023

SCALE: NTS
NO. 30757.02.00
REV. 0
G023

CADD D3—R4

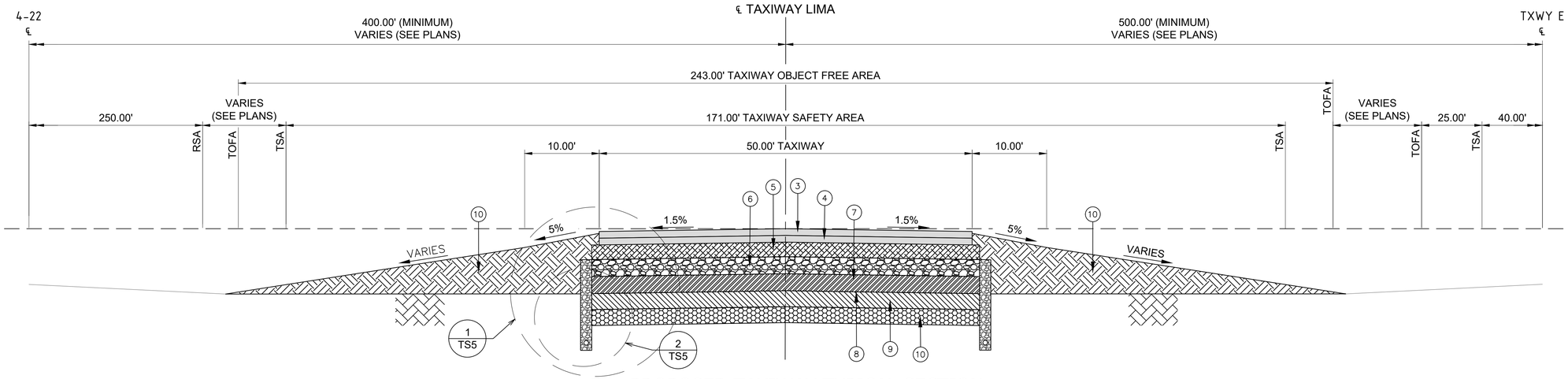


1 / TS2

PROPOSED TAXIWAY GRADING SECTION

SCALE: NOT TO SCALE

STA. 520+85.41 TO STA. 534+01.96
STA. 534+76.96 TO STA. 537+64.05
STA. 539+14.05 TO STA. 542+48.12
STA. 543+39.60 TO STA. 557+81.83
STA. 558+55.83 TO STA. 582+82.50



2 / TS2

PROPOSED TAXIWAY TYPICAL SECTION

SCALE: NOT TO SCALE

STA. 520+85.41 TO STA. 534+01.96
STA. 534+76.96 TO STA. 537+64.05
STA. 539+14.05 TO STA. 542+48.12
STA. 543+39.60 TO STA. 557+81.83
STA. 558+55.83 TO STA. 582+82.50

LEGEND:

* 1. EXISTING ASPHALT SURFACING AND BASE TO REMAIN
* 2. P-101/P-401 MILL & OVERLAY (2" THICK)
3. P-401 ASPHALT SURFACE COURSE (2" THICK)
4. P-403 ASPHALT MIXTURE BINDER COURSE (2" THICK)
5. P-403 ASPHALT BASE COURSE (5.0" THICK)
6. P-209 CRUSHED AGGREGATE (6.0" THICK)
7. P-407 ASPHALT TREATED PERMEABLE BASE COURSE (6" THICK)
8. GEOSYNTHETIC FABRIC
9. P-154 SUBBASE COURSE (18" THICK)
10. P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT
* 11. EXISTING EMBANKMENT TO REMAIN
* NOT USED THIS SHEET

NOTES:

1. CONTRACTOR SHALL REMOVE STANDING WATER FROM THE SUBGRADE DURING CONSTRUCTION BY GRADING, DITCHING, PUMPING, OR WHATEVER MEANS ARE NECESSARY TO KEEP THE SUBGRADE DRY.

2. SEE PLANS AND GEOMETRIC LAYOUT SHEETS FOR EXACT WIDTHS OF PAVEMENT, TSA, AND TOFA AT VARIOUS LOCATIONS.

3. SEE PROPOSED GRADING SHEETS AND CROSS SECTIONS FOR GRADING DETAILS.

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
IN THE STATE OF LOUISIANA
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

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721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

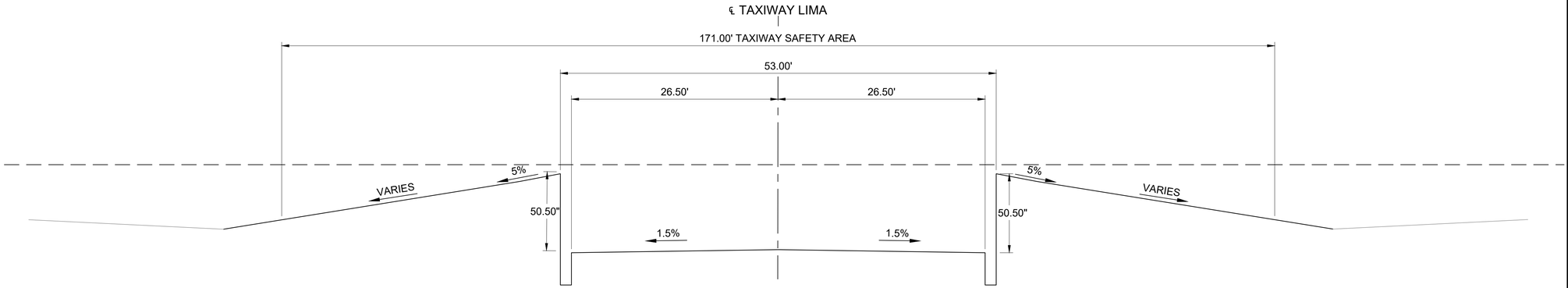
TAXIWAY LIMA EXTENSION

TYPICAL SECTION – TXWY L EXTENSION

DESIGNED A.J.F.
DRAWN K.A.L.
CHECKED B.S.R.
APPROVED N/A
APPROVED N/A
DATE TBD

SCALE: SHEET SCALE
NO. 30757.02.00
REV. 0
TS2

CADD D3-R4

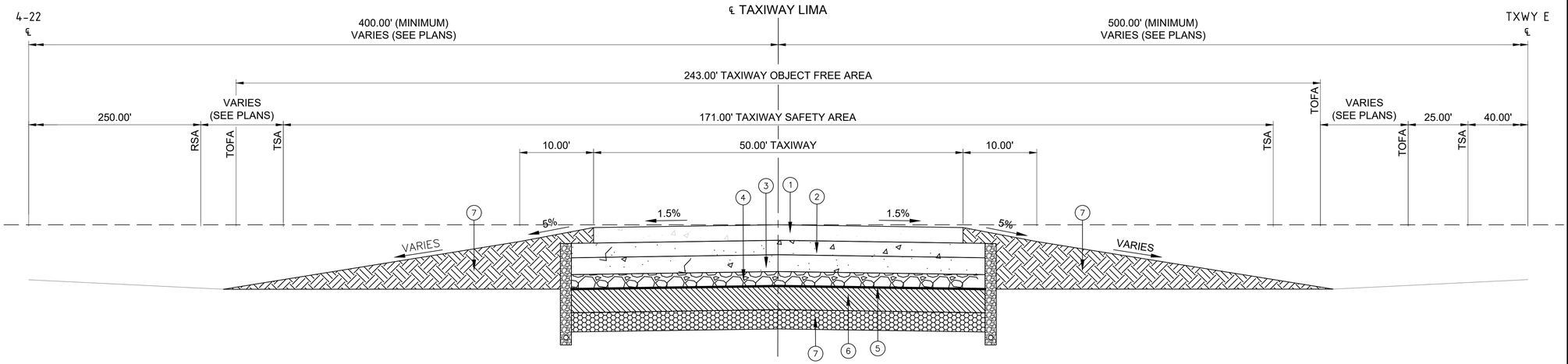


1 TS2.5

PROPOSED TAXIWAY GRADING SECTION

SCALE: NOT TO SCALE

STA. 520+85.41 TO STA. 534+01.96
STA. 534+76.96 TO STA. 537+64.05
STA. 539+14.05 TO STA. 542+48.12
STA. 543+39.60 TO STA. 557+81.83
STA. 558+55.83 TO STA. 582+82.50



2 TS2.5

PROPOSED TAXIWAY TYPICAL SECTION - BID ALTERNATE A

SCALE: NOT TO SCALE

STA. 520+85.41 TO STA. 534+01.96
STA. 534+76.96 TO STA. 537+64.05
STA. 539+14.05 TO STA. 542+48.12
STA. 543+39.60 TO STA. 557+81.83
STA. 558+55.83 TO STA. 582+82.50

LEGEND:

1. P-501 CEMENT CONCRETE PAVEMENT (9" THICK)
2. P-307 CEMENT TREATED PERMEABLE BASE COURSE (DRAINAGE LAYER) (6" THICK)
3. P-306 ECONOCRETE LEAN CONCRETE BASE COURSE (11.5" THICK)
4. P-209 CRUSHED AGGREGATE (6.0" THICK)
5. GEOSYNTHETIC SEPARATION LAYER
6. P-154 SUBBASE COURSE (18" THICK)
7. P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT

* 8. EXISTING EMBANKMENT TO REMAIN

* NOT USED THIS SHEET

NOTES:

1. CONTRACTOR SHALL REMOVE STANDING WATER FROM THE SUBGRADE DURING CONSTRUCTION BY GRADING, DITCHING, PUMPING, OR WHATEVER MEANS ARE NECESSARY TO KEEP THE SUBGRADE DRY.
2. SEE PLANS AND GEOMETRIC LAYOUT SHEETS FOR EXACT WIDTHS OF PAVEMENT, TSA, AND TOFA AT VARIOUS LOCATIONS.
3. SEE PROPOSED GRADING SHEETS AND CROSS SECTIONS FOR GRADING DETAILS.

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
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TAXIWAY LIMA EXTENSION

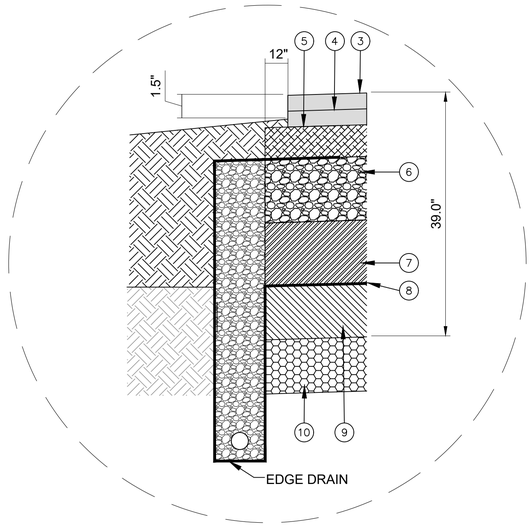
TYPICAL SECTION – TXWY L EXTENSION

DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: SHEET SCALE

NO.	REV.
TS2.5	0

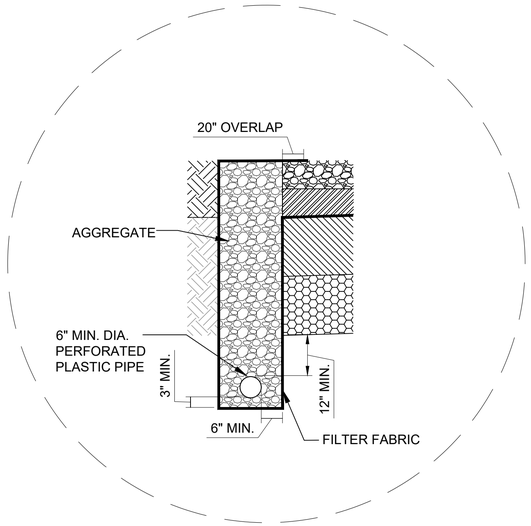
CADD D3-R4



1 TS5 **PAVEMENT LIP DETAIL**

SCALE: NOT TO SCALE

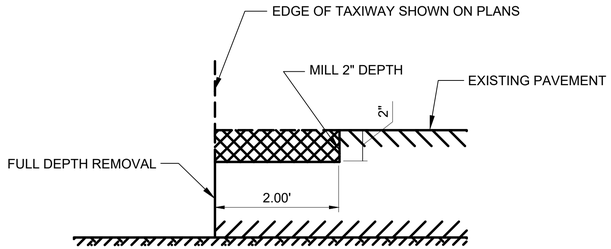
NOTE: RIGHT SIDE SIMILAR, BUT MIRRORED



2 TS5 **EDGE DRAIN DETAIL**

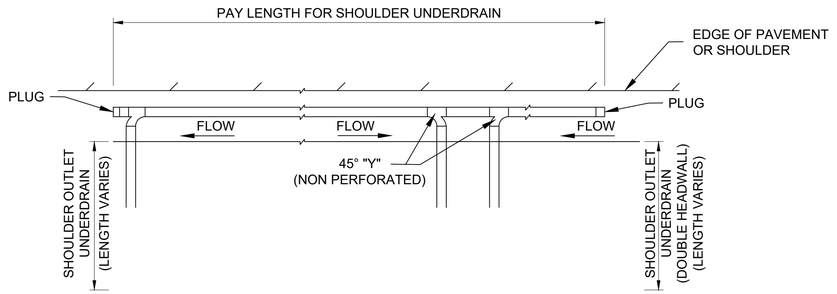
SCALE: NOT TO SCALE

NOTE: RIGHT SIDE SIMILAR, BUT MIRRORED



3 TS5 **TRANSITION TO EXISTING PAVEMENT DETAIL**

SCALE: NOT TO SCALE



4 TS5 **DUAL OUTLET LAYOUT DETAIL**

SCALE: NOT TO SCALE

LEGEND:

* 1. EXISTING ASPHALT SURFACING AND BASE TO REMAIN
* 2. P-101/P-401 MILL & OVERLAY (2" THICK)
3. P-401 ASPHALT SURFACE COURSE (2" THICK)
4. P-403 ASPHALT MIXTURE BINDER COURSE (2" THICK)
5. P-403 ASPHALT BASE COURSE (5.0" THICK)
6. P-209 CRUSHED AGGREGATE (6.0" THICK)
7. P-407 ASPHALT TREATED PERMEABLE BASE COURSE (6" THICK)
8. GEOSYNTHETIC FABRIC
9. P-154 SUBBASE COURSE (18" THICK)
10. P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT
* 11. EXISTING EMBANKMENT TO REMAIN
* NOT USED THIS SHEET

NOTES:

1. CONTRACTOR SHALL REMOVE STANDING WATER FROM THE SUBGRADE DURING CONSTRUCTION BY GRADING, DITCHING, PUMPING, OR WHATEVER MEANS ARE NECESSARY TO KEEP THE SUBGRADE DRY.
2. SEE PLANS AND GEOMETRIC LAYOUT SHEETS FOR EXACT WIDTHS OF PAVEMENT, TSA, AND TOFA AT VARIOUS LOCATIONS.
3. SEE PROPOSED GRADING SHEETS AND CROSS SECTIONS FOR GRADING DETAILS.
4. LONGITUDINAL EDGE DRAINS SHOULD OUTLET INTO CATCH BASINS AT 400' MAX INTERVALS USING 6" NON-PERFORATED PLASTIC PIPE. WHERE NO CATCH BASINS ARE AVAILABLE, DAYLIGHT OUTLETS AT 250' MAX INTERVALS.
5. THE PAVEMENT UNDERDRAIN SYSTEMS PAY ITEMS SHALL INCLUDE ALL REQUIRED TRANCHING, PLASTIC UNDERDRAIN PIPE (PERFORATED AND NON-PERFORATED), "Y"'S, FITTINGS, PLUGS, GEOTEXTILE FABRIC, AGGREGATE, AND BACKFILL.

