## **CONSTRUCTION PLANS - ISSUED SEPTEMBER 22, 2017**

# REPLACE AIRFIELD ELECTRICAL VAULT, REPLACE BEACON UNIT AND TOWER; RELOCATE REGULATOR; REPLACE REMAINING AIRFIELD LIGHTING, SIGNAGE AND NAVIGATIONAL AIDS

PEKIN MUNICIPAL AIRPORT

# PEKIN MUNICIPAL AIRPORT (C15) PEKIN, TAZEWELL COUNTY, ILLINOIS

# IDA PROJECT NO. C15-4578 SBG PROJECT NO. 3-17-SBGP-133/139

## SCOPE OF WORK:

THIS PROJECT CONSISTS OF REMOVING THE EXISTING ELECTRICAL VAULT AND CONSTRUCTION OF A NEW ELECTRICAL VAULT, REMOVING AND REPLACING THE RUNWAY LIGHTING AND TAXI GUIDANCE SIGNS, REMOVAL OF ONE EXISTING PAPI SYSTEM AND FURNISHING AND INSTALLING ONE L-880 PAPI SYSTEM ON RUNWAY 27, REMOVING THE EXISTING L-801A BEACON AND TOWER AND FURNISHING AND INSTALLING AN L-802A BEACON WITH NEW TILT-DOWN TOWER, FURNISHING AND INSTALLING REILS ON RUNWAY ENDS 9 AND 27, AND THE ASSOCIATED CABLING, DUCT WORK, HANDHOLES, MANHOLES, AND VAULT WORK.

THE ADDITIVE ALTERNATE NUMBER 1 CONSISTS OF FURNISHING AND INSTALLING NEW L-807(L) PRIMARY LIGHTED WIND CONE.

#### NOTICE TO CONTRACTORS AND BIDDERS

THESE CONSTRUCTION PLANS RELY UPON THE SPECIAL PROVISIONS AND THE SPECIFICATIONS TO PROVIDE FOR A COMPLETE DESCRIPTION OF THE WORK AND CONSTRUCTION REQUIREMENTS. THE PLANS SHALL ONLY BE USED IN COMBINATION WITH ALL CONTRACT DOCUMENTS.

No.	Issue/Description	Sheets Changed	Date	Ву

* CIGHTFOOT * CIGHTFOOT * CIGHTFOOT * OF ILLING	
Horing M. Lightford Kevin N. Lightfoot, P.E. Lic. Exp. 11/30/2017 Electrical Engineer Date	



7JOBS/17A0002/17A0002D/CAD/AIRPORT/SHEET/G-001-CVR

## PN010 TOTAL SHEETS = 55

ITEM NO.	DESCRIPTION	TOTAL QUANTITY	UNIT	AS-BUILT QUANTITY
AR101515	HIGH INTENSITY AIRPORT BEACON	1	EACH	
AR103410	BEACON TOWER	1	EACH	
AR103900	REMOVE BEACON TOWER	1	EACH	
AR108086	1/C #6 XLP-USE	5,540	L.F.	
AR108108	1/C #8 5KV UG CABLE	2,400	L.F.	
AR108158	1/C #8 5KV UG CABLE IN UD	13,800	L.F.	
AR108258	2/C #8 5KV UG CABLE IN UD	1,100	L.F.	
AR108756	1/C #6 GROUND	12,326	L. F.	
AR109100	CONSTRUCT ELECTRICAL VAULT	1	L. S.	
AR109200	INSTALL ELECTRICAL EQUIPMENT	1	L. S.	
AR109901	REMOVE ELECTRICAL VAULT	1	L. S.	
AR110012	2" DIRECTIONAL BORE	270	L.F.	
AR110013	3" DIRECTIONAL BORE	870	L.F.	
AR110202	2" PVC DUCT, DIRECT BURY	180	L.F.	
AR110503	3-WAY CONCRETE ENCASED DUCT	663	L.F.	
AR110504	4-WAY CONCRETE ENCASED DUCT	356	L.F.	
AR115610	ELECTRICAL HANDHOLE	13	EACH	
AR115710	ELECTRICAL MANHOLE	3	EACH	
AR125410	MITL-STAKE MOUNTED	19	EACH	
AR125415	MITL-BASE MOUNTED	8	EACH	
AR125441	TAXI GUIDANCE SIGN, 1 CHARACTER	1	EACH	
AR125444	TAXI GUIDANCE SIGN, 4 CHARACTER	2	EACH	
AR125445	TAXI GUIDANCE SIGN, 5 CHARACTER	1	EACH	
AR125446	TAXI GUIDANCE SIGN, 6 CHARACTER	1	EACH	
AR125505	MIRL, STAKE MOUNTED	38	EACH	
AR125510	MIRL, BASE MOUNTED	13	EACH	
AR125540	MI THRESHOLD LIGHT STAKE MTD	12	EACH	
AR125545	MI THRESHOLD LIGHT BASE MTD	4	EACH	
AR125565	SPLICE CAN	1	EACH	
AR125610	REILS	2	PAIR	
AR125615	PAPI (L-880 SYSTEM)	1	EACH	
AR150510	ENGINEER'S FIELD OFFICE	1	L.S.	
AR150520	MOBILIZATION	1	L.S.	
AR800476	REMOVE AIRFIELD LIGHTING	1	L. S.	

:	SUMMARY OF QUANTITIES - AD	DITIVE AL	TERNATE	
ITEM NO.	DESCRIPTION	TOTAL QUANTITY	UNIT	AS-BUILT QUANTITY
AS107812	L-807 WC-12' INTERNALLY LIT	1	EACH	

#### CERTIFIED PAYROLLS

THE RESIDENT ENGINEER CANNOT FORWARD CONSTRUCTION REPORTS TO THE ILLINOIS DIVISION OF AERONAUTICS FOR PROCESSING UNTIL ALL CERTIFIED PAYROLLS FOR THE PERIOD HAVE BEEN RECEIVED.

#### MATERIAL CERTIFICATION

MATERIAL TO BE INCORPORATED INTO THE PROJECT CANNOT BE USED WITHOUT PRIOR APPROVAL. ALL MATERIAL TO BE USED IN THE PROJECT MUST BE SUBMITTED TO THE RESIDENT ENGINEER FOR APPROVAL. USE OF MATERIAL WITHOUT PRIOR APPROVAL AND ULTIMATELY DETERMINED TO BE UNACCEPTABLE BY THE ILLINOIS DIVISION OF AERONAUTICS ARE SUBJECT TO REMOVAL AND/OR NON-PAYMENT.

#### EROSION CONTROL

THIS PROJECT WILL DISTURB LESS THAN 1 ACRE OF LAND, THEREFORE NO N.P.D.E.S. PERMIT WILL BE REQUIRED.

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9	EXISTING AIRFIELD LIGHTING - STA. 127+00 TO 140+75
10	EXISTING AIRFIELD LIGHTING - STA. 140+25 TO 150+00
11	EXISTING AIRFIELD LIGHTING - BEACON AREA
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# SEP 08, 2017 3:24 PM SCHUB01446 1-117.10BS/17A0002/17A0002D/CAD/4

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REPLACE AIRFIELD ELECTRICAL VAULT, REPLACE BEACON UNIT AND TOWER; RELOCATE REGULATOR; REPLACE REMAINING AIRFIELD LIGHTING, SIGNAGE AND NAVIGATIONAL AIDS

IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 Contract No. PN010

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SHEET TITLE

SUMMARY OF QUANTITIES AND INDEX OF SHEETS



THIS PROJECT (BASE BID) CONSISTS OF REMOVING THE EXISTING ELECTRICAL VAULT AND CONSTRUCTION OF A NEW ELECTRICAL VAULT REMOVING AND REPLACING THE RUNWAY LIGHTING AND TAXI GUIDANCE SIGNS, REMOVAL OF ONE EXISTING PAPI SYSTEM AND FURNISHING AND INSTALLING ONE L-880 PAPI SYSTEM ON RUNWAY 27, REMOVING THE EXISTING L-801A BEACON AND TOWER AND FURNISHING AND INSTALLING AN L-802A BEACON WITH NEW TILT-DOWN TOWER, FURNISHING AND INSTALLING REILS ON RUNWAY ENDS 9 AND 27, AND THE ASSOCIATED CABLING, DUCT WORK, HANDHOLES, MANHOLES, AND VAULT WORK

THE ADDITIVE ALTERNATE NUMBER 1 CONSISTS OF FURNISHING AND INSTALLING A NEW L-807(L) PRIMARY LIGHTED WIND CONE.

WORK AREA 1: TEMPORARY CLOSURE OF RUNWAY 9-27 (AND THEREFORE THE AIRPORT) TO COMPLETE WORK WITHIN THE RUNWAY SAFETY AREA AND THE LIMITS

WORK AREA 2: TEMPORARY CLOSURE OF TAXIWAY A3 NORTH OF TAXIWAY A. PERFORM WORK WITHIN CLOSURE LIMITS AND OUTSIDE OF RUNWAY 9-27 SAFETY AREA. RUNWAY 9-27 AND TAXIWAY A, A1, A2, AND TAXIWAY A3 SOUTH OF TAXIWAY A TO REMAIN OPEN TO AIRCRAFT.



#### LEGEND

	EXISTING PAVEMENTS
	EXISTING BUILDINGS
	EQUIPMENT PARKING AND STORAGE AREA
//////	PROPOSED HAUL ROUTE
	PROPOSED BARRICADES OR TRAFFIC CONES

CRITICAL POINT DATA					
LATITUDE	LONGITUDE	GROUND ELEVATION	equipment Height		
0°29'24.957"	W089 40' 00.402"	529'	25'		
0°29'21.775"	W089 40' 00.917"	528'	15'		
0°29′20.588″	W089 40' 01.173"	528'	15'		
0°29′26.474″	W089 40' 00.501"	528'	65'		
0°29′23.853″	W089 39' 49.676"	525'	25'		

#### J.U.L.I.E. INFORMATION

TAZEWELL
PEKIN
CINCINNATI
33
PEKIN MUNICIPAL AIRPORT
13906 AIRPORT LANE
PEKIN, ILLINOIS 61554



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DESCR	RIPTION
NO. DATE DES D	WN RE\
ISSUE: 09/22/2017	
PROJECT NO: 17A0002	
CAD FILE: G-003-SFY.DWG	
DESIGN BY: KNL 08/05/	2017
DRAMAN RV. ONO ODIODIC	2017
DRAWN DT: CWS 08/08/2	

SHEET TITLE

#### PROPOSED SAFETY PLAN

#### BARRICADE NOTES

- 1. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO PLACE AND MAINTAIN BARRICADES AS SHOWN ON THE PLANS AND AS DIRECTED BY THE AIRPORT MANAGER.
- 2. ALL CONSTRUCTION SIGNS AND TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES INCLUDING THE ILLINOIS SUPPLEMENT (LATEST EDITION) AND THE FAA ADVISORY CIRCULARS (LATEST EDITION) UNLESS NOTED OTHERWISE. THE FAA OR MORE STRINGENT SPECIFICATIONS SHALL GOVERN.
- BARRICADES SHALL BE SPACED END TO END THE WIDTH OF THE PAVEMENT IN 4' INCREMENTS AS DIRECTED BY THE ENGINEER. BARRICADES ARE TO BE SET BACK 66' FROM THE ACTIVE TAXIWAY CENTERLINE OR AS SHOWN ON THE PLANS.
- 4. CONSTRUCTION RED WARNING LIGHT: THESE ARE PORTABLE, LENS DIRECTED, ENCLOSED LIGHTS. THE COLOR OF THE LIGHT EMITTED SHALL BE RED. THEY MAY BE USED IN EITHER A STEADY BURN (TYPE C) OR LOW INTENSITY FLASHING MODE (TYPE A) UNLESS NOTED OTHERWISE
- 5. THE LIGHTING SHALL BE MAINTAINED IN OPERATION DURING THE HOURS OF DARKNESS BETWEEN 1/2 HOUR BEFORE SUNSET AND 1/2 HOUR AFTER SUNRISE AND WHEN CONDITIONS EXIST WHICH TEND TO OBSCURE VISION.
- 6. BARRICADES SHALL BE SECURED TO THE GROUND BY APPROVED METHODS TO PREVENT MOVEMENT BY PROP WASH, JET BLAST OR OTHER WIND CURRENTS.
- THE COLOR COMBINATION ON BARRICADES IS ORANGE AND WHITE. THE ORANGE STRIPES SHALL BE ENCAPSULATED LENS REFLECTIVE SHEETING. THE WHITE STRIPES SHALL BE EITHER ENCAPSULATED OR ENCLOSED LENS REFLECTIVE SHEETING AND MUST BE IN ACCEPTABLE CONDITION.
- 8. THE BARRICADES SHALL MEET THE APPLICABLE REQUIREMENTS OF FAA AC 150/5370-2, "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION" (CURRENT EDITION) AND SHALL BE APPROVED BY THE RESIDENT ENGINEER/RESIDENT TECHNICIAN PRIOR TO USE ON THE PROJECT
- COST FOR PLACING, MAINTAINING, AND REMOVING BARRICADES WILL NOT BE PAID FOR SEPARATELY, BUT IS TO BE CONSIDERED INCIDENTAL TO THE PROJECT.



- 1. TEMPORARY CLOSURE CROSS MARKINGS SHALL BE "AVIATION YELLOW."
- 2. TEMPORARY CLOSURE CROSS MARKINGS SHALL BE CONSTRUCTED OF PLYWOOD, SNOW FENCE OR APPROVED FABRIC AND SHALL BE SECURED TO PAVEMENT BY SANDBAGS OR OTHER APPROVED METHOD.
- 3. COST FOR PROVIDING, PLACING, MAINTAINING, AND REMOVING CLOSURE CROSSES SHALL BE INCLUDED IN THE COST OF THE OTHER CONTRACT ITFMS.

#### CLOSURE CROSS MARKER DETAIL

NOT TO SCALE

#### GENERAL NOTES

- 1. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, EQUIPMENT, AND TRANSPORTATION NECESSARY TO CONSTRUCT ALL ELEMENTS OF THE PROJECT AS DESCRIBED IN THE CONSTRUCTION PLANS AND SPECIFICATIONS
- 2. THE RULES, REGULATIONS, AND SPECIFICATIONS NOTED HEREIN SHALL BE CONSIDERED AS MINIMUM REQUIREMENTS. THEY SHALL NOT PROHIBIT THE CONTRACTOR FROM FURNISHING AND INSTALLING HIGHER GRADES OF MATERIAL THAN ARE SPECIFIED
- 3. THE CONSTRUCTION ENTRANCES AS SHOWN ON THE SAFETY PLAN SHALL BE USED FOR THE PROJECT. ACCESS TO THE PROJECT FOR ALL HAULING OF MATERIALS AND EQUIPMENT SHALL BE RESTRICTED TO THE DESIGNATED CONSTRUCTION ENTRANCES AND HAUL ROUTES. ACCESS TO THE WORK AREAS FROM THE STAGING AREA SHALL BE COORDINATED WITH THE RESIDENT ENGINEER/RESIDENT TECHNICIAN AND AIRPORT MANAGEMENT.
- 4. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT, PRESERVE AND REPAIR THE EXISTING AIRFIELD AND ROADWAY PAVEMENTS AT ALL TIMES. THE CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING ELECTRICAL, DRAINAGE, AND PAVEMENT STRUCTURES AT NO ADDITIONAL COST TO THE CONTRACT.
- 5. CONTRACTOR IS REQUIRED TO PROVIDE THEIR OWN RESTROOM FACILITIES.
- 6. UNLESS OTHERWISE NOTED, ALL DISTURBED AREAS OUTSIDE OF THE PROPOSED CONSTRUCTION LIMITS SHALL BE GRADED, SEEDED AND/OR HYDROMULCH SEEDED AT NO ADDITIONAL COST TO THE CONTRACT.
- 7. ALL WASTE MATERIAL SHALL BE HAULED FROM THE AIRPORT AND PROPERLY DISPOSED OF UNLESS OTHERWISE SPECIFIED HEREIN.
- 8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMITS FOR HAULING ON PUBLIC ROADS, AS APPLICABLE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECTING ANY DAMAGES TO ANY PAVEMENTS (PUBLIC OR PRIVATE) CAUSED BY HIS/HER CONSTRUCTION EQUIPMENT OR PERSONNEL.
- 9. THE OWNER SHALL HAVE THE RIGHT OF FIRST REFUSAL FOR ALL SALVAGEABLE MATERIAL REMOVED ON THE PROJECT.
- 10. THE CONTRACTOR SHALL PROVIDE ONE SET OF REDLINED RECORD DRAWINGS TO THE RESIDENT ENGINEER/RESIDENT TECHNICIAN AT THE COMPLETION OF THE PROJECT.
- 11. CONTRACTOR SHALL NOTE THAT ALL AREAS WITHIN THE AIRPORT PROPERTY LINE AND OUTSIDE THE CONSTRUCTION LIMITS MAY BE USED FOR AGRICULTURAL PURPOSES. THE CONSTRUCTION LIMITS SHALL BE RESTRICTED TO AREAS THAT ARE ABSOLUTELY NECESSARY TO DISTURB TO COMPLETE THE REQUIRED WORK ITEMS. LIMITS SHALL BE COORDINATED WITH THE RESIDENT ENGINEER PRIOR TO BEGINNING ANY WORK. ALL AREAS WHICH HAVE BEEN FARMED AND OR DESIGNATED TO BE FARMED AFTER THE PROJECT COMPLETION, AND HAVE BEEN DISTURBED BY CONSTRUCTION ACTIVITY, SHALL BE CHISEL PLOWED (36" MAX.) OR OTHERWISE SCARIFIED TO RETURN THE AREA TO A REASONABLE TILLABLE CONDITION (IF SO PERMITTED BY THE AIRPORT MANAGER.)
- 12. CONTRACTOR SHALL RESTORE TO ORIGINAL CONDITION ALL GRASS, STONE, OR PAVEMENT DISTURBED BY CONTRACTOR'S CONSTRUCTION OPERATIONS, STAGING, AND CONSTRUCTION ACCESS ROUTES. DISTURBED AREAS WILL BE REPAIRED, GRADED, MULCHED AND SEEDED UNLESS OTHERWISE NOTED. STAGING AREA AND SITE ACCESS RESTORATION SHALL BE INCLUDED IN THE COST OF THE PROJECT.
- 13. THE PROJECT PAY ITEMS ARE INTENDED TO BE INCLUSIVE OF ALL WORK TO BE PERFORMED AS SHOWN IN THESE PLANS. ALL INCIDENTAL WORK REQUIRED TO COMPLETE THE PROJECT TO THE SATISFACTION OF THE RESIDENT ENGINEER/RESIDENT TECHNICIAN IS TO BE INCLUDED IN THE COSTS OF PERFORMING THESE ITEMS.
- 14. APPROXIMATE LOCATIONS OF SOME UNDERGROUND UTILITIES ARE SHOWN THROUGHOUT THESE PLANS. THE CONTRACTOR SHALL DETERMINE EXACT LOCATIONS AND PROTECT THESE UTILITIES DURING CONSTRUCTION. ANY UTILITIES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. CONTRACTOR SHALL COORDINATE WITH THE PROPER PERSONS FOR THE PURPOSE OF LOCATING AND PROTECTING EXISTING UNDERGROUND UTILITIES.
- 15. THE CONTRACTOR MUST AT ALL TIMES MAINTAIN PROPER DRAINAGE FOR ALL AREAS AFFECTED BY HIS WORK.

