

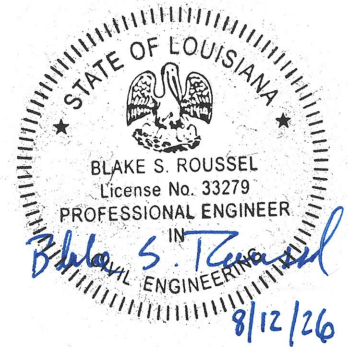
CONTRACT DOCUMENTS
AND
SPECIFICATIONS

FOR

AIP NO. TBD

TAXIWAY F RECONSTRUCTION

BATON ROUGE METROPOLITAN AIRPORT



ADDENDUM NO. 4

DATE ISSUED: AUGUST 13, 2026

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 the Louisiana Uniform Public Work Bid Form. Failure to do so may subject the bidder to disqualification.

Individual document changes consist of the following:

REVISIONS TO PROJECT SPECIFICATIONS:

The following sections have been added, deleted, or amended in the Specifications and Contract Documents dated July 2026.

- Table of Contents
 - Updated Table of Contents to add the below specification sections that were previously added to the project manual via Addendum 1.
 - P-401, P-403, P-407, P-602, P-603, D-705
 - Updated Table of Contents to remove section L-100 from the Project Manual.
- Louisiana Uniform Public Work Bid Form, Unit Price Form
 - Added L-108-5.1
 - Revised L-108-5.2 to L-108-5.1 and revised quantities
 - Revised L-108-5.4 to L-108-5.2 and revised quantities
 - Revised L-108-5.5 to L-108-5.3 and revised quantities
 - Deleted L-108-5.6 and incorporated into other items
 - Deleted L-108-5.7 and incorporated into other items

- Revised L-110-5.1 to L-110-5.2 and revised quantities
- Deleted L-110-5.2 2" PVC couplings demo and reinstall. Included in other items.
- Deleted L-110-5.3 2" PVC connectors demo and reinstall. Included in other items.
- Deleted L-110-5.6 L-867D Base can and cover. Covered by L-115 items.
- Deleted L-110-5.7 Duct Marker. Covered by other L-110 items.
- Revised L-110-5.8 Jack and Bored 2" HDPE Conduit with Couplings to L-110-5.3 and revised quantity.
- Deleted L-110-5.8 Jack and Bore L-867D Base Can and Cover
- Revised L-115-5.2 to L-115-5.1
- Consolidated L-125 items. Payment items removed are included in price for main item.
- DIVISION IV, Technical Specifications
 - Removed L-100
 - Updated all "L-" spec sections

REVISIONS TO CONSTRUCTION PLANS:

The following plan sheets have been revised:

- Sheet G006, SUMMARY OF ESTIMATED QUANTITIES
 - Modified pay items and quantities

ADDITIONAL ITEMS:

- Revised Cost Estimate reflecting above changes

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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 F Reconstruction

A.I.P. No. X-XX-XXXX-XXX-XXXX
 S.P. No. H.XXXXXXX

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.# _____	Contractor Quality Control Program (CQCP)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-100	1	LS		

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	1,310	LF		

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

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Pavement Removal (Taxiway F)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.1	4,407	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Removal of Existing Concrete Catch Basin		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.2	3	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Removal of Existing Pipe (Storm Drain)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.3	744	LF		

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	1	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	3,967	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	112	CY		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Subbase Course (18" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-154-5.1	3,387	CY		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Lime-Treated Subgrade (12")		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.1	6,603	SY		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Lime		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.2	85	TON		
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-209-5.1	6,603	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	6,603	SY		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Lean Concrete Base Course (11.0" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-306-8.1	5,884	SY		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Cement Treated Permeable Base Course (6.0" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-307	5,884	SY		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Asphalt Mixture Surface Course (2" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-401-8.1	52	TON		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Asphalt Mixture Binder Course (2" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1a	52	TON		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Asphalt Base Course (5" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-403-8.1b	129	TON		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Asphalt Permeable Treated Base Course		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-407-7.1	468	SY		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Concrete Pavement (9.0" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-501-8.1	5,713	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	28	GAL		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Emulsified Asphalt Track Coat		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-603-5.1	141	GAL		

DESCRIPTION:	X Base Bid or ☐	Alt.# _____	Joint Sealing Filler	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-605-5.1	8,300	LF		
DESCRIPTION:	X Base Bid or ☐	Alt.# _____	Concrete	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-610-6.1	275	CY		
DESCRIPTION:	X Base Bid or ☐	Alt.# _____	Surface Preparation	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.1a	5,437	SF		
DESCRIPTION:	X Base Bid or ☐	Alt.# _____	Taxiway Marking (Yellow)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-1	1,898	SF		
DESCRIPTION:	X Base Bid or ☐	Alt.# _____	Taxiway Marking (White)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-2	55	SF		
DESCRIPTION:	X Base Bid or ☐	Alt.# _____	Taxiway Marking (Red)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-3	263	SF		
DESCRIPTION:	X Base Bid or ☐	Alt.# _____	Taxiway Marking (Black)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-4	3,221	SF		
DESCRIPTION:	X Base Bid or ☐	Alt.# _____	Reflective Media	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.3c	193	LB		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Sodding		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
T-904-5.2	435	SY		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Topsoil (Obtained Onsite or Removed from Stockpile)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
T-905-5.1	710	CY		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	18" RCP (Class IV)(Includes Bedding & Backfill)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-701-5.1	78	LF		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	48" 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	402	LF		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	54" 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	342	LF		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	6" Pipe (Perforated PVC)(Includes Porous Backfill and Filter Fabric)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-705-5.4	424	LF		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Furnish, Install 36" x 24" Concrete Open Top Catch Basin		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-751-5.1	1	EA		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Furnish, Install 72" x 48" Concrete Open Top Catch Basin		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-751-5.2	3	EA		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.1	1,800	LF		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.2	3,960	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		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.3	2,160	LF		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Non-Encased Electrical Conduit, 2"		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-110-5.2	1,800	LF		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	HDPE Conduit, 2" Jack and Bore under Taxiway		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L110-5.3	280	LF		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Electrical Junction Structure L-867D, 16" Diameter, 24" Deep		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L115-5.1	8	EA		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Taxiway Edge Light, Elevated, Blue Lens		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L125-5.1	22	EA		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Runway Guard Light, Yellow Lens		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L125-5.2	2	EA		
DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Sign L-858 Size 1, 3 Panel, Concrete Base		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L125-5.3	2	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Sign L-858, Size1, 4 Panel, Concrete Base		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L125-5.4	2	EA		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Construction Safety and Phasing Plan		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1000	1	LS		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Seeding (Hydroseeding)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1001	0.9	AC		

