

TRANSPORTATION BULLETIN



Illinois Department of Transportation

ADDENDUM NO. 1

Dated: April 1, 2004

For: Transportation Bulletin
Volume 7 No. 11a Dated: March 19, 2004
Letting Date: April 23, 2004

Item No. 9A

Dixon Municipal Airport

Dixon, Illinois

Ill. Proj. No. C73-3313

AIP No. 3-17-0036-B5

Contract DI019

Rehabilitate Runway 8/26 and T-Hangar Pavements (Phase 1) – Including Drainage Improvements in the Proximity of the T-Hangar Pavements

TO ALL PLAN HOLDERS:

This Addendum forms a part of the Contract Documents and Modifies the Construction Plans , Special Provisions dated 12 March 2004, with the changes and additions noted Below.

This Addendum consists of the inclusion of Additive Alternate No. 1, "Install a L-880 4-Box PAPI system on Runway 26."

The Bidder must incorporate these changes into his Bid. Failure to do so may disqualify the Bidder.

This Addendum consists of a replacement Schedule of Prices, seven (7) new and replacement construction drawings and 29 pages of new and replacement written text.

COUNTY NAME	CODE	DIST	AIRPORT NAME	FED PROJECT	ILL PROJECT
OGLE	141	02	DIXON MUNICIPAL	3-17-0036-B5	C7-3 -3313

***** BASE *****

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE		TOTAL PRICE	
				DOLLARS	CENTS	DOLLARS	CTS
AR110502	2-WAY CONCRETE ENCASED DUCT	L.F.	38.000 X	=		=	
AR125941	ADJUST STAKE MOUNTED LIGHT	EACH	78.000 X	=		=	
AR125942	ADJUST BASE MOUNTED LIGHT	EACH	10.000 X	=		=	
AR150510	ENGINEER'S FIELD OFFICE	L.S.	1.000 X	=		=	
AR150560	TEMPORARY THRESHOLD	L.S.	1.000 X	=		=	
AR152410	UNCLASSIFIED EXCAVATION	C.Y.	2,905.000 X	=		=	
AR156510	SILT FENCE	L.F.	992.000 X	=		=	
AR156513	SEPARATION FABRIC	S.Y.	1,631.000 X	=		=	
AR156544	RIPRAP-GRADATION NO. 4	S.Y.	66.000 X	=		=	
AR201610	BITUMINOUS BASE COURSE	TON	147.000 X	=		=	
AR201620	BITUMINOUS BASE COURSE, LEVELING	TON	4,999.000 X	=		=	
AR201630	BITUMINOUS BASE TEST SECTION	EACH	1.000 X	=		=	
AR209608	CRUSHED AGG. BASE COURSE - 8"	S.Y.	1,593.000 X	=		=	
AR401610	BITUMINOUS SURFACE COURSE	TON	3,736.000 X	=		=	
AR401630	BITUMINOUS SURFACE TEST SECTION	EACH	1.000 X	=		=	

DIXON MUNICIPAL
 OGLE

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE		TOTAL PRICE	
				DOLLARS	CENTS	DOLLARS	CTS
AR401650	BITUMINOUS PAVEMENT MILLING	S.Y.	2,950.000	X			
AR401665	BITUMINOUS PAVEMENT SAWING	L.F.	1,046.000	X			
AR401900	REMOVE BITUMINOUS PAVEMENT	S.Y.	1,588.000	X			
AR401910	REMOVE & REPLACE BIT. PAVEMENT	S.Y.	142.000	X			
AR602510	BITUMINOUS PRIME COAT	GAL.	625.000	X			
AR603510	BITUMINOUS TACK COAT	GAL.	4,331.000	X			
AR620525	PAVEMENT MARKING-BLACK BORDER	S.F.	1,542.000	X			
AR620530	PAVEMENT MARKING-EPOXY	S.F.	22,978.000	X			
AR620590	TEMPORARY MARKING	S.F.	6,562.000	X			
AR701418	18" RCP, CLASS III	L.F.	167.500	X			
AR701436	36" RCP, CLASS III	L.F.	307.500	X			
AR701442	42" RCP, CLASS III	L.F.	242.500	X			
AR701512	12" RCP, CLASS IV	L.F.	113.000	X			
AR701515	15" RCP, CLASS IV	L.F.	148.500	X			
AR701900	REMOVE PIPE	L.F.	94.500	X			

DIXON MUNICIPAL
OGLE

ILLINOIS DEPARTMENT OF TRANSPORTATION
SCHEDULE OF PRICES
CONTRACT NUMBER - DI019

ECMS081 DTGECM03 ECMR003 PAGE 3
RUN DATE - 04/09/04
RUN TIME - 152338

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE		TOTAL PRICE	
				DOLLARS	CENTS	DOLLARS	CTS
AR705412	POROUS BACKFILL NO. 2	C.Y.	13.000 X				
AR705504	4" PERFORATED UNDERDRAIN	L.F.	380.500 X				
AR705630	UNDERDRAIN INSPECTION HOLE	EACH	1.000 X				
AR705640	UNDERDRAIN CLEANOUT	EACH	1.000 X				
AR751411	INLET-TYPE A	EACH	1.000 X				
AR751540	MANHOLE 4'	EACH	1.000 X				
AR751550	MANHOLE 5'	EACH	1.000 X				
AR751560	MANHOLE 6'	EACH	1.000 X				
AR751567	MANHOLE 7'	EACH	2.000 X				
AR752442	PRECAST REINFORCED CONC. FES 42"	EACH	1.000 X				
AR752542	GRATING FOR CONC. FES 42"	EACH	1.000 X				
AR800932	RUNWAY CLOSURE MARKER-SET	EACH	1.000 X				
AR800961	GRANULAR DRAINAGE SUBBASE - 12"	S.Y.	1,496.000 X				
AR800962	RAP SUBBASE - FROM ON-SITE	C.Y.	125.000 X				
AR800963	RAP SUBBASE - FROM OFF-SITE	C.Y.	480.000 X				

DIXON MUNICIPAL
 OGLE

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE		TOTAL PRICE	
				DOLLARS	CENTS	DOLLARS	CTS
AR800970	TRENCH DRAIN	L.F.	112.000 X	-	-	-	-
AR800972	BITUMINOUS SAND MIX - 2"	S.Y.	2,950.000 X	-	-	-	-
AR800973	CRACK CONTROL MATERIAL	L.F.	5,960.000 X	-	-	-	-
AR901510	SEEDING	ACRE	4.400 X	-	-	-	-
AR904510	SODDING	S.Y.	15,725.000 X	-	-	-	-
AR905510	TOPSOILING (FROM ON SITE)	C.Y.	745.000 X	-	-	-	-
AR905520	TOPSOILING (FROM OFF SITE)	C.Y.	1,870.000 X	-	-	-	-
AR908510	MULCHING	ACRE	4.400 X	-	-	-	-

SUBTOTAL BASE \$

***THE DEPARTMENT RESERVES THE RIGHT TO AWARD THIS CONTRACT ON THE
 ***BASIS OF ANY OF THE ALTERNATES OR COMBINATION THEREOF.

***** ALT 1 *****

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE		TOTAL PRICE	
				DOLLARS	CENTS	DOLLARS	CTS
AS108654	3/C #4 600 V UG CABLE IN UD	L.F.	2,018.000 X				
AS110014	4" DIRECTIONAL BORE	L.F.	168.000 X				
AS125615	PAPI (L-880 SYSTEM)	EACH	1.000 X				
AS800969	SECONDARY POWER DISTRIBUTION	L.S.	1.000 X				

SUBTOTAL ALT 1 \$
 CONTRACT - DI019

SUMMARY OF TOTAL ALTERNATES	
TOTAL BASE \$	
TOTAL ALT 1 \$	

NOTE:

1. EACH PAY ITEM SHOULD HAVE A UNIT PRICE AND A TOTAL PRICE.
2. THE UNIT PRICE SHALL GOVERN IF NO TOTAL PRICE IS SHOWN OR IF THERE IS A DISCREPANCY BETWEEN THE PRODUCT OF THE UNIT PRICE MULTIPLIED BY THE QUANTITY.
3. IF A UNIT PRICE IS OMITTED, THE TOTAL PRICE WILL BE DIVIDED BY THE QUANTITY IN ORDER TO ESTABLISH A UNIT PRICE.
4. A BID MAY BE DECLARED UNACCEPTABLE IF NEITHER A UNIT PRICE NOR A TOTAL PRICE IS SHOWN.