#### SAFETY NOTES

- FOLLOWING ARE THE CONSTRUCTION SAFETY PROCEDURES THAT THE CONTRACTOR SHALL FOLLOW THROUGHOUT THIS PROJECT
- 2. ALL PROVISIONS OF THE LATEST EDITION OF FAA ADVISORY CIRCULAR AC 150/5370-2 (CURRENT EDITION), "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION", APPLY TO THIS CONTRACT, EXCEPT AS MODIFIED BY THIS SAFETY PLAN, OR AS MODIFIED BY THE OWNER THROUGH THE RESIDENT ENGINEER AT THE PRECONSTRUCTION CONFERENCE, OR DURING THE COURSE OF THE CONTRACT
- 3. THE CONTRACTORS SHALL MINIMIZE DISRUPTION OF STANDARD OPERATING PROCEDURES FOR AERONAUTICAL ACTIVITY BY REMAINING WITHIN THE PRESCRIBED STAGING, CONSTRUCTION, AND PHASING AREAS PRESENTED ON THE PROPOSED SAFETY PLAN.
- 4. NO UNAUTHORIZED PERSONNEL SHALL ENTER ANY AREA OF THE AIRPORT THAT COULD POTENTIALLY BE HAZARDOUS. THE ENGINEER, ENGINEER'S REPRESENTATIVE AND/OR AIRPORT MANAGER RESERVE THE RIGHT TO SUSPEND OPERATIONS IN ORDER TO MAINTAIN SAFETY AT THE AIRPORT.
- 5. CONTRACTOR EQUIPMENT, VEHICLES, AND PROJECT MATERIALS SHALL BE STORED AT THE STAGING AREA SHOWN ON THE PLAN VIEW, EXCEPT AS OTHERWISE PROVIDED FOR AT THE PRECONSTRUCTION CONFERENCE.
- ALL CONSTRUCTION FOUIPMENT OPERATING IN THE PRESCRIBED CONSTRUCTION AREA IS REQUIRED TO DISPLAY A 6. CHECKERBOARD FLAG PROPERLY LOCATED AND/OR A ROTATING BEACON (STROBE) AS SPECIFIED IN AC 150/5210-5, "PAINTING, MARKING, AND LIGHTING OF VEHICLES USED ON AN AIRPORT" LATEST EDITION.
- 7. NO CONSTRUCTION MATERIAL STOCKPILES SHALL BE LOCATED WITHIN 250' OF RUNWAY 9-27 CENTERLINE WHEN ACTIVE, WITHIN 66' OF AN ACTIVE TAXIWAY CENTERLINE, WITHIN 58' OF AN ACTIVE TAXI LANE CENTERLINE, OR PENETRATE A PART 77 IMAGINARY SURFACE (PROVIDED BY THE ENGINEER) EXTENDING OUT AND UPWARDS FROM ALL SIDES OF AN ACTIVE RUNWAY.
- 8. CLOSED AIRFIELD PHASING AREAS, OPEN TRENCHES, AND STOCKPILED MATERIALS AT THE CONSTRUCTION SITE SHALL BE PROMINENTLY MARKED WITH LIGHTED BARRICADES WITH STEADY BURNING OR FLASHING RED LIGHTS AS SPECIFIED IN 150/5370-2, "OPERATIONAL SAFETY ON AIRPORT DURING CONSTRUCTION", LATEST EDITION. LIGHTED BARRICADES MUST BE NO TALLER THAN 24" (EXCLUSIVE OF SUPPLEMENTARY LIGHTS) ON THE TAXIWAYS AND COMPLY WITH ADVISORY CIRCULAR 150/5370-2, LATEST EDITION. CONTRACTOR SHALL NIGHT CHECK BARRICADES DAILY FOR PROPER OPERATION.
- NO OPEN TRENCHES WITHIN 75' OF RUNWAY 9-27 CENTERLINE WHEN ACTIVE OR WITHIN 39.5' OF AN ACTIVE TAXIWAY OR TAXILANE (TAXIWAY SAFETY AREA), WILL BE PERMITTED. OTHER TRENCHES SHALL BE MAINTAINED SAFE, I.E., BARRICADED OR COVERED WITH STEEL PLATES IN ALL OTHER AREAS.
- 10. OPEN TRENCHES, EXCAVATIONS, AND STOCKPILED MATERIALS AT THE CONSTRUCTION SITE SHOULD BE PROMINENTLY MARKED WITH ORANGE FLAGS AND LIGHTED WITH FLASHING YELLOW LIGHTS DURING HOURS OF RESTRICTED VISIBILITY AND/OR DARKNESS.
- 11. NO OPEN FLAME WELDING OR TORCH CUTTING OPERATION IS PERMITTED UNLESS ADEQUATE FIRE AND SAFETY PRECAUTIONS ARE PROVIDED AND HAVE BEEN APPROVED BY THE AIRPORT MANAGER. NO FLARE POTS ARE ALLOWED ON THE PROJECT.
- 12. SOIL, DEBRIS, AND LOOSE MATERIAL DROPPED OR TRUCKED ONTO AIRPORT ROADS, TAXIWAYS, AND SOD SURFACES, OR WHICH CAN BE BLOWN ONTO SUCH SURFACES, SHALL BE IMMEDIATELY SWEPT, PICKED UP AND REMOVED, OR PLACED INTO CLOSED CONTAINERS. ANY DAMAGE TO AIRPORT PROPERTY SHALL BE REPAIRED IMMEDIATELY AT NO COST TO THE OWNER.
- 13. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND MAINTAINING AIRPORT LIGHTING AND NAVIGATIONAL ELECTRICAL SYSTEMS DURING CONSTRUCTION. A CONTACT PERSON AND TELEPHONE NUMBER FOR 24 HOUR EMERGENCY IMMEDIATE REPAIR SHALL BE SUBMITTED TO THE AIRPORT MANAGER AND ENGINEER. HAUL ROUTES CROSSING PAVEMENT, DRAINAGE, MISCELLANEOUS. STRUCTURES AND/OR AIRFIELD CABLES SHALL BE PROTECTED FROM DAMAGE.
- 14. ALL AIRCRAFT AND AIRPORT OPERATIONS HAVE THE RIGHT-OF-WAY. CONTRACTOR TO YIELD TO VEHICLES AND REMAIN CLEAR AT ALL TIMES.
- 15. CONTRACTOR SHALL PLACE, SECURE, AND MAINTAIN LIGHTED BARRICADES AND CLOSURE CROSSES WHEN A RUNWAY/TAXIWAY/APRON IS CLOSED OR AS REQUIRED BY THE PLANS AND DESIGNATED BY THE ENGINEER.
- 16. CONTRACTOR SHALL MARK HAZARDOUS AREA WITH STEADY-BURNING OR FLASHING RED AND YELLOW LIGHTS DURING PERIODS OF LOW VISIBILITY AS REQUIRED.
- 17. THE CONTRACTOR SHALL PERIODICALLY PERFORM ONSITE INSPECTIONS THROUGHOUT THE DURATION OF THE PROJECT WITH THE IMMEDIATE REMEDY OF ANY DIFFERENCES, WHETHER CAUSED BY NEGLIGENCE, OVERSIGHT, OR PROJECT SCOPE CHANGE.
- 18. CONTRACTOR SHALL MOVE MAINTENANCE OF TRAFFIC COMPONENTS AT THE DIRECTION OF THE AIRPORT MANAGER AND/OR THE RESIDENT ENGINEER/RESIDENT TECHNICIAN AT NO ADDITIONAL COST.
- 19. CONTRACTOR SHALL NOT REMOVE THE BARRICADES WITHOUT THE APPROVAL BY THE AIRPORT MANAGER AND/OR RESIDENT ENGINEER/RESIDENT TECHNICIAN.
- 20. CONTRACTOR SHALL MAINTAIN FLASHERS, SIGNS AND/OR BARRICADES AS REQUIRED BY THE PLANS, CITY OR COUNTY REGULATIONS OR CONTRACTOR ACTIVITIES. CONTRACTOR SHALL OBTAIN ANY AND ALL REQUIRED LOCAL PERMITS UNLESS SPECIFIED OTHERWISE.
- 21. THE CONTRACTOR SHALL UTILIZE WATER AND/OR CHEMICALS APPROVED BY THE ENGINEER AS NECESSARY TO CONTROL DUST.
- 22. CONSTRUCTION EQUIPMENT OR CONSTRUCTION ACTIVITY WILL NOT BE PERMITTED WITHIN THE RUNWAY SAFETY AREA OF ANY ACTIVE RUNWAY CENTERLINE OR WITHIN THE OBJECT FREE AREA OF AN ACTIVE TAXIWAY OR
- 23. UNLESS SPECIFIED OTHERWISE, COST FOR THE ABOVE IS TO BE CONSIDERED INCIDENTAL TO THE PROJECT. SEPARATE PAYMENT WILL NOT BE MADE.

UTILITY NOTE THE LOCATION, SIZE, AND TYPE OF MATERIAL OF EXISTING UNDERGROUND AND/OR ABOVEGROUND 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 OWNER'S REPRESENTATIVE AND/OR THE RESIDENT ENGINEER SHALL ALSO BE IMMEDIATELY NOTIFIED. ANY DAMAGE TO 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 EXCAVATORS) FOR UTILITY INFORMATION, PHONE: 1-800-892-0123. CONTACT THE FAA (FEDERAL AVIATION ADMINISTRATION) FOR ASSISTANCE IN LOCATING FAA CABLES AND UTILITIES. LOCATION OF FAA POWER, CONTROL, AND COMMUNICATION CABLES SHALL BE COORDINATED WITH AND/OR LOCATED BY THE FAA. ALSO CONTACT AIRPORT DIRECTOR/MANAGER AND AIRPORT PERSONNEL FOR ASSISTANCE IN LOCATING UNDERGROUND AIRPORT CABLES AND/OR UTILITIES. ALSO COORDINATE WORK WITH ALL ABOVEGROUND UTILITIES.



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**REPLACE AIRFIELD** FI FCTRICAL VAULT REPLACE BEACON UNIT AND TOWER; RELOCATE **REGULATOR; REPLACE** REMAINING AIRFIELD LIGHTING. SIGNAGE AND NAVIGATIONAL AIDS

IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 Contract No. PN010

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SHEET TITLE

#### PROPOSED SAFETY PLAN NOTES

XXXX TRANSFORMER		
DISCONNECT SWITCH		
CIRCUIT BREAKER		
FUSE		
TRANSIENT VOLTAGE SURGE SUPPRESSOR OR SURGE PROTECTOR DEVICE		
GROUND - GROUND ROD, GROUNDING ELECTRODE, OR AT EARTH POTENTIAL		
D INDICATING LIGHT		
M MOTOR		
LOAD, MOTOR, # = HORSEPOWER		
ELECTRIC UTILITY METER BASE		
• JUNCTION BOX WITH SPLICE		
XXX EQUIPMENT, XXX = DEVICE DESCRIPTION		
GND GROUND BUS OR TERMINAL		
S/N NEUTRAL BUS		
PANELBOARD WITH MAIN LUGS		
PANELBOARD WITH MAIN BREAKER		
FUSE PANEL WITH MAIN FUSE PULLOUT		
DUPLEX RECEPTACLE 120V SINGLE PHASE GROUNDING TYPE		
CONTROL STATION		
RANSFER SWITCH		
ENGINE GENERATOR SET		

	ELECTRICAL LEGEND - SCHEMATIC				
$\neg \vdash$	NORMALLY OPEN (N.O.) CONTACT				
<b></b>	NORMALLY CLOSED (N.C.) CONTACT				
§*)	STARTER COIL, * = STARTER NUMBER				
아	OVERLOAD RELAY CONTACT				
(CR*)	CONTROL RELAY, * = CONTROL RELAY NUMBER				
R*	RELAY, * = RELAY NUMBER				
/°	TOGGLE SWITCH / 2 POSITION SWITCH				
	2-POSITION SELECTOR SWITCH				
	3-position selector switch (h-o-a shown)				
<u>_</u>	2 POLE DISCONNECT SWITCH				
	3 POLE DISCONNECT SWITCH				
Ĩ.	PHOTOCELL				
	TERMINAL BLOCK, * = TERMINAL NUMBER				
<b>_</b> *_	DEVICE TERMINAL, * = DEVICE TERMINAL NUMBER				
	INTERNAL PANEL WIRING				
	FIELD WIRING				
	FUSE				
GND	GROUND BUS OR TERMINAL				
S/N	NEUTRAL BUS				
Ť	GROUND, GROUND ROD, GROUND BUS				
0 0 0 0	INDUSTRIAL CONTROL RELAY OR LIGHTING CONTACTOR				
	S1 CUTOUT HANDLE REMOVED				
┝┤└╼ ╡ ╡ ┥ ╵	S1 CUTOUT HANDLE INSERTED				
՞⊱ւ	N.O. THERMAL SWITCH				
<del>، ۲</del>	N.C. THERMAL SWITCH				
	L-830 SERIES ISOLATION TRANSFORMER				

	ELECTRICAL ABBREVIATIONS
<b>\.F.F</b> .	ABOVE FINISHED FLOOR
, AMP	AMPERES
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BKR	BREAKER
С	CONDUIT
СВ	CIRCUIT BREAKER
СКТ	CIRCUIT
CR	CONTROL RELAY
CU	COPPER
OPDT	DOUBLE POLE DOUBLE THROW
OPST	DOUBLE POLE SINGLE THROW
EM	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
EP	EXPLOSION PROOF
ES	EMERGENCY STOP
etl	INTERTEK - ELECTRICAL TESTING LABS
etm	ELAPSE TIME METER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFI	GROUND FAULT INTERRUPTER
GND	GROUND
GRSC	GALVANIZED RIGID STEEL CONDUIT
HID	HIGH INTENSITY DISCHARGE
HOA	HAND OFF AUTOMATIC
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
J	JUNCTION BOX
KVA	KILOVOLT AMPERE(S)
ĸw	KILOWATTS
LC	LIGHTING CONTACTOR
TFMC	LIQUID TIGHT FLEXIBLE METAL CONDUIT (UL LISTED)
LTG	LIGHTING
LP	LIGHTING PANEL
MAX	MAXIMUM
мсв	MAIN CIRCUIT BREAKER
мсм	THOUSAND CIRCULAR MIL
MDP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
мн	METAL HALIDE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
NEC	NATIONAL ELECTRICAL CODE (NFPA 70)
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OHE	OVERHEAD ELECTRIC
OL	OVERLOAD

A

PB PC	PULL BOX						
PC							
DDD	PHOTO CELL						
PUB	POWER DISTRIBUTION BLOCK						
PNL	PANEL						
RCPT	RECEPTACLE						
R	RELAY						
S	STARTER						
SPD	SURGE PROTECTION DEVICE						
SPST	SINGLE POLE SINGLE THROW						
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR						
TYP	TYPICAL						
UG	UNDERGROUND						
UGE	UNDERGROUND ELECTRIC						
UL	UNDERWRITER'S LABORATORIES						
v	VOLTS						
W/	WITH						
w/o	WITHOUT						
WP	WEATHER PROOF						
XFER	TRANSFER						
XFMR	TRANSFORMER						
AIRPO	IRI EQUIPMENT/FACILITY ABBREVIATIONS						
ASOS	AUTOMATED SURFACE OBSERVING SYSTEM						
ATCT	AIR TRAFFIC CONTROL TOWER						
AWOS	AUTOMATED WEATHER OBSERVING SYSTEM						
CCR							
DME							
FAR	FEDERAL AVIATION REGULATION						
GS	GLIDE SLOPE FACILITY						
HIRL	HIGH INTENSITY RUNWAY LIGHT						
ILS	INSTRUMENT LANDING SYSTEM						
IM	INNER MARKER						
LIR	LOW IMPACT-RESISTANT						
LOC	LOCALIZER FACILITY						
MALS	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM						
MALSR	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATING LIGHTS						
MIRL	MEDIUM INTENSITY RUNWAY LIGHT						
MITL	MEDIUM INTENSITY TAXIWAY LIGHT						
NDB	NON-DIRECTIONAL BEACON						
PAPI	PRECISION APPROACH PATH INDICATOR						
PLASI	PULSE LIGHT APPROACH SLOPE INDICATOR						
RAIL	RUNWAY ALIGNMENT INDICATING LIGHTS						
REIL	RUNWAY END IDENTIFIER LIGHT						
RVR	RUNWAY VISUAL RANGE						
VADI	VISUAL APPROACH DESCENT INDICATOR						
VASI	VISUAL APPROACH SLOPE INDICATOR						
VOR	VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE FACILITY						

## NOTES:

1. ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED IN CONFORMANCE WITH NFPA 70 - NATIONAL ELECTRICAL CODE (NEC) MOST CURRENT ISSUE IN FORCE. THE RESPECTIVE EQUIPMENT MANUFACTURER'S DIRECTIONS AND ALL OTHER APPLICABLE LOCAL CODES, LAWS, ORDINANCES, AND REQUIREMENTS IN FORCE. ANY INSTALLATIONS WHICH VOID THE U.L. LISTING. INTERTEK TESTING SERVICES VERIFICATION/ETL LISTING (OR OTHER THIRD PARTY LISTING) AND/OR THE MANUFACTURER'S WARRANTY OF A DEVICE WILL NOT BE PERMITTED

2. CONTRACTOR SHALL KEEP A COPY OF THE LATEST NEC IN FORCE ON SITE AT ALL TIMES DURING/CONSTRUCTION FOR USE AS A REFERENCE.