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

TYPICAL SECTION – TXWY L EXTENSION

DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: N.T.S.
NO. 30757.02.00
REV. 0
TS5

CADD D3-R4

FOR CONTINUATION SEE SHEET CDB2B

POINT #	NORTHING	EASTING
1	737875.2141	3339046.2771
2	737971.3878	3338944.4884
3	738004.9059	3338909.0134
4	738120.9081	3338786.2386
5	737932.7860	3339094.5502
6	738021.7869	3339000.3531
7	738059.4113	3338960.5320
8	738175.0271	3338838.1662
9	738118.4830	3339208.0490
10	738147.5110	3339177.7780
11	738150.5585	3339283.3319
12	738224.4506	3339204.7949
13	738243.8370	3339073.3760
14	738295.5650	3339017.9710
15	738299.9313	3339127.0100
16	738350.5235	3339070.3983

POINT #	NORTHING	EASTING
17	738441.0953	3338866.8892
18	738511.8680	3338790.9270
19	738481.5943	3338931.7230
20	738579.5523	3338828.0574
21	738262.9445	3339380.5954
22	738333.2464	3339305.8520
23	738335.4870	3339412.7050
24	738365.0290	3339383.6770
25	738405.6403	3339226.9094
26	738457.2469	3339173.5036
27	738460.5110	3339278.4840
28	738511.0930	3339223.6060
29	738590.6906	3339034.6532
30	738688.4959	3338931.1666
31	738657.5052	3339071.3064

POINT #	NORTHING	EASTING
32	738728.8779	3338995.8131
33	738474.2992	3339601.8178
34	738559.2477	3339511.8404
35	738486.7390	3339646.7010
36	738591.3579	3339536.0963
37	738606.4430	3339454.2350
38	738731.9782	3339321.6019
39	738619.0040	3339506.5890
40	738658.1484	3339465.3519
41	738781.2520	3339398.3837
42	738832.8410	3339360.6410
43	738690.5480	3339845.9990
44	739138.4011	3339135.9301
45	739214.8867	3339079.7241
46	739277.8330	3339139.1300

REMOVE EXISTING ENHANCED CENTERLINE PAVEMENT MARKING

REMOVE EXISTING 22L-4R AND HOLD LINE PAVEMENT MARKING

1017 SY OF ASPHALT PAVEMENT REMOVAL
NOT IN PHASE I ALTERNATE 2

1002 SY OF ASPHALT PAVEMENT REMOVAL
NOT IN PHASE I ALTERNATE 2

EXISTING GRATE INLET TO BE REMOVED

EXISTING GRATE INLET TO BE REMOVED

EXIST: RUNWAY 4L-22R
ULT: RUNWAY 4-22

194 SY OF CONCRETE PAVEMENT REMOVAL

REMOVE EXISTING CENTERLINE PAVEMENT MARKING

5 SY OF CONCRETE PAVEMENT REMOVAL

REMOVE EXISTING 22R-4L AND HOLD LINE PAVEMENT MARKING

ABANDON IN PLACE
PLUG AND FILL WITH P-153 CLSM
312 LF EXISTING 24" RCP

TAXIWAY L BASELINE

SAWCUT EXISTING ASPHALT. SEE SHEET CD100 NOTE 4.

860 LF OF EXISTING 30" RCP TO BE REMOVED

CAUTION
UNDERGROUND FAA CABLES 4L–22R RVR AND GLIDESLOPE

REMOVE EXISTING TAXIWAY CENTERLINE AND THRESHOLD LINE

REMOVE EXISTING 22R-4L AND HOLD LINE PAVEMENT MARKING

NOT IN PHASE I ALTERNATE 2

REMOVE EXISTING TAXIWAY CENTERLINE AND THRESHOLD LINE

1896 SY OF ASPHALT PAVEMENT REMOVAL

REMOVE EXISTING 22L-4R AND THRESHOLD BAR PAVEMENT MARKING

SAWCUT EXISTING ASPHALT. SEE SHEET CD100 NOTE 4.

REMOVE EXISTING TAXIWAY CENTERLINE (NOT IN PHASE I ALTERNATE 2)

2236 SY OF ASPHALT PAVEMENT REMOVAL

SAWCUT EXISTING ASPHALT. SEE SHEET CD100 NOTE 4.

CAUTION
UNDERGROUND FAA CABLES RTR

PHASE I

3426 SY OF ASPHALT PAVEMENT REMOVAL
PHASE II - NOT IN CONTRACT

EXIST: RUNWAY 4R-22L
ULT: DECOMMISSIONED

REMOVE RWY 4R-22L CENTERLINE

NOT IN PHASE I ALTERNATE 2

REMOVE EXISTING MARKING

160 LF OF EXISTING 30" RCP TO BE REMOVED
PHASE II - NOT IN CONTRACT

REMOVE EXIST TAXIWAY CENTERLINE AND HOLD LINE

SAWCUT EXISTING ASPHALT. SEE SHEET CD100 NOTE 4.

EXISTING SIGN. SEE ELECTRICAL SHEETS

1143 SY OF ASPHALT PAVEMENT REMOVAL

CAUTION
UNDERGROUND FAA CABLES RTR

SAWCUT EXISTING ASPHALT. SEE SHEET CD100 NOTE 4.

EXIST: TWY E
ULT: DECOMMISSIONED

EXIST: TWY E

NOT IN PHASE I ALTERNATE 2

2040 SY OF ASPHALT PAVEMENT MILLING.
PHASE II - NOT IN CONTRACT

1084 SY OF ASPHALT PAVEMENT REMOVAL

REMOVE EXISTING ENHANCED TAXIWAY CENTERLINE

SAWCUT EXISTING ASPHALT. SEE SHEET CD100 NOTE 4.

REMOVE RWY 4R-22L CENTERLINE

REMOVE RWY 4R-22L CENTERLINE (NOT IN PHASE I ALTERNATE 2)

SAWCUT EXISTING ASPHALT. SEE SHEET CD100 NOTE 4.

REMOVE EXIST ENHANCED TAXIWAY CENTERLINE AND HOLD LINE

REMOVE EXISTING TAXIWAY CENTERLINE (NOT IN PHASE I ALTERNATE 2)

EAST GA APRON

NOT INCLUDED IN PHASE I ALTERNATE 2

FOR PHASE I ALTERNATE 2, REMOVE HOLD LINES AND LEGENDS ONLY. CENTER LINES MAY REMAIN.

FOR CONTINUATION SEE SHEET CDB2B

FOR CONTINUATION SEE SHEET CDB2C

FOR CONTINUATION SEE SHEET CDB3C

AT FULL SIZE 0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

NOTES:

1. SEE SHEET CD100 FOR DEMOLITION NOTES.
2. WORK NORTH OF TAXIWAY B NOT INCLUDED IN PHASE I ALTERNATE 2.

LEGEND:

- EXISTING ASPHALT REMOVAL LIMITS
- EXISTING ASPHALT PAVEMENT MILLING
- EXISTING CONCRETE REMOVAL LIMITS
- EXISTING PAVEMENT MARKING TO BE REMOVED
- EXISTING GRAVEL TO BE REMOVED
- OBJECTS TO BE DEMOLISHED

CAUTION:

1. FAA CABLES AND OTHER UTILITIES ARE BEING CROSSED AND MUST REMAIN ACTIVE FOR DURATION OF PROJECT. CONTRACTOR RESPONSIBLE FOR ANY REPAIRS TO DAMAGED LINES AT NO ADDITIONAL COST TO THE OWNER.

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
IN
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

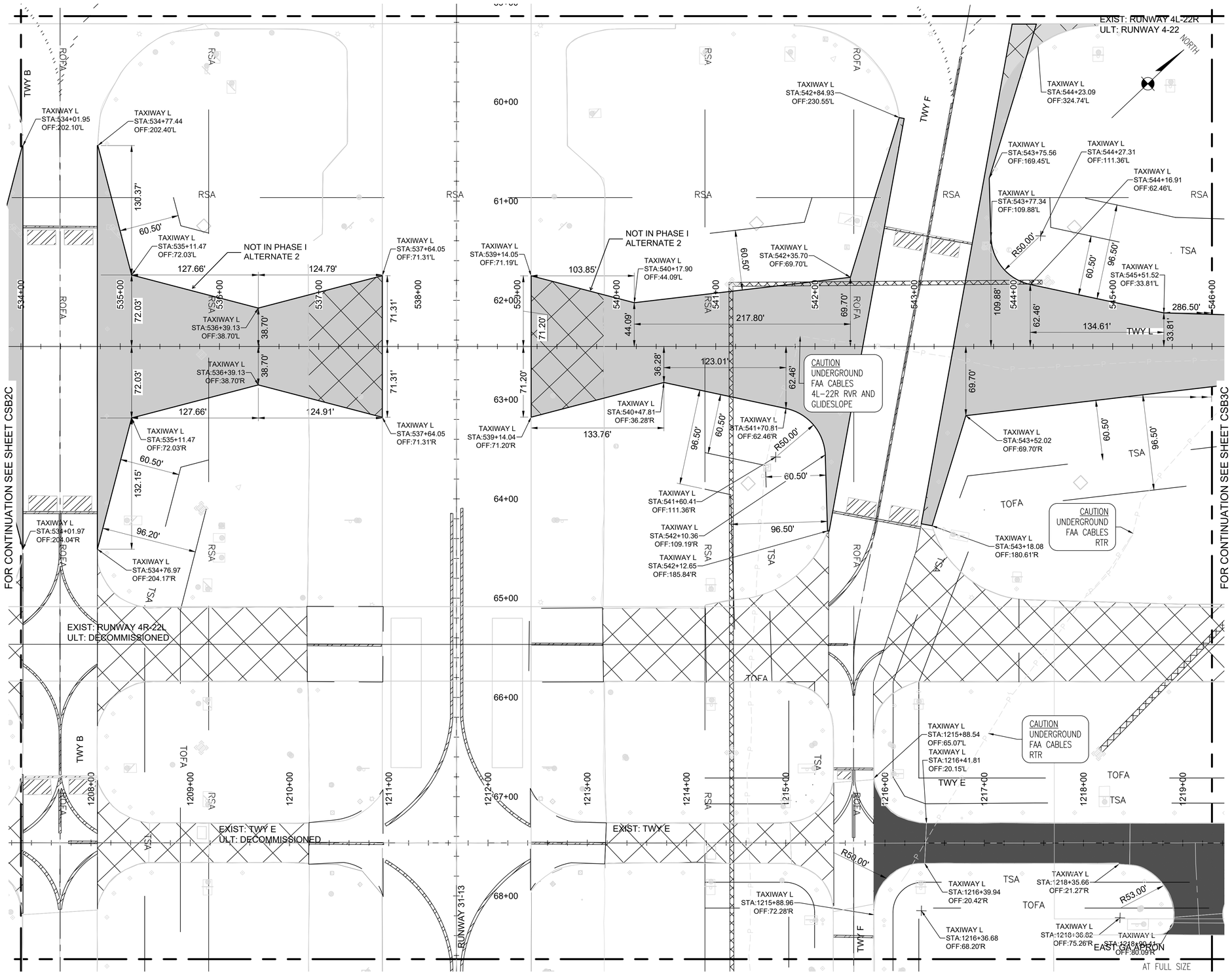
PROPOSED DEMOLITION PLAN – AREA B2D

DESIGNED	W.T.B.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: 1" = 50'

NO. 30757.02.00 | REV.

CDB2D | 0



NOTES:

1. SEE SHEET CS100 FOR SITE PLAN NOTES.
2. ALL WORK ON THIS SHEET NORTH AND EAST OF TAXIWAY F IS PHASE II. NOT IN THIS CONTRACT.

LEGEND:

- PROPOSED ASPHALT PAVEMENT
- PROPOSED MILL AND OVERLAY
- PERIMETER ROAD PAVEMENT
- EXISTING ASPHALT REMOVAL LIMITS
- EXISTING ASPHALT PAVEMENT MILLING
- EXISTING CONCRETE REMOVAL LIMITS
- EXISTING PAVEMENT MARKING TO BE REMOVED
- EXISTING GRAVEL TO BE REMOVED
- OBJECTS TO BE DEMOLISHED

CAUTION:

1. FAA CABLES AND OTHER UTILITIES ARE BEING CROSSED AND MUST REMAIN ACTIVE FOR DURATION OF PROJECT. CONTRACTOR RESPONSIBLE FOR ANY REPAIRS TO DAMAGED LINES AT NO ADDITIONAL COST TO THE OWNER.