Construction Plans and Special Provisions

**Dixon Municipal Airport
Overlay Runway 8-26 and Rehabilitate Hangar Pavements
AIP Project No. 3-17-0036-B5
IDA Project No. C73-3313**

Addendum No. 1

CHANGES TO THE CONSTRUCTION PLANS

Replace the following drawings in the Construction Plans dated 12 March 2004 with the replacement drawings attached:

Replace:

With:

Sheet No.	Title	Dated	Sheet No.	Title	Dated
1	Cover Sheet	12 March 2004	1	Cover Sheet	01 April 2004
2	Summary of Quantities	12 March 2004	2	Summary of Quantities	01 April 2004

Add the following drawings to the Construction Plans:

Sheet No.	Title	Dated
69	Runway 26 PAPI Site Plan	01 April 2004
70	Runway 26 PAPI Details	01 April 2004
71	Secondary Power Distribution Panel and Lighting Contactor Details	01 April 2004
72	Electrical One Line Diagram for Runway 26 PAPI	01 April 2004
73	Electrical Cable Details	01 April 2004

Construction Plans and Special Provisions

**Dixon Municipal Airport
Overlay Runway 8-26 and Rehabilitate Hangar Pavements
AIP Project No. 3-17-0036-B5
IDA Project No. C73-3313**

Addendum No. 1

CHANGES TO THE SPECIAL PROVISIONS

Replace the following pages of the Special Provisions dated 12 March 2004 with the replacement pages attached:

Replace:

With:

Page Nos.	Title	Dated	Page Nos.	Title	Dated
i, ii	Table of Contents	12 March 2004	i, ii	Table of Contents	01 April 2004

Delete the following pages of the Special Provisions dated 12 March 2004:

Page Nos.	Title	Dated
12	Item 108 Installation of Underground Cable for Airports	12 March 2004
13, 14	Item 110 Installation of Airport Underground Electrical Duct	12 March 2004

Add the following new pages to the Special Provisions:

Page Nos.	Title	Dated
71, 72, 73, 74, 75, 76, 77, 78, 79	Item 108 Installation of Underground Cable for Airports	01 April 2004
80, 81, 82	Item 110 Installation of Airport Underground Electrical Duct	01 April 2004
83, 84, 85, 86	Item 125615 PAPI (L-880 System)	01 April 2004
87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97	Item 800969 Secondary Power distribution	01 April 2004

INDEX OF SPECIAL PROVISIONS

<u>Page Number</u>	<u>Description</u>
1	General
1	Governing Specifications and Rules and Regulations
2	Illinois Department of Transportation, Division of Aeronautics, Supplemental Specifications, Recurring Special Provisions & Policy Memorandums
5	Section 10 Definition of Terms
6	Section 20 Scope of Work
7	Section 30 Control of Work
8	Section 40 Control of Materials
9	Section 50 Legal Relations and Responsibility to Public
10	Section 60 Prosecution and Progress
11	Section 70 Measurement and Payment
12	Item 108 Revised by Addendum No. 01
13	Item 110 Revised by Addendum No. 01
15	Item 125 Installation of Airport Lighting Systems
17	Item 150510 Engineer's Field Office
19	Item 150560 Temporary Threshold
21	Item 152 Excavation and Embankment
23	Item 156000 Erosion Control
24	Item 156513 Separation Fabric
25	Item 156540 Riprap
26	Item 201002 Bituminous Base Course - Method II
27	Item 209 Crushed Aggregate Base Course
29	Item 401002 Bituminous Surface Course - Method II
30	Item 401650 Bituminous Pavement Milling
31	Item 401665 Bituminous Pavement Sawing
32	Item 401900 Remove Bituminous Pavement
33	Item 401910 Remove and Replace Bituminous Pavement
36	Item 602 Bituminous Prime Coat
37	Item 603 Bituminous Tack Coat
38	Item 610 Structural Portland Cement Concrete
39	Item 620 Pavement Marking

SPECIAL PROVISIONS
DIXON MUNICIPAL AIRPORT (C73)
OVERLAY RUNWAY 8-26 and REHABILITATE HANGAR PAVEMENTS

AIP PROJECT NO. 3-17-0036-B5
IDA PROJECT NO. C73-3313

Addendum No. 01

<u>Page</u> <u>Number</u>		<u>Description</u>
40	Item 701	Pipe for Storm Sewers and Culverts
42	Item 705	Pipe Underdrains for Airports
48	Item 751	Manholes, Catch Basins, Inlets and Inspection Holes
49	Item 752	Concrete Culverts, Headwalls and Miscellaneous Drainage Structures
51	Item 800932	Runway Closure Marker - Set
53	Item 800961	Granular Drainage Subbase
57	Item 800962	RAP Subbase
61	Item 800970	Trench Drain
63	Item 800972	Partial Depth Bituminous Crack Repair and Patch
66	Item 901	Seeding
67	Item 904	Sodding
68	Item 905	Topsoiling
70	Item 908	Mulching
71	Item 108	Installation of Underground Cable for Airports (Addendum 01)
80	Item 110	Installation of Airport Underground Electrical Duct (Addendum 01)
83	Item 125615	PAPI (L-880 System) (Addendum 01)
87	Item 800969	Secondary Power Distribution (Addendum 01)

ITEM 108

INSTALLATION OF UNDERGROUND CABLE FOR AIRPORTS

Revise Item 108 of the Standard Specifications as follows:

108-1.1 DESCRIPTION. Delete the last sentence and insert the following:

"This item of work shall also consist of the installation of feeder cable for the Runway 26 PAPI system at the locations shown on the Plans and in accordance with these specifications. This item shall include "cable in unit duct" where noted on the Plans and specified herein.

"In areas where there is a congestion of buried cable or where the proposed cable crosses an existing cable, the Contractor will be required to trench the proposed cable into place. In all other areas, the Contractor has the option to either trench or plow the proposed cable in unit duct into place. The trenching or plowing of this cable will be considered incidental to the Contract unit price of the proposed cable and no additional compensation will be allowed.

"When crossing existing circuits, the Contractor will be required to hand dig the trenches for the proposed cable."

MATERIALS

108-2.1 GENERAL. Add the following.

"All cable shall be UL listed as suitable for installed application."

108-2.2 CABLE. Revise this section to read as follows:

"XLP-USE Wire - Cable shall comply with UL Standard 44, UL Standard 854, and Federal Specification A-A-59544. Conductor shall be concentric strand soft copper, conforming to ASTM B8 and Underwriters' Laboratories Standard UL44 for Rubber Insulated Wires. Insulation shall be rated for 600V. Insulation shall be cross-linked polyethylene conforming to Underwriter's Laboratories Requirements for Type USE-2 insulation. Cable shall be UL listed and marked USE-2. Cable shall be Southwire Company or Rome Cable Corporation, Type USE or approved equal.

"Item AR108654, 3/C #4 600 V UG Cable In UD shall consist of 3-1/C #4 AWG, XLP-USE, 600 volt cable in unit duct (1.25-inch or sized larger as required per NEC). Conductor insulation shall be color coded Black, Red and Green for 240 VAC, single phase circuits with an equipment ground wire.

"All other wiring associated with the PAPI system shall be the type and size as shown on the Plans and/or as specified herein and shall be considered incidental to Item AR125615 PAPI (L-880 System) - per each.

"All other wiring associated with the new electric service and power distribution and control center power panel (for the Runway 26 PAPI system) shall be the type and size as shown on the Plans and/or as specified herein and shall be considered incidental to Item AR800969 (Secondary Power Distribution - per each."

108-2.3 BARE COPPER WIRE (Counterpoise). Revise this section to read:

"Bare copper counterpoise wire will not be required on this project under Item 108. Bare copper counterpoise wire associated with the PAPI installations shall be as specified under Item AR125615, and shall be incidental to Item AR125615 PAPI (L-880 System) - per each."

108-2.4 CABLE CONNECTIONS. Delete paragraphs (b) and (e). Add the following to this section after the first paragraph:

"The cost of furnishing and installing all cable connections as specified shall not be paid for separately but shall be included in the cost of the cable.

"The Contractor will use a cable stripper/penciler whenever cable connections are made.

"All breaks in the unit duct shall be sealed by shrink kits.

"All below grade splices shall be installed in splice cans. Splice cans shall be L-867, Class I, Size B (12-inch diameter), 24-inch deep with ½ inch thick steel cover. Larger size splice cans shall be provided as applicable, for specific equipment applications or manufacturer's recommendations, and/or where detailed on the Plans. Splice cans located in areas subject to heavy aircraft or vehicle loading shall be L-868 type. The Resident Engineer shall approve all splice locations before work commences."

Add the following paragraph after subparagraph (e):

"(f) Heat Shrink Tubing; On all connections, only waterproof connectors will be used, installed in accordance with the manufacturer's installation recommendations. Each waterproof splice shall be further protected by applying heat shrinkable tubing with interior adhesive shall be applied over all cable connections. One-piece heat shrink kits that cover the entire waterproof connector kit shall be used. Two layers of electrical tape shall be wrapped around the connection before the heat shrinkable tubing is installed. The heat shrinkable tubing will be as manufactured by 3M, Scotch or equal."

Add:

108-2.6 UNIT DUCT. Unit duct shall be as described under this item.

The duct shall comply with NEMA Standards Publication No. TC7-1990, Part 4, ASTM D3485, and ASTM D1248, with additions, options and exceptions as detailed herein. The duct shall be annealed during the extrusion process. The duct shall be manufactured from black, virgin, high-density polyethylene resin designated as Type III, Grade P34, and Class C, Category 5 material in accordance with ASTM D1248.