3. ALL VAULT WORK, POWER OUTAGES, AND/OR SHUT DOWN OF EXISTING SYSTEMS SHALL BE COORDINATED WITH THE AIRPORT MANAGER. ONCE SHUT DOWN, THE CIRCUITS SHALL BE LABELED AS SUCH TO PREVENT ACCIDENTAL ENERGIZING OF THE RESPECTIVE CIRCUITS. ALL PERSONNEL SHALL FOLLOW U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA) 29 CFR PART 1910 OCCUPATIONAL SAFETY & HEALTH STANDARDS FOR ELECTRICAL SAFETY AND LOCKOUT/TAGOUT PROCEDURES INCLUDING, BUT NOT LIMITED TO, 29 CFR SECTION 1910.147 THE CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT).

4. COLOR CODE PHASE AND NEUTRAL CONDUCTOR INSULATION FOR NO. 6 AWG OR SMALLER. PROVIDE COLORED INSULATION OR COLORED MARKING TAPE FOR PHASE AND NEUTRAL CONDUCTORS FOR NO. 4 AWG AND LARGER. INSULATED GROUND CONDUCTORS SHALL HAVE GREEN COLORED INSULATION FOR ALL CONDUCTOR AWG AND/OR KCMIL TO COMPLY WITH NEC 250.119. NEUTRAL CONDUCTORS SHALL HAVE WHITE COLORED INSULATION FOR NO. 6 AWG AND SMALLER TO MEET THE REQUIREMENTS OF NEC 200.6. 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

5. SEE RESPECTIVE SITE PLANS FOR SITE LEGEND INFORMATION.

LTFMC DENOTES LIQUID TIGHT FLEXIBLE METAL CONDUIT UL LISTED, SUNLIGHT RESISTANT, & SUITABLE FOR GROUNDING. LIQUID TIGHT FLEXIBLE METAL CONDUIT AND ASSOCIATED FITTINGS SHALL BE U.L. LISTED TO MEET THE REQUIREMENTS OF NEC 350.6. LIQUID TIGHT FLEXIBLE METAL CONDUIT THAT IS USED FOR FLEXIBILITY (INCLUDING CONNECTIONS TO CCR'S & TRANSFORMERS) SHALL REQUIRE AN EXTERNAL BONDING JUMPER OR INTERNAL EQUIPMENT GROUNDING CONDUCTOR PER NEC 350.60. EXTERNAL BONDING JUMPERS USED WITH CCR INSTALLATIONS SHALL BE #6 AWG COPPER (MINIMUM). DO NOT INSTALL LTFMC THAT IS NOT UL LISTED. CONFIRM LTFMC BEARS THE UL LABEL PRIOR TO INSTALLATION.

7. 6.ALL ENCLOSURES RATED NEMA 4, 4X SHALL HAVE WATERTIGHT HUBS AT CONDUIT ENTRANCES UL LISTED NEMA 4, 4X FOR THE RESPECTIVE ENCLOSURE, TO MAINTAIN THE NEMA 4, 4X RATING.

8. CONTRACTOR SHALL FIELD VERIFY EXISTING SITE CONDITIONS. CONTRACTOR SHALL FIELD VERIFY RESPECTIVE CIRCUITS AND POWER SOURCES PRIOR TO REMOVING OR DISCONNECTING THE RESPECTIVE AIRFIELD LIGHTING, TAXI SIGN, NAVAID, OR OTHER DEVICE.

9. HIGH VOLTAGE CIRCUITS (AIRFIELD LIGHTING 5000 VOLT SERIES CIRCUITS AND OTHER CIRCUITS RATED ABOVE 600 VOLTS) AND LOW VOLTAGE CIRCUITS (RATED 600 VOLTS AND BELOW) SHALL NOT BE INSTALLED IN THE SAME WIREWAY, CONDUIT, DUCT, RACEWAY, JUNCTION STRUCTURE OR HANDHOLE.



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IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139

Contract No. PN010

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DESCRIPTION					
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ISSUE: 09/22/2017					
PROJECT NO: 17A0002					
CAD FILE: E-001-LGND.DWG					
DESIGN BY: KNL 07/12/2017					
DRAWN BY: CWS 07/21/2017					

SHEET TITLE

#### ELECTRICAL LEGEND AND ABBREVIATIONS





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SHEET TITLE

EXISTING ELECTRICAL ONE LINE DIAGRAM FOR VAULT





**EXISTING AIRFIELD** LIGHTING - STA. 100+00 TO 113+25



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			- Existing RU Paid For U Airfield Lig	JNWAY LIGHTS TO BE REMOVED. INDER ITEM AR800476 REMOVE CHTING PER LUMP SUM (TYP.).						
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W	+00	128+00 129+00	130±00	1-31+00	<u>132+00</u> 1 133+00	RUNN 134+00	AY 9–27	136+00	137+00	138+00
ATCH LINE - STA		R		IXXIMAX VS			XISIING PAPI 9 IRCUIT <b>EXISTING RUNWAY</b> REMOVED WHEF WITH NEW WORK PLACE ELS 	CIRCUIT TO BE TE IN CONFLICT ABANDONED IN EWHERE (TYP.).		
127+00		EXISTING ELECTRICAL DUCT BE ABANDONED IN PLAC		0 m /	EXISTING TAXI GUIDANCE SIG PAID FOR UNDER ITEM AR80 AIRFIELD LIGHTING PER LUMF	IS TO BE REMOVED. 0476 REMOVE • SUM (TYP.).				
			st 1,50 − − − 0	11-5- 01	- <sub>35</sub> 0 — — — — — — — — — — — — — — — — — — —				 	
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			11,20 11,2 <sup>1</sup> 11,2 <sup>2</sup>	T1-9 <sup>3</sup> T1-9 <sup>4</sup> T1-9 <sup>5</sup>	EXISTING TAXIWAY LIGHTS TO REMAIN	11-91	EXISTING TAXIWAY CIRCUIT TO REMAIN	lghting	11- <sup>39</sup>	
	⊠HH	EXISTING ELECTRICAL HANDHOLE								
	⊖ ĸ ⊟ R	BE REMOVED EXISTING TAXI GUIDANCE SIGN TO BE REMO	VED							
	⊟R ⊖P	EXISTING BASE MOUNTED RUNWAY LIGHT TO	OLD LIGHT TO							
	⊟R	EXISTING STAKE MOUNTED RUNWAY LIGHT TO	O BE REMOVED							
	OR	EXISTING BASE MOUNTED TAXIWAY LIGHT TO	BE REMOVED							
	0	EXISTING BASE MOUNTED TAXIWAY LIGHT								
	$\bigcirc \pi$	EXISTING STARE MOONTED TAXIMAT LIGHT IN								

## <u>LEGEND</u>

- EXISTING PAVEMENT
- EXISTING BUILDING
- EXISTING BUILD
- EXISTING MARKING

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- \_\_\_\_\_
- EXISTING ELECTRICAL DUCT
- ------ EXISTING ELECTRICAL CABLES
- \_\_\_\_\_
- E EXISTING ELECTRICAL CABLES
- -----> EXISTING STORM SEWER/UNDERDRAIN
- O EXISTING STAKE MOUNTED TAXIWAY LIGHT





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SHEET TITLE

EXISTING AIRFIELD LIGHTING - STA. 127+00 TO 140+75



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#### <u>LEGEND</u>

	EXISTING PAVEMENT
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-UGE	EXISTING ELECTRIC UTILITY UG PRIMARY
0	EXISTING STAKE MOUNTED TAXIWAY LIGHT
$\bigcirc \mathbf{R}$	EXISTING STAKE MOUNTED TAXIWAY LIGHT TO BE REMOVE
0	EXISTING BASE MOUNTED TAXIWAY LIGHT
OR	EXISTING BASE MOUNTED TAXIWAY LIGHT TO BE REMOVED
⊟R	EXISTING STAKE MOUNTED RUNWAY LIGHT TO BE REMOVE
⊟R	EXISTING BASE MOUNTED RUNWAY LIGHT TO BE REMOVED
⊖R	EXISTING STAKE MOUNTED RUNWAY THRESHOLD LIGHT TO BE REMOVED
⊟R	EXISTING TAXI GUIDANCE SIGN TO BE REMOVED
⊠HH	EXISTING ELECTRICAL HANDHOLE
P	EXISTING WIND CONE
Φ	EXISTING WIND TEE



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SHEET TITLE

EXISTING AIRFIELD LIGHTING - BEACON AREA





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		PROPOSED BASE MOUNTED RUNWAY LIGHT
	۲	PROPOSED STAKE MOUNTED THRESHOLD LIGHT
	۲	PROPOSED BASE MOUNTED THRESHOLD LIGHT
	•	PROPOSED STAKE MOUNTED TAXIWAY EDGE LIGHT
© Sc HH MH		PROPOSED BASE MOUNTED TAXIWAY EDGE LIGHT
	∎ <sub>sc</sub>	PROPOSED SPLICE CAN
	H	PROPOSED ELECTRICAL HANDHOLE
	(H	PROPOSED ELECTRICAL MANHOLE
	•	PROPOSED L-8491 REIL
		PROPOSED L-807(L) WIND CONE
	•	PROPOSED AIRPORT ROTATING BEACON WITH POLE
	Φ	EXISTING WIND TEE





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PROPOSED ELECTRICAL DUCTS

------ PROPOSED 3-1/C #6 USE IN 2" DUCT

- PROPOSED RUNWAY LIGHTING CABLE

PROPOSED TAXIWAY GUIDANCE SIGN

PROPOSED STAKE MOUNTED RUNWAY LIGHT

PROPOSED BASE MOUNTED RUNWAY LIGHT

PROPOSED STAKE MOUNTED THRESHOLD LIGHT

PROPOSED BASE MOUNTED THRESHOLD LIGHT

PROPOSED STAKE MOUNTED TAXIWAY EDGE LIGHT

PROPOSED BASE MOUNTED TAXIWAY EDGE LIGHT

PROPOSED SPLICE CAN

PROPOSED ELECTRICAL HANDHOLE

PROPOSED ELECTRICAL MANHOLE

PROPOSED L-8491 REIL

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PROPOSED L-807(L) WIND CONE

PROPOSED AIRPORT ROTATING BEACON WITH POLE

EXISTING WIND TEE



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SHEET TITLE

PROPOSED AIRFIELD LIGHTING - BEACON AREA

#### AIRFIELD LIGHTING NOTES

- 1. ALL WORK, POWER OUTAGES, AND/OR SHUT DOWN OF EXISTING SYSTEMS SHALL BE COORDINATED WITH THE AIRPORT DIRECTOR/MANAGER. ONCE SHUT DOWN, THE CIRCUITS SHALL BE LABELED AS SUCH TO PREVENT ACCIDENTAL ENERGIZING OF THE RESPECTIVE CIRCUITS. ALL PERSONNEL SHALL FOLLOW U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA) 29 CFR PART 1910 OCCUPATIONAL SAFETY & HEALTH STANDARDS FOR ELECTRICAL SAFETY AND LOCKOUT/TAGOUT PROCEDURES INCLUDING, BUT NOT LIMITED TO 29 CFR SECTION 1910.147 THE CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT).
- 2. CONTRACTOR SHALL FIELD VERIFY EXISTING SITE CONDITIONS. CONTRACTOR SHALL FIELD VERIFY RESPECTIVE CIRCUITS AND POWER SOURCES PRIOR TO REMOVING OR DISCONNECTING THE RESPECTIVE AIRFIELD LIGHTING, NAVAID, OR OTHER DEVICE.
- 3. PROPOSED AIRFIELD LIGHTS, TAXIWAY LIGHTS, GUIDANCE SIGNS, OTHER AIRFIELD LIGHTING, SPLICE CANS, HANDHOLES, MANHOLES, ELECTRICAL DUCTS, AND CABLE SHALL BE INSTALLED AT THE LOCATIONS SHOWN AND IN COMPLIANCE WITH THE SPECIFICATIONS, SPECIAL PROVISIONS, RESPECTIVE DETAILS, AND MANUFACTURER'S RECOMMENDATIONS.
- 4. PROPOSED TAXI GUIDANCE SIGNS SHALL BE LOCATED SUCH THAT THE CLOSEST SIDE OF THE SIGN IS 15' FROM THE PAVEMENT EDGE, UNLESS SHOWN OTHERWISE.
- 5. PROPOSED CABLE FOR RUNWAY AND TAXIWAY LIGHTING SHALL BE INSTALLED APPROXIMATELY 12' FROM THE PAVEMENT EDGE. CABLES SHALL BE PLACED A MINIMUM OF 18" BELOW FINISHED GRADE.
- 6. THE PROPOSED RUNWAY AND TAXIWAY LIGHTING CABLE SHALL BE 1/C, #8 AWG, FAA L-824, 5000 VOLT, TYPE C UNDERGROUND CABLE IN UNIT DUCT.
- 7. IN AREAS WHERE THERE IS A CONGESTION OF CABLES OR WHERE THE PROPOSED CABLE CROSSES AN EXISTING CABLE. THE CONTRACTOR IS REQUIRED TO HAND DIG THE TRENCH NECESSARY FOR THE PROPOSED CABLE. AT OTHER LOCATIONS, THE PROPOSED CABLE MAY BE TRENCHED OR PLOWED INTO PLACE. HAND DIGGING, TRENCHING AND/OR PLOWING WILL BE CONSIDERED INCIDENTAL TO THE PROPOSED CABLES AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.
- 8. PROPOSED AIRFIELD LIGHTS WILL BE FITTED WITH LENSES IN ACCORDANCE WITH THE LIGHT LENS SCHEDULE.
- 9. ALL PROPOSED AIRFIELD LIGHTS, AND TAXI GUIDANCE SIGNS AND EXISTING AIRFIELD LIGHTS ON TAXIWAY CIRCUIT, SHALL BE TAGGED BY THE CONTRACTOR IN ACCORDANCE WITH THE LIGHT NUMBERS SHOWN ON THESE CONSTRUCTION DRAWINGS. TAGS FOR THE PROPOSED LIGHTS AND EXISTING LIGHTS SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.
- 10. SEE "TAXI GUIDANCE SIGN SCHEDULE" FOR INFO ON SIGN LEGENDS.
- 11. RUNWAY EXIT/TAXIWAY ENTRANCE LIGHTS (TAXIWAY LIGHTS TO DEFINE THE THROAT OR ENTRANCE INTO THE INTERSECTING TAXIING ROUTE) SHALL BE CONNECTED TO THE RESPECTIVE RUNWAY SERIES CIRCUIT TO BE ILLUMINATED WHEN THE RUNWAY EDGE LIGHTS ARE ON TO COMPLY WITH FAA AC 150/5340-30H. CHAPTER 2, PART 2,1,4b(4),
- 12. HOLDING POSITION SIGNS FOR RUNWAYS SHALL BE CONNECTED TO THE RESPECTIVE RUNWAY SERIES CIRCUIT TO BE ILLUMINATED WHEN THE ASSOCIATED RUNWAY LIGHTS ARE ILLUMINATED TO COMPLY WITH FAA AC 150/5340-18F, CHAPTER 1, PART 15 "SIGN OPERATION"
- 13. THE CONTRACTOR SHALL SECURE, IDENTIFY AND PLACE ALL TEMPORARY EXPOSED WIRING IN CONDUIT, DUCT OR UNIT DUCT TO PREVENT ELECTROCUTION AND FIRE IGNITION SOURCES AS PER THE REQUIREMENTS OF FAA AC 150/5370-2F, PART 218, PARAGRAPH C. ALL LABOR, MATERIALS, AND TIME NECESSARY TO COMPLY WITH THIS REQUIREMENT SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.
- 14. HOMERUN CABLES FOR A RESPECTIVE CIRCUIT THAT ARE INSTALLED IN CONDUIT OR DUCT SHALL BE RUN TOGETHER IN THE SAME RACEWAY OR DUCT.
- 15. EXISTING AIRFIELD LIGHTING CABLES (SCHEDULED FOR REPLACEMENT) IN AREAS OF NEW WORK SHALL BE DISCONNECTED & REMOVED WHERE IN CONFLICT WITH NEW CONSTRUCTION. IN OTHER AREAS CABLES MAY BE ABANDONED IN PLACE.
- 16. THE CONTRACTOR IS REQUIRED TO FILL IN ALL HOLES AND DEPRESSIONS RESULTING FROM THE NEW WORK, WITH EARTH MATERIAL. THE AREAS SHALL BE COMPACTED TO PREVENT FUTURE SETTLEMENT AND FERTILIZED. SEEDED. AND MULCHED IN ACCORDANCE WITH ITEMS 901 AND 908 RESPECTIVELY.
- 17. FURNISH AND INSTALL A #6 AWG BARE SOLID COPPER GROUND AND BOND IT TO EACH GROUND ROD AT THE RESPECTIVE ARFIELD LIGHT FIXTURES AND TAXI GUIDANCE SIGNS. THE #6 AWG GROUND SHALL BE DIRECT BURIAL IN TRENCH APPROXIMATELY 12 TO 18 IN. BELOW GRADE. THE GROUND CONDUCTOR MAY BE INSTALLED ABOVE THE #8 FAA L-824, 5,000-VOLT CABLE IN UNIT DUCT OR IN AN ADJACENT TRENCH. THE #6 AWG GROUND SHALL BE CONNECTED TO EACH RESPECTIVE GROUND ROD WITH AN EXOTHERMIC WELD" CONNECTION. THE COMPLETED GROUND WIRE INSTALLED WILL PROVIDE A GROUND RING SYSTEM FOR THE RESPECTIVE AIRFIELD LIGHTING CIRCUIT. THE GROUND WIRE WILL NOT BE INSTALLED WITH THE HOMERUN CABLES FOR THE RESPECTIVE AIRFIELD LIGHTING CIRCUIT. THE #6 AWG BARE SOLID COPPER GROUND WILL BE PAID FOR UNDER ITEM AR108756 1/C #6 GROUND PER LINEAL FOOT.
- 18. IN THE EVENT THAT OTHER CONSTRUCTION PROJECTS ARE IN PROGRESS AT THE AIRPORT AT THE SAME TIME AS THIS PROJECT, THE CONTRACTOR WILL BE REQUIRED TO COOPERATE WITH ALL OTHER CONTRACTORS AND THE AIRPORT MANAGER IN THE COORDINATION OF THE WORK.
- 19. NO CONNECTION TO AN ACTIVE LIGHTING CIRCUIT WILL BE BROKEN UNTIL THE CIRCUIT HAS BEEN TURNED OFF IN ACCORDANCE WITH NOTE 1.