DESCRIPTION:	X Base Bid or ☐ Alt.# _____	Adjusting Catch Basins		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1002	1	EA		

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 F Reconstruction

A.I.P. No. X-XX-XXXX-XXX-XXXX
 S.P. No. H.XXXXXX

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 ☒ 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	340	LF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Pavement Removal (Taxiway F)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.1	577	SY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Clearing and Grubbing		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-151-4.2	0.3	AC		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Unclassified Excavation		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-152-4.1	644	CY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Embankment in Place		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-152-4.2	36	CY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Subbase Course (18" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-154-5.1	358	CY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Lime Treated Subgrade (12")		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.1	716	SY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Lime		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.2	9	TON		

DESCRIPTION:	☐ Base Bid or ☒ 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-209-5.1	716	SY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Separation Geotextile		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-209-5.2	716	SY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Lean Concrete Base Course (11.0" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-306-8.1	724	SY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Cement Treated Permeable Base Course (6.0" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-307	724	SY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Concrete Pavement (9.0" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-501-8.1	702	SY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Joint Sealing Filler		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-605-5.1	1,268	LF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Surface Preparation		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.1a	399	LF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Taxiway Marking (Yellow)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-1	133	SF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Taxiway Marking (Black)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-4	266	SF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Reflective Media		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.3c	12	LB		

DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Sodding		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
T-904-5.2	50	SY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Topsoil (Obtained Onsite or Removed from Stockpile)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
T-905-5.1	212	CY		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	6" Pipe (Perforated PVC)(Includes Porous Backfill and Filter Fabric)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-705-5.4	256	LF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.1	300	LF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.2	660	LF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed Above the Duct Bank or Conduit, Including Connections/Terminations		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.3	360	LF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Non-Encased Electrical Conduit, 2"		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L110-5.2	330	LF		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Electrical Junction Structure L-867D, 16" Diameter, 24" Deep		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L115-5.1	4	EA		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Taxiway Edge Light, Elevated, Blue Lens		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L125-5-1	5	EA		
DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1	Construction Safety and Phasing Plan		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1000	1	LS		

DESCRIPTION:	☐ Base Bid or ☒ Alt.# 1		Seeding (Hydroseeding)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1001	0.3	AC		

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 F Reconstruction

A.I.P. No. X-XX-XXXX-XXX-XXXX
 S.P. No. H.XXXXXX

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		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C-102-5.1e	440	LF		

DESCRIPTION:	___ Base Bid or X Alt. #2	Pavement Removal (Taxiway F)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-101-5.1	544	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	0.4	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	904	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	268	CY		

DESCRIPTION:	___ Base Bid or X Alt. #2	Subbase Course (18" Thick)		
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-154-5.1	415	CY		

DESCRIPTION:	___ Base Bid or X	Alt. #2	Lime Treated Subgrade (12")	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.1	863	SY		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Lime	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-155-8.2	11	TON		
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-209-5.1	863	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	863	SY		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Lean Concrete Base Course (11.0" Thick)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-306-8.1	1,138	SY		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Cement Treated Permeable Base Course (6.0" Thick)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-307	1,138	SY		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Concrete Pavement (9.0" Thick)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-501-8.1	1,105	SY		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Joint Sealing Filler	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-605-5.1	1,540	LF		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Surface Preparation	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.1a	768	LF		

DESCRIPTION:	___ Base Bid or X	Alt. #2	Taxiway Marking (Yellow)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-1	234	SF		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Taxiway Marking (Black)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.2b-4	535	SF		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Reflective Media	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
P-620-5.3c	20	LB		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Sodding	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
T-904-5.2	50	SY		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Topsoil (Obtained Onsite or Removed from Stockpile)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
T-905-5.1	300	CY		
DESCRIPTION:	___ Base Bid or X	Alt. #2	6" Pipe (Perforated PVC)(Includes Porous Backfill and Filter Fabric)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
D-705-5.4	424	LF		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.1	500	LF		
DESCRIPTION:	___ Base Bid or X	Alt. #2	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.2	1,120	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	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L-108-5.3	600	LF		

DESCRIPTION:	___ Base Bid or X	Alt. #2	Non-Encased Electrical Conduit, 2"	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L110-5.2	500	LF		
DESCRIPTION:	___ Base Bid or X	Alt. #2	HDPE Conduit, 2" Jack and Bore under Taxiway	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L110-5.3	70	LF		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Electrical Junction Structure L-867D, 16" Diameter, 24" Deep	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L115-5.1	2	EA		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Taxiway Edge Light, Elevated, Blue Lens	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L125-5.1	13	EA		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Sign L-858 Size 1, 3 Panel, Concrete Base	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
L125-5.3	1	EA		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Construction Safety and Phasing Plan	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1000	1	LS		
DESCRIPTION:	___ Base Bid or X	Alt. #2	Seeding (Hydroseeding)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
S-1001	0.4	AC		

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

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, #6 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. AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet (long and 3/4 inch in diameter).