Addendum No. 01

Standard sizes of smooth wall polyethylene duct shall conform to the dimensional requirements specified below:

Nominal Duct Size	Nominal Inside Diameter	Nominal Standard Wall	Nominal Outside Diameter*
3/4"	0.910"	0.070"	1.050"
1"	1.145"	0.085"	1.315"
1-1/4"	1.440"	0.110"	1.660"
1-1/2"	1.650"	0.125"	1.900"
2"	2.065"	0.155"	2.375"
2-1/2"	2.449"	0.213"	2.875"
3"	3.048"	0.228"	3.500"
4"	4.000"	0.250"	4.500"

* Dimensions include allowance for duct eccentricity.

Dimensional measurements shall be performed on samples removed from each complete length of finished duct. The manufacturer shall have the capability to manufacture a composite wire/cable-in-duct system, wherein the wire and cables are placed in the polyethylene duct without sticking during the extrusion process. The open ends of each length of reeled flexible duct shall be sealed by plastic caps to prevent the entrance of dirt and water. The duct shall have a durable identification, which shows the manufacturer's name and/or trademark, all at intervals not to exceed ten (10) feet.

The manufacturer shall furnish copies of certified test reports on duct. The unit duct shall be Cablecon, as manufactured by Dura-Line Corporation, or approved equal.

Add:

108-2.7 CABLE PLOWING EQUIPMENT. At the Contractor's option cable in unit-duct may be installed in trench or using cable plowing equipment. The plow shall also be capable of concurrently installing the line marking tape as specified elsewhere for this item.

The plowing equipment shall be of the vibratory type. It shall vibrate at a rate of at least 1200 cycles per minutes. The vibrating unit shall not be rigidly mounted on the tractor. It shall be connected to the tractor for towing, in such a manner that the tractor will not dampen the vibrations.

The plow blade shall be a sufficient length to facilitate installation of the unit duct at the specified depth. The shoe throat shall be sized for the unit duct size. Cable way and cable guides shall be smooth, free of obstructions and sharp edges and shall not cause bending of the unit duct at shorter than 3-inch radius. It also shall not cause excessive cable strain, which may damage cable insulation or stretch the conductor.

Where two or more unit ducts are installed in a single operation, the plow shall be equipped with separate feeds, one for each unit duct, to provide the specified separation. The plow shall also be capable of concurrently installing the line marking tape as specified elsewhere for this item.

CONSTRUCTION REQUIREMENTS

108-3.1 GENERAL. Add the following:

"All airfield lighting and lighting power circuits are considered critical. It is, therefore, imperative that the Contractor carefully review the Plans showing lighting layouts, the proposed location of cable runs, and delineate the locations of existing cable.

"Care shall be taken so as not to damage any existing circuits. Any existing circuits damaged shall be immediately repaired to the satisfaction of the Engineer and/or the respective utility or owner where applicable. Any repairs of existing cables will be considered incidental to the Contract and no additional compensation will be allowed.

"The cable quantities shown in the Plans are from straight line measurement and do not consider any vertical distances or runs within the shelter buildings or equipment enclosures, nor do the quantities include the required cable slack as stated in Section 108-3.4.

"If the Contractor desires to lay cable on a line other than that shown on the Plans, he shall obtain approval from the Project Engineer. Any additional cable needed by such Contractor-requested change shall be at the Contractor's expense.

"New underground cable installed under this Project shall be marked so as to identify its associated circuit at all locations such as ducts, electrical manholes, etc. and when over other lighting cables in the same location. Means for this marking shall be approved by the Resident Engineer. The type of marking shall be recorded and given to the Airport Owner. The cost of this work shall be incidental to the cable.

"Only cable in unit duct or telephone cable rated for plowing may be plowed.

"The unit duct shall be installed so that it is possible to withdraw a cable and pull-in a new replacement cable. Sweeping, long-radius bends shall be used; any runs with a kink or short radius bend will be rejected and replaced at the Contractor's expense.

"At base cans, the unit duct shall be inserted at least 3-inches inside each of the can hubs, and then the end of the hub shall be sealed using a heat shrink connection."

108-3.2 INSTALLATION IN DUCT OR CONDUIT. Add the following to this section:

"The proposed cable and unit duct shall be factory assembled and delivered to the site on reels.

"The unit duct will be run continuous through all ducts and conduits unless shown otherwise on the Plans."

108-3.3 TRENCHING. Add the following to this section:

"Cable trenches shall be excavated to the minimum depths shown on the Plans. Cable plowing shall be done at the minimum depths shown on the Plans."

108-3.4 INSTALLATION IN TRENCHES. Delete the first paragraph and replace with the following:

"Except as described elsewhere in this item, the Contractor is permitted to use a cable plow for installing the cable. Should the Contractor elect to install the cable in trenches, he is permitted to use mechanical cable-laying equipment in conjunction with a trenching machine. If mechanical cable-laying equipment is used, it should provide for the physical inspection of cable prior to backfilling. Sharp bends or kinks in the cable shall not be permitted.

"Any and all trenches will be backfilled to a smooth grade to the satisfaction of the Resident Engineer. The backfill shall be compacted to the satisfaction of the Resident Engineer and shall not result in the development of "fallen trenches". "Fallen" trenches/plowing shall be repaired by additional backfilling to the satisfaction of the Resident Engineer. This backfill work/re-work shall be incidental to the Contract unit price for cable.

"Areas disturbed during the installation of the proposed cable, which are not completed before the Contract seeding operations, and disturbed areas outside of the seeding/sodding limits will be fertilized and seeded. The fertilizing and seeding will be completed in accordance with Item 901, but will be incidental to the Contract unit price for cable."

108-3.5 BACKFILLING. Add the following:

"Line marking tape shall be installed during the backfill process at a minimum depth of 6 inches and a maximum depth of 12 inches. Installation methods shall be to the satisfaction of the Resident Engineer. Line marking tape shall be color red for power cables and orange for telephone cable, Terra Tape - Sentry Line, Reinforced Detectable, by Reef Industries, Inc., 9209 Alameda Genoa Rd., Houston, TX 77075-2339, 1-800-231-6074, or equal."

108-3.7 CABLE MARKERS. Add the following:

"The Contractor shall provide and install cable markers along the cable runs as described in this section."

108-3.8 SPLICING. Delete subparagraphs (b), (c), (d) and (e) and insert the following:

"Splices will be allowed in new circuits only at electrical handholes or in splice cans. Splices of multi-conductor control cable and/or telephone communications cable will not be allowed.

"Any repairs necessary in existing cables cut during construction will be made with the cast splice kit. The Contractor shall have a minimum of two (2) splice kits on the job site at all times for emergency repairs. Splice markers shall be installed over each splice in cables not to be abandoned. Cast splice kits shall be specified in paragraph (a) of Item 108-2.4."

108-3.9 BARE COUNTERPOISE WIRE INSTALLATION AND GROUNDING FOR LIGHTNING PROTECTION. Revise this section to read as follows:

"Bare copper counterpoise wire will not be required on this project under Item 108. Bare copper counterpoise wire associated with the PAPI installations shall be as specified under Item AR125615, and shall be incidental to Item AR125615 PAPI (L-880 System) - per each."

108-3.10 TESTING. Add the following paragraphs:

"g. All testing shall be in the presence of the Resident Engineer. Test equipment and power to conduct the tests shall be furnished and operated by the Contractor at no cost to the Contract. The equipment shall be approved by the Resident Engineer before testing. All cables found to be defective due to installation methods shall be replaced by the Contractor at his expense."

Add:

108-3.11 PLOWING-IN OF CABLE IN UNIT DUCT OR TELEPHONE CABLE DIRECT BURY.

NOTICE: Plowing-in of unit duct or telephone cable does not relieve the Contractor of responsibility for repairing damage to existing cables cut as a result of the Contractor's operations, as described in Paragraph 108-3.1. Extreme care must be taken to locate all existing circuits in the working limits of the plowing operations before commencing the operation. The Contractor shall have the option of trenching-in cables as described in Paragraph 108-3.3, 108-3.4, 108-3.5, and 108-3.6 in lieu of plowing-in any sections so noted on the Plans - at no additional cost or time to the Contract.

If the Contractor elects to plow the cable in unit-duct or telephone cable into place, his plowing operation must conform to the following requirements:

The forward moving speed of the plow shall be between 15 and 40 feet per minute. The plow shall be wide enough to freely allow the unit-duct to pass through it but not exceed the overall width of two inches. The line marking tape shall be installed concurrent with the cable plowing.

The unit duct shall be inserted into the plow in a manner that will not cause the unit-duct to bind, pull or break. The unit-duct shall be installed so that it is possible to withdraw a cable and pull in a new one. Sweeping long radius bends shall be used. Any run with a kink or short radius bend will be rejected. The cable in unit duct shall be installed continuous between lights without any splices in cable or unit duct. The holes for the transformer bases or at locations of cable termination shall be dug before the plowing operation is commenced. A method approved by the Engineer shall be used to prevent the walls of the holes from collapsing due to tractor and plow wheels.