LIGHT LENS SCHEDULE						
LIGHT NUMBERS	LENS	ORIENTATION	FIXTURE TYPE			
R1-1 TO R1-3	BLUE		EXISTING L-861T(L)			
R1-4 TO R1-11	RED/GREEN	RED SIDE FACING WEST (TOWARD THRESHOLD)	L-861E(L)			
R1-12 TO R1-21	CLEAR-WHITE/YELLOW	YELLOW SIDE FACING WEST (TOWARD RUNWAY 9 APPROACH)	L-861(L)			
R1-22 TO R1-27	CLEAR-WHITE		L-861(L)			
R1-28 TO R1-37	CLEAR-WHITE/YELLOW	YELLOW SIDE FACING WEST (TOWARD RUNWAY 27 APPROACH)	L-861(L)			
R1-38 TO R1-45	RED/GREEN	RED SIDE FACING EAST (TOWARD THRESHOLD)	L-861E(L)			
R1-46 TO R1-56	BLUE		L-861T(L)			
R1-57	CLEAR-WHITE/YELLOW	YELLOW SIDE FACING EAST (TOWARD RUNWAY 27 APPROACH)	L-861(L)			
R1-58 TO R1-73	BLUE		L-861T(L)			
R1-74 TO R1-77	CLEAR-WHITE/YELLOW	YELLOW SIDE FACING EAST (TOWARD RUNWAY 27 APPROACH)	L-861(L)			
R1-78 TO R1-89	BLUE		EXISTING L-861T(L)			
R1-90	CLEAR-WHITE/YELLOW	YELLOW SIDE FACING EAST (TOWARD RUNWAY 27 APPROACH)	L-861(L)			
R1-91 TO R1-92	BLUE		EXISTING L-861T(L)			
R1-93 TO R1-95	CLEAR-WHITE/YELLOW	YELLOW SIDE FACING EAST (TOWARD RUNWAY 27 APPROACH)	L-861(L)			
R1-96 TO R1-101	CLEAR-WHITE		L-861(L)			
R1-102 TO R1-115	BLUE		EXISTING L-861T(L)			
R1-116 TO R1-125	CLEAR-WHITE/YELLOW	YELLOW SIDE FACING WEST (TOWARD RUNWAY 9 APPROACH)	L-861(L)			
R1-126 TO R1-131	BLUE		EXISTING L-861T(L)			

	TAXI GUIDANCE SIGN SCHEDULE				
Sign Numbers	LOCATION	SIDE A	SIDE B		
R1-TGS1	TAXIWAY A3 INTERSECTION WITH RUNWAY 27 AT HOLD LINE.	A3 27			
R1-TGS2	TAXIWAY TURNAROUND INTERSECTION WITH RUNWAY 9 AT HOLD LINE.	9	BLANK		
R1-TGS3	TAXIWAY TURNAROUND INTERSECTION WITH RUNWAY 27-9 AT HOLD LINE	27-9	BLANK		
R1-TGS4	TAXIWAY A INTERSECTION WITH RUNWAY 27-9 AT HOLD LINE	A 27-9	BLANK		
R1-TGS5	TAXIWAY A1 INTERSECTION WITH RUNWAY 27-9 AT HOLD LINE	A1 27-9	BLANK		

#### TAXI GUIDANCE SIGN SCHEDULE

А	TYPE L-858L(L) LOCATION SIGN - YELLOW LEGEND AND BORDER ON A BLACK BACKGROUND
27-9	TYPE L-858R(L) MANDATORY INSTRUCTION SIGN - BLACK OUTLINE ON OUTSIDE EDGE OF WHITE LEGEND ON BACKGROUND
RAMP 1	TYPE L-858Y(L) DIRECTION, DESTINATION, AND BOUNDARY SIGN - BLACK LEGEND ON A YELLOW BACKGROUND
BLANK	BLANK - BLACK BACKGROUND

#### TAXI GUIDANCE SIGN NOTES

- 1. THE PROPOSED TAXI GUIDANCE SIGNS SHALL CONFORM TO ADVISORY CIRCULAR 150/5345-44 (CURRENT ISSUE(S) IN EFFECT) AND BE FAA-APPROVED FOR TYPE L-858Y(L) DIRECTION, DESTINATION, AND BOUNDARY SIGNS (BLACK LEGEND ON YELLOW BACKGROUND); TYPE L-858R(L) MANDATORY INSTRUCTION SIGN (BLACK OUTLINE ON OUTSIDE EDGE OF WHITE LEGEND ON RED BACKGROUND); AND/OR TYPE L-858L(L) LOCATION SIGN (YELLOW LEGEND AND BORDER ON BLACK BACKGROUND).
- 2. THE SIGNS SHALL BE SIZE 1, 18-IN. SIGN FACE WITH A 12-IN. LEGEND; STYLE 2, POWERED FROM A 4.8 TO 6.6 AMP SERIES LIGHTING CIRCUIT; CLASS 2, FOR OPERATION FROM -40 DEGREES F TO 131 DEGREES F; MODE 2, TO WITHSTAND WIND LOADS OF 200 M.P.H., BASE-MOUNTED, DOUBLE-SIDED, AS SPECIFIED ON THE PLANS.
- 3. TAXI GUIDANCE SIGNS SHALL HAVE LED (LIGHT EMITTING DIODE) TYPE ILLUMINATION AND THEY SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF FAA ENGINEERING BRIEF NO. 67D LIGHT SOURCES OTHER THAN INCANDESCENT AND XENON FOR AIRPORT AND OBSTRUCTION LIGHTING FIXTURES.
- 4. THE PROPOSED TAXI GUIDANCE SIGNS SHALL BE LOCATED SUCH THAT THE CLOSEST SIDE OF THE SIGN IS 15' FROM THE PAVEMENT EDGE OR RESPECTIVE RUNWAY SURFACE EDGE.
- 5. ALL PROPOSED TAXI GUIDANCE SIGNS SHALL BE TAGGED BY THE CONTRACTOR IN ACCORDANCE WITH THE SIGN NUMBERS SHOWN ON THESE CONSTRUCTION DRAWINGS.

GROUND			

RED



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IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 Contract No PN010

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#### **AIRFIELD LIGHTING** NOTES AND SCHEDULES

LIGHT LC	LIGHT LOCATION TABLE FOR RUNWAY 9-27 CIRCUIT					
LIGHT NUMBER	NORTHING	EASTING	GROUND RESISTANCE OF GROUND ROD (OHM)			
R1-TGS1	1392324.46	2435603.95				
R1-4	1392171.78	2435596.16				
R1-5	1392161.78	2435596.30				
R1-6	1392151.78	2435596.45				
R1-7	1392141.78	2435596.59				
R1-8	1392106.79	2435597.10				
R1-9	1392096.79	2435597.24				
R1-10	1392086.79	2435597.39				
R1-11	1392076.79	2435597.53				
R1-12	1392074.10	2435411.62				
R1-13	1392071.42	2435225.72				
R1-14	1392068.73	2435039.81				
R1-15	1392066.05	2434853.90				
R1-16	1392063.36	2434668.00				
R1-17	1392060.68	2434482.09				
R1-18	1392057.99	2434296.18				
R1-19	1392055.31	2434110.28				
R1-20	1392052.62	2433924.37				
R1-21	1392049.94	2433738.46				
R1-22	1392047.25	2433552.56				
R1-23	1392044.57	2433366.65				
R1-24	1392041.88	2433180.74				
R1-25	1392039.20	2432994.84				
R1-26	1392036.51	2432808.93				
R1-27	1392033.83	2432623.02				
R1-28	1392031.14	2432437.12				
R1-29	1392028.46	2432251.21				
R1-30	1392025.77	2432065.31				
R1-31	1392023.09	2431879.40				
R1-32	1392020.40	2431693.49				
R1-33	1392017.72	2431507.59				
R1-34	1392015.03	2431321.68				
R1-35	1392012.35	2431135.77				
R1-36	1392009.66	2430949.87				
R1-37	1392006.97	2430763.96				
R1-38	1392004.29	2430578.05				
R1-39	1392014.29	2430577.91				
R1-40	1392024.29	2430577.76				
R1-41	1392034.29	2430577.62				
R1-42	1392069.28	2430577.11				

LIGHT LC	LIGHT LOCATION TABLE FOR RUNWAY 9-27 CIRCUIT				
LIGHT NUMBER	NORTHING	EASTING	GROUND RESISTANCE OF GROUND ROD (OHM)		
R1-43	1392079.28	2430576.97			
R1-44	1392089.28	2430576.83			
R1-45	1392099.28	2430576.68			
R1-46	1392139.28	2430576.10			
R1-47	1392185.52	2430575.44			
R1-48	1392231.78	2430574.79			
R1-49	1392277.31	2430585.01			
R1-50	1392313.25	2430614.82			
R1-51	1392331.74	2430657.69			
R1-52	1392328.75	2430704.28			
R1-53	1392304.93	2430744.44			
R1-54	1392195.29	2430771.19			
R1-55	1392128.69	2430839.74			
R1-56	1392112.39	2430843.23			
R1-57	1392101.96	2430762.59			
R1-58	1392103.72	2430676.63			
R1-59	1392108.72	2430676.56			
R1-60	1392112.03	2430648.22			
R1-61	1392140.14	2430636.10			
R1-62	1392186.38	2430635.43			
R1-63	1392232.63	2430634.76			
R1-TGS2	1392244.71	2430647.05			
R1-64	1392261.08	2430646.07			
R1-65	1392273.20	2430674.18			
R1-66	1392261.89	2430702.63			
R1-TGS3	1392297.03	2430766.92			
R1-67	1392238.33	2430812.99			
R1-68	1392171.72	2430881.55			
R1-69	1392151.19	2430902.69			
R1-70	1392130.66	2430923.82			
R1-71	1392111.57	2430953.30			
R1-72	1392113.22	2430987.72			
R1-73	1392108.22	2430987.79			
R1-74	1392107.34	2431134.40			
R1-75	1392110.02	2431320.31			
R1-76	1392112.71	2431506.21			
R1-77	1392115.39	2431692.12			
R1-TGS4	1392259.20	2431862.47			
R1-90	1392118.08	2431878.03			
R1-93	1392120.76	2432063.93			

LIGHT LC	CATION TABL	E FOR RUNW	AY 9–27 CIRCUIT
LIGHT NUMBER	NORTHING	EASTING	GROUND RESISTANCE OF GROUND ROD (OHM)
R1-94	1392123.45	2432249.84	
R1-95	1392126.13	2432435.75	
R1-96	1392128.82	2432621.65	
R1-97	1392131.50	2432807.56	
R1-98	1392134.19	2432993.47	
R1-99	1392136.87	2433179.37	
R1-100	1392139.56	2433365.28	
R1-101	1392142.24	2433551.19	
R1-TGS5	1392296.75	2433689.15	
R1-116	1392144.93	2433737.09	
R1-117	1392147.61	2433923.00	
R1-118	1392150.30	2434108.91	
R1-119	1392152.98	2434294.81	
R1-120	1392155.67	2434480.72	
R1-121	1392158.35	2434666.62	
R1-122	1392161.04	2434852.53	
R1-123	1392163.72	2435038.44	
R1-124	1392166.41	2435224.34	
R1-125	1392169.09	2435410.25	
BEACON	1393011.96	2435609.46	

- NOTES 1. COORDINATES SHOWN ARE REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), ILLINOIS STATE PLANE COORDINATE SYSTEM WEST ZONE, US FOOT.
- 2. CONTRACTOR SHALL TEST AND RECORD THE EARTH GROUND RESISTANCE FOR THE GROUND ROD AT EACH AIRFIELD LIGHT FIXTURE, EACH TAXI GUIDANCE SIGN, SPLICE CAN, AND NAVAID. GROUND RODS FOR AIRFIELD LIGHTS SHALL BE TESTED AND RECORDED WITH CONNECTIONS TO THE #6 AWG COPPER GROUND RING.



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#### LIGHT LOCATION TABLE



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#### NOTES

- 1. SUITABLE FOR DIRECT BURIAL IN EARTH OR CONCRETE. CONNECTIONS TO GROUND RODS SHALL BE MADE WITH
- 2. FOR BASE MOUNTED LIGHT FIXTURES THE LIGHT FIXTURE MUST BE BONDED TO THE LIGHT BASE INTERNAL GROUND LUG INSTRUCTIONS FOR PROPER METHODS OF ATTACHING A BONDING WIRE.
- 3. AR108756 1/C #6 GROUND PER LINEAR FOOT.
- DIAMETER BY 20-FOOT LONG GROUND ROD PER TWO ADJACENT TAXIWAY LIGHTS.
- 5. BETWEEN THE TWO THRESHOLD LIGHTS.
- STEEL USED TO MANUFACTURE GROUND RODS SHALL BE 100% DOMESTIC STEEL. TO COMPLY WITH THE AIRPORT 6.
- FURTHER DIRECTION. COPIES OF THE GROUND SYSTEM TEST RESULTS SHALL BE FURNISHED TO THE RESIDENT ENGINEER/RESIDENT TECHNICIAN, AND THE PROJECT ENGINEER.



(NOT TO SCALE)

GROUNDING FOR RUNWAY LIGHTS, TAXIWAY LIGHTS, AND LIGHTED TAXI GUIDANCE SIGNS SHALL BE AS DETAILED ON THE PLANS AND AS SPECIFIED HEREIN. PER FAA AC 150/5340-30H DESIGN AND INSTALLATION DETAILS FOR AIRPORT VISUAL AIDS, CHAPTER 12, PART 12.6; A GROUND MUST BE INSTALLED AT EACH LIGHT FIXTURE. THE PURPOSE OF THE LIGHT BASE GROUND IS TO PROVIDE A DEGREE OF PROTECTION FOR MAINTENANCE PERSONNEL FROM POSSIBLE CONTACT WITH AN ENERGIZED LIGHT BASE OR MOUNTING STAKE THAT MAY RESULT FROM A SHORTED POWER CABLE OR ISOLATION TRANSFORMER. A LIGHT BASE GROUND SHALL BE INSTALLED AT EACH TRANSFORMER BASE/LIGHT CAN ASSOCIATED WITH RUNWAY LIGHTS, TAXIWAY LIGHTS, AND LIGHTED TAXI GUIDANCE SIGNS. A LIGHT BASE GROUND SHALL ALSO BE INSTALLED AT EACH STAKE MOUNTED LIGHT FIXTURE. A LIGHT BASE GROUND SHALL BE INSTALLED AND CONNECTED TO THE METAL FRAME OF EACH TAXI GUIDANCE SIGN AS DETAILED ON THE PLANS AND IN ACCORDANCE WITH THE RESPECTIVE TAXI GUIDANCE SIGN MANUFACTURER RECOMMENDATIONS. THE LIGHT BASE GROUND SHALL BE A #6 AWG BARE COPPER CONDUCTOR BONDED TO THE GROUND LUG ON THE RESPECTIVE L-867 TRANSFORMER BASE/LIGHT CAN OR MOUNTING STAKE AND A 3/4-INCH DIAMETER BY 20-FEET LONG (MINIMUM) UL LISTED COPPER CLAD GROUND ROD. (TWO 3/4-INCH DIAMETER BY 10-FEET LONG, UL LISTED COPERCIAD GOUND RODS COUPLED TOGETHER), 20-FEET LONG GOUND RODS ARE REQUIRED DUE TO POOR RESISTANCE OF THE SOIL AT THE RESPECTIVE SITE. CONNECTIONS TO GROUND LUGS ON THE L-867 TRANSFORMER BASE/LIGHT CAN OR MOUNTING STAKE SHALL BE WITH A UL LISTED GROUNDING CONNECTOR EXOTHERMIC WELD TYPE CONNECTORS, CADWELD BY PENTAIR ERICO PRODUCTS, INC., THERMOWELD BY CONTINENTAL INDUSTRIES, INC., ULTRAWELD BY HARGER, OR APPROVED 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. TOP OF GROUND RODS SHALL BE BURIED 12 INCHES MINIMUM BELOW GRADE, UNLESS SPECIFIED OTHERWISE HEREIN, FOR RESPECTIVE APPLICATIONS

VIA A #6 AWG STRANDED COPPER WIRE RATED FOR 600 VOLTS WITH GREEN XHHW INSULATION OR A BRAIDED GROUND STRAP OF EQUIVALENT CURRENT RATING. THE GROUND WIRE LENGTH MUST BE SUFFICIENT TO ALLOW THE REMOVAL OF THE LIGHT FIXTURE FROM THE LIGHT BASE FOR ROUTINE MAINTENANCE. SEE THE LIGHT FIXTURE MANUFACTURER'S

FURNISH AND INSTALL A #6 AWG BARE SOLID COPPER GROUND AND BOND IT TO EACH GROUND ROD AT THE RESPECTIVE AIRFIELD LIGHT FIXTURES AND TAXI GUIDANCE SIGNS. THE #6 AWG GROUND SHALL BE DIRECT BURIAL IN TRENCH APPROXIMATELY 12 TO 18 INCHES BELOW BELOW GRADE. THE GROUND CONDUCTOR MAY BE INSTALLED ABOVE THE #8 FAA L-824, 5000-VOLT CABLE IN UNIT DUCT OR IN AN ADJACENT TRENCH. THE #6 AWG GROUND SHALL BE CONNECTED TO EACH RESPECTIVE GROUND ROD WITH AN EXOTHERMIC WELD CONNECTION. THE COMPLETED GROUND WIRE INSTALLED WILL PROVIDE A GROUND RING SYSTEM FOR THE RESPECTIVE AIRFIELD LIGHTING CIRCUIT. THE GROUND WIRE WILL NOT BE INSTALLED WITH THE HOMERUN CABLES. THE #6 AWG BARE SOLID COPPER GROUND WILL BE PAID FOR UNDER ITEM

FOR TAXIWAY LIGHTS THAT ARE SPACED WITH LESS THAN 10 FEET OF SEPARATION BETWEEN THEM PROVIDE ONE 3/4-INCH

FOR RUNWAY THRESHOLD LIGHTS THAT ARE SPACED WITH 10 FEET OF SEPARATION BETWEEN THEM, PROVIDE ONE 3/4 -INCH DIAMETER BY 20-FOOT LONG GROUND ROD PER TWO ADJACENT THRESHOLD LIGHTS. LOCATE GROUND ROD MIDWAY

IMPROVEMENT PROGRAM BUY AMERICAN PREFERENCE REQUIREMENTS AND THE STEEL PRODUCTS PROCUREMENT ACT.