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

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721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

SITE PLAN – AREA B2D

DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: 1" = 50'

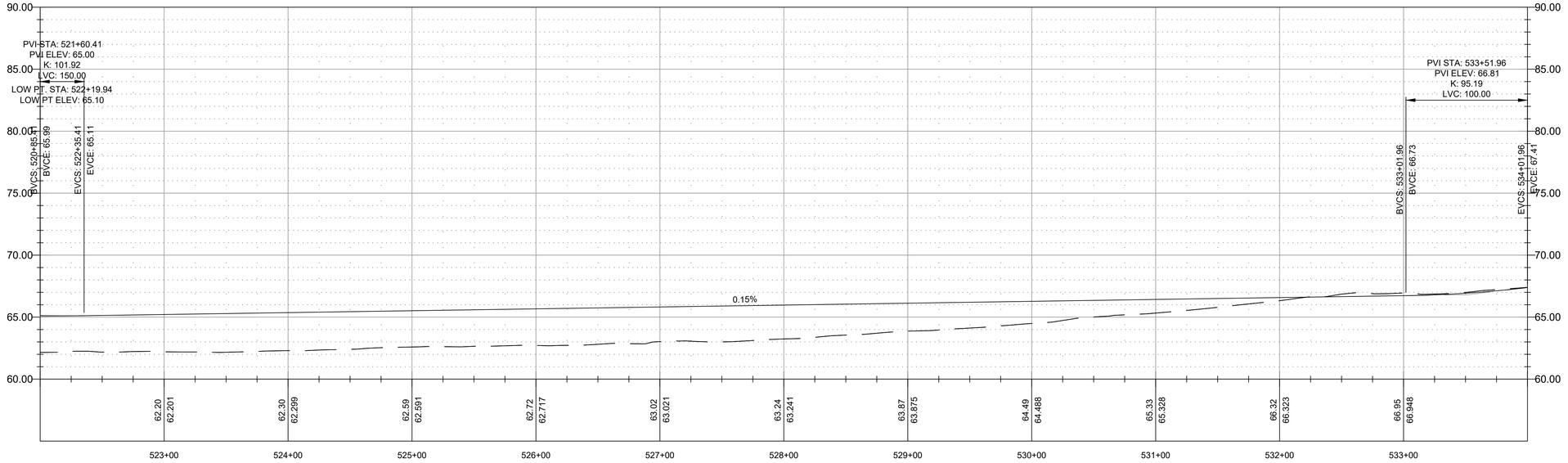
NO. 30757.02.00

CSB2D

REV. 0

CADD D3-R4

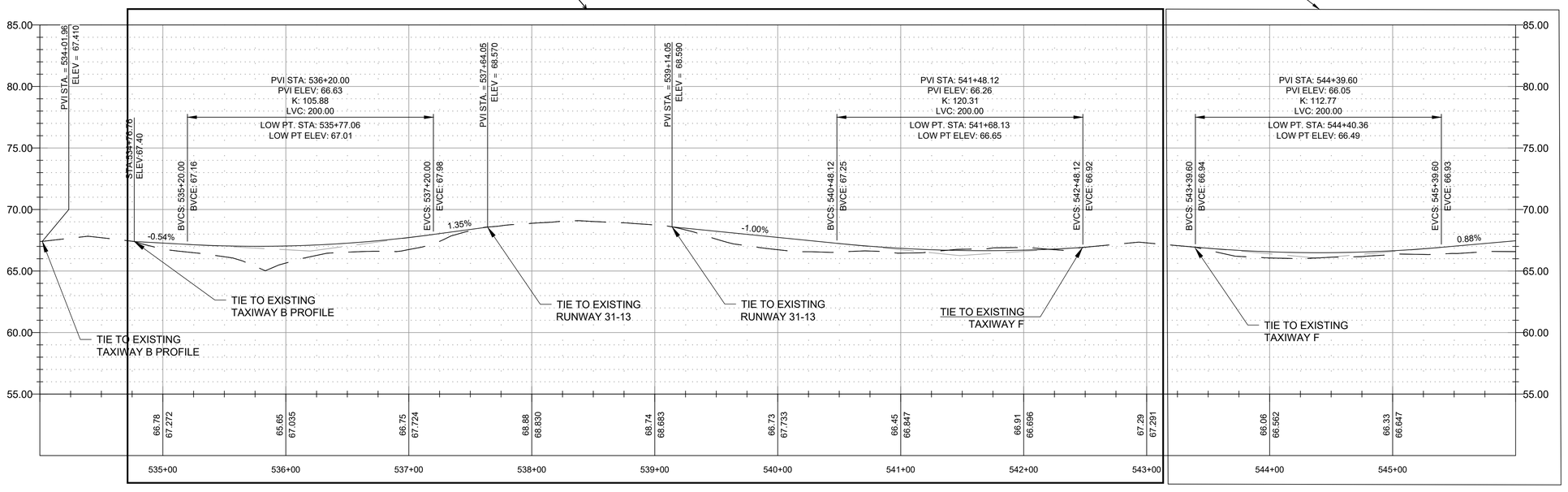
TXWY L ℄ PROFILE
STATION 522+00 TO 534+00



TXWY L ℄ PROFILE
STATION 534+00 TO 546+00

NOT IN PHASE I ALTERNATE 2

PHASE II - NOT IN THIS CONTRACT



AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.

721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

SITE PLAN PROFILE

DESIGNED A.J.F.
DRAWN K.A.L.
CHECKED B.S.R.
APPROVED N/A
APPROVED N/A
DATE TBD

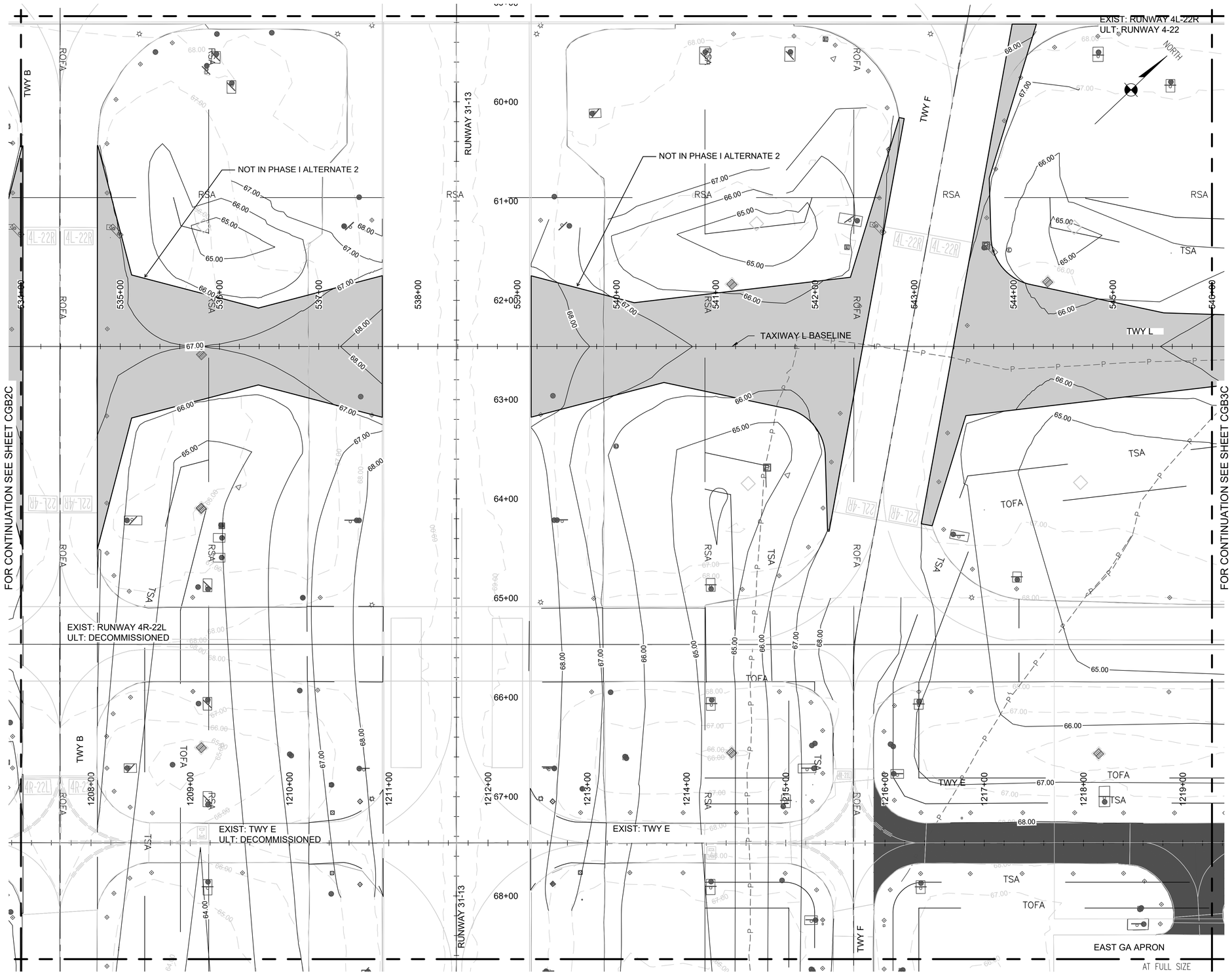
SCALE: H:1" = 50', V:1"=5'

NO. 30757.02.00

REV. 0

CSP102

CADD D3-R4



NOTES:

1. SEE SHEET CG100 FOR GRADING SHEET NOTES.
2. ALL WORK ON THIS SHEET NORTH AND EAST OF TAXIWAY F IS PHASE II. NOT IN THIS CONTRACT.

LEGEND:

- EXISTING CONTOUR
- FINISHED CONTOUR
- 65.00 ELEVATION LABEL

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

PROPOSED GRADING PLAN – AREA B2D

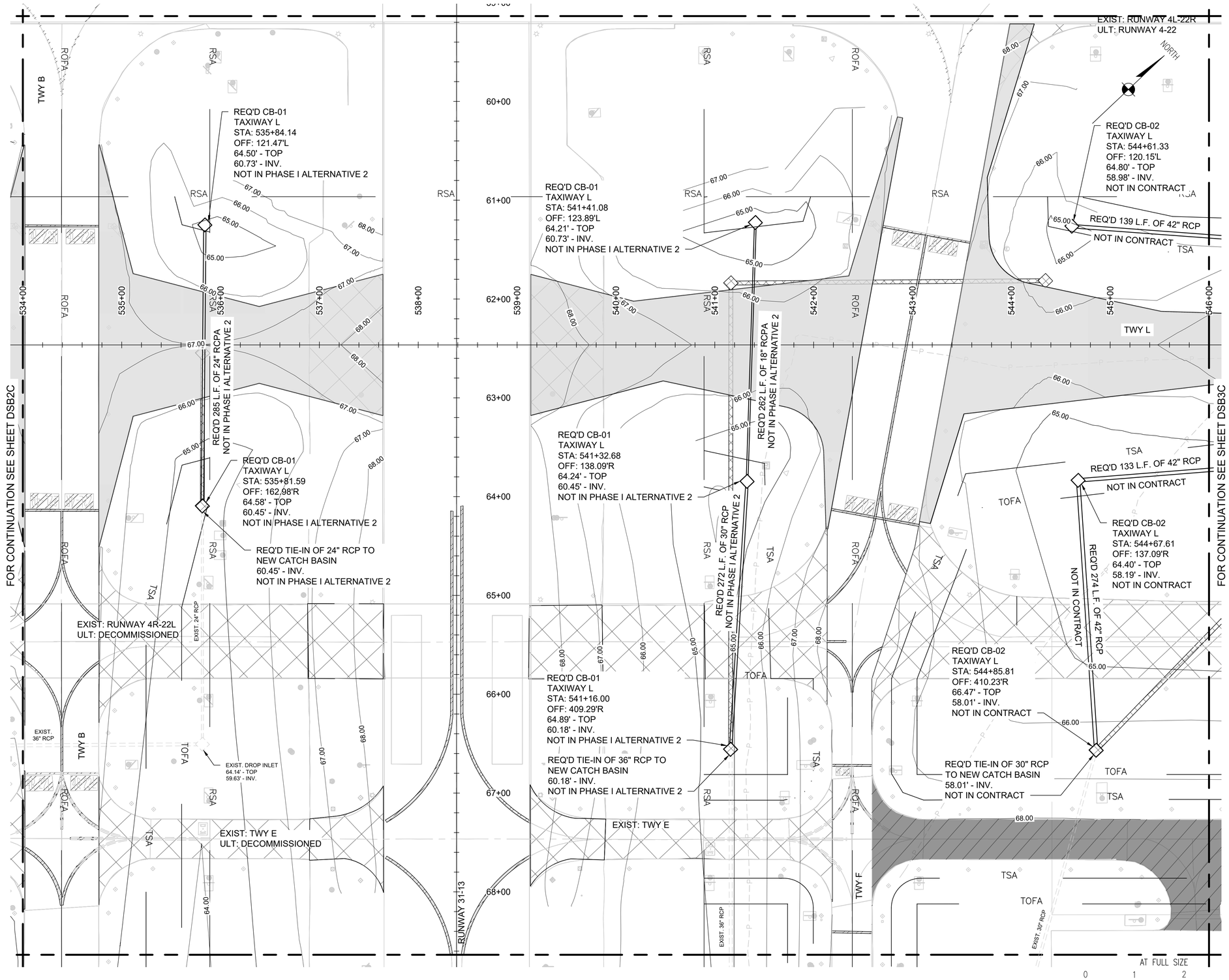
DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: 1" = 50'

NO. 30757.02.00 | REV. 0

CGB2D

CADD D3-R4



AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NOTES:

1. REFER TO CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN FOR PROJECT PHASING.
2. SEE SHEET DS200 FOR TYPICAL DETAILS.