The unit duct may be unreeled along the proposed cable route before plowing or the unit duct reels may be mounted on the tractor. In the latter case, unreeling of the unit duct shall not cause excessive tension on the cable.

After the tractor and the plow are positioned at the beginning of the run, sufficient unit duct slack shall be pulled through the throats. Then the plow shall be lowered into the hole and the unit duct shall be hand held for the start of plowing. At each equipment hole the plow shall be stopped (movement and vibration), raised and the required amount of slack shall be hand pulled. Care shall be taken during the operation that the unit duct, at the entrance into the equipment hole, shall not be pulled from the specified depth. Plowing shall be continued by lowering the plow, starting it and holding the unit duct by hand until it is firmly held by the ground.

The plow shall not be backed onto the unit duct.

When an underground obstruction is encountered, the plow shall be lifted out of the ground. The obstruction shall be removed by hand digging. An opening shall be hand dug around the unit duct down to the depth of the unit duct and large enough to lower the plow, then the plow shall be lowered into the opening. While this is being done the unit duct shall be pulled back into the throat by hand to prevent kinks or sharp bends. In no case shall the unit duct be bent sharper than 3 inch radius, or be subjected to excessive tension.

After installation of unit duct by plowing, the disturbed earth at the surface shall be leveled and, if necessary, compacted by a device approved by the Engineer.

Ends of cable shall be taped immediately after cutting to prevent moisture from entering the cable. Where the cable is not expected to be connected for at least 72 hours, the tape shall also be varnished.

To identify routing of the unit duct, immediately after plowing stakes shall be installed every 200 feet along straight runs and at each curve. Later these stakes shall be replaced by regular concrete cable markers. Concrete markers shall be placed in areas not used for agricultural purposes (plowed fields).

Plow operators shall be experienced and qualified by schooling and/or by sufficient on the job training under an experienced operator. Proof of such qualification shall be required from the Contractor.

Add:

108-3.12 LOCATING OF EXISTING UNDERGROUND UTILITIES AND CABLES. The location, size, and type of material of existing underground utilities indicated on the Plans are not represented as being accurate, sufficient or complete. Neither the owner nor the Engineer assumes any responsibility whatever in respect to the accuracy, completeness, or sufficiency of the information. There is no guarantee, either expressed or implied, that the locations, size and type of material of existing underground utilities indicated are representative of those to be encountered in the construction. It shall be the Contractor's responsibility to determine the actual location of all such facilities, including service connections to underground utilities. Prior to construction, the Contractor shall notify the utility companies of his operational Plans and shall obtain from the respective utility companies detailed information and assistance relative to the location of their facilities and the working schedule of the companies for removal or adjustment where required. In the event an unexpected utility interference is encountered during construction, the Contractor shall immediately notify the utility company of jurisdiction. The Engineer shall also be immediately notified. Any such mains and services shall be restored to service at once and paid for by the Contractor at no additional cost to the Contract.

All utility cables and lines shall be located by the respective utility. Contact JULIE (Joint Utility Location Information for Excavation) for utility information, phone: 1-800-892-0123. It should be noted that all FAA control and communications cables shall be located by the FAA. Also contact the Resident Engineer and Airport Manager for assistance in locating underground airport cables and/or utilities.

The Contractor shall locate and mark all existing cables within ten (10) feet of the proposed excavation or plowing/trenching area. Any cables found interfering with the proposed excavation or cable plowing/trenching shall be hand-dug and exposed. Any damaged cables shall be immediately repaired to the satisfaction of the Resident Engineer and at the Contractor's expense. The Resident Engineer and the Airport Owner shall immediately be notified if any cables are damaged.

Payment for locating and marking underground cables will not be paid for separately but shall be considered incidental to the plowing/trenching of cable in unit duct.

METHOD OF MEASUREMENT

108-4.1 METHOD OF MEASUREMENT. Delete this Section in its entirety.

108-4.2 METHOD OF MEASUREMENT. Delete this Section in its entirety and replace with the following:

"108-4.2 METHOD OF MEASUREMENT. Cables in unit duct will be measured as "one unit". Individual conductors will not be measured separately but as one run length. The quantity for cable in unit duct shall be the linear feet installed in trench, duct or conduit, measured in place, completed and ready for operation and accepted as satisfactory, and no extra quantity will be allotted for the required cable slack, turns, splices, etc., as stated under Section 108-3.4 of the Standard Specifications. The Contractor shall take this into consideration in preparing his bid and ordering the items concerned."

BASIS OF PAYMENT

108-5.1 Add the following:

"All plowing/trenching, hand-digging, exposing of existing cable ducts, backfilling, removal and disposal of existing cables, etc., shall not be paid for separately but shall be considered incidental to the Contract unit price for cable in unit duct or telephone cable direct bury.

"If, upon delivery and incorporation of any materials, the Contractor has failed to provide the necessary submittals as required by Sections 30-18, 40-01, 40-03 and 40-11 of the Standard Specifications, Supplemental Specifications and Special Provisions, the pay item shall not be included on the Contractor Progress Payment report until such submittals have been furnished."

Delete the last sentence and insert the following:

"Payment will be made under:

"Item AR108654 3/C #4 600V UG Cable in UD - per linear foot."

ITEM 110

INSTALLATION OF AIRPORT UNDERGROUND ELECTRICAL DUCT

Revise Item 110 of the Standard Specifications and Supplemental Specifications as follows:

110-1.1 DESCRIPTION. Add the following:

"This item shall consist of the construction of 2-way concrete encased duct at the locations shown on the Plans. Excavation and backfilling for the encased duct shall not be paid for separately but shall be included in the unit cost of the duct.

"This item shall also include duct installed by directional bore method, using Schedule 40 PVC conduit or HPDE duct as specified below and as shown on the Plans."

EQUIPMENT AND MATERIALS

110-2.5 STEEL CONDUIT. Delete the first sentence.

Add the following sentence:

"Steel conduits shall be galvanized rigid steel (GRS)."

110-2.7 PLASTIC CONDUIT. Add the following:

"Conduits for the 2-way concrete encased duct shall be 4-inch diameter, PVC, Schedule 40, UL listed, encased in concrete, in accordance with the details shown in the Plans.

"Conduits for directional boring shall be Schedule 40 PVC, UL listed, rated for 90 deg. C cable conforming to NEMA Standard TC-2 and UL 651 and suitable for directional boring installation or HDPE (High Density Polyethylene), UL listed, conforming to NEMA Standard TC-7 and UL 651B and suitable for directional boring installation. Per NEC 300.5 (K), raceways installed using directional boring equipment shall be approved for the purpose. Provide manufacturer's literature confirming the respective duct is suitable for directional boring with the respective shop drawing submittal."

CONSTRUCTION METHODS

110-3.1 GENERAL. Add the following:

"The proposed ducts will be constructed at the locations and in accordance with the details shown on the Plans.

"Underground ducts installed by directional boring method shall be installed in a manner that will not damage any existing underground utilities and shall not disturb or damage the respective pavement or roadway surface. Ducts shall be directional bored at the locations shown on the construction plans. The duct will be bored at a minimum depth of 36 inches below the top of pavement it is being bored under, unless shown otherwise on the plans. Ducts installed under paved areas and roadways shall extend a minimum of 3 feet beyond the respective pavement or roadway surface. A pull wire will be left in the conduit if it is to be left vacant. The ends of the conduit will be sealed with approved plugs."

110-3.4 DUCT MARKERS. Delete this Section and replace with the following:

"110-3.4 DUCT MARKERS. The location of all ducts shall be marked by installing a concrete duct marker (2 foot by 2 foot), at each end of each duct and at bends, as shown in the Plans. Also, each bituminous pavement edge shall be marked with a brass marker installed in the finished pavement, as shown in the Plans. Ducts under concrete pavement shall be marked with a "D" impressed into the fresh pavement, as shown on the Plans. The cost of furnishing and installing the markers shall be included in the unit price of the duct."

110-3.5 BACKFILLING. Add the following to the first paragraph:

"Concrete encased duct located under paved areas shall be backfilled with the FA-6 material."

METHOD OF MEASUREMENT

110-4.1 METHOD OF MEASUREMENT. Delete this Section and replace with the following:

"110-4.10 METHOD OF MEASUREMENT. The quantity of Concrete Encased Duct to be paid for under this item shall be the number of linear feet of the type and size of multi-way duct bank installed, measured in place, completed and accepted. Separate measurements for individual ducts in a multi-duct bank will not be made.

"The quantity of duct installed by directional bore, regardless of conduit type, shall be the number of linear feet of duct installed and measured in place, complete and accepted by the Resident Engineer.

"No separate measurement shall be made for furnishing and installing duct markers as they are incidental to a completed and accepted duct installation.

"Excavation, backfilling, topsoiling, seeding and mulching, or sodding for the trenching and backfilling of the duct installation and duct removal shall not be paid for separately but shall be included in the unit cost of the duct."