FOR EACH GROUNDING ELECTRODE SYSTEM, THE CONTRACTOR SHALL TEST THE MADE ELECTRODE GROUND SYSTEM WITH AN INSTRUMENT SPECIFICALLY DESIGNED FOR TESTING GROUNDING SYSTEMS. TEST RESULTS SHALL BE RECORDED FOR EACH GROUNDING ELECTRODE SYSTEM. IF GROUND RESISTANCE EXCEEDS 25 OHMS, CONTACT THE PROJECT ENGINEER FOR

-L-861 RUNWAY LIGHT AS SHOWN ON



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#### AIRFIELD LIGHTING **DETAILS SHEET 2**



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SHEET TITLE

#### **REIL DETAILS AND** NOTES



ST HANSON Engineering | Planning | Allied S Offices Nationwide www.hanson-inc.com Hanson Professional Services Inc. 1525 S. 6th Street Springfield, IL 62568 phone: 217-788-2450 fax: 217-788-2503 Illinois Licensed Professional Service Corporation #184-001084 3/8/2017 OFESSION KEVIN N **IGHTFOOT** 062-047643 E OF ILL y Di hig EXPIRES: 11/30/2017 PEKIN MUNICIPAL AIRPORT 111 South Capitol Street Pekin, Illinois 61554 Telephone: 309.477.2300 **REPLACE AIRFIELD** CONTRACTOR SHALL INSTALL BUSSMANN ELECTRICAL VAULT, IN-LINE WATERPROOF FUSE HOLDERS WITH REPLACE BEACON UNIT FUSE AND SURGE PROTECTOR AS SPECIFIED AND TOWER; RELOCATE AT BASE OF POLE TO PROTECT FIXTURE **REGULATOR; REPLACE** REMAINING AIRFIELD LIGHTING, SIGNAGE AND NAVIGATIONAL AIDS GROUNDING LUG OR GROUNDING BAR. PROVIDED WITH POLE, CONNECT #2 BARE STRANDED COPPER GROUND WIRE IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 BASIS OF DESIGN Contract No. PN010 (UNFACTORED LOADS): M = 44.000FT - #P = 2000 #GRADE V = 1200 #FOUR THREADED HOOKED ANCHOR CABLE IN UNIT DUCT OR PVC/HDPE ADAPTER SCHEDULE 40 PVC DESCRIPTION NO. DATE DES DWN REV - 2" GALVANIZED RIGID CONDUIT EXTEND 2'-0" FROM BASE. ISSUE: 09/22/2017 PROJECT NO: 17A0002 CAD FILE: E-506-ELEC.DWG PORTLAND CEMENT CONCRETE PER ITEM 610. DESIGN BY: KNI 07/12/2017 DRAWN BY: CWS 07/21/2017 8-#6 REINFORCING BARS WITH REVIEWED BY: BSS 08/21/2017 SHEET TITLE

AIRPORT ROTATING

**BEACON DETAILS** 



SPLICE DETAILS ARE PROVIDED FOR NEW WORK AND TO ASSIST IN REPAIRS OF ACCIDENTAL OR UNEXPECTED INTERRUPTIONS AND/OR CUTS TO AIRFIELD LIGHTING

2. CONTRACTOR SHALL KEEP ON HAND A MINIMUM OF 10 SETS OF SPLICE KITS FOR L-823 CONNECTORS AND A MINIMUM OF 10 SETS OF TYPE A LOW VOLTAGE SPLICE

3. EVERY AIRFIELD LIGHTING CABLE SPLICER SHALL BE QUALIFIED IN MAKING CABLE SPLICES AND TERMINATIONS ON CABLES RATED AT AND/OR ABOVE 5,000 VOLTS AC TO COMPLY WITH THE REQUIREMENTS OF FAA 150/5370-10G ITEM L-108.

4. WHEN PREPARING CABLE FOR SPLICES, THE CONTRACTOR SHALL USE A CABLE STRIPPER/PENCILLER WHENEVER CABLE CONNECTIONS ARE MADE.

INSIDE DIAMETER OF RESPECTIVE CABLE CONNECTOR SHALL PROPERLY MATCH

WRAP ALL PRIMARY AND SECONDARY POWER CONNECTIONS WITH SUFFICIENT LAYERS OF HIGH VOLTAGE ELECTRICAL INSULATING TAPE (RUBBER SPLICING TAPE SUITABLE FOR PRIMARY ELECTRICAL INSULATION FOR SPLICING CABLE FROM 600 VOLTS TO 69,000 VOLTS) AND COVER WITH VINYL ELECTRICAL TAPE (ALL-WEATHER VINYL INSULATING TAPE SUITABLE FOR PROTECTIVE JACKETING FOR HIGH-VOLTAGE CABLE SPLICES AND REPAIRS) FOR FULL VALUE OF CABLE INSULATION VOLTAGE. PER ILLINOIS STANDARD SPECIFICATIONS FOR CONSTRUCTION OF AIRPORTS ITEM 108, ITEM 125, AND FAA AC 150/5370-10G ITEM L-108, HIGH VOLTAGE ELECTRICAL INSULATING TAPE SHALL BE 3M SCOTCH 23, 3M SCOTCH 130C OR APPROVED EQUIVALENT, AND VINYL ELECTRICAL TAPE SHALL BE 3M SCOTCH 88 OR APPROVED EQUIVALENT. TAPES MUST BE RATED SUITABLE FOR THE APPLICATION.

PROVIDE CABLE TAGS TO IDENTIFY THE RESPECTIVE CIRCUITS ALL POINTS OF ACCESS INCLUDING L-867 BASES, L-868 BASES, HANDHOLES, MANHOLES, JUNCTION BOXES,

8. CONNECTION OF CONDUCTORS MUST BE MADE BY USING CRIMP CONNECTORS AND A CRIMPING TOOL APPROVED BY THE CONNECTOR/LUG MANUFACTURER. THE TOOL MUST PRODUCE A COMPLETE CRIMP BEFORE IT CAN BE REMOVED. THE CRIMPING TOOL USED MUST BE LISTED BY THE L-823 KIT MANUFACTURER. MAKE THE NUMBER AND TYPE OF CRIMPS PER THE KIT MANUFACTURER'S INSTRUCTIONS.



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IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 Contract No. PN010

DESCRIPTION NO. DATE DES DWN REV ISSUE: 09/22/2017 PROJECT NO: 17A0002 CAD FILE: E-507-ELEC.DWG DESIGN BY: KNL 07/12/2017 DRAWN BY: CWS 07/21/2017 REVIEWED BY: BSS 08/21/2017

SHEET TITLE

#### AIRFIELD LIGHTING CABLE SPLICE DETAILS



18/2017



#### DUCT INSTALLATION NOTES

- ALL ELECTRICAL EQUIPMENT AND MATERIALS SHALL BE INSTALLED IN CONFORMANCE WITH NFPA 70 - NATIONAL ELECTRICAL CODE (NEC) MOST CURRENT ISSUE IN FORCE. THE RESPECTIVE EQUIPMENT MANUFACTURER'S DIRECTIONS AND ALL OTHER APPLICABLE LOCAL CODES, LAWS, ORDINANCES, AND REQUIREMENTS IN FORCE. ANY INSTALLATIONS WHICH VOID THE U.L. LISTING, INTERTEK TESTING SERVICES VERIFICATION/ETL LISTING (OR OTHER THIRD PARTY LISTING) AND/OR THE MANUFACTURER'S WARRANTY OF A DEVICE WILL NOT BE PERMITTED
- CONTRACTOR SHALL KEEP A COPY OF THE LATEST NEC IN FORCE ON SITE AT 2. ALL TIMES DURING CONSTRUCTION FOR USE AS A REFERENCE.
- CONTRACTOR SHALL COORDINATE WORK AND ANY POWER OUTAGES AND/OR SHUT 3. DOWN OF SYSTEMS WITH THE RESPECTIVE FACILITY OWNER PERSONNEL AND THE AIRPORT MANAGER/DIRECTOR. ONCE SHUT DOWN, THE CIRCUITS SHALL BE LABELED AS SUCH TO PREVENT ACCIDENTAL ENERGIZING OF THE RESPECTIVE CIRCUITS. ALL PERSONNEL SHALL FOLLOW U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA) 29 CFR PART 1910 OCCUPATIONAL SAFETY & HEALTH STANDARDS FOR ELECTRICAL SAFETY AND LOCKOUT/TAGOUT PROCEDURES INCLUDING, BUT NOT LIMITED TO, 29 CFR SECTION 1910.147 THE CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT).
- THE LOCATION, SIZE AND TYPE OF MATERIAL OF EXISTING UNDERGROUND AND/OR ABOVEGROUND UTILITIES INDICATED ON THE PLANS IS NOT REPRESENTED AS 4. BEING ACCURATE, SUFFICIENT OR COMPLETE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY WHATEVER IN RESPECT TO 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 OWNER'S REPRESENTATIVE AND/OR THE RESIDENT ENGINEER SHALL ALSO BE IMMEDIATELY NOTIFIED. ANY DAMAGE TO 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 EXCAVATORS) FOR UTILITY INFORMATION, PHONE: 1-800-892-0123. CONTACT THE FAA (FEDERAL AVIATION ADMINISTRATION) FOR ASSISTANCE IN LOCATING FAA CABLES AND UTILITIES. ALSO CONTACT AIRPORT DIRECTOR/MANAGER AND AIRPORT PERSONNEL FOR ASSISTANCE IN LOCATING UNDERGROUND AIRPORT CABLES AND/OR UTILITIES. ALSO COORDINATE WORK WITH ALL ABOVEGROUND UTILITIES.
- ADJUSTMENTS TO DUCT BANK ROUTES MIGHT BE REQUIRED TO ACCOMMODATE EXISTING SITE CONDITIONS AND UNDERGROUND LINES AND UTILITIES. CONTRACTOR SHALL FIELD VERIFY EXISTING SITE CONDITIONS. CONTRACTOR SHALL COORDINATE DUCT ROUTE ADJUSTMENTS WITH THE RESIDENT ENGINEER/ RESIDENT TECHNICIAN AND THE AIRPORT MANAGER.
- 6. CONTRACTOR SHALL LOCATE AND MARK ALL EXISTING CABLES, LINES, OR UTILITIES WITHIN 10 FT OF PROPOSED EXCAVATING/TRENCHING AREA. ANY CABLES, LINES, AND UTILITIES FOUND INTERFERING WITH PROPOSED EXCAVATION OR CABLE/TRENCHING SHALL BE HAND DUG AND EXPOSED. ANY DAMAGED CABLES OR OTHER UTILITIES SHALL BE IMMEDIATELY REPAIRED TO THE SATISFACTION OF THE RESPECTIVE OWNER'S REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE. THE RESIDENT ENGINEER/RESIDENT TECHNICIAN AND OWNER SHALL BE NOTIFIED IMMEDIATELY IF ANY CABLES OR OTHER UTILITIES ARE DAMAGED
- PAYMENT FOR LOCATING AND MARKING UNDERGROUND UTILITIES AND CABLES WILL 7 NOT BE PAID FOR SEPARATELY, BUT SHALL BE CONSIDERED INCIDENTAL TO THE RESPECTIVE DUCT INSTALLATION.
- THE CONTRACTOR WILL DETERMINE IF THERE IS A CONFLICT BETWEEN THE INSTALLATION OF THE PROPOSED ELECTRICAL DUCTS AND ANY EXISTING UTILITIES. 8. HE WILL MAKE ALL NECESSARY ADJUSTMENTS IN DEPTH OF INSTALLATION TO AVOID ANY AND ALL PROPOSED UNDERGROUND IMPROVEMENTS
- CONDUITS FOR DIRECT BURIAL OR CONCRETE ENCASED DUCT BANK SHALL BE SCHEDULE 40 PVC CONDUIT, UL-LISTED, RATED FOR 90°C CABLE-CONFORMING TO NEMA STANDARD TC-2 AND UL 651, LISTED SUITABLE FOR UNDERGROUND USE EITHER DIRECT-BURIED OR ENCASED IN CONCRETE, OR SCHEDULE 40 (MINIMUM) HDPE CONDUIT, UL LISTED, CONFORMING TO NEMA STANDARD TC-7 AND UL 651B AND LISTED SUITABLE FOR UNDERGROUND USE; EITHER DIRECT BURY OR ENCASED IN CONCRETE.

- DUCTS SHALL BE BURIED DEEPER.
- BORED LINDER

- RACEWAY OR DUCT.
- INSTALLATION
- RESISTANT MATERIAL

10. CONDUITS FOR DIRECTIONAL BORING SHALL BE SCHEDULE 40 PVC CONDUIT OR SCHEDULE 80 PVC CONDUIT, UL-LISTED, RATED FOR 90°C CABLE-CONFORMING TO NEMA STANDARD TC-2 AND UL 651 AND SUITABLE FOR DIRECTIONAL BORING INSTALLATION, SCHEDULE 80 HDPE CONDUIT, UL-LISTED, CONFORMING TO NEMA STANDARD, C-7 AND LL 651B AND SUITABLE FOR DIRECTIONAL BORING INSTALLATION, OR WALL TYPE SDR 13.5 OR SDR 11 HDPE CONDUIT MANUFACTURED IN ACCORDANCE WITH ASTM D-3350 (SPECIFICATION OF POLYETHYLENE PLASTICS PIPE AND FITTINGS MATERIALS) AND ASTM F2160 (STANDARD SPECIFICATION FOR SOLID WALL, HIGH-DENSITY POLYETHYLENE CONDUIT BASED ON CONTROLLED OUTSIDE DIAMETER), AND SUITABLE FOR DIRECTIONAL BORING INSTALLATION. PER NEC 300.5 (K), RACEWAYS INSTALLED USING DIRECTIONAL BORING EQUIPMENT SHALL BE APPROVED FOR THE PURPOSE.

11. INSTALLATION OF CONDUIT AND DUCTS SHALL CONFORM TO ITEM 110 AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS.

12. DUCTS INSTALLED IN TRENCH SHALL BE INSTALLED 18 IN. MINIMUM BELOW GRADE IN TURF AREAS NOT SUBJECT TO FARMING. DUCTS LOCATED IN AREAS SUBJECT TO FARMING SHALL BE 42 IN. MINIMUM BELOW GRADE. MINIMUM DEPTH OF TOP OF DUCT ENCASEMENT SHALL BE 42" IN AREAS UNDER ROADWAYS. WHERE DETAILED ON THE PLANS OR WHERE REQUIRED TO AVOID OBSTRUCTIONS,

13. WHERE CONCRETE-ENCASED DUCT INTERFACES TO AN ELECTRICAL HANDHOLE OR MANHOLE, THE CONCRETE ENCASEMENT SHALL BE INSTALLED UP TO THE RESPECTIVE HANDHOLE OR MANHOLE. PROVIDE BUSHINGS OR BELLS AT CONDUIT TERMINATIONS IN ELECTRICAL HANDHOLES OR MANHOLES.

14. 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 DUCTS WILL BE BORED AT A MINIMUM DEPTH OF 42 IN. BELOW THE RESPECTIVE PAVEMENT IT IS BEING

15. A PULL WIRE SHALL BE INSTALLED IN EACH CONDUIT OR DUCT TO BE LEFT

16. HIGH VOLTAGE CIRCUITS (AIRFIELD LIGHTING 5000 VOLT SERIES CIRCUITS AND/OR OTHER CIRCUITS RATED ABOVE 600 VOLTS) AND LOW VOLTAGE CIRCUITS (RATED 600 VOLTS AND BELOW) SHALL NOT BE INSTALLED IN THE SAME RACEWAY, CONDUIT, DUCT, HANDHOLE, OR MANHOLE.