STATE OF LOUISIANA
JOSEPH A. COTTEN
REG. No. 47445
PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

PEC
PROFESSIONAL ENGINEERING CONSULTANTS CORPORATION

TAXIWAY LIMA EXTENSION

DRAINAGE SITE PLAN – AREA B2D

DESIGNED	C.H.B./J.A.C.
DRAWN	C.H.B.
CHECKED	D.A.C.
APPROVED	D.A.C.
APPROVED	T.A.A.
DATE	06/2024

SCALE: 1" = 50'

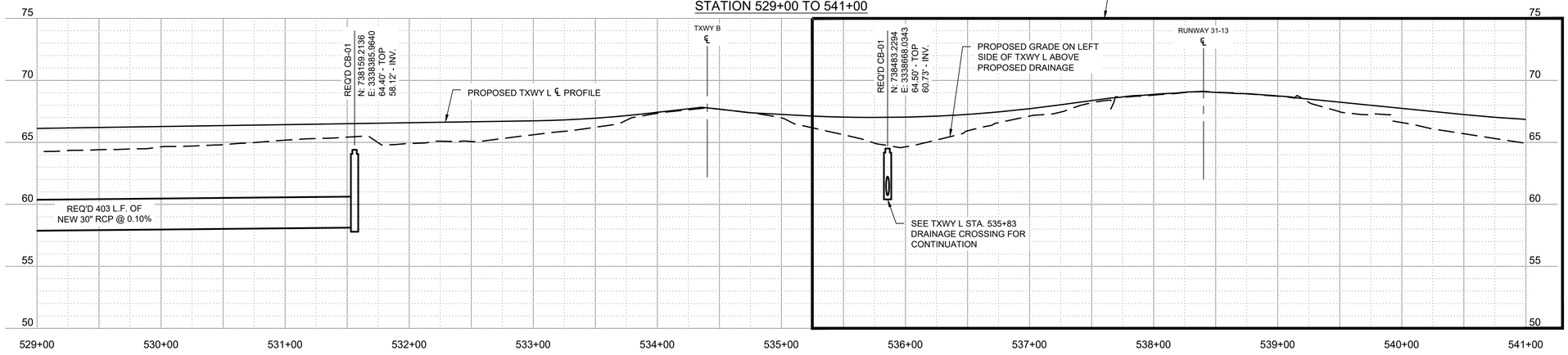
NO. 30757.02.00

REV. 0

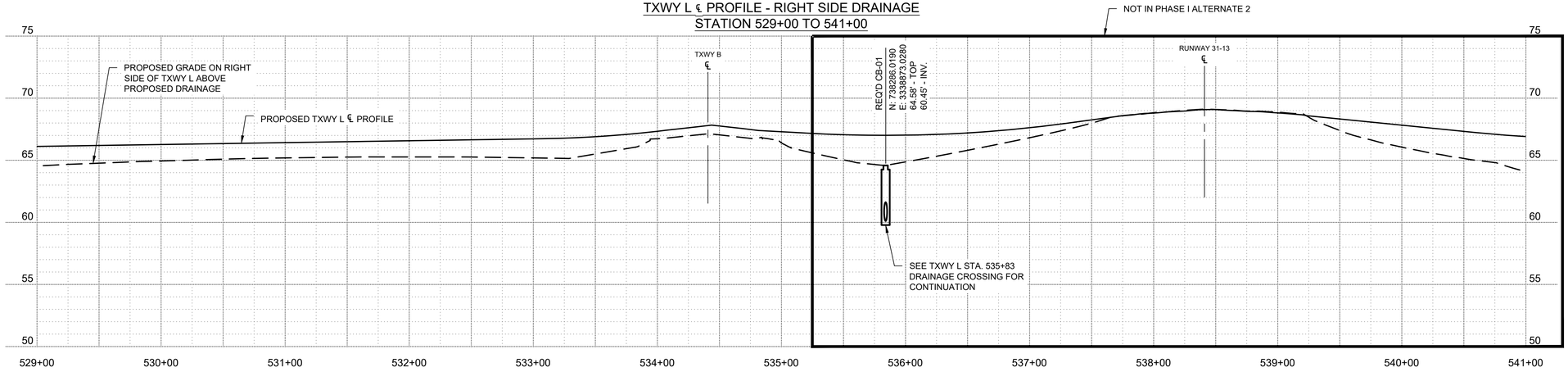
DSB2D

CADD D3-R4

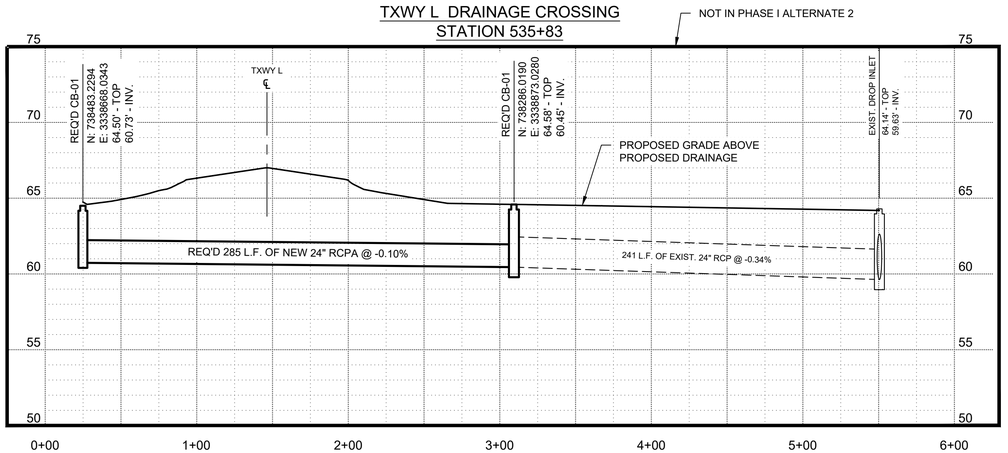
TXWY L ℄ PROFILE - LEFT SIDE DRAINAGE
STATION 529+00 TO 541+00



TXWY L ℄ PROFILE - RIGHT SIDE DRAINAGE
STATION 529+00 TO 541+00



TXWY L DRAINAGE CROSSING
STATION 535+83



NOTES:

1. REFER TO CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN FOR PROJECT PHASING.
2. SEE SHEET DS200 FOR TYPICAL DETAILS.

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

STATE OF LOUISIANA
JOSEPH A. COTTEN
REG. No. 47445
REGISTERED
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

PEC
PROFESSIONAL
ENGINEERING
CONSULTANTS
CORPORATION

TAXIWAY LIMA EXTENSION

DRAINAGE SITE PLAN PROFILE

DESIGNED	C.H.B./JAC
DRAWN	C.H.B.
CHECKED	D.A.C.
APPROVED	D.A.C.
APPROVED	T.A.A.
DATE	06/2024

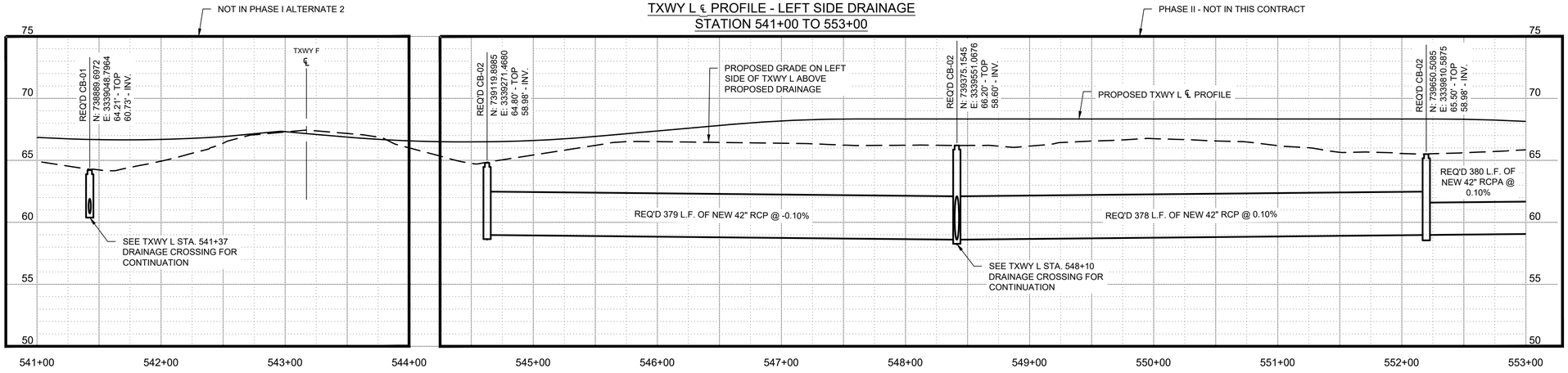
SCALE: H:1"=50', V:1"=5'

NO. 30757.02.00 | REV. 0

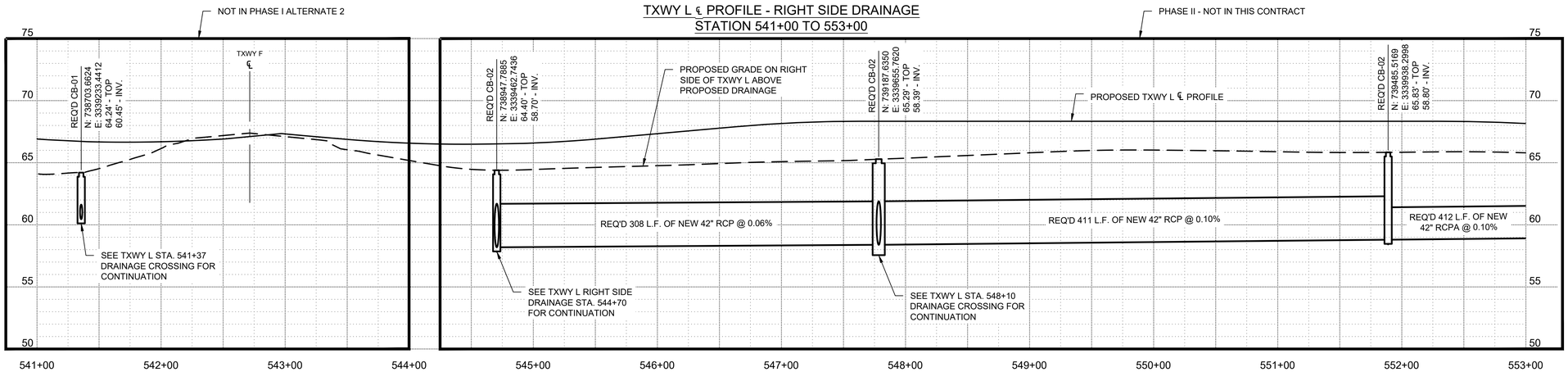
DSP102

CADD D3-R4

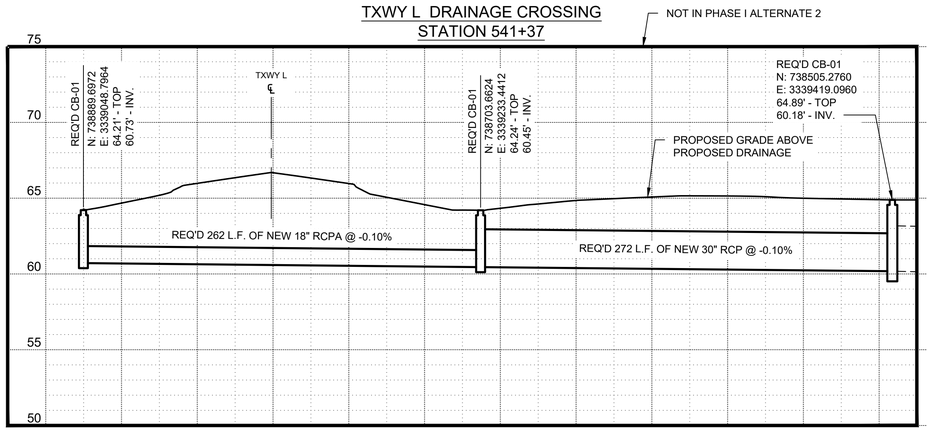
TXWY L ℄ PROFILE - LEFT SIDE DRAINAGE
STATION 541+00 TO 553+00



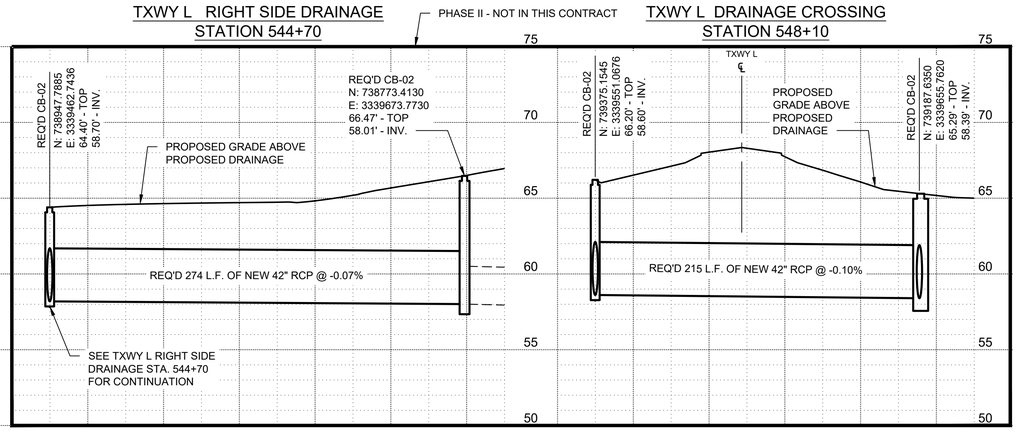
TXWY L ℄ PROFILE - RIGHT SIDE DRAINAGE
STATION 541+00 TO 553+00



TXWY L DRAINAGE CROSSING
STATION 541+37



TXWY L RIGHT SIDE DRAINAGE
STATION 544+70



TXWY L DRAINAGE CROSSING
STATION 548+10

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NOTES:

1. REFER TO CONSTRUCTION SAFETY PLAN AND AIRPORT SAFETY PLAN FOR PROJECT PHASING.
2. SEE SHEET DS200 FOR TYPICAL DETAILS.