BASIS OF PAYMENT

110-5.1 BASIS OF PAYMENT. Delete this Section and replace with the following:

"110-5.1 BASIS OF PAYMENT. Payment will be made at the Contract unit price for each type and size of duct bank completed and accepted. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, for disposal of removed concrete duct, for preparation of all duct ends to remain, and for all labor, equipment, tools, and incidentals necessary to complete this item.

"If, upon delivery and incorporation of any materials, the Contractor has failed to provide the necessary submittals as required by Sections 30-18, 40-01, 40-03 and 40-11 of the Standard Specifications, Supplemental Specifications and Special Provisions, the pay item shall not be included on the Contractor Progress Payment report until such submittals have been furnished.

"Payment will be made under:

"Item AR110502 2-Way Concrete Encased Duct - per linear foot.
Item AR110014 4" Directional Bore - per linear foot."

ITEM 125615

PAPI (L-880 SYSTEM)

DESCRIPTION

125615-1.1 This item of work shall consist of furnishing and installing Precision Approach Path Indicators (PAPI's) at the locations shown on the Construction Plans. Each installation will be in accordance with the details on the Plans and these Special Provisions. Also included in this item will be the testing of the installation and all incidentals necessary to place the respective PAPI system into proper operation and to the satisfaction of the Resident Engineer.

MATERIALS

125615-2.1 PAPI UNITS. The proposed PAPI units shall be a Type L-880 system consisting of four dust-tight light units (each containing two lamps), Style "A" (240 VAC \pm 10%, 60 Hz input power), Class I qualified to -35°C, a power and control unit (PCU), and all accessories as per FAA AC 150/5345-28D and approved by the FAA AC 150/5345-53B, or latest revision. PAPI light units shall be of the "three mounting leg" type. The PCU shall include a main breaker to provide overcurrent protection and to serve as a maintenance safety switch to disconnect all power to the PAPI installation when in the "off" or "tripped" position. PAPI systems shall be Crouse-Hinds Catalog Number 8802A-1-17, or approved equal.

125615-2.2 SCREW ANCHOR FOUNDATIONS. Screw anchor foundations shall be as detailed in the Plans. The four light units and the PCU shall be mounted on separate steel plate and screw anchor assemblies.

125615-2.3 FEEDER AND CONTROL CABLE. Feeder cables from the respective power source to the respective PAPI installation shall be sized as detailed in the Plans and in conformance with Item 108. Control cable shall be as recommended by the respective PAPI manufacturer and per FAA AC 150/5345-28D. Power feeds from the PAPI PCU to the four PAPI light units shall be per manufacturer's recommendations and/or instructions. Note for the Crouse-Hinds Catalog Number 8802A-1 PAPI, the power feeds from the PAPI Power and Control Unit to the two furthest PAPI lighting units shall be #2 AWG (minimum) XLP-USE or THWN, 600 Volt cable. The power feeds from the PAPI Power and Control Unit to the two closest PAPI lighting units shall be #6 AWG (minimum) XLP-USE or THWN, 600 Volt cable. These conductor sizes are based on review with the Crouse-Hinds Field Service Support Center and are to accommodate voltage drop requirements.

125615-2.4 CONDUIT AND DUCTS. Conduit and ducts for the PAPI systems shall conform to Item 110, per manufacturer's recommendations, as detailed on the Plans, and as specified herein. Conduit for power and control cables from the PAPI Power and Control Unit to the PAPI lighting units and between the PAPI lighting units shall be 2-inch Schedule 40 PVC conduit, or larger where required by NEC and/or manufacturer's recommendations for the respective cables. Schedule 40 PVC conduit shall be UL listed and comply with NEMA Specification TC-2 (Conduit), (Fittings UL-514), and UL-651 (Standard for rigid nonmetallic conduit), and shall be suitable for aboveground, direct earth burial, concrete encasement, and exposed applications. Schedule 40 PVC conduit shall be Carlon Plus 40 conduit or approved equal.

125615-2.5 SPLICE CANS. Splice cans shall conform to the requirements of FAA AC 150/5345-42C for Type L-867, Class I, Size B (12-inch nominal diameter), 24-inch deep. Splice cans shall have steel covers, ½ in. thick, or as recommended by the respective PAPI manufacturer where the splice can is installed at the PAPI installation. Include ground lugs on the interior and exterior of the base can.

125615-2.6 GROUND RODS. Ground rods shall be ¾" diameter by 10' long UL listed copper clad, with 10-mil minimum copper coating.

125615-2.7 CONCRETE. Concrete for splice cans shall conform to Item 610.

125615-2.8 LEGEND PLATES. Legend plates shall be required for all PAPI power control units, safety switches, circuit breakers, disconnects, etc. Legend plates shall be provided to identify the equipment controlled, the power source and voltage, and the function of each device. Legend plates shall be weatherproof and abrasion resistant phenolic material. Lettering shall be ½-inch black letters on a white background, unless otherwise noted.

CONSTRUCTION METHODS

125615-3.1 INSTALLATION OF PAPI SYSTEMS. Installation of PAPI systems shall conform to FAA AC No. 150/5345-28D titled "PRECISION APPROACH PATH INDICATOR (PAPI) SYSTEMS" and the respective manufacturer's instructions. The Contractor shall furnish and install screw anchor foundations and base plates for the PAPI system units as shown in the Plans. Structural leg placement shall be as per manufacturer's recommendations. The structural legs shall have a breakable coupling not more than 2 inches from the top of the base plate. A 1-inch minimum conduit will be installed as shown to provide power cable access. The power control unit will be installed at the location recommended by the manufacturer. Any installations where the equipment is above ground shall have breakable couplings located 1-½ inches above final grade.

The PAPI unit will be installed and aimed in accordance with manufacturer's specifications. The aiming angles will comply with those shown on the Plans.

In the automatic mode of operation the PAPI units shall be activated by radio control as follows:

- 3 clicks - Off
- 5 clicks - Remain on
- 7 clicks - Remain on

The completed PAPI unit will be flight-checked by the Illinois Division of Aeronautics, and it shall be the Contractor's responsibility to have a representative present to make any necessary adjustments in the aiming of the PAPI unit.

Addendum No. 01

125615-3.2 ELECTRICAL. The Contractor shall furnish and install all electrical materials necessary for complete and operational installation of the PAPI systems as shown on the Plans and specified herein. The complete installation and wiring shall be done in a neat, workmanlike manner. All electrical work shall comply with the requirements of the National Electrical Code (most current issue in force). Electrical equipment shall be installed in conformance with the respective manufacturer's directions and recommendations for the respective application. Any installations which void the UL listing, ETL listing, (or other third party listing), and/or the manufacturer's warranty of a device shall not be permitted.

125615-3.3 CABLE INSTALLATION FOR PAPI'S. Installation of cables shall conform to Item 108, the applicable sections of FAA AC 150/5345-28D, per the respective equipment manufacturer's recommendations, and as detailed on the Plans. Power and control cables from the PAPI PCU to the PAPI light units and between the PAPI light units shall be installed in 2-inch PVC Schedule 40 conduit, or larger size as required by NEC and/or the manufacturer's recommendations for the respective cable sizes.

125615-3.4 CONDUIT INSTALLATION FOR PAPI'S. Installation of conduit shall conform to Item 110, the respective PAPI manufacturer's installation instructions and/or recommendations, as detailed on the Plans and as specified herein.

125615-3.5 GROUNDING FOR PAPI'S. Grounding for PAPI's shall conform to the respective PAPI manufacturer's installation instructions, as detailed on the Plans, and as specified herein. The power circuit to each PAPI light unit, including the PAPI PCU, shall include an equipment ground wire of the same size and type as the phase conductors. Furnish and install a 3/4-inch diameter by 10-foot long copper clad ground rod at each PAPI lighting unit and the PCU. Bond each PAPI light unit (housing/foundation/mounting flange) and PCU (housing/foundation/mounting flange) to the respective ground rod with a #6 AWG stranded copper grounding electrode conductor. Top of ground rods shall be buried 30" below grade. All connections to ground rods shall be exothermic weld as manufactured by Cadweld or Thermoweld. Connections to PAPI unit frame (housing/foundation/mounting flange) shall be as recommended by the manufacturer or with a UL-listed grounding connector. All ground rods associated with the complete PAPI installation shall be bonded to together with a #6 AWG solid copper counterpoise conductor. This counterpoise conductor shall be installed in the same trench located 10 inches above the power and control conductors conduit, between each respective PAPI light unit and the PCU.

METHOD OF MEASUREMENT

125615-4.1 The PAPI systems to be furnished and installed shall be measured for payment as a unit price per each and shall include a Type L-880 system consisting of four light units, a power and control unit (PCU), all anchors, plates and materials as required for foundations, all cable and conduit between and/or at the PAPI lighting units and PCU, grounding, splice cans, equipment, excavating, labor, tools, testing, and incidentals necessary to furnish a complete and operational PAPI system as approved by the Resident Engineer.