17. CONTROL CABLES SHALL BE RUN IN SEPARATE DUCTS FROM POWER CABLES.

18. HOMERUN CABLES FOR A RESPECTIVE CIRCUIT SHALL BE INSTALLED IN THE SAME

19. COORDINATE DUCT INTERFACE TO MANHOLES AND HANDHOLES. FIELD CUT OPENINGS FOR CONDUITS AND DUCTS TO INTERFACE TO MANHOLES AND/OR HANDHOLES. CUT WALL OF RESPECTIVE HANDHOLE OR MANHOLE WITH A TOOL DESIGNED FOR MATERIAL TO BE CUT. SIZE HOLES FOR RESPECTIVE DUCTS, CONDUITS, AND TERMINATION FITTINGS AND SEAL AROUND PENETRATIONS. ALL CORING, INTERFACE, CUTTING, AND SEALING WILL BE CONSIDERED INCIDENTAL TO THE RESPECTIVE DUCT INSTALLATION AND/OR RESPECTIVE HANDHOLE/MANHOLE

20. CONTRACTOR SHALL COORDINATE DUCT MARKING WITH AIRPORT.

21. ALL POWER AND CONTROL CABLES IN HANDHOLES, MANHOLES, AND JUNCTION BOXES SHALL BE TAGGED TO IDENTIFY THE RESPECTIVE CABLE. A MINIMUM OF TWO TAGS SHALL BE PROVIDED ON EACH CABLE IN A MANHOLE; ONE AT THE CABLE ENTRANCE AND ONE AT THE CABLE EXIT. CABLE TAGS SHALL BE STAMPED BRASS TAGS OR OTHER WEATHERPROOF/WATERPROOF CORROSION



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SHEET TITLE

#### DUCT BANK DETAILS AND NOTES



- 2. HANDHOLES SHALL BE PRECAST. PRECAST MANUFACTURERS MUST BE ON THE IDOT (ILLINOIS DEPT. OF TRANSPORTATION) APPROVED LIST OF CERTIFIED PRECAST CONCRETE PRODUCERS.
- 3. FRAMES AND LIDS (CASTINGS) SHALL BE MADE IN THE USA TO COMPLY WITH THE AIRPORT IMPROVEMENT PROGRAM BUY AMERICAN PREFERENCES REQUIREMENTS.
- 4. MINIMUM CONCRETE STRENGTH SHALL BE 4,500 PSI (MINIMUM) AFTER 28 DAYS.
- 5. COORDINATE INSTALLATION OF HANDHOLES WITH RESPECTIVE FINISHED GRADE ELEVATIONS.
- ALL CORING, INTERFACE, AND LABOR ASSOCIATED WITH CONDUIT, DUCT, CABLE IN UNIT DUCT, AND/OR CABLE ENTRIES WILL BE CONSIDERED INCIDENTAL TO THE INSTALLATION OF THE HANDHOLE AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.
- 7. HANDHOLES WILL BE PAID FOR UNDER ITEM AR115610 ELECTRICAL HANDHOLE PER EACH.

ELECTRICAL HANDHOLE "NOT TO SCALE"

Щ.

ADD LOGO FOR

RESPECTIVE

HANDHOLE.

SEE NOTES.





## PRECAST 4'x4'x4' ELECTRICAL MANHOLE NOTES

#### 1. 4'x4'x4' ELECTRICAL MANHOLE SHALL BE CONSTRUCTED TO MEET THE FOLLOWING:

#### DESIGN CRITERIA:

- 2) DESIGN LOADING: AASHTO HS20 (32,000 LB/AXLE)
- 4) CONCRETE COMPRESSIVE STRENGTH: F'c = 4500 PSI 5) REINFORCING STEEL: ASTM A706, Fy = 60000 PSI

#### DESIGN ASSUMPTIONS:

- 1) GROUND WATER LEVEL: 3'-6" BELOW GRADE. 2) EARTH COVER: 2'-0" MINIMUM TO 5'-0" MAXIMUM 3) LIVE LOAD IMPACT: 2'-0" 1 = 20%2'-1" TO 2'-11" 1 = 10% 3'-0" TO 5'-0" 1 = 0%
- 4) COEFFICIENT OF ACTIVE EARTH PRESSURE: Ka 0.3
- 5) SPECIFIC WEIGHT OF STD. AGGREGATE CONCRETE" 150 PCF 6) SPECIFIC WEIGHT OF DRY EARTH: 100 PCF
- 7) SPECIFIC WEIGHT OF SATURATED EARTH: 120 PCF
- 8) EQUIVALENT FLUID PRESSURE OF DRY EARTH: 30 PSF 9) EQUIVALENT FLUID PRESSURE OF SATURATED EARTH: 80 PSF

## THESE REQUIREMENTS PRIOR TO INSTALLATION.

- 2.
- 3. WATERTIGHT AFTER DUCT BANK INSTALLATION.
- PRODUCERS ..
- 5.
- 6 MANHOLE WALL. SPACED TO SUPPORT RESPECTIVE CABLES.
- 7.
- INCLUDE FLOOR SUMP OR DRAINAGE PIPE. 8.
- AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.
- 10. GROUND ROD INSTALLATION.

1) DESIGN SPECIFICATION: ACI 318, AASHTO LOAD FACTOR DESIGN METHOD, AND ASTM C858 3) LIVE LOAD SURCHARGE: .5% OF THE WHEEL LOADING APPLIED TO 8'-0" OF DEPTH.

THE SUPPLIER SHALL PROVIDE CERTIFICATION THAT THE PRECAST MANHOLES MEET OR EXCEED

MANHOLE FRAME & LID SHALL BE CAPABLE OF WITHSTANDING MINIMUM 50,000 POUND LOADS. MANHOLE FRAME & LID SHALL BE NEENAH CATALOG NO. R-1640-C MANHOLE FRAME A SOLID LID, EAST JORDAN IRON WORKS CATALOG NO. 1825 FRAME AND COVER, OR APPROVED EQUAL. LID FOR LOW VOLTAGE MANHOLES SHALL BE LABELED "LOW VOLTAGE ELECTRIC" OR "OV-600V". LIDS FOR HIGH VOLTAGE MANHOLES CONTAINING AIRFIELD LIGHTING SERIES CIRCUIT WIRING SHALL BE LABELED "DANGER HIGH VOLTAGE KEEP OUT 5000 VOLTS" TO COMPLY WITH 2014 NEC ARTICLE 300.45 "WARNING SIGNS" AND 2014 NEC ARTICLE 314.30(D) "COVERS". COORDINATE LETTERING WITH MFR.

COORDINATE DUCT BANK INTERFACE & OPENINGS WITH THE MANHOLE MFR. CONTRACTOR SHALL SLOPE DUCT BANK TO PRECAST MANHOLE OPENINGS. ALL OPENINGS SHALL BE SEALED

4'x4'x4' MANHOLE SHALL BE MANUFACTURED BY A CONCRETE ELECTRICAL MANHOLE PRODUCER ON THE ILLINOIS DEPARTMENT OF TRANSPORTATION APPROVED LIST OF CERTIFIED PRECAST CONCRETE

4'x4'x4' MANHOLE SHALL BE PAID FOR UNDER ITEM AR115710 ELECTRICAL MANHOLE PER EACH.

CABLE RACKS SHALL BE HEAVY DUTY CORROSION RESISTANT NYLON MATERIAL WITH CORROSION RESISTANT STAINLESS STEEL MOUNTING HARDWARE; UNDERGROUND DEVICES, INC. CAT. NO. 3SR1N, 3SR2N OR 3SR3N OR EQUAL. PROVIDE AT LEAST TWO TRIPLE HOOK CABLE RACKS ON EACH

COORDINATE INSTALLATION OF MANHOLES WITH RESPECTIVE FINISHED GRADE ELEVATIONS.

ALL CORING, INTERFACE, AND LABOR ASSOCIATED WITH CONDUIT, DUCT, CABLE IN UNIT DUCT, AND/OR CABLE ENTRIES WILL BE CONSIDERED INCIDENTAL TO THE INSTALLATION OF THE MANHOLE

INCLUDE 2" MIN. SCHED. 40 PVC CONDUIT SLEEVE IN BOTTOM OF MANHOLE TO ACCOMMODATE



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GN BY: KNL 07/12/2017 DRAWN BY: CWS 07/21/2017 REVIEWED BY: BSS 08/21/2017

SHEET TITLE

#### 4'X4'X4' ELECTRICAL MANHOLE DETAILS





#### P.A.P.I. NOTES

<u>NOTES</u>

- 1. THE PROPOSED PRECISION APPROACH PATH INDICATOR (PAPI) SYSTEM WILL BE PLACED AT THE LOCATION SHOWN ON PROPOSED ELECTRICAL PLAN SHEETS.
- 2. THE PROPOSED CONCRETE FOUNDATION PIERS SHALL BE AS DETAILED ON THE "STYLE B PAPI FOUNDATION DETAILS" SHEET.
- 3. EACH PAPI UNIT SHALL BE CONSTRUCTED SUCH THAT THE BEAM CENTERS WILL BE WITHIN ±1" OF ELEVATION 524.00'
- 4. THE INBOARD LIGHT UNIT MUST NOT BE LESS THAN 50 FT. FROM THE RUNWAY EDGE (MEASURED TO THE EDGE OF THE LIGHT UNIT) OR TO OTHER RUNWAYS OR TAXIWAYS, AND THE PAPI LIGHT UNITS MUST HAVE A LATERAL SEPARATION OF 20 FT (MEASURED CENTER TO CENTER), IN ACCORDANCE WITH AC 150/5340-30H PART 7.5 DESIGN, d. PAPI, (7)(a) AND (7)(b).
- 5. THE PROPOSED PAPI SIGNAL SHALL BE VISIBLE FOR A 10 DEGREE ZONE ON EITHER SIDE OF THE RUNWAY CENTERLINE IN ACCORDANCE WITH FAA ADVISORY CIRCULAR 150/5340-30H, FIGURE 80. BAFFLES WILL BE REQUIRED TO SET THE LIMITS OF THE OBSTACLE CLEARANCE SURFACE TO 10 DEGREES EITHER SIDE OF THE RUNWAY CENTERLINE (20 DEGREES TOTAL) TO RESTRICT EXCESS HORIZONTAL LIGHT BEAM DISTRIBUTION, IN ACCORDANCE WITH FAA AC 150/5340-30H PART 7.7 INSTALLATION, f. PAPI, (7)(c).
- 6. TO ACCOMMODATE TREES THAT WERE IDENTIFIED 10.5' FROM THE OUTERMOST LHA, ADDITIONAL BAFFLES SHALL BE INSTALLED TO LIMIT THE VISIBLE LIGHT SIGNAL TO 6.5 DEGREES ON THE LEFT SIDE OF THE APPROACH (PILOT'S VIEWPOINT). THIS SHALL BE MEASURED FROM THE OUTERMOST LIGHT UNIT. EACH LIGHT UNIT SHALL HAVE THE SAME CUT-OFF RANGE. SEE 'LIGHT SIGNAL BAFFLE DETAIL' THIS SHEET. COORDINATE BAFFLE INSTALLATION WITH ENGINEER AND MANUFACTURER PRIOR TO ORDERING PAPI UNITS TO CONFIRM CORRECT BAFFLES FOR SFLECTED MANUFACTURER.
- 7. THE 4-BOX PAPI INSTALLATION WILL BE PAID FOR UNDER ITEM: AR125615 PAPI (L-880 SYSTEM) PER EACH.

LOWEST ON-COURSE ANGLE - 2° 50' ELEVATION A = 550.3' TCH = 25.0'

#### 2\* 50' 00" = 25.0' 570 565 UNIT #1 (30' ABOVE GLIDE PATH) -560 <u>JNIT #2 (10 ABOVE GLIDE PATH) –</u> 555 EFFECTIVE VISUAL GLIDE PATH (3.00) 550 545 - UNIT #4 (30' BELOW GLIDE PATH) 540 JNIT #3 (10' BELOW 535 GLIDE PATH) 530 - RUNWAY THRESHOLD 525 520 515 142+00 144+00 146+00 148+00 150+00 152+00 154+00 STATIONING IN FEET ALONG RUNWAY CENTERLINE

#### RUNWAY CENTERLINE PROFILE

PAPI DATA-RUNWAY END 27					
	P.A.P.I. UNIT #1	P.A.P.I. UNIT #2	P.A.P.I. UNIT #3	P.A.P.I. UNIT #4	
AIMING ANGLE	3 <b>°</b> 30'	3 <b>°</b> 10'	2•50'	2*30'	
APPROXIMATE GROUND ELEVATION	521.6'	521.2'	520.8'	520.6'	
P.A.P.I. UNIT APERTURE	524.00'	524.00'	524.00'	524.00'	







#### GENERAL NOTES

- 1. ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED IN CONFORMANCE WITH NFPA 70 - NATIONAL ELECTRICAL CODE (NEC) MOST CURRENT ISSUE IN FORCE, THE RESPECTIVE EQUIPMENT MANUFACTURER'S DIRECTIONS AND ALL OTHER APPLICABLE LOCAL CODES, LAWS, ORDINANCES, AND REQUIREMENTS IN FORCE ANY INSTALLATIONS WHICH VOID THE U.L. LISTING, INTERTEK TESTING SERVICES VERIFICATION/ETL LISTING (OR OTHER THIRD PARTY LISTING) AND/OR THE MANUFACTURER'S WARRANTY OF A DEVICE WILL NOT BE PERMITTED.
- CONTRACTOR SHALL KEEP A COPY OF THE LATEST NEC IN FORCE ON SITE AT 2. ALL TIMES DURING CONSTRUCTION FOR USE AS A REFERENCE.
- CONTRACTOR SHALL COORDINATE WORK AND ANY POWER OUTAGES AND/OR SHUT 3. DOWN OF SYSTEMS WITH THE RESPECTIVE FACILITY OWNER PERSONNEL AND THE AIRPORT MANAGER/DIRECTOR. ONCE SHUT DOWN, THE CIRCUITS SHALL BE LABELED AS SUCH TO PREVENT ACCIDENTAL ENERGIZING OF THE RESPECTIVE CIRCUITS. ALL PERSONNEL SHALL FOLLOW U.S. DEPARTMENT OF LABOR OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA) 29 CFR PART 1910 OCCUPATIONAL SAFETY & HEALTH STANDARDS FOR ELECTRICAL SAFETY AND LOCKOUT/TAGOUT PROCEDURES INCLUDING, BUT NOT LIMITED TO, 29 CFR SECTION 1910.147 THE CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT).
- THE CONTRACTOR SHALL ASCERTAIN THAT ALL LIGHTING SYSTEM COMPONENTS 4. FURNISHED BY HIM, INCLUDING FAA APPROVED EQUIPMENT, ARE COMPATIBLE IN ALL RESPECTS WITH EACH OTHER AND THE REMAINDER OF THE NEW/EXISTING SYSTEM. ANY NONCOMPATIBLE COMPONENTS FURNISHED BY THIS CONTRACTOR SHALL BE REPLACED BY HIM AT NO ADDITIONAL COST TO THE AIRPORT SPONSOR WITH A SIMILAR UNIT, APPROVED BY THE ENGINEER (DIFFERENT MODEL OR DIFFERENT MANUFACTURER) THAT IS COMPATIBLE WITH THE REMAINDER OF THE AIRPORT LIGHTING SYSTEM.
- IN CASE THE CONTRACTOR ELECTS TO FURNISH AND INSTALL AIRPORT LIGHTING 5. EQUIPMENT REQUIRING ADDITIONAL WIRING, TRANSFORMERS, ADAPTORS, MOUNTINGS, ETC., TO THOSE SHOWN ON THE DRAWINGS AND/OR LISTED IN THE SPECIFICATION, ANY COST FOR THESE ITEMS SHALL BE INCIDENTAL TO THE EQUIPMENT COST
- 6. THE CONTRACTOR INSTALLED EQUIPMENT (INCLUDING FAA APPROVED) SHALL NOT GENERATE ANY ELECTROMAGNETIC INTERFERENCE IN THE EXISTING AND/OR NEW COMMUNICATIONS, WEATHER, AIR NAVIGATION, AND AIR TRAFFIC CONTROL EQUIPMENT, ANY EQUIPMENT GENERATING SUCH INTERFERENCE SHALL BE REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST WITH THE EQUIPMENT MEETING THE APPLICABLE SPECIFICATIONS AND NOT GENERATING ANY INTERFERENCE.
- WHEN A SPECIFIC TYPE, STYLE, CLASS, ETC. OF FAA APPROVED EQUIPMENT IS SPECIFIED ONLY THAT TYPE, STYLE, CLASS, WILL BE ACCEPTABLE, EVEN THOUGH EQUIPMENT OF OTHER TYPES STYLES, CLASSES, ETC. MAY BE APPROVED. 7.
- ANY AND ALL INSTRUCTIONS FROM THE RESIDENT ENGINEER/RESIDENT TECHNICIAN 8. TO THE CONTRACTOR REGARDING CHANGES IN OR DEVIATIONS FROM THE PLANS AND SPECIFICATIONS SHALL BE IN WRITING WITH COPIES SENT TO THE AIRPORT SPONSOR AND THE ILLINOIS DEPARTMENT OF TRANSPORTATION DIVISION OF AERONAUTICS. THE CONTRACTOR SHALL NOT ACCEPT ANY VERBAL INSTRUCTIONS FROM THE RESIDENT ENGINEER/RESIDENT TECHNICIAN REGARDING ANY CHANGES FROM THE PLANS AND SPECIFICATIONS.
- A MINIMUM OF THREE COPIES OF THE INSTRUCTION BOOK SHALL BE SUPPLIED 9. WITH EACH DIFFERENT TYPE OF EQUIPMENT. THE BOOKS DESCRIBING A MORE SOPHISTICATED TYPE OF EQUIPMENT, SUCH AS REGULATORS, PAPI, REIL, ETC. AS A MINIMUM SHALL CONTAIN THE FOLLOWING:
  - A DETAILED DESCRIPTION OF THE OVERALL EQUIPMENT AND ITS INDIVIDUAL A. COMPONENTS.
  - THEORY OF OPERATION INCLUDING THE FUNCTION OF EACH COMPONENT. B.
  - INSTALLATION INSTRUCTION. C.
  - START-UP INSTRUCTIONS. D
  - PREVENTATIVE MAINTENANCE REQUIREMENTS. Ε.
  - CHART FOR TROUBLE-SHOOTING.
  - G. COMPLETE POWER AND CONTROL DETAILED WIRING DIAGRAM(S), SHOWING EACH CONDUCTOR/CONNECTION/COMPONENT - "BLACK" BOXES ARE NOT ACCEPTABLE. THE DIAGRAM OF THE NARRATIVE SHALL SHOW VOLTAGE/CURRENTS/WAVE SHAPES AT STRATEGIC LOCATIONS TO BE USED WHEN CHECKING AND/OR TROUBLE-SHOOTING THE EQUIPMENT. WHEN THE EQUIPMENT HAS SEVERAL MODES OF OPERATION, SUCH AS SEVERAL BRIGHTNESS STEPS, THESE PARAMETERS SHALL BE INDICATED FOR ALL DIFFERENT MODES.
  - PARTS LIST WHICH WILL INCLUDE ALL MAJOR AND MINOR COMPONENTS SUCH AS RESISTORS, DIODES, ETC. IT SHALL INCLUDE A COMPLETE Н. NOMENCLATURE OF EACH COMPONENT AND, IF APPLICABLE, THE NAME OF ITS MANUFACTURER AND THE CATALOG NUMBER.
  - SAFETY INSTRUCTIONS. 1.