STATE OF LOUISIANA
JOSEPH A. COTTEN
REG. No. 47445
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

PEC
PROFESSIONAL ENGINEERING CONSULTANTS CORPORATION

TAXIWAY LIMA EXTENSION

DRAINAGE SITE PLAN PROFILE

DESIGNED	C.H.B./J.A.C.
DRAWN	C.H.B.
CHECKED	D.A.C.
APPROVED	D.A.C.
APPROVED	T.A.A.
DATE	06/2024

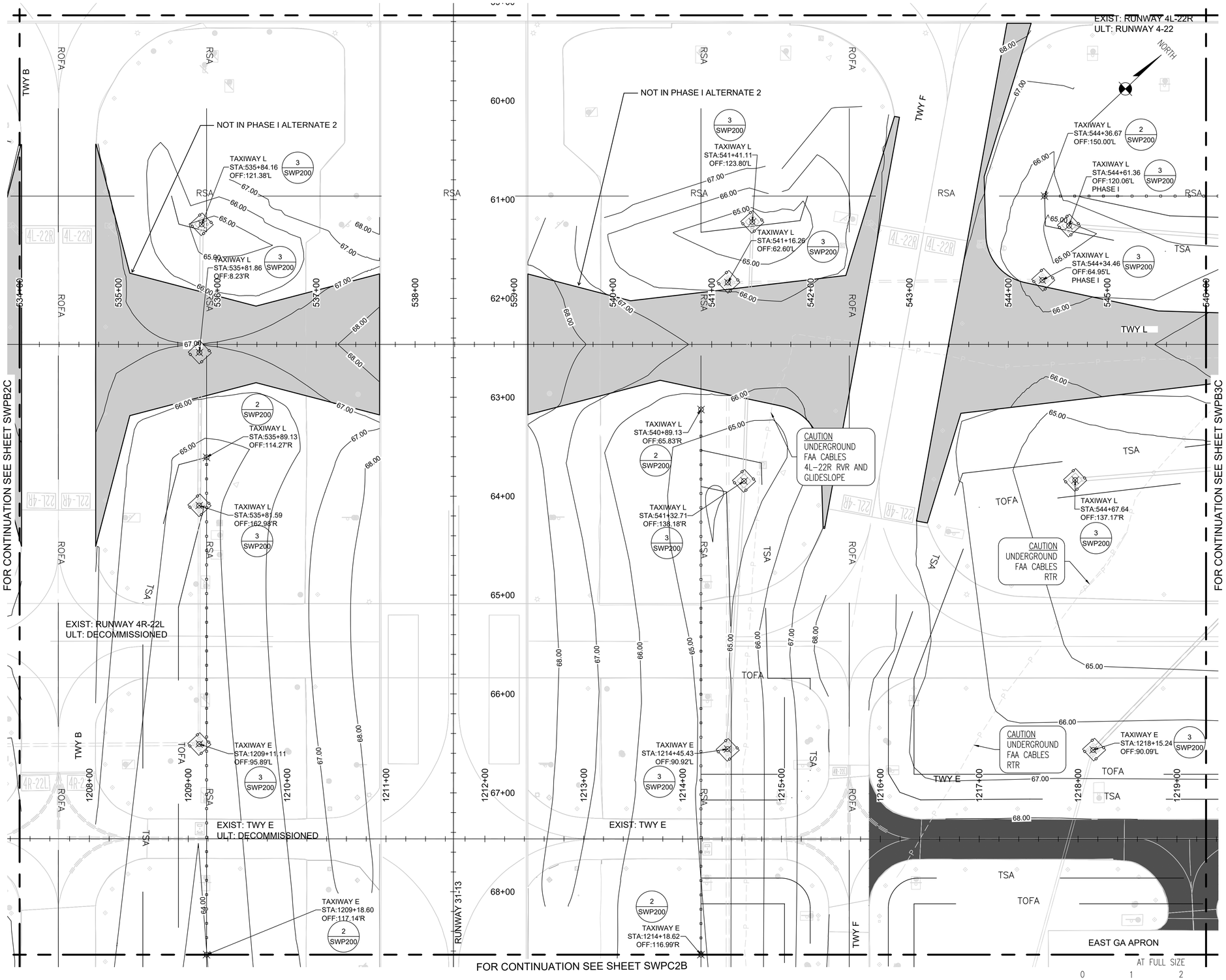
SCALE: H:1"=50', V:1"=5'

NO. 30757.02.00

REV. 0

DSP103

CADD D3-R4



NOTES:

1. SEE SHEET SWP100 FOR NOTES.
2. ALL WORK ON THIS SHEET NORTH AND EAST OF TAXIWAY F IS PHASE II UNLESS OTHERWISE NOTED AS PHASE I. PHASE II IS NOT IN THIS CONTRACT.

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
IN CIVIL ENGINEERING
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

STORM WATER PROTECTION
PLAN – AREA B2D

DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: 1" = 50'

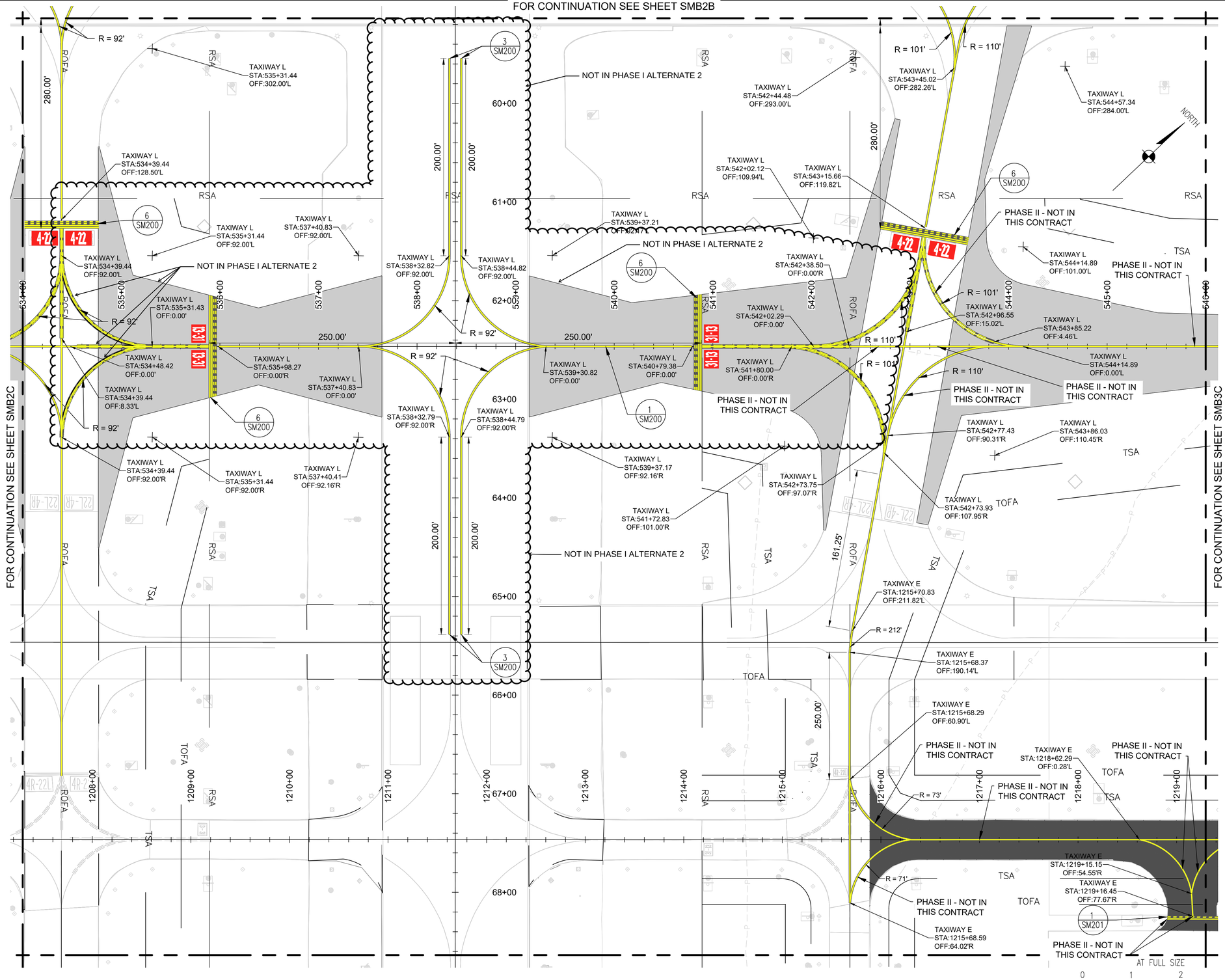
NO.	REV.
SWPB2D	0

CADD D3-R4

FOR CONTINUATION SEE SHEET SMB2B

FOR CONTINUATION SEE SHEET SMB2C

FOR CONTINUATION SEE SHEET SMB3C



NOTES:

1. SEE SM200 AND SM201 FOR PAVEMENT MARKING NOTES.

LEGEND:

- PROPOSED ASPHALT PAVEMENT
- PROPOSED MILL AND OVERLAY
- PERIMETER ROAD PAVEMENT
- PROPOSED YELLOW STRIPING
- PROPOSED BLACK STRIPING

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
IN
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

MARKING LAYOUT PLAN – AREA B2D

DESIGNED	W.T.B.
DRAWN	G.T.H.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: 1" = 50'

NO.	REV.
SMB2D	0

CADD D3-R4

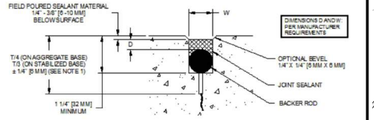
EXIST: RUNWAY 4L-22R
ULT: RUNWAY 4-22

NORTH

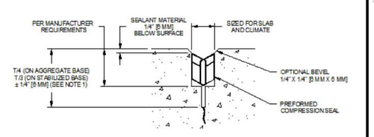
RSA
TOFA
TSA
TWY L
TAXIWAY L BASELINE
510+00
511+00
512+00
513+00
514+00
515+00
516+00
517+00
518+00
519+00
520+00
521+00
522+00
600+00
601+00
602+00
603+00
DROP INLET
63.52'-TOP
60.30'-INV.
DROP INLET
63.52'-TOP
60.30'-INV.
DROP INLET
61.55'-TOP
55.17'-INV.
36" RCP
42" RCP
54" RCP
15.00'
12.50'
EXT: TWY L
ULT: TWY P
DIR. ONLY
DIR. ONLY
FOR CONTINUATION SEE SHEET CGB2C

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

CONTRACTION JOINT DETAILS

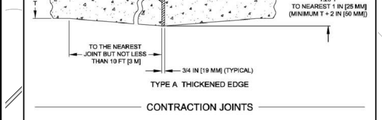


DETAIL 1 - FIELD POURED



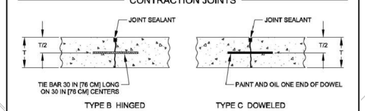
DETAIL 2 - PREFORMED SEAL

ISOLATION JOINTS



TYPE A THICKENED EDGE

CONTRACTION JOINTS

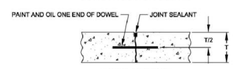


TYPE B HINGED

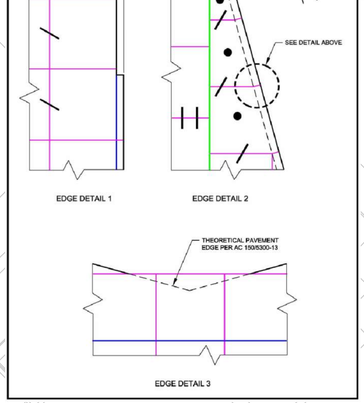
TYPE C DOWELED

TYPE D DUMMY

CONSTRUCTION JOINTS



TYPE E DOWELED



NOTES:

1. JOINT LAYOUT APPLIES TO PHASE I ALTERNATE 1 ONLY.

2. SEAL ALL JOINTS. JOINT SEAL TO BE PAID UNDER ITEMS P-604-6.1 COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS (PER LF) AND P-605-5.1 JOINT SEALING FILLER (PER LF).

3. TYPICAL JOINT SPACING IS 12.50 FT WIDE X 15.00 FT LONG.

4. NONSTANDARD SHAPED PANELS SHALL BE REINFORCED (SEE LEGEND).

LEGEND:

- TYPE A ISOLATION JOINT
- TYPE B HINGED OR TYPE C DOWELED CONTRACTION JOINT
- TYPE C DOWELED CONTRACTION JOINT
- TYPE D DUMMY CONTRACTION JOINT
- TYPE E DOWELED CONSTRUCTION JOINT
- EMBEDDED STEEL 0.05 PERCENT IN BOTH DIRECTIONS WHEN LENGTH-TO-WIDTH RATIO EXCEEDS 1.25 OR IN SLABS THAT ARE NOT RECTANGULAR (6 X 6 - 8/8 WWF)