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

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

b. The field-attached plug-in splice. Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

c. The factory-molded plug-in splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

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

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

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

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

108-2.6 Concrete. Concrete shall be proportioned, placed, and cured per 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 wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

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

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

the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

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

CONSTRUCTION METHODS

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

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

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

Provide not less than 3 feet (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 in size. The cable circuit identification shall match the circuits noted on the construction plans.

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

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

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

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

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

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

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

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

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

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

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

trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

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

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

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

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

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

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

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

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

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

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

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the direct-buried cable or the

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

c. Restoration. Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the sodding, topsoiling, fertilizing, liming, seeding, sprigging and mulching as required. 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 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 high and 3 inches wide, with width of stroke 1/2 inch and 1/4 inch deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPICE" 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 on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

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

with integral sealant extending at least 1-1/2 inches on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

d. Taped or heat-shrink splices. A taped splice shall be made in the following manner:

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

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

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

e. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer's recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

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

a. Equipotential. 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 minimum or 12 inches 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. Counterpoise size is as shown on the plans. The isolation method is an alternate method for use only with edge lights installed in turf and stabilized soils and raceways installed parallel to and adjacent to the edge of the pavement. NFPA 780 uses 15 feet to define “adjacent to”.

The counterpoise conductor shall be installed halfway between the pavement edge and the light base, mounting stake, raceway, or cable being protected.

The counterpoise conductor shall be installed 8 inches minimum below grade. The counterpoise is not connected to the light base or mounting stake. An additional grounding electrode is required at each light base or mounting stake. The grounding electrode is bonded to the light base or mounting stake with a 6 AWG solid copper conductor.

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

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

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

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

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

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (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.

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

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

a. All slag shall be removed from welds.

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

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

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

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

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

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

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

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

e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments complies with Table 1. Verify continuity of all series airfield lighting circuits prior to energization.

TABLE 1. INSULATION RESISTANCE TO GROUND

<i>CIRCUIT LENGTH IN FEET</i>	<i>MINIMUM MEGOHMS AT 500VDC</i>	<i>MINIMUM MEGOHMS AT 1000VDC</i>
10,000 OR LESS	50	45
10,000 – 20,000	40	36
20,000 OR MORE	30	27

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

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

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

i. That the impedance to ground of each ground rod does not exceed **25 ohms** prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

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

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

METHOD OF MEASUREMENT

108-4.1 Trenching shall be measured by the linear feet 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 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 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	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits - per linear foot
Item L-108-5.2	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit - per linear foot
Item L-108-5.3	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed Above the Duct Bank or Conduit, Including Connections/Terminations - per linear foot

REFERENCES

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

Advisory Circulars (AC)

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

Commercial Item Description

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

ASTM International (ASTM)

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

Mil Spec

MIL-PRF-23586F Performance Specification: Sealing Compound (with Accelerator),
Silicone Rubber, Electrical

MIL-I-24391 Insulation Tape, Electrical, Plastic, Pressure Sensitive

National Fire Protection Association (NFPA)

NFPA-70 National Electrical Code (NEC)

NFPA-780 Standard for the Installation of Lightning Protection Systems

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

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

Federal Aviation Administration Standard

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

END OF ITEM L-108

Item L-110 Airport Underground Electrical Duct Banks and Conduits

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits 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.

110-2.4 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.

110-2.8 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), with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches wide. Detectable tape is incidental to the respective bid item.

CONSTRUCTION METHODS

110-3.1 General. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches per 100 feet (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 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 below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. Flowable backfill may alternatively be used

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (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.

110-3.3 Conduits without concrete encasement. Trenches for single-conduit lines shall be not less than 6 inches nor more than 12 inches wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (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 apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (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.

Conduits jacked and bored under taxiways shall be HDPE type which meets UL Standard 651A, ASTM D3350 cell classification 334420C or higher, and ASTM F2160 with minimum wall rating of SDR 11 for directional boring applications.

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 thick extending approximately one inch above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (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 high and 3 inches wide with width of stroke 1/2 inch and 1/4 inch deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

110-3.5 Backfilling for conduits. For conduits, 8 inches of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.6 Backfilling for duct banks. After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 "Excavation and Embankment" except that the material used for backfill shall be select material not larger than 4 inches in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet (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 , . 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. Cable removed shall become the property of the owner. If owner does not wish to retain removed cables, then contractor shall remove from site and dispose of properly.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

Item L-110-5.2	Non-Encased Electrical Conduit, 2", - per linear foot
Item L-110-5.3	HDPE Conduit, 2" Jack and Bore under Taxiway – 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
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National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
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Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

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Item L-115 Electrical Manholes and Junction Structures

DESCRIPTION

115-1.1 This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the RPR. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the RPR including removal of existing manholes and junction structures as shown on the plans .

EQUIPMENT AND MATERIALS

115-2.1 General.