BASIS OF PAYMENT

125615-5.1 Payment shall be made at the Contract unit price per each. This price and payment shall be full compensation for furnishing and installing all materials, for all excavating, labor, tools, equipment, and incidentals necessary to complete this item of work. Cable in unit duct from the respective power source/panelboard to the respective PAPI installation shall be paid for under item 108. The meter base, load center, surge protector, radio controller and lighting contactor (power and control source for the respective PAPI installations) shall be paid for under item AR800969 Secondary Power Distribution.

If, upon delivery and incorporation of any materials, the Contractor has failed to provide the necessary submittals as required by Sections 30-18, 40-01, 40-03 and 40-11 of the Standard Specifications, Supplemental Specifications and Special Provisions, the pay item shall not be included on the Contractor Progress Payment report until such submittals have been furnished.

Payment will be made under:

Item AR125615 PAPI (L-880 System) - per each.

ITEM 800969

SECONDARY POWER DISTRIBUTION

DESCRIPTION

800969-1.1 This item shall include furnishing and installing power distribution and control centers for the PAPI's (Precision Approach Path Indicators) on Runway 26. Power for this system shall be a new 120/240 VAC, 1 Phase, 3 wire electric service. Power distribution and control center installation shall include utility meter base, load center with main breaker in an enclosure UL listed suitable for use as service equipment, all associated power wiring and conduits, surge protection, lighting contactor control panel, L-854 radio control unit, GFCI convenience receptacle, associated support structures and hardware, cables, conduits, labeling, and all associated grounding and equipment as required to make a complete and operational installation as detailed on the Plans and specified herein.

MATERIALS

800969-2.1 METER SOCKET. Meter socket for the new electric utility service shall be UL listed meter base conforming to the requirements of the serving electric utility company.

800969-2.2 LOAD CENTER. Load center for the powering the PAPI system on Runway 26 shall be 120/240 VAC, 1 Phase, 3 wire, 100 Amp, 12 circuit, with a 100 Amp, 2 pole main breaker in a NEMA 3R rainproof enclosure, UL listed suitable for service entrance, Square D Catalog Number QO112M100RB with PK9GTA equipment ground bar, or approved equal. Load center shall be provided with plug-on circuit breakers of size, type, number of poles, trip rating, and Amp Interrupting Capacity as detailed on the Plans. Breakers shall be 1 or 2 pole with an integral crossbar to assure simultaneous opening of all poles in multiple circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF", and "TRIPPED" positions. Circuit breakers shall be UL-listed in accordance with UL Standard 489 and shall be rated 120/240 volts AC, 1 phase 3 wire. A circuit directory frame and card with a clear plastic cover shall be provided on door interior. Circuit directory shall be typed indicating each branch circuit of the load center. Revise directory to reflect circuiting changes as required. Load centers and the respective enclosures shall be as detailed on the Plans. All new load centers shall be UL-listed and bear the UL label.

800969-2.3 AC POWER SURGE ARRESTER/TRANSIENT VOLTAGE SURGE SUPPRESSORS. AC power surge arrester/transient voltage surge suppressor for the load center, that powers the PAPI's on Runway 26, shall be UL 1449, second edition listed, suitable for a 120/240 VAC, 1 phase, 3 wire plus ground system, with a surge current rating of 120,000 Amperes, 8 x 20 microsecond wave per mode, and status indication lights in a NEMA 4 outdoor rated enclosure, Lightning Protection Corporation Model LPC 2020-3U-G, or approved equal.

800969-2.4 LIGHTING CONTACTOR PANEL FOR PAPI'S. Lighting contactor control panel for PAPI's on Runway 26 shall be as detailed on the Plans.

800969-2.5 L-854 RADIO CONTROLLERS. L-854 radio controllers shall be FAA approved and comply with FAA AC 150/5345-49 (latest issue), and FCC Rules and Regulations: Part 15. The radio controller shall be a Type I classification (air-to-ground) unit consisting of an AM receiver and Type A decoder mounted in a metal weatherproof, NEMA 4 enclosure, painted international orange per FAA Standard 595A. Input voltage shall be 120 VAC, 60 Hz. Frequency range shall be 118 to 136 MHz. Unit shall have solid-state circuitry other than the relays. Include antenna mounted each radio control unit enclosure with weather proof interface. Coordinate radio frequency with the Resident Engineer and Airport Manager.

800969-2.6 GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES. Receptacles with ground fault circuit interrupters shall be provided and installed where noted on the Plans. Ground fault circuit interrupter receptacles shall be rated 120 VAC, 60 HZ, 20 Amps, specification grade, duplex type, with NEMA 5-20R receptacle configuration and a trip threshold of 5 ± 1 milliamps. Ground fault circuit interrupter receptacles shall be UL Class "A" ground fault interrupter receptacle units complying with and tested in accordance with UL Standard No. 943. Ground fault circuit interrupter shall be as manufactured by Leviton, or equal, include junction boxes of surface-mount FS design as manufactured by Appleton, Crouse-Hinds, or equal, and industrial grade rain tight NEMA 3R (while outlet is in use, as well as when not in use), UL-listed, FS box mountable, weather-proof covers, TayMac Corporation Catalog NO. 20550 or approved equal.

800969-2.7 THWN Wire. Cable shall be 1/C sized as indicated on the Plans. Cable shall comply with Underwriters' Laboratories Standard UL-83 and shall be UL Listed as VW-1. Conductor shall be soft annealed uncoated cooper and shall comply with ASTM B3 and B8. Insulation shall be rated for 600V. Insulation shall be polyvinyl-chloride conforming to Underwriters' Laboratories requirements for Type THW. The outer covering shall be nylon conforming to Underwriters' Laboratories for type THHN or THWN. Cable shall be UL-listed and marked THWN. Service conductors and power and control wiring shall be Rome Building Wire, Type THWN, or approved equal.

800969-2.8 XHHW Wire. **XHHW wire may be used instead of THWN wire the Contractors option.** Cable shall be UL listed as Type XHHW-2 per UL Standard 44 for Rubber-Insulated wires and cables. Cable shall also conform to ICEA S-95-658/NEMA WC70 and Federal Specification J-C-30B. Conductors shall be Class B stranded annealed uncoated copper per UL Standard 44. Insulation shall be rated for 600V. Insulation shall be cross-linked polyethylene complying with the physical and electrical requirements of UL Standard 44 for Type XHHW-2. Service conductors and/or power and control wiring shall be Rome Building Wire, Type XHHW-2, or approved equal.

800969-2.9 JUNCTION AND PULL BOXES. Junction and pull boxes shall be sized as required for conductors and splices and per 2002 NEC Article 314. Boxes shall be UL-listed. Special boxes made to suit conditions shall be used to accommodate the respective application or where required by National Electrical Code even though they might not be indicated on the drawings. Surface mounted exterior junction and pull boxes located in non-hazardous, non-classified areas, shall be NEMA 4X stainless steel or aluminum, Crouse-Hinds, Killark, Hoffman, Hennessy, or equal. All junction and pull boxes installed in classified hazardous areas (Class 1, Division 1 or 2, Group D) shall be NEMA 7 and NEMA 4 and shall comply with applicable provisions of the NEC including, but not limited to, Articles 500 and 501.

800969-2.10 GALVANIZED RIGID STEEL CONDUIT. All galvanized rigid steel conduit and couplings shall conform to Federal Specification WW-C-581 and conform to Item 110. Conduit and fittings shall also conform to the requirements of UL 6 and UL 514B.

800969-2.11 SCHEDULE 40 PVC CONDUITS. Schedule 40 PVC conduit shall comply with Item 110 and the following: Conduit shall be Schedule 40 PVC, 90°C, UL-rated or approved equal. Material shall comply with NEMA Specification TC-2 (Conduit), (Fittings UL-514), and UL-651 (Standard for rigid nonmetallic conduit). The conduit and fittings shall carry a UL label (on each 10 ft length of conduit and stamped or molded on every fitting). Conduit and fittings shall be identified for type and manufacturer and shall be traceable to location of plant and date manufactured. The markings shall be legible and permanent. The conduit shall be made from polyvinyl chloride C-300 compound that includes inert modifiers to improve weather ability, heat distortion. Clean reworked material, generated by the manufacturer's own conduit production, may be used by the same manufacturer, provided the end products meet the requirements of this specification. The conduit and fittings shall be homogenous plastic material free from visible cracks, holes, or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks, or other imperfections, which could mar conductors or cables. Conduit fittings and cement shall be produced by the same manufacturer to assure system integrity and shall be Carlon Plus 40 conduit or equal.

800969-2.12 LIQUID-TIGHT FLEXIBLE METAL CONDUIT. Liquid-tight flexible metal conduit shall consist of polyvinyl jacket over flexible hot dip galvanized steel tubing. The flexible conduit shall be completely sealed from liquids, dust, dirt and fumes, and be resistant to oil, gasoline, grease, and abrasion. Jacket shall also be sunlight resistant. Liquid-tight flexible metal conduit shall be UL-listed, suitable for use as a grounding conductor, and comply with Article 350 of the NEC. Liquid tight flexible metal conduit shall be Anaconda Sealite Type UA as manufactured by Ananmet Electrical Inc., 1000 Broadway East, Mattoon, IL 61938-0039, Liqueatite Type LA as manufactured by Liqueatite 222 W. Central Ave., Roselle, IL 60172, or approved equal.