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

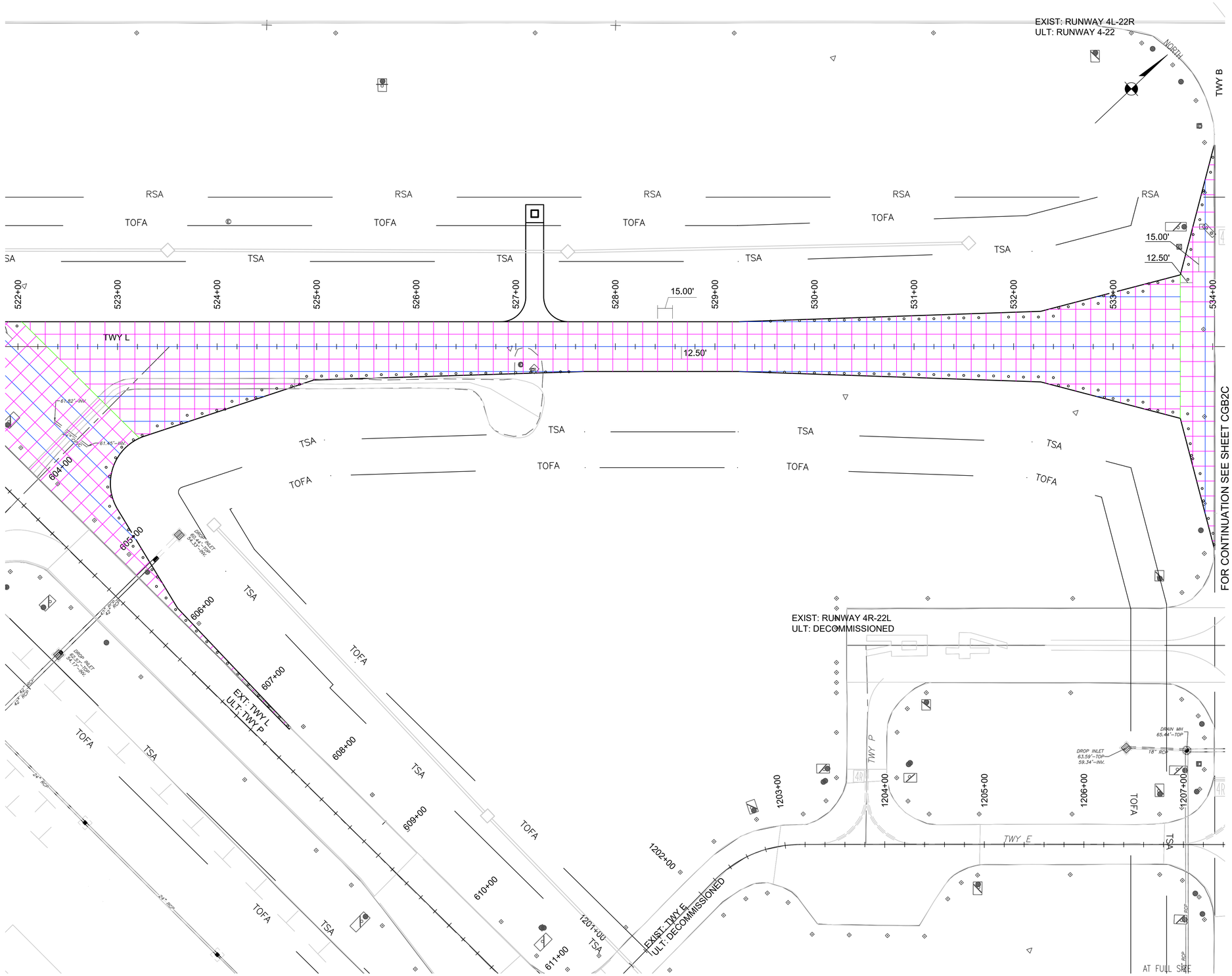
PROPOSED JOINT LAYOUT – AREA B1D

DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: 1" = 50'

NO.	REV.
JLB1D	JL1

CADD D3-R4



NOTES:

1. JOINT LAYOUT APPLIES TO PHASE I ALTERNATE 1 ONLY.

2. SEAL ALL JOINTS. JOINT SEAL TO BE PAID UNDER ITEMS P-604-6.1 COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS (PER LF) AND P-605-5.1 JOINT SEALING FILLER (PER LF).

3. TYPICAL JOINT SPACING IS 12.50 FT WIDE X 15.00 FT LONG.

4. NONSTANDARD SHAPED PANELS SHALL BE REINFORCED (SEE LEGEND).

LEGEND:

- TYPE A ISOLATION JOINT
- TYPE B HINGED OR TYPE C DOWELED CONTRACTION JOINT
- TYPE C DOWELED CONTRACTION JOINT
- TYPE D DUMMY CONTRACTION JOINT
- TYPE E DOWELED CONSTRUCTION JOINT
- EMBEDDED STEEL 0.05 PERCENT IN BOTH DIRECTIONS WHEN LENGTH-TO-WIDTH RATIO EXCEEDS 1.25 OR IN SLABS THAT ARE NOT RECTANGULAR (6 X 6 - 8/8 WWF)

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

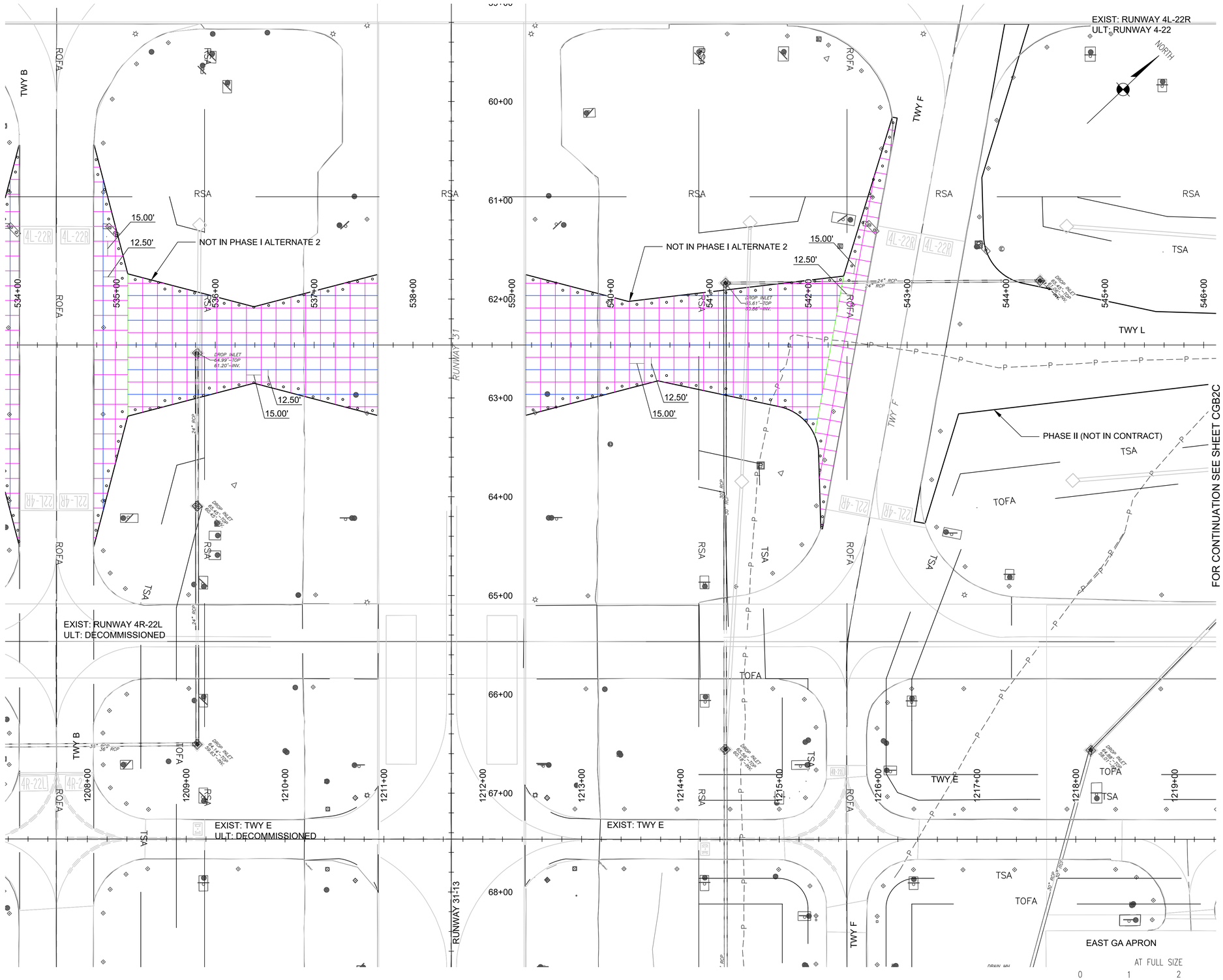
PROPOSED JOINT LAYOUT – AREA B2C

DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: 1" = 50'

NO. 30757.02.00 | REV. JLB2C | JL2

CADD D3-R4



NOTES:

1. JOINT LAYOUT APPLIES TO PHASE I ALTERNATE 1 ONLY.

2. SEAL ALL JOINTS. JOINT SEAL TO BE PAID UNDER ITEMS P-604-6.1 COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS (PER LF) AND P-605-5.1 JOINT SEALING FILLER (PER LF).

3. TYPICAL JOINT SPACING IS 12.50 FT WIDE X 15.00 FT LONG.

4. NONSTANDARD SHAPED PANELS SHALL BE REINFORCED (SEE LEGEND).

LEGEND:

- TYPE A ISOLATION JOINT
- TYPE B HINGED OR TYPE C DOWELED CONTRACTION JOINT
- TYPE C DOWELED CONTRACTION JOINT
- TYPE D DUMMY CONTRACTION JOINT
- TYPE E DOWELED CONSTRUCTION JOINT
- EMBEDDED STEEL 0.05 PERCENT IN BOTH DIRECTIONS WHEN LENGTH-TO-WIDTH RATIO EXCEEDS 1.25 OR IN SLABS THAT ARE NOT RECTANGULAR (6 X 6 - 8/8 WWF)

STATE OF LOUISIANA
BLAKE S. ROUSSEL
License No. 33279
PROFESSIONAL ENGINEER
07/18/2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

Stanley Consultants INC.
721 Government Street, Suite 302, Baton Rouge, Louisiana 70802
www.stanleyconsultants.com

TAXIWAY LIMA EXTENSION

PROPOSED JOINT LAYOUT – AREA B2D

DESIGNED	A.J.F.
DRAWN	K.A.L.
CHECKED	B.S.R.
APPROVED	N/A
APPROVED	N/A
DATE	TBD

SCALE: 1" = 50'

NO. 30757.02.00 | REV.

JLB2D | JL3

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

CADD D3-R4

FOR CONTINUATION SEE SHEET LSDB2A

EXIST: RUNWAY 4L-22R
ULT: RUNWAY 4-22

NORTH

SIGN #41

SIGN #46

SIGN #79

522+00 523+00 524+00 525+00 526+00 527+00 528+00 529+00 530+00 531+00 532+00 533+00 534+00

TWY L

FOR CONTINUATION SEE SHEET LSDB1D

FOR CONTINUATION SEE SHEET LSDB2D

SIGN #198

EXIST: TWY L
ULT: TWY P

SIGN #192

4 SIGN #67

1201+00

EXIST: TWY E
ULT: DECOMMISSIONED

1202+00

SIGN #70

SIGN #71

1203+00

1204+00

SIGN #72

1205+00

REMOVE 783 LF OF
EXISTING CONDUIT

1206+00

SIGN #73

4

1 2

SIGN #74

REMOVE 628 LF OF
EXISTING CONDUIT

SIGN #75

SIGN #76

SIGN #77

1207+00

1 END PHASE I
ALT 1 DEMO

1 2 REMOVE 958 LF OF
EXISTING CONDUIT

SIGN #78

1 END PHASE I
ALT 1 DEMO

EXIST: RUNWAY 4R-22L
ULT: DECOMMISSIONED

FOR CONTINUATION SEE SHEET LSDC2A

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

NOTES:

1. SEE SHEET LSD100 FOR NOTES.
2. ALL RUNWAY 4R-22L LIGHTING AND SIGNAGE TO BE REMOVED IN PHASE I. WORK TO BE DONE IN THIS CONTRACT.
3. TAXIWAY E LIGHTING AND SIGNAGE ON THIS SHEET TO BE REMOVED IN PHASE I. WORK TO BE DONE IN THIS CONTRACT.

LEGEND:

- LIGHT TO BE REMOVED
- SIGN TO BE REMOVED
- CONDUIT TO BE REMOVED
- PAVEMENT MARKING TO BE REMOVED
- PAVEMENT MILLING
- PAVEMENT TO BE REMOVED

STATE OF LOUISIANA
KENNETH W. POWERS
License No. 39558
PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING

7/18/24

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
1	REVISED PER ADDENDUM NO. 1	DLH	KWP	KWP	07/18/2024

VOLKERT
9448 Brookline Drive, Baton Rouge, Louisiana 70809
www.volkert.com

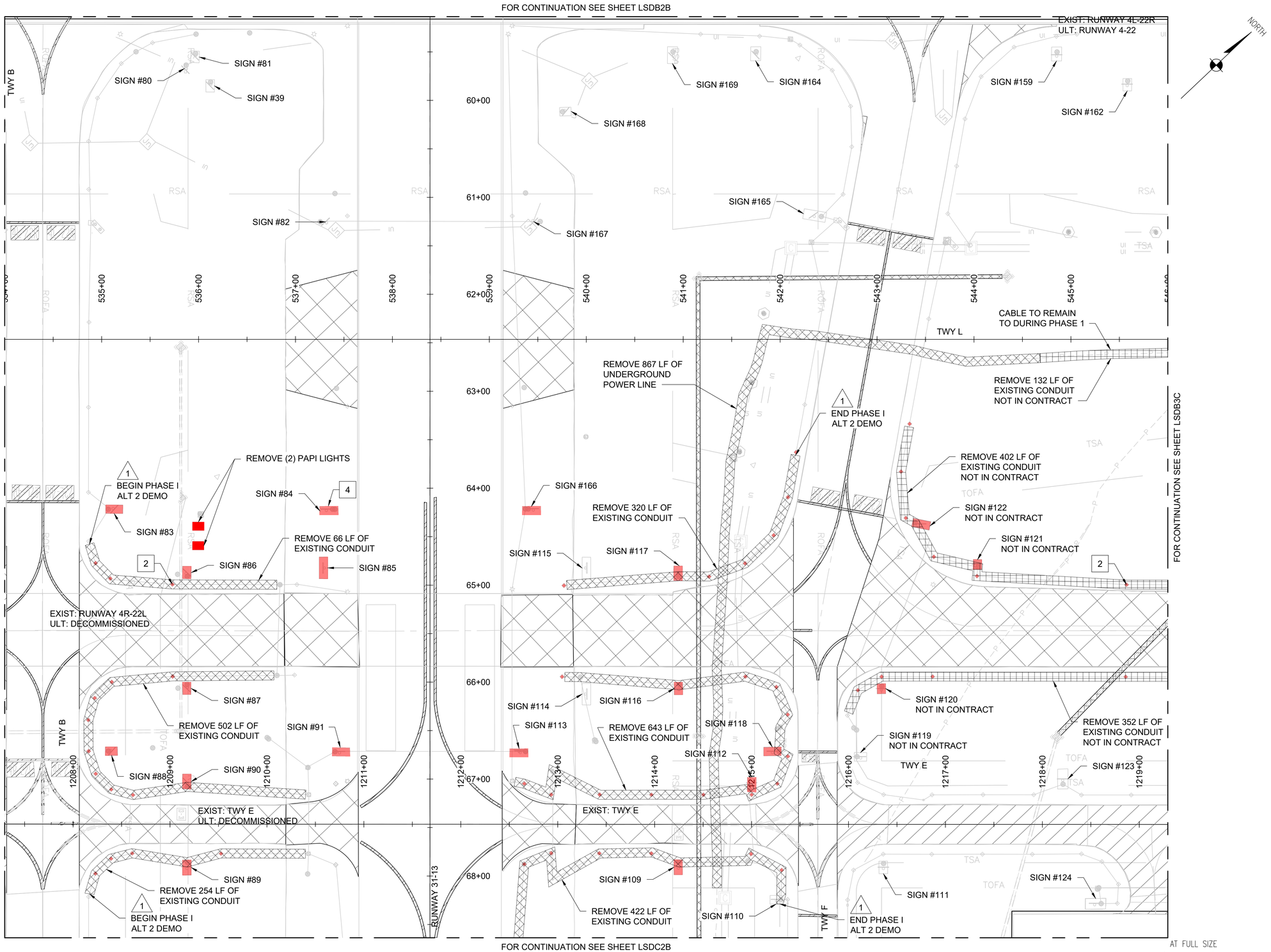
TAXIWAY LIMA EXTENSION

LIGHTING & SIGNING DEMOLITION PLAN

DESIGNED DLH
DRAWN PML
CHECKED JFS
APPROVED XXX
APPROVED XXX
DATE JULY 2024

SCALE: 1" = 50'
NO. 30757.02.00
REV. 0
LSDB2C

CADD D3-R4



AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NOTE:

SEE SHEET LSD100 FOR NOTES.