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

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

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

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

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

115-2.2 Concrete structures. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Cast-in-place concrete structures shall be 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 thickness for L-867 and 3/4-inch thickness for L-868. All junction boxes shall be provided with both internal and external ground lugs.

115-2.5 Mortar. The mortar shall be composed of one part of cement and two parts of mortar sand, by volume. The cement shall be per the requirements in ASTM C150, Type I. The sand shall be per the requirements in ASTM C144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C206. Water shall be potable, reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product.

115-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

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 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.

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 diameter hot-dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2-inch 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 (2.4 m) long nor less than 3/4 inch in diameter.

CONSTRUCTION METHODS

115-3.1 Unclassified excavation. It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the RPR without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the RPR. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the RPR. Structures shall be placed after the RPR has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches 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.

115-3.6 Removal of sheeting and bracing. In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than 6 inches of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The RPR may direct the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

115-3.7 Backfilling. After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches 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.

115-3.9 Grounding. A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches 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 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.

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 Structure L-867D, 16" Diameter, 24" Deep - Per Each
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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
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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)
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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
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Mil Spec

MIL-P-21035	Paint High Zinc Dust Content, Galvanizing Repair
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National Fire Protection Association (NFPA)

NFPA-70

National Electrical Code (NEC)

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Item L-125 Installation of Airport Lighting Systems

DESCRIPTION

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

EQUIPMENT AND MATERIALS

125-2.1 General.

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

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

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

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

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

EQUIPMENT AND MATERIALS

125-2.2 Conduit/Duct. Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.

125-2.3 Cable and Counterpoise. Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.

125-2.4 Tape. Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.

125-2.5 Cable Connections. Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.

125-2.6 Retroreflective Markers. Retroreflective markers shall be type L-853 and shall conform to the requirements of AC 150/5345-39.

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

Elevated Taxiway Lights

Type	Class	Mode	Style	Option	Base	Filter	Transformer	Notes
L-861	2	1	3	N/A	L-867	BLUE	L-830	N/A

Runway Guard Lights

Type	Class	Mode	Style	Option	Base	Filter	Transformer	Notes
L-804	2	1	3	N/A	L-867	YELLOW	L-830	N/A

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

Signs

Type	Size	Style	Class	Mode	Notes
L-858	1	2	1	2	N/A

125-2.12 Light Base and Transformer Housings. Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type L-867, Class 1A, Size B shall

be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates shall be provided to accommodate various sizes of fixtures.

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

INSTALLATION

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

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

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

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

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

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

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

METHOD OF MEASUREMENT

125-4.1 Reflective markers will be measured by the number installed as completed units in place, ready for operation, and accepted by the RPR. Runway and taxiway lights will be measured by the number of each type installed as completed units in place, ready for operation, and accepted by the RPR. Guidance signs will be measured by the number of each type and size installed as completed units, in place, ready for operation, and accepted by the RPR. Runway End Identifier Lights shall be measured by each system installed as a completed unit in place, ready for operation, and accepted by the RPR.

Precision Approach Path Indicator shall be measured by each system installed as a completed unit, in place, ready for operation, and accepted by the RPR. Abbreviated Precision Approach Path Indicator shall be measured by each system installed as a completed unit, in place, ready for operation, and accepted by the RPR.

BASIS OF PAYMENT

125-5.1 Payment will be made at the Contract unit price for each complete runway or taxiway light, guidance sign, reflective marker, runway end identification light, precision approach path indicator, or abbreviated precision approach path indicator installed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item including the demolition and removal of existing taxiway edge light and guidance signs, including all associated components, foundations, wiring, accessories, and incidental materials necessary to fully remove the systems from service, unless otherwise noted to remain.

Payment will be made under:

Item L-125-5.1	Taxiway Edge Light, elevated, Blue Lens - each
Item L-125-5.2	Runway Guard Light, Yellow Lens - each
Item L-125-5.3	Sign L-858 Size 1, 3 Panel, Concrete Base - each
Item L-125-5.4	Sign L-858, Size1, 4 Panel, Concrete Base -each

REFERENCES

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

Advisory Circulars (AC)

AC 150/5340-18	Standards for Airport Sign Systems
AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-44	Specification for Runway and Taxiway Signs
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-51	Specification for Discharge-Type Flashing Light Equipment
AC 150/5345-53	Airport Lighting Equipment Certification Program

Engineering Brief (EB)

EB No. 67

Light Sources Other than Incandescent and Xenon for Airport and
Obstruction Lighting Fixtures