800969-2.13 GROUND RODS. Ground rods shall be 3/4-inch diameter, 10-foot long, UL-listed, copper clad with 10-mil minimum copper coating.

800969-2.14 LEGEND PLATES. Legend plates shall be required for all panelboards, safety switches, circuit breakers, disconnects, transformers, control panels, etc. Legend plates shall be provided to identify the equipment controlled, the power source, and the function of each device. Legend plates shall be weatherproof and abrasion resistant phenolic material. Lettering shall be 1/2-inch black letters on a white background, unless otherwise noted.

CONSTRUCTION METHODS

800969-3.1 LOCATE EXISTING UNDERGROUND UTILITIES AND CABLES. The location, size, and type of material of existing underground utilities indicated on the Plans are not represented as being accurate, sufficient or complete. It shall be the Contractor's responsibility to determine the actual location of all such facilities, including service connections to underground utilities.

Prior to construction, the Contractor shall notify the utility companies of his operational plans and shall obtain from the respective utility companies detailed information and assistance relative to the location of their facilities and the working schedule of the companies for removal or adjustment where required. In the event an unexpected utility interference is encountered during construction, the Contractor shall immediately notify the utility company of jurisdiction. The Resident Engineer and Airport Owner shall also be immediately notified. Any such mains and services shall be restored to service at once and paid for by the Contractor at no additional cost to the Contract.

Contact JULIE (Joint Utility Location Information for Excavation) for utility information, phone: 1-800-892-0123. Also contact the Airport Manager and/or respective airport personnel for assistance in locating underground airport cables and/or utilities.

800969-3.2 ELECTRICAL. The Contractor shall furnish and install all electrical materials necessary for complete and operational installation of the PAPI and REIL systems as shown on the Plans and specified herein. The complete installation and wiring shall be done in a neat, workmanlike manner. All electrical work shall comply with the requirements of the National Electrical Code (most current issue in force). Electrical equipment shall be installed in conformance with the respective manufacturer's directions and recommendations for the respective application. Any installations which void the UL listing, ETL listing, (or other third party listing), and/or the manufacturer's warranty of a device shall not be permitted.

The Contractor should examine the proposed site to evaluate the complexity of the work.

Contractor shall coordinate work and any power outages to buildings located on the airport with the Airport Manager/Director and/or the respective building personnel. Contractor shall coordinate work and any power outages to airfield lighting systems with the Resident Engineer and the Airport Owner.

The Contractor shall be responsible for furnishing and setting all anchor bolts required to install his equipment.

Where concrete mounting pads, foundations, or piers are required for equipment mounting, the Contractor shall furnish all concreting and form work necessary to complete the installation. Concrete shall conform to Item 610.

800969-3.3 ELECTRIC SERVICE ENTRANCE. Contractor shall furnish and install electric service entrance as detailed on the Plans and specified herein. As part of the service entrance work, the Contractor shall coordinate with the serving utility the installation of a 120/240 VAC, single-phase, 3 -wire service sufficient to handle a 100-amp service for the PAPI's on Runway 26. The Contractor shall coordinate the new electric service with the serving electric utility company and the Airport Manager and/or Airport Authority. **The respective Airport Authority/IDOT Division of Aeronautics shall pay for all associated electric utility company charges required to provide electric service for the Runway 26 PAPI System. The Contractor is not responsible for electric utility company charges associated with the electric service for the Runway 26 PAPI System.**

The Contractor shall coordinate the new electric service with the serving electric utility company and the Airport Manager. The service entrance shall include, but not be limited to, all service entrance equipment, labor and materials as detailed on the Plans and specified herein, in order to provide a complete and operational electrical system.

Serving Electric Utility: Major work items to be performed by the serving electric utility company shall be as follows:

1. The furnishing of power for a 120/240 VAC, single-phase, 3-wire secondary service sufficient to handle the loads for a 100-amp service.
2. The furnishing and installing of the meter.
3. Connecting the customer's service entrance conductors to the secondary side of the transformer.
4. The Serving Electric Utility Company shall retain the right to review and approve drawings prior to installation.

Contractor: Major work items to be performed by the Contractor (in contract) shall be as follows (all work, labor, equipment, and materials shall be as detailed on the Plans specified herein, and per the serving electric utility's requirements, where applicable):

1. Furnishing and installing the service entrance support structure.
2. Furnishing and installing service entrance conduit.
3. Furnishing and installing service entrance conductors.
4. Furnishing and installing the service entrance load center.
5. Furnishing and installing ground conductors, ground rod(s), and grounding electrode conductor conduit.
6. Furnishing and installing conduit and conductors between the load center and the meter base.
7. Furnishing and installing a meter base per the serving electric utility requirements.
8. Coordinating electric service work and billing arrangements with the serving electric utility and the Airport Manager and/or Respective Airport Authority.
9. Verifying all requirements with serving electric utility.
10. Additional work as required by the serving electric utility and as required to provide a complete and operational electric service entrance system.

800969-3.4 LOAD CENTER INSTALLATION. Install load centers as shown on the Plans and in accordance with NEMA PB1.1. Install load centers plumb. Install circuit breakers in load center in conformance with the respective manufacturer/s directions. Connect only one wire/cable to each breaker terminal. Provide filter plates for unused spaces in load centers. Provide typed or neatly printed circuit directory to identify each branch circuit in the load center. Revise directory to reflect circuiting changes as required. Provide legend plates for all load centers to identify the area and/or equipment controlled by the load center, the power source, and the voltage system. Legend plates shall be weatherproof and abrasion resistant phenolic material. Lettering shall be black on white background. Load centers shall be thoroughly inspected for physical damage, proper alignment, anchorage, and grounding. The exterior finish shall be inspected for blemishes, nicks, and bare spots, and touched up as required using matching touch-up paint. Inspections shall be made for proper installation and tightness of connections for circuit breakers. Load centers shall be thoroughly tested after installation and connection to respective loads. Contractor shall measure and record voltage at the load center and amperage to the load center, with the respective equipment operating.

800969-3.5 SURGE ARRESTER INSTALLATION. Install Surge Protector Devices (SPD)/Transient Voltage Surge Suppressor (TVSS) devices in conformance with of FAA-STD-019d, dated August 9, 2002, "LIGHTNING AND SURGE PROTECTION, GROUNDING, BONDING AND SHIELDING REQUIREMENTS FOR FACILITIES AND ELECTRONIC EQUIPMENT" and the respective manufacturer's directions and recommendations. Contractor shall confirm all connections to the surge arrester (phases, neutral, and ground) are completed and secure. Connection leads to the surge arrester shall be sized per the respective manufacturer's recommendation, and as detailed herein and shall be maintained as short as possible, maximum two feet in length, and laced together for mutual coupling. The conduit or conduit nipple connecting the SPD/TVSS device enclosure to the panel enclosure shall be sealed with duct seal or other nonflammable medium to prevent soot from entering the enclosure in the event of a SPD/TVSS device failure.

800969-3.6 LIGHTING CONTACTOR INSTALLATION. Install lighting contactor control panel as detailed on the Plans and in conformance with the manufacturer's directions.

800969-3.7 L-854 RADIO CONTROLLER INSTALLATION. Install L-854 Radio Controller as detailed on the Plans and in conformance with the manufacturer's directions.

800969-3.8 CABLE INSTALLATION. Installation of cables shall conform to Item 108, per the respective equipment manufacturer's recommendations, and as detailed on the Plans.

800969-3.9 CONDUIT INSTALLATION. Installation of conduit shall conform to Item 110, as detailed on the Plans and as specified herein.

Conduit size and fill requirements shall comply with Appendix C, conduit fill tables, of the NEC. It should be noted these are minimum requirements and larger conduit sizes or smaller fill requirements shall be used whenever specified or detailed on the drawings.

Ream conduits only after threads are cut. Cut joints square to butt solidly into couplings. Where necessary to join two pieces of conduit, and it is impossible to use standard couplings, use 3-piece malleable iron conduit coupling. The use of running thread is prohibited. This applies to all rigid conduit installations, underground or otherwise.

Make all joints in steel underground conduit watertight with approved joint compound. Temporarily plug conduit openings to exclude water, concrete, or any foreign materials during construction. Clean conduit runs before pulling in conductors.

Where conduit enters a box or fitting, provide a steel locknut and an insulated metallic bushing. Use this method to terminate conduit in panels, pull boxes, safety switches, etc.

Provide NEMA four hubs for all conduit entries into enclosures rated NEMA 4, 4X to maintain NEMA 4, 4X rating.

Do not run conduit below or adjacent to water piping.