LEGEND:

- LIGHT TO BE REMOVED
- SIGN TO BE REMOVED
- CONDUIT TO BE REMOVED IN PHASE I ALT 2 (1)
- CONDUIT TO BE REMOVED IN PHASE II
- PAVEMENT MARKING TO BE REMOVED
- PAVEMENT MILLING
- PAVEMENT TO BE REMOVED

STATE OF LOUISIANA
KENNETH W. POWERS
License No. 39559
PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING

7/18/24

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
1	REVISED PER ADDENDUM NO. 1	DLH	KWP	KWP	07/18/2024

VOLKERT
9448 Brookline Drive, Baton Rouge, Louisiana 70809
www.volkert.com

TAXIWAY LIMA EXTENSION

LIGHTING & SIGNING DEMOLITION PLAN

DESIGNED	DLH
DRAWN	PML
CHECKED	JFS
APPROVED	XXX
APPROVED	XXX
DATE	JULY 2024

SCALE: 1" = 50'

NO. 30757.02.00

REV. 0

LSDB2D

CADD 03-R4

TWY/ RWY	SIGN #	FRONT	BACK	VIEW
4R	120	← F y	b	SOUTH
4L-22R	121	F → y	b	SOUTH
F	122	F b 22L-4R r	b	SOUTH
E	123	E b E1 → y	b	SOUTH
E1	124	E1 b ← E → y	E1 b	SOUTH
E	125	E b ← E1 y	b	SOUTH
E2	126	E2 b ← E → y	E2 b	SOUTH
E	127	E b E2 → y	b	SOUTH
E	128	E b ← E2 y	b	SOUTH
F.I.S.D.O.	129	← E → y	b	NORTH
E	130	← G y E b	b	NORTH
4R-22L	131	G → y	b	NORTH
4R-22L	132	← G y	b	NORTH
G	133	G b 4R-22L r	G b	NORTH
E	134	E b G → y	b	NORTH
G	135	→ b	E b E1 y	NORTH
E	136	E b 22L r	E b	NORTH
4R-22L	137	E → y	b	NORTH
4R-22L	138	← G y	b	NORTH
4R-22L	139	G → y	b	NORTH
G	140	G b 22L-4R r	G b	NORTH
G	141	G b 4L-22R r	▤ y G b	NORTH
4L-22R	142	G → y	b	NORTH
4L-22R	143	← G y	b	NORTH
4L-22R	144	← G y	b	NORTH
4L-22R	145	G → y	b	NORTH
4L-22R	146	1 w	6 w	NORTH
4L-22R	147	← A y	b	NORTH
A	148	A b 22 r	▤ y A b	NORTH
M	149	? r	b	NORTH
A	150	A b	b	NORTH
A	151	A b	b	NORTH
A	152	← G y A b	b	NORTH
G	153	G b 22-4 r	G b ▤ y	NORTH
G	154	G b ← A → y	b	NORTH
A	155	A b G → y	b	NORTH
4L-22R	156	2 w	5 w	NORTH
A	157	← F y A b	b	NORTH
4L-22R	158	F → y	b	NORTH
4L-22R	159	← F y	b	NORTH
F	160	F b 22-4 r	▤ y F b	NORTH
F	161	F b ← A → y	b	NORTH
4L-22R	162	3 w	4 w	NORTH
4L-22R	163	← F y	b	NORTH
4L-22R	164	F → y	b	SOUTH
F	165	F b 4-22 r	▤ y F b	SOUTH
31-13	166	22L-4R r	b	SOUTH
13-31	167	4-22 r	← L y	SOUTH
13-31	168	2 w	5 w	SOUTH
4L-22R	169	31-13 r	b	SOUTH
4L-22R	170	31-13 r	b	NORTH
13-31	171	A → y	b	NORTH
13-31	172	22-4 r	b	NORTH
A	173	A b 31-13 r	▤ y A b	NORTH
A	174	← F → y A b	b	NORTH
B	175	ILS r	b	▥ y NORTH
A	176	ILS r	▥ y	NORTH

TWY/ RWY	SIGN #	FRONT	BACK	VIEW
A	177	ILS r	▥ y	NORTH
4L-22R	178		Q → y	SOUTH
4L-22R	179	← Q y	b	SOUTH
4L-22R	180		A → y	SOUTH
A	181	22-4 r A b	A b ▤ y	SOUTH
A	182	A b A → y	b	SOUTH
A	183	A b 22-4 r	▤ y A b	SOUTH
A	185	← A y A b	b	SOUTH
A	186	A b Q → y	b	SOUTH
4L-22R	187	1 w	6 w	SOUTH
L	188	L b Q → y	L b	SOUTH
4L-22R	189	← L1 y	b	SOUTH
L	190	L1 b 4-22 r	▤ y	SOUTH
L	191	4R APCH r	b	SOUTH
L	192	4R APCH r	b	SOUTH
Q	193	← L → y	b	SOUTH
H	194	? r	b	SOUTH
C	195	4L ↑ y	b	SOUTH
B	196	← B → y	b	NORTH
L	197	L b L1 → y	b	SOUTH
L	198	← P1 b L1 y	b	SOUTH
F	199	F → y	b	NORTH
F	200	F b 13 r	▤ y F b	NORTH
F	201	ILS r	▥ y	NORTH
F	202	F b F3 → y	w	NORTH
F	203	F3 b ← F → y	F3 b	NORTH
F	204	← F3 y	b	NORTH
F	205	F3 → y	b	NORTH
F	206	F3 b 31-13 r	▤ y	NORTH
F	207	← F3 y F b	b	NORTH
F	208	← A → y F b	b	NORTH
T	209	T ↘ L ↙ y	T b	SOUTH
L	210	← T y	b	SOUTH
L	211	T ↙ y	b	SOUTH
L	220	P ↙ y	b	SOUTH
L	221	↙ P y P1 y L b	w	SOUTH
L	222	← B → y L b	w	SOUTH
L	223	← L → y B b	w	SOUTH
L	224	← L y	b	SOUTH
L	225	← L → y	w	SOUTH
L	226	L b 13-31 r	L b ▤ y	SOUTH
L	227	L → y	b	SOUTH
L	228	L b 31-13 r	L b ▤ y	SOUTH
L - PHASE I	229	← L y F b	w	SOUTH
L - PHASE II	229	← L → y F b	w	SOUTH
L - PHASE I	230	← L y	w	SOUTH
L - PHASE II	230	← L → y	w	SOUTH
L	231	← F → y L b	w	SOUTH
L	232	← L → b G y	w	SOUTH
L	233	G b 4-22 r	G b ▤ y	SOUTH
L	234	← L → y	w	SOUTH
L	235	← L → b G y	w	SOUTH
L	236	← L → y G b	w	SOUTH
L	237	ILS r	▥ y	SOUTH
L	238	L b 22 r	L b ▤ y	SOUTH
L	239	L → y	b	SOUTH
L	240	E ↑ y G → y	b	SOUTH
L	241	L b L1 → y	L b	SOUTH

△1 *

LEGEND:

REMAIN

UPDATE

REMOVE

NEW

△1 * SEE NOTE 1

COLOR CODE:

SYMBOL	BACKGROUND	CHARACTERS
b	BLACK	YELLOW
r	RED	WHITE
w	BLACK	WHITE
y	YELLOW	BLACK

△1 NOTE:

1. SIGNS 229 AND 230 PANELS SHALL BE UPDATED PER PHASE I AND II CONSTRUCTION. THE COST SHALL BE SUBSIDIARY TO PAY ITEM L-125-5.6.

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1	REVISED PER ADDENDUM NO. 1	DLH	KWP	KWP	07/18/2024

VOLKERT
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TAXIWAY LIMA EXTENSION

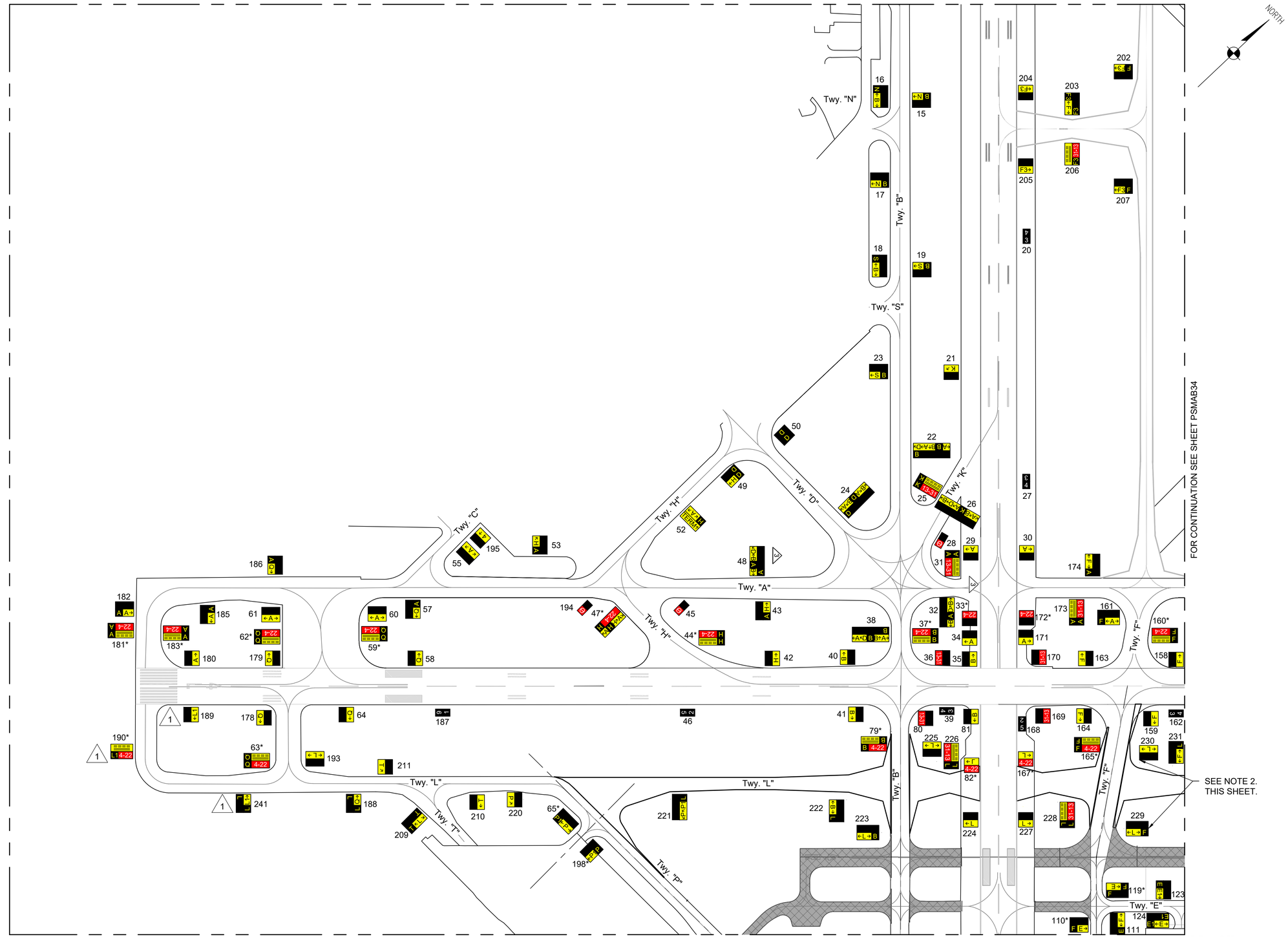
PROPOSED SIGNAGE MAP

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

DESIGNED DLH
DRAWN PML
CHECKED JFS
APPROVED XXX
APPROVED XXX
DATE JULY 2024

SCALE: NONE
NO. 30757.02.00
REV. 0
PSM202

CADD D3-R4



NOTE:

1. SIGNS NOT INCLUDED IN PHASE I CONTRACT WORK ARE AS FOLLOWS:
   111, 123, 124, 158, 159, 162, 230, & 231.
   ALL OTHER SIGNAGE WORK ON THIS SHEET IS INCLUDED IN PHASE I.
2. REFER TO SHEET PSM202 FOR SIGN PANEL LAYOUT. THIS SIGN WILL HAVE A DIFFERENT PANEL LAYOUT FOR PHASE I COMPARED TO PHASE II. DEPICTED HERE IS THE ULTIMATE LAYOUT CONSTRUCTED IN PHASE II.