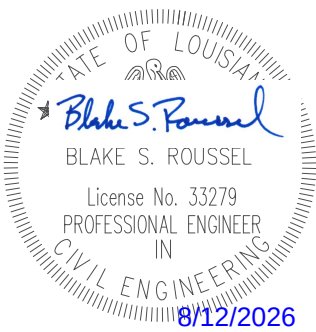
END OF ITEM L-125

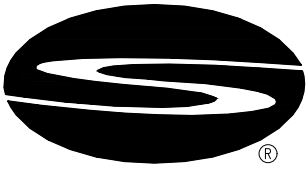
BASE BID SUMMARY OF QUANTITIES				
Ref. No.	Item Description	Qty	Unit	
C-100	Contractor Quality Control Program (CQCP)	1	LS	
C-102-5.1e	Installation and Removal of Silt Fence	1,310	LF	
C-105	Mobilization	1.0	LS	
P-101-5.1	Pavement Removal (Taxiway F)	4,407	SY	
P-101-5.2	Removal of Existing Concrete Catch Basin	3	EA	
P-101-5.3	Removal of Existing Pipe (Storm Drain)	744	LF	
P-151-4.2	Clearing and Grubbing	1	AC	
P-152-4.1	Unclassified Excavation	3,967	CY	
P-152-4.2	Embankment in Place	112	CY	
P-154-5.1	Subbase Course (18" Thick)	3,387	CY	
P-155-8.1	Lime-Treated Subgrade (12")	6,603	SY	
P-155-8.2	Lime	85	TON	
P-209-5.1	Crushed Aggregate Base Course (6.0" Thick)	6,603	SY	
P-209-5.2	Separation Geotextile	6,603	SY	
P-306-8.1	Lean Concrete Base Course (11.0" Thick)	5,884	SY	
P-307	Cement Treated Permeable Base Course (6.0" Thick)	5,884	SY	
P-401-8.1	Asphalt Mixture Surface Course (2" Thick)	52	TON	
P-403-8.1a	Asphalt Mixture Binder Course (2" Thick)	52	TON	
P-403-8.1b	Asphalt Base Course (5" Thick)	129	TON	
P-407-7.1	Asphalt Permeable Treated Base Course	468	SY	
P-501-8.1	Concrete Pavement (9.0" Thick)	5,713	SY	
P-602-5.1	Emulsified Asphalt Prime Coat	28	GAL	
P-603-5.1	Emulsified Asphalt Tack Coat	141	GAL	
P-605-5.1	Joint Sealing Filler	8,300	LF	
P-610-6.1	Concrete	275	CY	
P-620-5.1a	Surface Preparation	5,437	SF	
P-620-5.2b-1	Taxiway Marking (Yellow)	1,898	SF	
P-620-5.2b-2	Taxiway Marking (White)	55	SF	
P-620-5.2b-3	Taxiway Marking (Red)	263	SF	
P-620-5.2b-4	Taxiway Marking (Black)	3,221	SF	
P-620-5.3c	Reflective Media	193	LB	
T-904-5.2	Sodding	435	SY	
T-905-5.1	Topsoil (Obtained Onsite or Removed from Stockpile)	710	CY	
D-705-5.4	6" Pipe (Perforated PVC)(Includes Porous Backfill and Filter Fabric)	424	LF	
D-701-5.1	18" RCP (Class IV)(Includes Bedding & Backfill)	78	LF	
D-701-5.2	48" RCP (Class IV)(Includes Bedding & Backfill)	402	LF	
D-701-5.3	54" RCP (Class IV)(Includes Bedding & Backfill)	342	LF	
D-751-5.1	Furnish, Install 36" x 24" Concrete Open Top Catch Basin	1	EA	
D-751-5.2	Furnish, Install 72" x 48" Concrete Open Top Catch Basin	3	EA	
L-108-5.1	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits	1,800	LF	
L-108-5.2	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit	3,960	LF	
L-108-5.3	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed Above the Duct Bank or Conduit, Including Connections/Terminations	2,160	LF	
L-110-5.2	Non-Encased Electrical Conduit, 2"	1,800	LF	
L-110-5.3	HDPE Conduit, 2" Jack and Bore Under Taxiway	280	LF	
L-115-5.1	Electrical Junction Structure, L-867D, 16" diameter, 24" deep	8	EA	
L-125-5.1	Taxiway Edge Light, Elevated, Blue Lens	22	EA	
L-125-5.2	Runway Guard Light, Yellow Lens	2	EA	
L-125-5.3	Sign L-858 Size 1, 3 Panel, Concrete Base	2	EA	
L-125-5.4	Sign L-858, Size 1, 4 Panel, Concrete Base	2	EA	
S-1000	Construction Safety and Phasing Plan	1	LS	
S-1001	Seeding (Hydroseeding)	0.9	AC	
S-1002	Adjusting Catch Basins	1	EA	

ALT 1 SUMMARY OF QUANTITIES				
Ref. No.	Item Description	Qty	Unit	
C-102-5.1e	Installation and Removal of Silt Fence	340	LF	
P-101-5.1	Pavement Removal (Taxiway F)	577	SY	
P-151-4.2	Clearing and Grubbing	0.3	AC	
P-152-4.1	Unclassified Excavation	644	CY	
P-152-4.2	Embankment in Place	36	CY	
P-154-5.1	Subbase Course (18" Thick)	358	CY	
P-155-8.1	Lime Treated Subgrade (12")	716	SY	
P-155-8.2	Lime	9	TON	
P-209-5.1	Crushed Aggregate Base Course (6.0" Thick)	716	SY	
P-209-5.2	Separation Geotextile	716	SY	
P-306-8.1	Lean Concrete Base Course (11.0" Thick)	724	SY	
P-307	Cement Treated Permeable Base Course (6.0" Thick)	724	SY	
P-501-8.1	Concrete Pavement (9.0" Thick)	702	SY	
P-605-5.1	Joint Sealing Filler	1,268	LF	
P-620-5.1a	Surface Preparation	399	LF	
P-620-5.2b-1	Taxiway Marking (Yellow)	133	SF	
P-620-5.2b-4	Taxiway Marking (Black)	266	SF	
P-620-5.3c	Reflective Media	12	LB	
T-904-5.2	Sodding	50	SY	
T-905-5.1	Topsoil (Obtained Onsite or Removed from Stockpile)	212	CY	
D-705-5.4	6" Pipe (Perforated PVC)(Includes Porous Backfill and Filter Fabric)	256	LF	
L-108-5.1	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits	300	LF	
L-108-5.2	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit	660	LF	
L-108-5.3	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed Above the Duct Bank or Conduit, Including Connections/Terminations	360	LF	
L-110-5.2	Non-Encased Electrical Conduit, 2"	330	LF	
L-115-5.1	Electrical Junction Structure, L-867D, 16" diameter, 24" deep	4	EA	
L-125-5.1	Taxiway Edge Light, Elevated, Blue Lens	5	EA	
S-1000	Construction Safety and Phasing Plan	1	LS	
S-1001	Seeding (Hydroseeding)	0.3	AC	