Provide UL listed liquid tight flexible metal conduit at final connections to devices where subject to vibration or to accommodate transition from a device to a rigid conduit system. UL listed liquid tight flexible metal conduit shall be listed suitable for grounding and shall be sunlight resistant.

800969-3.10 MARKING AND LABELING. Legend plates shall be provided for all equipment. Legend plates shall be provided to identify the equipment controlled, the power source, and the function of each device. Legend plates shall be weatherproof and abrasion resistant phenolic/plastic engraved material and fastened with contact type permanent adhesive, screws, or rivets. Installation shall not break, crack, or deform the legend plate. Lettering shall be 1/2-inch high, black on a white background, unless noted otherwise.

- (a) Each load center/panelboard shall be furnished with a weatherproof phenolic engraved legend plate that identifies the panel designation, the power source, and the respective voltage, phase, and wire.
- (b) Each individual circuit breaker, safety switch, control panel, etc. shall be furnished with a weatherproof phenolic engraved legend plate that identifies the respective device, the power source, and the respective voltage, phase, and wire. Furnish additional phenolic engraved legend plates as detailed on the Plans and/or where required by code.
- (c) At electrical handholes, identify each cable with respect to the system or device served.
- (e) Color code phase and neutral conductor insulation for No. 8 AWG or smaller. Provide colored marking tape for phase and neutral conductors for No. 6 AWG and larger. Insulated ground conductors shall have green colored insulation for all conductor AWG and/or KCMIL. Standard colors for power wiring and branch circuits shall be as follows:

120/240 VAC, 1 Phase, 3-Wire

Phase A	Black
Phase B	Red
Neutral	White
Ground	Green

800969-3.11 GROUNDING REQUIREMENTS. Grounding shall conform to the following as applicable: The Contractor shall furnish and install all grounding shown on the Plans and/or as may be necessary or required to make a complete grounding system as required by the latest National Electrical Code (NEPA 70) in force. The reliability of the grounding system is dependent on careful, proper installation and choice of materials. Improper preparation of surfaces to be joined to make an electrical path, loose joints or corrosion can introduce impedance that will seriously impair the ability of the ground path to protect personnel and equipment and to absorb transients that can cause noise in communications circuits. The following functions are particularly important to ensure a reliable ground system:

- (a) All products associated with the grounding system shall be UL-listed and labeled.
- (b) All bolted or mechanical connections shall be coated with a corrosion preventative compound before joining, Dearborn Chemical Company "No-Oxide A" compound or equal.
- (c) Metallic surfaces to be joined shall be prepared by the removal of all non-conductive material, per 2002 National Electrical Code Article 250-12. All copper bus bars must be cleaned prior to making connections to remove surface oxidation.
- (d) Raceway fittings shall be made up tight to provide a permanent low impedance path for all circuits.
- (e) Furnish and install ground rings, ground fields, and/or ground rods at all locations where shown on the Plans or specified herein. Ground rods shall be $\frac{3}{4}$ in. diameter, 10 ft long, UL-listed, copper clad with 10-mil minimum copper coating. Top of ground rods shall be a minimum of 30 in. below finish grade unless otherwise noted on the Plans. Ground rods shall be spaced as detailed on the Plans and in no case spaced less than one-rod length apart. All connections to ground rods and/or ground rings shall be made with one shot, exothermic weld type connectors, Cadweld by Erico Products, Inc., Solon, Ohio, (Phone 1-800-248-9353). Thermoweld by Continental Industries, Inc., Tulsa, Oklahoma (Phone 918-663-1440) or equal. Exothermic weld connections shall be installed in conformance with the respective manufacturer's directions using molds as required for each respective application. Bolted connections will not be permitted at ground rods or at buried grounding electrode conductors. In addition to the grounding work described herein and shown on the Plans, the Contractor shall test the made electrode ground field/ground ring with an instrument specifically designed for testing ground field systems. If ground resistance exceeds 10 Ohms, contact Resident Engineer for further direction. Copies of ground field test results shall be furnished to the Resident Engineer, upon request, for review and record purposes.

- (f) All connections, located above grade, between the different types of grounding conductors shall be made using UL-listed double compression crimp type connectors or UL-listed bolted ground connectors. For ground connections to enclosures, cases and frames of electrical equipment not supplied with ground lugs the Contractor shall drill required holes for mounting a bolted ground connector. All bolted ground connectors shall be Burndy, Thomas and Betts, or equal. Tighten connections to comply with tightening torques in UL Standard 486A to assure permanent and effective grounding.
- (g) All metal equipment enclosures, conduits, cabinets, boxes, receptacles, etc. shall be bonded to the respective grounding system. Provide grounding bushings at all conduits entering service entrance equipment (meter bases, service disconnects, service panelboards, etc.) and distribution panels or load centers and ground wire from bushing to ground bus in the respective service entrance equipment or distribution panel.
- (h) Each feeder circuit and/or branch circuit shall include an equipment ground wire. Metal raceway or conduit shall not meet this requirement. The equipment ground wire from equipment shall not be smaller than allowed by 2002 NEC Table 250-122 "Minimum Size Conductors or Grounding Raceway and Equipment." When conductors are adjusted in size to compensate for voltage drop, equipment-grounding conductors shall be adjusted proportionately according to circular mil area. All equipment ground wires shall be copper either bare or insulated green in color. Where the equipment grounding conductors are insulated, they shall be identified by the color green and shall be the same insulation type as the phase conductors.
- (i) The secondary neutral of all transformers (separately derived system transformers) shall be grounded in accordance with National Electrical Code. The respective grounding electrode conductor shall be connected to the neutral point of the transformer between the transformer and the output disconnecting means. Size of the grounding electrode conductor shall be in accordance with 2002 NEC Article 250-66 and Table 250-66 unless shown larger on the drawings. A bond shall be provided between the neutral and transformer case, or other metal that is part of the AC equipment grounding system, so as to complete a circuit for fault current to the transformer winding from the AC equipment grounding system. Size of the neutral bonding conductor shall be in accordance with 2002 NEC Article 250-102.
- (j) All exterior metal conduits, where not electrically continuous because of manholes, handholes, non-metallic junction boxes, etc., shall be bonded to all other metal conduit in the respective duct run, and at each end, with a copper bonding jumper sized in conformance with 2002 NEC 250-102. Where metal conduits terminate in an enclosure (such as a motor control center, switchboard, etc) where there is not electrical continuity with the conduit and the respective enclosure, provide a bonding jumper from the respective enclosure ground bus to the conduit sized per 2002 NEC 250-102.

- (k) Install grounding electrode conductors and/or individual ground conductors in Schedule 40 or Schedule 80 PVC conduit. Where grounding electrode conductors or individual ground conductors are run in PVC conduit, Do Not completely encircle conduit with ferrous and/or magnetic materials. Use non-metallic reinforced fiberglass strut support. Where metal conduit clamps are installed, use nylon bolts, nuts, washers and spacers to interrupt a complete metallic path from encircling the conduit.

800969-3.12 TESTING. The Contractor shall make at his own expense any tests of equipment, wiring, or insulation deemed necessary by any inspection department or by the Contractor Officer and shall provide all apparatus, meters, materials, and labor required to make such tests.

The Contractor shall test and demonstrate to the satisfaction of the Engineer the following:

- (a) That all lighting, power, and control circuits are continuous and free from short circuits.
- (b) That all circuits are free from unspecified grounds.
- (c) That the insulation resistance to ground of all ungrounded conductors of multiple circuits is not less than 50 megohms.
- (d) That all circuits are properly connected in accordance with applicable wiring diagrams.
- (e) That all circuits are operable. Tests shall be conducted that include operating each control not less than ten (10) times and the continuous operation of each lighting and power circuit for not less than one-half an hour.
- (f) Test all transformers, measure and record primary and secondary voltages when operating under load.
- (g) All tests shall be recorded, stating the wire circuit reading, date, and field conditions. Submit test results to Resident Engineer.

METHOD OF MEASUREMENT

800969-4.1 The quantity of this item to be furnished and installed shall be measured for payment as a unit price per lump sum and shall include all materials, equipment, support hardware, excavation, cables, conduits, surge protection, grounding, electric feeder work, labor, tools, connections, coordination, preparation, assembly, testing and other incidentals as required to perform the specified work for each power distribution and control center associated with the respective PAPI's located on Runway 26.

BASIS OF PAYMENT

800969-5.1 Payment shall be made at the Contract unit price per lump sum. This price and payment shall be full compensation for furnishing and installing all materials, equipment, support hardware, excavation, cables, conduits, surge protection, grounding, electric feeder work, labor, tools, connections, coordination, preparation, assembly, and incidentals necessary to complete this item of work.

If, upon delivery and incorporation of any materials, the Contractor has failed to provide the necessary submittals as required by Sections 30-18, 40-01, 40-03 and 40-11 of the Standard Specifications, Supplemental Specifications and Special Provisions, the pay item shall not be included on the Contractor Progress Payment report until such submittals have been furnished.

Payment will be made under:

Item AR800969 Secondary Power Distribution - per lump sum.