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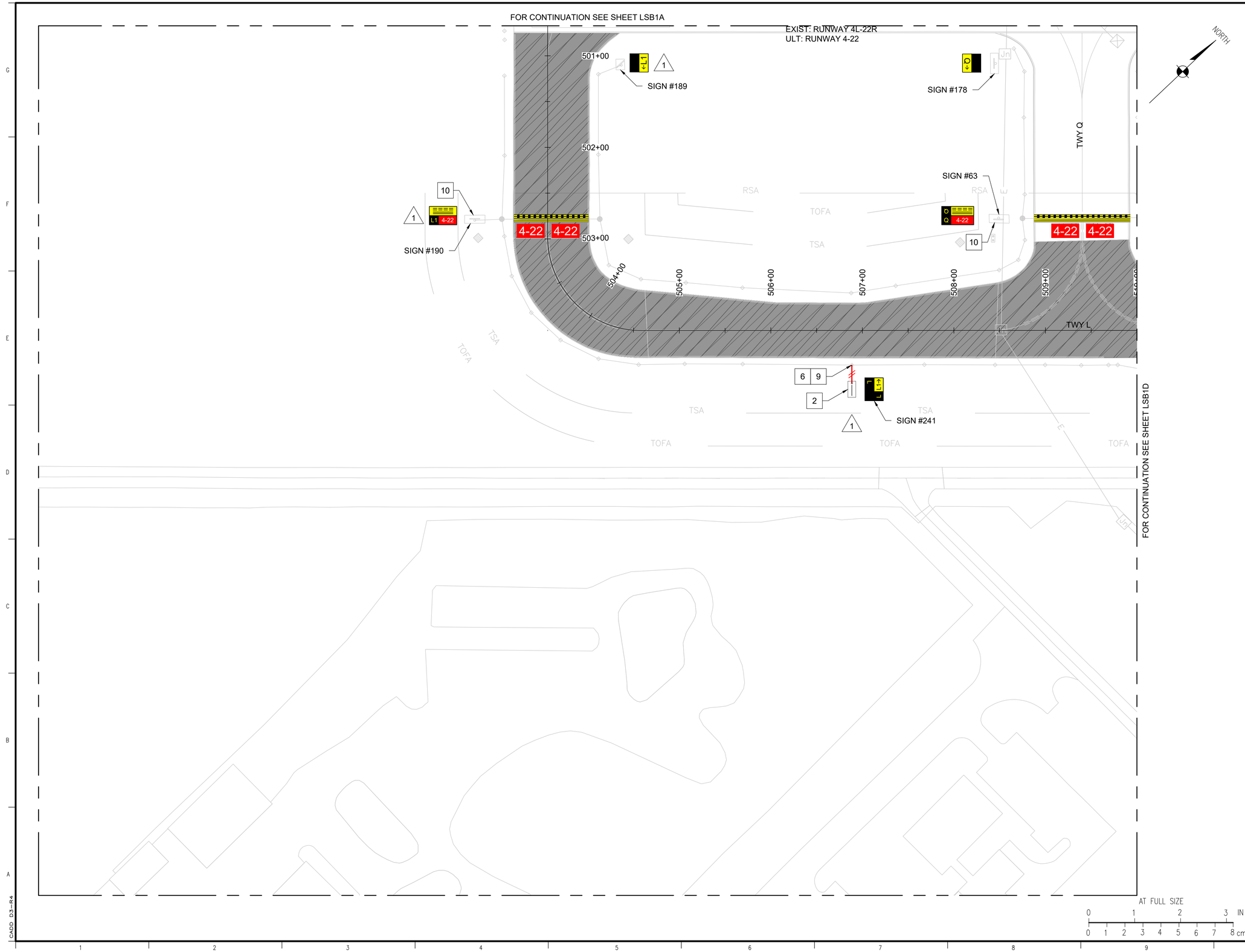
TAXIWAY LIMA EXTENSION

PROPOSED SIGNAGE MAP

DESIGNED	DLH
DRAWN	PML
CHECKED	JFS
APPROVED	XXX
APPROVED	XXX
DATE	JULY 2024

SCALE: 1" = 200'
AT FULL SIZE
NO. 30757.02.00
PSMAB12
REV. 0

CADD D3-R4



NOTE:

SEE SHEET LS200 FOR NOTES.

LEGEND:

- PROPOSED MILL AND OVERLAY
- PROPOSED ASPHALT PAVEMENT
- PERIMETER ROAD PAVEMENT
- PROPOSED ELECTRICAL CIRCUIT
- PROPOSED 2" HDPE RVR CONDUIT

KENNETH W. POWERS
License No. 39558
PROFESSIONAL ENGINEER IN
ELECTRICAL ENGINEERING
STATE OF LOUISIANA

7/18/24

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
1	REVISED PER ADDENDUM NO. 1	DLH	KWP	KWP	07/18/2024

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www.volkert.com

TAXIWAY LIMA EXTENSION

LIGHTING & SIGNING PLAN

DESIGNED DLH
DRAWN PML
CHECKED JFS
APPROVED XXX
APPROVED XXX
DATE JULY 2024

SCALE: 1" = 50'
NO. 30757.02.00
REV. 0
LSB1C

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

CADD D3-R4

FOR CONTINUATION SEE SHEET LSB2A

FOR CONTINUATION SEE SHEET LSB1D

FOR CONTINUATION SEE SHEET LSB2D

FOR CONTINUATION SEE SHEET LSC2A

SIGN #46

PROPOSED 2" HDPE RVR CONDUIT

8 EQUAL SPACES @ 121.35' = 970.88'

EXIST: RUNWAY 4L-22R
ULT: RUNWAY 4-22

SIGN #41

CKT RWY 4-22

TWY L CIRCUIT TO END AT EXISTING LIGHT FOR PHASE I ALT 1.

TWY L CIRCUIT CONTINUATION FOR PHASE I ALT 2.

PHASE I ALT. 1

3 EQUAL SPACES @ 428.82 = 128.47'

SIGN #79

L-166 L-165 L-164 L-163 L-162 L-161 L-160 L-159 L-158 L-157 L-156 L-155 L-154 L-153 L-152

522+00 523+00 524+00 525+00 526+00 527+00 528+00 529+00 530+00 531+00 532+00 533+00

CKT TW L

TWY L

3 EQUAL SPACES @ 46.02' =138.06'

6 EQUAL SPACES @ 121.23' =727.36'

3 EQUAL SPACES @ 46.31' = 138.94'

4 EQUAL SPACES @ 44.05' = 176.22'

L-354 L-353 L-352 L-351 L-350 L-349 L-348 L-347 L-346 L-345 L-344

SIGN #221

SIGN #222

CKT TWY L

L-359 L-358 L-357 L-356 L-355

L-360 L-361 L-362 L-363 L-364 L-365 L-366

3 EQUAL SPACES @ 38.31' =114.94'

4 EQUAL SPACES @ 43.05' =172.21'

3 EQUAL SPACES @ 43.6' = 130.58'

SIGN #223

L-343 L-342

TWY L CIRCUIT CONTINUATION FOR PHASE I ALT 2.

TWY L CIRCUIT TO END AT LIGHT L-342 FOR PHASE I ALT 1.

SIGN #198

EXT: TWY L
ULT: TWY P

EX LIGHT

CKT TWY P

EXIST: RUNWAY 4R-22L
ULT: DECOMMISSIONED

CKT TWY B

L-341 L-340

119.40'

18.60'

1203+00 1204+00 1205+00 1206+00 1207+00 1202+00 1201+00

EXIST: TWY E
ULT: DECOMMISSIONED

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NOTE:

SEE SHEET LS200 FOR NOTES.

LEGEND:

- PROPOSED MILL AND OVERLAY
- PROPOSED ASPHALT PAVEMENT
- PERIMETER ROAD PAVEMENT
- PROPOSED ELECTRICAL CIRCUIT
- PROPOSED 2" HDPE RVR CONDUIT
- PHASE I ALT. 1 TEMPORARY ELECTRICAL CIRCUIT LOOP CONNECTION. DISCONNECT ONCE PHASE I ALT. 2 IS CONSTRUCTED.

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TAXIWAY LIMA EXTENSION

LIGHTING & SIGNING PLAN

DESIGNED	DLH
DRAWN	PML
CHECKED	JFS
APPROVED	XXX
APPROVED	XXX
DATE	JULY 2024

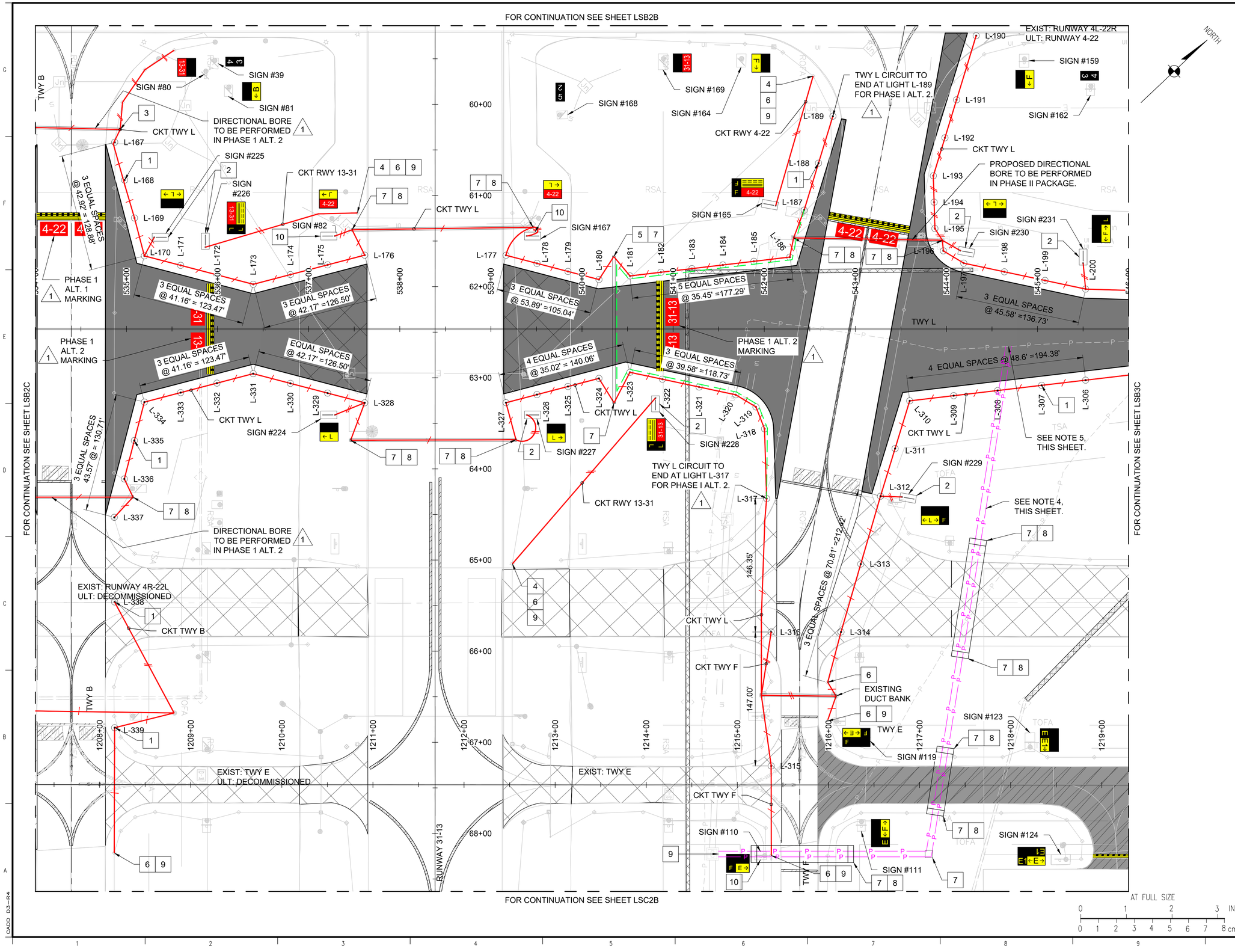
SCALE: 1" = 50'

NO. 30757.02.00

REV. 0

LSB2C

CADD D3-R4



NOTES:

1. SEE SHEET LS200 FOR NOTES.
2. ALL SIGNAGE AND LIGHTING WORK EAST OF TAXIWAY F IS PHASE II. NOT IN CONTRACT.
3. PHASE I CIRCUIT CONSTRUCTION WILL CONCLUDE ON THE SOUTHWEST SIDE OF TWY F. A TEMPORARY INTERCONNECTION CIRCUIT WILL BE INSTALLED TO LINK THE LOOP FOR CKT TWY L. THIS TEMPORARY INTERCONNECTION WILL ORIGINATE AT LIGHT L-187 AND EXTEND TO LIGHT L-317 AS INDICATED IN THE PLAN VIEW. UPON COMPLETION OF PHASE II CONSTRUCTION, THE TEMPORARY INTERCONNECTION IS TO BE DISCONNECTED.
4. REQUIRED 2-2" CONDUITS FOR TEMPORARY COMMUNICATION LINE. PROVIDE 1-12 PAIR CONTROL CABLE PER CONDUIT. INCLUDE 1 REQUIRED #1/0 GUARD WIRE FOLLOWING PARALLEL. GROUND RODS TO BE SPACED 90' O.C.
5. REQUIRED RAYCHEM SPLICE KIT TO BE USED FOR TEMPORARY CONNECTION TO EXISTING CIRCUIT.

LEGEND:

- PROPOSED MILL AND OVERLAY
- PROPOSED ASPHALT PAVEMENT
- PERIMETER ROAD PAVEMENT
- PROPOSED ELECTRICAL CIRCUIT
- PROPOSED 2" HDPE RVR CONDUIT
- TEMPORARY COMMUNICATION LINE
- PHASE I ALT. 2 TEMPORARY ELECTRICAL CIRCUIT LOOP CONNECTION. DISCONNECT ONCE PHASE II IS CONSTRUCTED.

7/18/24

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
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TAXIWAY LIMA EXTENSION

LIGHTING & SIGNING PLAN

DESIGNED	DLH
DRAWN	PML
CHECKED	JFS
APPROVED	XXX
APPROVED	XXX
DATE	JULY 2024

SCALE: 1" = 50'

NO. 30757.02.00 | REV. 0

LSB2D

AT FULL SIZE 0 1 2 3 IN | 0 1 2 3 4 5 6 7 8 cm

CADD D3-R4