ALT 2 SUMMARY OF QUANTITIES				
Ref. No.	Item Description	Qty	Unit	
C-102-5.1e	Installation and Removal of Silt Fence	440	LF	
P-101-5.1	Pavement Removal (Taxiway F)	544	SY	
P-151-4.2	Clearing and Grubbing	0.4	AC	
P-152-4.1	Unclassified Excavation	904	CY	
P-152-4.2	Embankment in Place	268	CY	
P-154-5.1	Subbase Course (18" Thick)	415	CY	
P-155-8.1	Lime Treated Subgrade (12")	863	SY	
P-155-8.2	Lime	11	TON	
P-209-5.1	Crushed Aggregate Base Course (6.0" Thick)	863	SY	
P-209-5.2	Separation Geotextile	863	SY	
P-306-8.1	Lean Concrete Base Course (11.0" Thick)	1,138	SY	
P-307	Cement Treated Permeable Base Course (6.0" Thick)	1,138	SY	
P-501-8.1	Concrete Pavement (9.0" Thick)	1,105	SY	
P-605-5.1	Joint Sealing Filler	1,540	LF	
P-620-5.1a	Surface Preparation	768	LF	
P-620-5.2b-1	Taxiway Marking (Yellow)	234	SF	
P-620-5.2b-4	Taxiway Marking (Black)	535	SF	
P-620-5.3c	Reflective Media	20	LB	
T-904-5.2	Sodding	50	SY	
T-905-5.1	Topsoil (Obtained Onsite or Removed from Stockpile)	300	CY	
D-705-5.4	6" Pipe (Perforated PVC)(Includes Porous Backfill and Filter Fabric)	424	LF	
L-108-5.1	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits	500	LF	
L-108-5.2	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit	1,120	LF	
L-108-5.3	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed Above the Duct Bank or Conduit, Including Connections/Terminations	600	LF	
L-110-5.2	Non-Encased Electrical Conduit, 2"	500	LF	
L-110-5.3	HDPE Conduit, 2" Jack and Bore Under Taxiway	70	LF	
L-115-5.1	Electrical Junction Structure, L-867D, 16" diameter, 24" deep	2	EA	
L-125-5.1	Taxiway Edge Light, Elevated, Blue Lens	13	EA	
L-125-5.3	Sign L-858 Size 1, 3 Panel, Concrete Base	1	EA	
S-1000	Construction Safety and Phasing Plan	1	LS	
S-1001	Seeding (Hydroseeding)	0.4	AC	

CADD D3-R4



2	ELECTRICAL QTO UPDATES	CRD	BSR	BSR	8/11/2026
1	HMA QTO UPDATES	CRD	BSR	BSR	7/24/2026
NO.	REVISIONS	DSGN	CHKD	APVD	DATE
Stanley Consultants INC. 721 Government Street, Suite 302, Baton Rouge, Louisiana 70802 www.stanleyconsultants.com					
TAXIWAY F RECONSTRUCTION					
SUMMARY OF ESTIMATED QUANTITIES					
SHEET 8					
DESIGNED <u>C.R.D.</u> DRAWN <u>J.H.A.</u> CHECKED <u>B.J.F.</u> APPROVED <u>B.S.R.</u> APPROVED <u>C.G.W.</u> DATE <u>07/02/2026</u>				SCALE: NTS NO. 31585.01 G006	
				REV. 2	

Ref. No.	Item Description	Unit	Qty	Unit Price	Total Price
C-100	Contractor Quality Control Program (CQCP)	LS	1	\$200,000.00	\$200,000.00
C-102-5.1e	Installation and Removal of Silt Fence	LF	1,310	\$5.00	\$6,550.00
C-105	Mobilization	LS	1	\$500,000.00	\$500,000.00
P-101-5.1	Pavement Removal (Taxiway F)	SY	4,407	\$17.00	\$74,926.73
P-101-5.2	Removal of Existing Concrete Catch Basin	EA	3	\$1,000.00	\$3,000.00
P-101-5.3	Removal of Existing Pipe (Storm Drain)	LF	744	\$75.00	\$55,800.00
P-151-4.2	Clearing and Grubbing	AC	1	\$12,000.00	\$14,697.91
P-152-4.1	Unclassified Excavation	CY	3,967	\$25.00	\$99,175.00
P-152-4.2	Embankment in Place	CY	112	\$40.00	\$4,480.00
P-154-5.1	Subbase Course (18" Thick)	CY	3,387	\$75.00	\$254,025.00
P-155-8.1	Lime-Treated Subgrade (12")	SY	6,603	\$5.25	\$34,665.75
P-155-8.2	Lime	TON	85	\$450.00	\$38,250.00
P-209-5.1	Crushed Aggregate Base Course (6.0" Thick)	SY	6,603	\$40.00	\$264,120.00
P-209-5.2	Separation Geotextile	SY	6,603	\$4.00	\$26,412.00
P-306-8.1	Lean Concrete Base Course (11.0" Thick)	SY	5,884	\$75.00	\$441,300.00
P-307	Cement treated Permeable Base Course (6.0" Thick)	SY	5,884	\$85.00	\$500,140.00
P-401-8.1	Asphalt Mixture Surface Course (2" Thick)	TON	52	\$250.00	\$13,000.00
P-403-8.1a	Asphalt Mixture Binder Course (2" Thick)	TON	52	\$250.00	\$13,000.00
P-403-8.1b	Asphalt Base Course (5" Thick)	TON	129	\$250.00	\$32,250.00
P-407-7.1	Asphalt Permeable Treated Base Course	SY	468	\$100.00	\$46,800.00
P-501-8.1	Concrete Pavement (9.0" Thick)	SY	5,713	\$116.00	\$662,708.00
P-602-5.1	Emulsified Asphalt Prime Coat	GAL	28	\$10.00	\$280.00
P-603-5.1	Emulsified Asphalt Track Coat	GAL	141	\$2.00	\$282.00
P-605-5.1	Joint Sealing Filler	LF	8,300	\$2.00	\$16,600.00
P-610-6.1	Concrete	CY	275	\$125.00	\$34,375.00
P-620-5.1a	Surface Preparation	SF	5,437	\$1.00	\$5,437.05
P-620-5.2b-1	Taxiway Marking (Yellow)	SF	1,898	\$1.00	\$1,898.48
P-620-5.2b-2	Taxiway Marking (White)	SF	55	\$1.00	\$54.74
P-620-5.2b-3	Taxiway Marking (Red)	SF	263	\$1.00	\$262.59
P-620-5.2b-4	Taxiway Marking (Black)	SF	3,221	\$1.00	\$3,221.24
P-620-5.3c	Reflective Media	LB	193	\$6.00	\$1,158.00
T-904-5.2	Sodding	SY	435	\$20.00	\$8,700.00
T-905-5.1	Topsoil (Obtained Onsite or Removed from	CY	710	\$15.00	\$10,650.00
D-701-5.1	18" RCP (Class IV)(Includes Bedding & Backfill)	LF	78	\$350.00	\$27,300.00
D-701-5.2	48" RCP (Class IV)(Includes Bedding & Backfill)	LF	402	\$450.00	\$180,900.00
D-701-5.3	54" RCP (Class IV)(Includes Bedding & Backfill)	LF	342	\$650.00	\$222,300.00
D-705-5.4	6" Pipe (Perforated PVC)(Includes Porous Backfill	LF	424	\$50.00	\$21,200.00
D-751-5.1	Furnish, Install 36" x 24" Concrete Open Top	EA	1	\$5,500.00	\$5,500.00
D-751-5.2	Furnish, Install 72" x 48" Concrete Open Top	EA	3	\$12,000.00	\$36,000.00

L-108-5.1	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits	LF	1,800	\$89.31	\$160,753.77
L-108-5.2	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit	LF	3,960	\$8.29	\$32,825.27
Ref. No.	Item Description	Unit	Qty	Unit Price	Total Price
L-108-5.3	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed Above the Duct Bank or Conduit, Including Connections/Terminations	LF	2,160	\$19.05	\$41,151.99
L-110-5.2	Non-Encased Electrical Conduit, 2"	LF	1,800	\$45.49	\$81,887.02
L110-5.3	HDPE Conduit, 2" Jack and Bore under Taxiway	LF	280	\$77.21	\$21,618.43
L115-5.1	Electrical Junction Structure L-867D, 16" Diameter, 24" Deep	EA	8	\$2,696.94	\$21,575.54
L125-5.1	Taxiway Edge Light, Elevated, Blue Lens	EA	22	\$9,012.36	\$198,271.91
L125-5.2	Runway Guard Light, Yellow Lens	EA	2	\$13,278.96	\$26,557.91
L125-5.3	Sign L-858 Size 1, 3 Panel, Concrete Base	EA	2	\$21,829.31	\$43,658.61
L125-5.4	Sign L-858, Size1, 4 Panel, Concrete Base	EA	2	\$22,162.21	\$44,324.41
S-1000	Construction Safety and Phasing Plan	LS	1	\$325,000.00	\$325,000.00
S-1001	Seeding (Hydroseeding)	AC	0.9	\$3,200.00	\$2,880.00
S-1002	Adjusting Catch Basins	EA	1	\$6,500.00	\$6,500.00

Base Bid Total					\$4,868,424.34

Ref. No.	Item Description	Unit	Qty	Unit Price	Total Price
C-102-5.1e	Installation and Removal of Silt Fence	LF	340	\$5.00	\$1,700.00
P-101-5.1	Pavement Removal (Taxiway F)	SY	577	\$17.00	\$9,809.04
P-151-4.2	Clearing and Grubbing	AC	0.3	\$12,000.00	\$3,600.00
P-152-4.1	Unclassified Excavation	CY	644	\$25.00	\$16,100.00
P-152-4.2	Embankment in Place	CY	36	\$40.00	\$1,440.00
P-154-5.1	Subbase Course (18" Thick)	CY	358	\$75.00	\$26,828.71
P-155-8.1	Lime Treated Subgrade (12")	SY	716	\$5.25	\$3,759.00
P-155-8.2	Lime	TON	9	\$450.00	\$4,050.00
P-209-5.1	Crushed Aggregate Base Course (6.0" Thick)	SY	716	\$40.00	\$28,657.29
P-209-5.2	Separation Geotextile	SY	716	\$4.00	\$2,865.73
P-306-8.1	Lean Concrete Base Course (11.0" Thick)	SY	724	\$45.00	\$32,599.45
P-307	Cement Treated Permeable Base Course (6.0" Thick)	SY	724	\$85.00	\$61,576.74
P-501-8.1	Concrete Pavement (9.0" Thick)	SY	702	\$116.00	\$81,440.64
P-605-5.1	Joint Sealing Filler	LF	1,268	\$2.00	\$2,536.00
P-620-5.1a	Surface Preparation	LF	399	\$1.00	\$399.33
P-620-5.2b-1	Taxiway Marking (Yellow)	SF	133	\$1.00	\$133.11
P-620-5.2b-4	Taxiway Marking (Black)	SF	266	\$1.00	\$266.22
P-620-5.3c	Reflective Media	LB	12	\$6.00	\$72.00
T-904-5.2	Sodding	SY	50	\$20.00	\$1,000.00
T-905-5.1	Topsoil (Obtained Onsite or Removed from Stockpile)	CY	212	\$15.00	\$3,180.00
D-705-5.4	6" Pipe (Perforated PVC)(Includes Porous Backfill and Filter Fabric)	LF	256	\$50.00	\$12,800.00
L-108-5.1	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits	LF	300	\$92.37	\$27,711.59
L-108-5.2	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit	LF	660	\$8.19	\$5,405.14
L-108-5.3	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed Above the Duct Bank or Conduit, Including Connections/Terminations	LF	360	\$19.92	\$7,170.25
L110-5.2	Non-Encased Electrical Conduit, 2"	LF	330	\$52.18	\$17,218.80
L115-5.1	Electrical Junction Structure L-867D, 16" Diameter, 24" Deep	EA	4	\$2,696.98	\$10,787.92
L125-5-1	Taxiway Edge Light, Elevated, Blue Lens	EA	5	\$8,795.31	\$43,976.53
S-1000	Construction Safety and Phasing Plan	LS	1	\$116,000.00	\$116,000.00
S-1001	Seeding (Hydroseeding)	AC	0.3	\$3,200.00	\$960.00
Alternate No. 1 Total					\$524,043.48

Ref. No.	Item Description	Unit	Qty	Unit Price	Total Price
C-102-5.1e	Installation and Removal of Silt Fence	LF	440	\$5.00	\$2,200.00
P-101-5.1	Pavement Removal (Taxiway F)	SY	544	\$17.00	\$9,248.00
P-151-4.2	Clearing and Grubbing	AC	0.4	\$12,000.00	\$4,800.00
P-152-4.1	Unclassified Excavation	CY	904	\$25.00	\$22,600.00
P-152-4.2	Embankment in Place	CY	268	\$40.00	\$10,720.00
P-154-5.1	Subbase Course (18" Thick)	CY	415	\$75.00	\$31,125.00
P-155-8.1	Lime Treated Subgrade (12")	SY	863	\$5.25	\$4,530.75
P-155-8.2	Lime	TON	11	\$450.00	\$4,950.00
P-209-5.1	Crushed Aggregate Base Course (6.0" Thick)	SY	863	\$40.00	\$34,520.00
P-209-5.2	Separation Geotextile	SY	863	\$4.00	\$3,452.00
P-306-8.1	Lean Concrete Base Course (11.0" Thick)	SY	1,138	\$45.00	\$51,210.00
P-307	Cement Treated Permeable Base Course (6.0" Thick)	SY	1,138	\$85.00	\$96,730.00
P-501-8.1	Concrete Pavement (9.0" Thick)	SY	1,105	\$116.00	\$128,180.00
P-605-5.1	Joint Sealing Filler	LF	1,540	\$2.00	\$3,080.00
P-620-5.1a	Surface Preparation	LF	768	\$1.00	\$768.00
P-620-5.2b-1	Taxiway Marking (Yellow)	SF	234	\$1.00	\$234.00
P-620-5.2b-4	Taxiway Marking (Black)	SF	535	\$1.00	\$535.00
P-620-5.3c	Reflective Media	LB	20	\$6.00	\$120.00
T-904-5.2	Sodding	SY	50	\$20.00	\$1,000.00
T-905-5.1	Topsoil (Obtained Onsite or Removed from Stockpile)	CY	300	\$15.00	\$4,500.00
D-705-5.4	6" Pipe (Perforated PVC)(Includes Porous Backfill and Filter Fabric)	LF	424	\$50.00	\$21,200.00
L-108-5.1	Trenching for direct-buried cable, 18-inch minimum depth, turf and pavement restoration, protection of existing circuits	LF	500	\$83.17	\$41,583.01
L-108-5.2	No. 6 AWG, 5 kV, L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit	LF	1,120	\$8.19	\$9,172.36
L-108-5.3	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed Above the Duct Bank or Conduit, Including Connections/Terminations	LF	600	\$24.20	\$14,522.05
L110-5.2	Non-Encased Electrical Conduit, 2"	LF	500	\$66.18	\$33,092.01
L110-5.3	HDPE Conduit, 2" Jack and Bore under Taxiway	LF	70	\$111.06	\$7,774.02
L115-5.1	Electrical Junction Structure L-867D, 16"	EA	2	\$2,696.98	\$5,393.96
L125-5.1	Taxiway Edge Light, Elevated, Blue Lens	EA	13	\$6,761.43	\$87,898.63
L125-5.3	Sign L-858 Size 1, 3 Panel, Concrete Base	EA	1	\$21,829.31	\$21,829.31
S-1000	Construction Safety and Phasing Plan	LS	1	\$116,000.00	\$116,000.00
S-1001	Seeding (Hydroseeding)	AC	0.4	\$3,200.00	\$1,280.00
Alternate No. 2 Total					\$774,248.10