#### POWER AND CONTROL NOTES

- PROVIDE LEGEND PLATES FOR ALL ELECTRICAL EQUIPMENT TO IDENTIFY FUNCTION, CIRCUIT VOLTAGE AND PHASE. WHERE THE EQUIPMENT CONTAINS FUSES, ALSO IDENTIFY THE FUSE OR FUSE LINK AMPERE RATING. WHERE THE EQUIPMENT 1. DOES NOT HAVE SUFFICIENT AREA TO INSTALL LEGEND PLATES, THE LEGEND PLATES SHALL BE INSTALLED ON THE WALL NEXT TO THE UNIT. LEGEND PLATES SHALL BE WEATHERPROOF ENGRAVED PLASTIC OR PHENOLIC MATERIAL, 1/4" HIGH BLACK LETTERS ON A WHITE BACKGROUND UNLESS NOTED OTHERWISE. SECURE WITH WEATHERPROOF ADHESIVE AND MACHINE SCREWS. FURNISH ADDITIONAL LEGEND PLATES WHERE REQUIRED BY CODE, FOR ADDITIONAL EQUIPMENT, AS DETAILED HEREIN ON THE PLANS, AND AS NOTED IN THE SPECIAL PROVISION SPECIFICATIONS.
- 2. COLOR CODE ALL PHASE WIRING BY THE USE OF COLORED WIRE INSULATION AND/OR COLORED TAPE. WHERE TAPE IS USED, THE WIRE INSULATION SHALL BE BLACK. BLACK AND RED SHALL BE USED FOR PHASE CONDUCTORS ON 120/240VAC SINGLE-PHASE, THREE WIRE SYSTEMS AND BLACK, ORANGE (FOR HIGH LEG) AND BLUE SHALL BE USED FOR PHASE CONDUCTORS ON 240/120VAC THREE-PHASE, FOUR WIRE SYSTEMS. NEUTRAL CONDUCTORS, SIZE NO. 6 AWG OR SMALLER, SHALL BE IDENTIFIED BY A CONTINUOUS WHITE OR NATURAL GRAY OUTER FINISH ALONG ITS ENTIRE LENGTH. NEUTRAL CONDUCTORS LARGER THAN NO. 6 AWG SHALL BE IDENTIFIED EITHER BY A CONTINUOUS WHITE OR NATURAL GRAY OUTER FINISH ALONG ITS ENTIRE LENGTH OR BY THE USE OF WHITE TAPE AT ITS TERMINATIONS AND INSIDE ACCESSIBLE WIREWAYS. INSULATED GROUND CONDUCTORS SHALL HAVE GREEN COLORED INSULATION FOR ALL CONDUCTOR SIZES (AWG OR KCMIL).
- 3. ALL BRANCH CIRCUIT CONDUCTORS CONNECTED TO A PARTICULAR PHASE SHALL BE IDENTIFIED WITH THE SAME COLOR. THE COLOR CODING SHALL BE EXTENDED TO THE POINT OF UTILIZATION.
- IN CONTROL WIRING THE SAME COLOR SHALL BE USED THROUGHOUT THE SYSTEM 4 FOR THE SAME FUNCTION, SUCH AS 10%, 30%, 100% BRIGHTNESS CONTROL,
- LOW VOLTAGE (600 V.) AND HIGH VOLTAGE (5000 V.) CONDUCTORS SHALL BE 5. INSTALLED IN SEPARATE WIREWAYS.
- 6. NEATLY LACE WIRING IN DISTRIBUTION PANELS, WIREWAYS, SWITCHES AND JUNCTION/PULL BOXES.
- THE MINIMUM SIZE OF PULL/JUNCTION BOXES, REGARDLESS OF THE QUANTITY AND SIZE OF THE CONDUCTORS SHOWN, SHALL BE AS FOLLOWS:
  - IN STRAIGHT PULLS THE LENGTH OF THE BOX SHALL NOT BE LESS THAN A. EIGHT TIMES THE TRADE DIAMETER OF THE LARGER CONDUIT. THE TOTAL AREA (INCLUDING THE CONDUIT CROSS-SECTIONAL AREA) OF A BOX END SHALL BE AT LEAST 3 TIMES GREATER THAN THE TOTAL TRADE CROSS-SECTIONAL AREA OF THE CONDUITS TERMINATING AT THE END.
  - IN ANGLE PULLS OR 'U' PULLS THE DISTANCE BETWEEN EACH CONDUIT ENTRY INSIDE THE BOX AND THE OPPOSITE WALL OF THE BOX SHALL NOT BE LESS THAN SIX (6) TIMES THE TRADE DIAMETER OF THE LARGEST CONDUIT. THIS DISTANCE SHALL BE INCREASED FOR ADDITIONAL ENTRIES BY THE AMOUNT OF THE SUM OF THE DIAMETERS OF ALL OTHER CONDUIT ENTRIES ON THE SAME WALL AS THE BOX. THE DISTANCE BETWEEN CONDUIT ENTRIES ENCLOSING THE SAME CONDUCTOR SHALL NOT BE LESS THAN SIX TIMES THE TRADE DIAMETER OF THE LARGEST CONDUIT.
- A RUN OF CONDUIT BETWEEN TERMINATIONS AT EQUIPMENT ENCLOSURES, SQUARE 8. DUCTS AND PULL/JUNCTION BOXES, SHALL NOT CONTAIN MORE THAN THE EQUIVALENT OF FOUR QUARTER BENDS (360 DEGREES TOTAL), INCLUDING THOSE BENDS LOCATED IMMEDIATELY AT THE TERMINATIONS, CAST, CONDUIT TYPE OUTLETS SHALL NOT BE TREATED AS PULL/JUNCTION BOXES.
- EQUIPMENT CABINETS SHALL NOT BE USED AS PULL/JUNCTION BOXES. ONLY 9. WIRING TERMINATING AT THE EQUIPMENT SHALL BE BROUGHT INTO THESE ENCLOSURES.
- SPLICES AND JUNCTION POINTS SHALL BE PERMITTED ONLY IN JUNCTION BOXES, DUCTS EQUIPPED WITH REMOVABLE COVERS, AND AT EASILY ACCESSIBLE 10. LOCATIONS
- CIRCUIT BREAKERS IN POWER DISTRIBUTION PANEL(S) SHALL BE THERMAL-MAGNETIC MOLDED CASE, PERMANENT TRIP WITH 100 AMPERE, MINIMUM 11.
- 12. DUAL LUGS SHALL BE USED WHERE TWO (2) WIRES, SIZE NO. 6 OR LARGER, ARE TO BE CONNECTED TO THE SAME TERMINAL.
- ALL INTERIOR WALL MOUNTED EQUIPMENT ENCLOSURES SHALL BE MOUNTED ON HOT DIPPED GALVANIZED STEEL STRUT SUPPORT, OR STAINLESS STEEL STRUT 13. SUPPORT, WITH CORROSION RESISTANT HARDWARE.
- SUPPORT FOR EXTERIOR MOUNTED EQUIPMENT SHALL USE HOT DIPPED GALVANIZED STEEL STRUT SUPPORT OR STAINLESS STEEL STRUT SUPPORT WITH STAINLESS STEEL HARDWARE. PROVIDE ZINC RICH PAINT APPLIED TO FIELD CUTS OF GALVANIZED STEEL SUPPORT TO MINIMIZE THE POTENTIAL FOR CORROSION PER THE RESPECTIVE STRUT SUPPORT MANUFACTURER'S RECOMMENDATIONS.

- 15.
- 16. FLEXIBLE METAL CONDUIT THAT IS USED FOR FLEXIBILITY (INCLUDING SHALL REQUIRE AN EXTERNAL BONDING JUMPER OR INTERNAL EQUIPMENT GROUNDING CONDUCTOR PER NEC 350.60. DO NOT INSTALL LIQUID TIGHT FLEXIBLE METAL CONDUIT THAT IS NOT UL. LISTED. CONFIRM LIQUID-TIGHT FLEXIBLE METAL CONDUIT BEARS THE UL LABEL PRIOR TO INSTALLING IT.
- TO OR AT RIGHT ANGLES WITH THE LINES OF THE STRUCTURE.
- 18. ALL STEEL CONDUITS, FITTINGS, NUTS, BOLTS, ETC. SHALL BE GALVANIZED.
- 19. LARGER UNDERGROUND WIRE IS INSTALLED, USE INSULATED BUSHINGS.
- USE DOUBLE LOCK NUTS AT EACH CONDUIT TERMINATION. 20.
- 21. WRAP ALL PRIMARY AND SECONDARY POWER CONNECTIONS WITH SUFFICIENT VOLTS TO 69,000 VOLTS) AND COVER WITH VINYL ELECTRICAL TAPE HIGH-VOLTAGE CABLE SPLICES AND REPAIRS) FOR FULL VALUE OF CABLE THE APPLICATION.
- 22. NO. 12 AWG. COPPER MINIMUM.
- 23. THE FOLLOWING SHALL APPLY TO RELAY/CONTACTOR PANELS/ENCLOSURES:
  - TO MAINTAIN THE NEMA 4. 4X RATING OF THE ENCLOSURE.
  - B.
  - FERMINATIONS WITHOUT CONNECTORS ARE NOT ACCEPTABLE
  - D. VOLTAGE COMPONENTS.
  - TERMINAL BLOCK.
  - F.
  - G.
  - н. AND COLOR OF EACH TERMINAL CONDUCTOR AND TERMINAL.
  - ALL WIRING SHALL BE NEATLY TRAINED AND LACED.
  - MINIMUM WIRE SIZE SHALL BE NO. 12 AWG. J.
- 24. REQUIREMENTS OF NEC 110.16 "ARC FLASH HAZARD WARNING".

CONDUITS FOR ELECTRIC SERVICE ENTRANCE AND FEEDERS SHALL BE AS DETAILED HEREIN ON THE PLANS. WHERE GALVANIZED RIGID STEEL CONDUIT IS SPECIFIED IT SHALL HAVE THREADED FITTINGS. SET SCREW TYPE FITTINGS WILL NOT BE ACCEPTABLE. CONDUITS FOR UNDERGROUND APPLICATIONS SHALL BE AS DETAILED HEREIN. CONDUITS FOR GROUNDING ELECTRODE CONDUCTORS OR INDIVIDUAL GROUNDING CONDUCTORS SHALL BE SCHEDULE 40 OR SCHEDULE 80

PROVIDE LIQUID TIGHT FLEXIBLE METAL CONDUIT AT CONNECTIONS TO EQUIPMENT SUBJECT TO VIBRATION OR WHERE FLEXIBILITY IS REQUIRED. LIQUID TIGHT FLEXIBLE METAL CONDUIT AND ASSOCIATED FITTINGS SHALL BE U.L. LISTED TO MEET THE REQUIREMENTS OF NEC 350.6, SUITABLE FOR GROUNDING, SUNLIGHT RESISTANT, AND RESISTANT TO OIL, GASOLINE, AND GREASE. LIQUID TIGHT CONNECTIONS TO MOTORS, TRANSFORMERS, & CONSTANT CURRENT REGULATORS)

UNLESS OTHERWISE SHOWN, ALL EXPOSED CONDUITS SHALL BE RUN PARALLEL

USE CONDUIT BUSHINGS AT EACH CONDUIT TERMINATION. WHERE NO. 4 AWG OR

LAYERS OF HIGH VOLTAGE ELECTRICAL INSULATING TAPE (RUBBER SPLICING TAPE SUITABLE FOR PRIMARY ELECTRICAL INSULATION FOR SPLICING CABLE FROM 600 (ALL-WEATHER VINYL INSULATING TAPE SUITABLE FOR PROTECTIVE JACKETING FOR INSULATION VOLTAGE. PER ILLINOIS STANDARD SPECIFICATIONS FOR CONSTRUCTION OF AIRPORTS ITEM 108, ITEM 125 AND FAA AC 150/5370-10G ITEM L-108, HIGH VOLTAGE ELECTRICAL INSULATING TAPE SHALL BE 3M SCOTCH 23, 3M SCOTCH 130C OR APPROVED EQUIVALENT, AND VINYL ELECTRICAL TAPE SHALL BE 3M SCOTCH 88 OR APPROVED EQUIVALENT. TAPES MUST BE RATED SUITABLE FOR

UNLESS OTHERWISE NOTED, ALL SINGLE CONDUCTOR CONTROL WIRING SHALL BE

A. FOR INTERIOR LOCATIONS ALL COMPONENTS SHALL BE MOUNTED IN NEMA 12 (DUST TIGHT) ENCLOSURE(S) WITH VERTICALLY HINGED COVERS. FOR EXTERIOR/OUTDOOR LOCATIONS ALL COMPONENTS SHALL BE MOUNTED IN NEMA 4X STAINLESS STEEL ENCLOSURE(S) WITH VERTICALLY HINGED COVERS. ALL CONDUIT ENTRIES INTO NEMA 4, 4X ENCLOSURES SHALL HAVE NEMA 4 HUBS LISTED SUITABLE FOR THE RESPECTIVE ENCLOSURE

THE ENCLOSURE(S) SHALL HAVE AMPLE SPACE FOR THE CIRCUIT COMPONENTS, TERMINAL BLOCKS AND INCOMING AND INTERNAL WIRING.

ALL CONTROL CONDUCTOR TERMINATIONS SHALL BE OF THE OPEN-EYE CONNECTOR/SCREW TYPE. SOLDERED CLOSED-EYE TERMINATIONS, OR

WHEN THE ENCLOSURE COVER IS OPENED, ALL CIRCUIT COMPONENTS, WIRING AND TERMINALS SHALL BE EXPOSED AND ACCESSIBLE WITHOUT REMOVAL OF ANY PANELS, COVERS, ETC., EXCEPT THOSE COVERING HIGH

ACCESS TO, OR REMOVAL OF A CIRCUIT COMPONENT OR TERMINAL BLOCK WILL NOT REQUIRE THE REMOVAL OF ANY OTHER CIRCUIT COMPONENT OR

EACH CIRCUIT COMPONENT SHALL BE CLEARLY IDENTIFIED INDICATING ITS CORRESPONDING NUMBER SHOWN ON THE DRAWINGS AND ITS FUNCTION.

A COMPLETE WIRING DIAGRAM SHALL BE MOUNTED ON THE INSIDE OF THE COVER. THE DIAGRAM SHALL REPRESENT EACH CONDUCTOR BY A SEPARATE

THE DIAGRAM SHALL IDENTIFY EACH CIRCUIT COMPONENT AN NUMBERING

FURNISH & INSTALL A WEATHERPROOF WARNING LABEL FOR EACH METER SOCKET, SERVICE DISCONNECT, SAFETY SWITCH, CUTOUT, PANELBOARD, & CONTROL PANEL TO WARN PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS, PER THE



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**REPLACE AIRFIELD** ELECTRICAL VAULT, REPLACE BEACON UNIT AND TOWER; RELOCATE **REGULATOR; REPLACE** REMAINING AIRFIELD LIGHTING. SIGNAGE AND NAVIGATIONAL AIDS

IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 Contract No. PN010

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SHEET TITLE

#### ELECTRICAL NOTES SHEET 1

#### AIRFIELD LIGHTING NOTES

- UNLESS OTHERWISE NOTED, ALL UNDERGROUND AIRFIELD LIGHTING SERIES CIRCUIT CONDUCTORS WHETHER DEB OR IN DUCT/CONDUIT SHALL BE FAA APPROVED 5000 VOLT L-824 TYPE. ALL UNDERGROUND FIELD POWER LOW VOLTAGE (600 VOLT & BELOW) CIRCUIT CONDUCTORS WHETHER DEB OR IN DUCT/CONDUIT SHALL BE UL LISTED 600 VOLT, TYPE XLP-USE-2 COPPER CONDUCTORS. CONDUCTOR SIZES SHALL BE AS SPECIFIED, HEREIN.
- NO COMPONENTS OF PRIMARY CIRCUIT SUCH AS CABLE, CONNECTORS AND TRANSFORMERS SHALL BE BROUGHT ABOVE GROUND AT EDGE LIGHTS, SIGNS, REIL, PAPI, ETC.
- 3. THERE SHALL BE NO EXPOSED POWER/CONTROL CABLES BETWEEN THE POINT WHERE THEY LEAVE THE UNDERGROUND (DEB OR L-867 BASES) AND WHERE THEY ENTER THE EQUIPMENT (SUCH AS TAXIWAY SIGNS, PAPI, REIL, ETC.) ENCLOSURES. THESE CABLES SHALL BE ENCLOSED IN RIGID CONDUIT OR IN FLEXIBLE, WATERTIGHT CONDUIT WITH BREAKABLE COUPLING(S) AT THE GRADE OR THE HOUSING COVER, AS SHOWN IN APPLICABLE DETAILS.
- 4. THE JOINTS OF THE L-823 PRIMARY CONNECTORS SHALL BE 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, AS SHOWN ON AIRFIELD LIGHTING CABLE SPLICE DETAILS.
- 5. THE CABLE ENTRANCE INTO THE FIELD-ATTACHED L-823 CONNECTORS SHALL BE ENCLOSED BY A HEAT-SHRINKABLE TUBING WITH CONTINUOUS INTERNAL ADHESIVE, AS SHOWN ON AIRFIELD LIGHTING CABLE SPLICE DETAILS.
- L-823 TYPE II, TWO-CONDUCTOR SECONDARY CONNECTORS SHALL BE CLASS 'A' (FACTORY MOLDED).
- THERE SHALL BE NO SPLICES IN THE SECONDARY CABLE(S) WITHIN THE STEMS OF A RUNWAY/TAXIWAY EDGE/THRESHOLD LIGHTING FIXTURE AND THE WIREWAYS LEADING TO TAXIWAY SIGNS AND PAPI/REIL EQUIPMENT.
- ELECTRICAL INSULATING GREASE SHALL BE APPLIED WITHIN THE L-823, SECONDARY, TWO CONDUCTOR CONNECTORS TO PREVENT WATER ENTRANCE. THESE CONNECTORS SHALL NOT BE TAPED.
- 9. DEB ISOLATION TRANSFORMERS SHALL BE BURIED AT A DEPTH OF TEN (10") INCHES ON A LINE CROSSING THE LIGHT AND PERPENDICULAR TO THE RUNWAY/TAXIWAY CENTERLINE AT A LOCATION TWELVE (12") INCHES FROM THE LIGHT OPPOSITE FROM THE RUNWAY/TAXIWAY.
- 10. A SLACK OF THREE (3') FEET, MINIMUM, PLUS DEPTH OF BASE CAN (IF APPLICABLE), SHALL BE PROVIDED IN THE PRIMARY CABLE AT EACH TRANSFORMER/CONNECTOR TERMINATION. AT STAKE-MOUNTED LIGHTS, THE SLACK SHALL BE LOOSELY COILED IMMEDIATELY BELOW THE ISOLATION TRANSFORMER. THERE SHALL BE NO ADDITIONAL PAYMENT FOR CABLE SLACK AND THEREFORE THE QUANTITY OF PROPOSED CABLE SLACK HAS NOT BEEN INCLUDED IN THE RESPECTIVE CABLE PAY ITEMS.
- 11. DIRECTION OF PRIMARY CABLES SHALL BE IDENTIFIED BY COLOR CODING AS FOLLOWS: WHEN FACING LIGHT WITH BACK TO PAVEMENT, CABLE TO THE LEFT IS CODED RED AND CABLE TO RIGHT IS CODED BLUE. THIS APPLIES TO STAKE MOUNTED LIGHTS AND BASE MOUNTED LIGHTS WHERE THE BASE HAS ONLY ONE ENTRANCE.
- 12. L-867 BASES SHALL BE SIZE B, 24" DEEP, CLASS I, UNLESS OTHERWISE NOTED.
- 13. BASE MOUNTED BREAKABLE COUPLINGS SHALL NOT HAVE WEEP HOLES TO THE OUTSIDE. PLUGGED UP HOLES SHALL NOT BE ACCEPTABLE. IT SHALL BE A 1/4" DIAMETER, MINIMUM, OR EQUIVALENT OPENING FOR DRAINAGE FROM THE SPACE AROUND THE SECONDARY CONNECTOR INTO THE L-867 BASE.
- 14. THE ELEVATION OF THE BREAKABLE COUPLING GROOVE SHALL NOT EXCEED 1-1/2" ABOVE THE EDGE OF THE COVER IN CASE OF BASE MOUNTED COUPLINGS, OR THE TOP OF THE STAKE IN CASE OF STAKE MOUNTED COUPLINGS.
- 15. WHERE THE BREAKABLE COUPLING IS NOT AN INTEGRAL PART OF THE LIGHT FIXTURE STEM OR MOUNTING LEG, A BEAD OF SILICON SEAL SHALL BE APPLIED COMPLETELY AROUND LIGHT STEM OR WIREWAY AT BREAKABLE COUPLING TO PROVIDE A WATERTIGHT SFAL
- 16. TOPS OF THE STAKES SUPPORTING LIGHT FIXTURES SHALL BE FLUSH WITH THE SURROUNDING GRADE.
- 17. PLASTIC LIGHTING FIXTURE COMPONENTS, SUCH AS LAMP HEADS, STEMS, BREAKABLE COUPLINGS, BASE COVERS, BRACKETS, STAKES, SHALL NOT BE ACCEPTABLE.
- 18. THE TOLERANCE FOR THE HEIGHT OF RUNWAY/TAXIWAY EDGE LIGHTS SHALL BE: ONE (1) INCH. IN CASE OF STAKE MOUNTED LIGHTS, THE SPECIFIED LIGHTING FIXTURE HEIGHT SHALL BE MEASURED BETWEEN THE TOP OF THE STAKE AND THE TOP OF THE LENS. IN CASE OF BASE MOUNTED LIGHTS, THE SPECIFIED LIGHTING FIXTURE HEIGHT SHALL BE MEASURED BETWEEN THE TOP OF THE BASE FLANGE AND THE TOP OF THE LENS, THUS INCLUDING THE BASE COVER, THE FRANGIBLE COUPLING, THE STEM, THE LAMP HOUSING AND THE LENS.
- 19. THE TOLERANCE FOR THE LATERAL SPACING (LIGHT LANE TO RUNWAY/TAXIWAY CENTERLINE) OF RUNWAY/TAXIWAY EDGE LIGHTS SHALL BE ONE (1) INCH. THIS ALSO APPLIES AT INTERSECTIONS TO LATERAL SPACING BETWEEN LIGHTS OF A RUNWAY/TAXIWAY AND THE INTERSECTING RUNWAY/TAXIWAY.

- ENTRANCES INTO L-867 BASES SHALL HAVE CONDUIT COUPLINGS OR REDUCERS TO INTERFACE UNIT DUCT/CONDUIT TO L-867 BASE HUBS, OR SHALL BE SEALED WITH HEAT SHRINK.
- GALVANIZED/PAINTED EQUIPMENT/COMPONENT SURFACES SHALL NOT BE DAMAGED BY DRILLING, FILING, ETC. DRAIN HOLES IN METAL TRANSFORMER HOUSINGS SHALL BE MADE BEFORE GALVANIZING.
- 22. EDGE LIGHT NUMBERING TAGS SHALL BE FACING THE PAVEMENT.
- 23. CABLE/SPLICE/DUCT MARKERS SHALL BE PRECAST CONCRETE OF THE SIZE SHOWN. LETTERS/NUMBERS/ARROWS FOR THE LEGEND TO BE IMPRESSED INTO THE TOPS OF THE MARKERS SHALL BE PRE-ASSEMBLED AND SECURED IN THE MOLD BEFORE THE CONCRETE IS POURED. LEGEND INSCRIBED BY HAND IN WET CONCRETE SHALL NOT BE ACCEPTABLE.
- 24. ALL UNDERGROUND CABLE RUNS SHALL BE IDENTIFIED BY CABLE MARKERS AT 200 FEET MAXIMUM SPACING, WITH AN ADDITIONAL MARKER AT EACH CHANGE OF DIRECTION OF THE CABLE RUN. CABLE MARKERS SHALL BE INSTALLED IMMEDIATELY ABOVE THE CABLES.
- 25. THERE SHALL BE NO SPLICES BETWEEN THE ISOLATION TRANSFORMERS. L-823 CONNECTORS ARE ALLOWED AT TRANSFORMER CONNECTIONS ONLY, UNLESS OTHERWISE SHOWN.
- 26. APPLY AN OXIDE INHIBITING, ANTI-SEIZING COMPOUND TO ALL SCREWS, NUTS AND BREAKAGE COUPLING THREADS.
- 27. LOCATIONS OF ENDS OF ALL UNDERGROUND DUCTS SHALL BE IDENTIFIED BY DUCT MARKERS.
- 28. WHERE A PARALLEL, CONSTANT VOLTAGE PAPI SYSTEM IS PROVIDED, THE "T" SPLICES SHALL BE OF THE CAST TYPE.
- 29. CONCRETE USED FOR SLABS, FOOTINGS, BACKFILL AROUND TRANSFORMER HOUSINGS, MARKINGS, ETC. SHALL BE 3500 PSI, AIR-ENTRAINED IN ACCORDANCE WITH ITEM 610 STRUCTURAL PORTLAND CEMENT CONCRETE.
- 30. ALL POWER AND CONTROL CABLES IN MAN/HAND HOLES SHALL BE TAGGED. USE EMBOSSED COPPER STRIPS TO BE ATTACHED AT BOTH ENDS TO THE CABLE BY THE USE OF PLASTIC STRAPS. MINIMUM OF TWO TAGS SHALL BE PROVIDED ON EACH CABLE IN A MAN/HAND HOLE-ONE AT THE CABLE ENTRANCE AND ONE AT THE CABLE EXIT.
- 31. THE LOCATION, SIZE AND TYPE OF MATERIAL OF EXISTING UNDERGROUND AND/OR ABOVEGROUND UTILITIES INDICATED ON THE PLANS IS NOT REPRESENTED AS BEING ACCURATE. SUFFICIENT OR COMPLETE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY WHATEVER IN RESPECT TO 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 OWNER'S REPRESENTATIVE AND/OR THE RESIDENT ENGINEER SHALL ALSO BE IMMEDIATELY NOTIFIED. ANY DAMAGE TO 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 EXCAVATORS) FOR UTILITY INFORMATION, PHONE: 1-800-892-0123. CONTACT THE FAA (FEDERAL AVIATION ADMINISTRATION) FOR ASSISTANCE IN LOCATING FAA CABLES AND UTILITIES. LOCATION OF FAA POWER, CONTROL AND COMMUNICATION CABLES SHALL BE COORDINATED WITH AND/OR LOCATED BY THE FAA. ALSO CONTACT AIRPORT DIRECTOR/MANAGER AND AIRPORT PERSONNEL FOR ASSISTANCE IN LOCATING UNDERGROUND AIRPORT CABLES AND/OR UTILITIES. ALSO COORDINATE WORK WITH ALL ABOVE GROUND UTILITIES.
- 32. WHEN PREPARING CABLE FOR SPLICES, THE CONTRACTOR SHALL USE A CABLE STRIPPER/PENCILLER WHENEVER CABLE CONNECTIONS ARE MADE.







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SHEET	TITLE			

#### FLOOR PLAN, BUILDING ELEVATIONS & BUILDING SECTION



AND TOWER; RELOCATE LIGHTING, SIGNAGE AND

NO	DATE	DES	CRIPT	ION
NO.	DAIL	DES	DWN	REV
ISSUE:	09/22/17	7		
PROJEC	CT NO: 1	7A000	2	
CAD FIL	E: 2017-04	2 SHTS.C	WG	
DESIGN	BY: JH	P/USJ		
DRAWN BY: USJ				
REVIEW	ED BY:	JHP		

## **SECTIONS & DETAILS**

## PROJECT SPECIFICATIONS

#### 01.00 General Requirements

- All work under this contract shall be governed by AIA 01 01 document A201 "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION" AIA document A201, 2007 edition.
- 01 02 48 hours prior to beginning work, contact joint utility locating information, 1-800-892-0123.
- 01.03 Contractor shall be responsible for coordination of the work of his own forces, his sub-contractors, work by other contracts, and work performed by Owner's own forces, as it relates to
- work of this contract. 01.04 Contractor shall erect one project identification sign at a location on the site as directed by the Owner. Other signs identifying the contractor(s) for the project may be allowed at the Owner's discretion and the location of such supplementary signage will be as directed by the Owner's representative.
- 01.05 The contractor will provide the owner with a one year warranty for all work performed, the period will start the day of substantial completion
- Testing Services: The Contractor shall hire a testing service 01.06 Company. The Company shall be approved by the Architect/Engineer. The following will require testing: Soil Bearing Capacity

#### Concrete: Compressive Strength, Slump

- 02.00 Existing Conditions
- Cutting & Patching: Turn off all utilities and drain pipes on all 02.01 work to be cut. Before cutting investigate affect on surrounding work. If it is determined that surrounding work will be adversely affected consult the architect/engineer. Temporarily support all work that is to remain until permanent work is complete. When patching, match adjacent existing elevation, texture, finish and color. Finish whole area patch is located in from edge of area to edge of area.
- 02.02 The client will provide the contractor the use of currently available electric power, water and sewer for temporary use during construction at no cost to the contractor. Any additional utilities required will be at the contractor's expense. The contractor will provide for disposal of all demolition work.

03.00 Concrete

- 03 01 03 02 All concrete work shall be in accordance with the following (latest addition): ACI 301 - Structural concrete for buildings ACI 347 - Recommended practice for conc. formwork ACI 304 - Measuring, mixing, transporting & placing ACI 305 - Recommended practice for hot weather ACI 306 - Recommended practice for cold weather ACI 318 - Building Code Requirements for Structural Concrete 03.02 Quality Control Testing
  - A. The contractor's quality control program shall include the tests and certifications in this Section, all costs for concrete testing shall be borne be the Contractor. The number of tests specified are the minimum required. Additional tests shall be performed when there is reason to suspect nonconformance to the specified requirements Testing entities shall be subject to the approval of the Architect/Engineer. All field test must be observed by the Owner's resident project representative (RPR)
  - B. Aggregates shall be sampled and tested as prescribed in ASTM C33. Tests shall be made on each size and results submitted for approval of sources well in advance of concrete placing. Gradation tests shall then be made on each size at intervals corresponding to each 250 cubic vards of concrete.
  - C. Concrete: Each set of test specimens shall consist of three specimens each taken from separate batches. One set shall be taken from each 50 cubic vards or fraction thereof, of concrete placed, and at least one set shall be made in each 8-hour shift. Sampling shall conform to ASTM C172, and the preparation and handling of specimens shall conform to ASTM C31. Cylinders shall be cured in the laboratory and tested by ASTMC39. Field curing may be required when air temperatures below 40 Deg F are anticipated. The standard age of test shall be 28 days, but 7-day test may be used, on written approval, when the strength relationship between 7-day and 28-day test has been established for a specific mix. Cylinders may be made by the Contractor in the presence of the RPR but must be strength tested by an approved independent laboratory. The strength of each set shall be reported.
  - D Slump: At least one slump test shall be made and results recorded for each set of strength samples. Slump shall be determined by ASTM C143, and may be made by the Contractor in the presence of the RPR.
  - E. Entrained Air: Content shall be determined immediately after discharge from the mixer by ASTM C231. Air content measurements shall be made no less frequent than that required for slump, and may be made by the Contractor in the presence of the RPR.
  - F. Materials Certifications: Certificates of compliance shall be submitted for the following materials: Sheet-type curing materials Premolded joint filler strips Air entraining admixture Membrane-forming curing compounds Vapor Barrier Joint Sealer Cement

#### 03.00 Concrete (Continued)

03.02

- Quality Control Testing The contractor's quality control program shall include the tests and certifications in this Section, all costs for concrete testing shall be borne be the Contractor. The number of tests specified are the minimum required. Additional tests shall be performed when there is reason to suspect nonconformance to the specified requirements. Testing entities shall be subject to the approval of the Architect/Engineer. All field test must be observed by the Owner's resident project representative (RPR).
- Appreciates shall be sampled and tested as prescribed in ASTM C33. Tests shall be made on each size and results submitted for approval of sources well in advance of concrete placing. Gradation tests shall then be made on
- 03 03 Materials: Cement: ASTM C150. Type I or II
  - Fine Aggregate: Clean natural sand, ASTM C33
  - Coarse Aggregate: Crushed rock, washed grabel, or other
  - inert granular material comforming to ASTM C33, well graded nominal size. 3/4 inch
  - Water: Clean and free form deleterious substances. Air-Entraining Agent: ASTM C260
  - Reinforcing Steel: Bars: ASTM A615, Grade 60 with Grade 40 used to
  - specifically noted field bent dowel bars. Bar Supports: Department of Commerce, Product Standard PS7, fabricated from galvanized wire.
  - G. Expansion Joint Filler: Prmolded, ASTM D1751 or D1752 strips 1/2 inch thick unless otherwise indicated. Joint Sealer: ASTM D1850
  - Forms:
  - Prefabricated

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- Plywood: Department of Commerce, Product Standard PS1, Waterproof, resin-bonded, exterior
- type, Douglas fir. 3. Lumber: Straight, uniform width and thickness, and free from knots, offsets, holes, dents, and other surface defects.
- 4. Form Oil: Light colored paraffin oil or other acceptable nonstaining material
- Waterproof Sheeting: ASTM C171 Interior Membrane Curing Compound: ASTM C309, Type
- All exterior slabs on grade shall receive a curing
- compound conforming to ASTM C 309, Type I. M. Vapor Barrier: Unless noted otherwise, all interior slabs-on-orade shall be provided over min. 10 mil
- polyethylene vapor barrier. Where shown, non-shrink grout shall be equal to Euclid Chemical "Firmix": Bonsal Company "Construction Grout": or Sonneborn "Sonoarout".
- Preliminary Review: The source and quality of concrete material s and concrete proportions proposed for the work shall be submitted to the Architect/Engineer to review before any concrete is placed. Limiting Requirements: Concrete shall be controlled with the 03.14
- following limiting requirements: A. Minimum Cement Factors: The quality of portland cement shall not be less than 6.7 bags (630 pounds) per cubic
- Aggregates: The maximum total combined aggregate R weight shall be 2930 pounds, and the maximum fine aggregate weight shall be 1200 pounds per cubic yard. The actual weights to be used shall be those necessary to produce concrete of proper consistency.
- Total Water Content: Total water content of concrete shall not exceed 33 gallons of water per cubic yard. D Slump: Concrete slump shall be kept as low as possible
- consistent with proper handling and thorough compaction. Unless otherwise authorized by the Architect/Engineer, slump shall not exceed 5 inches.
- Total Air Content: The total volumetric air content of F concrete after placement shall be between 4 and 7
- E. Strength: All concrete shall have a minimum, 27-day compressive strength 2700 PSI & 28-day compressive strenath of 4.000 PSI. All footing excavations shall be clean and free of debris. standing water and loose soil prior to placing concrete. Footings shall be inspected and approved by the
- Architect/Engineer prior to concrete placing. Unless shown to the contrary, all slab control joints shall be a minimum of 1/4 of slab thickness.
- All concrete exposed to the weather shall be air entrained. Reinforcement Reinforcement shall be fabricated to shapes and
- dimensions shown and placed where indicated. Reinforcement shall be fee of any substance that would recuce or destroy the bond. After any substantial delay, steel left exposed shall be inspected and cleaned. Laps of splices shall be made in conformance with ACI Standard
- Reinforcement detailing and placement, including concrete protection for steel reinforcement, unless otherwise indicated, shall conform to ACI Stancards 318 and 315.

#### 03.00 Concrete (Continued)

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- G. Protective covering for reinforcement bars shall be as follows unless otherwise noted on the drawings: 3" where concrete is cast against ground 1" for slabs 1-1/2" for walls.
- H. Supports shall be installed and intersections and splices of reinforcement securely tied with 16 gauge black annealed wire to limit displacement to the tolerances permitted by ACI Standard 315. The number, type, and spacing of supports shall conform to ACI Standard 315, unless otherwise indicated Reinforcement for slabs-on-orade and for footings shall be supported on precast concrete blocks. Size and spacing of blocks shall be as required to provide firm support and clearances specified or indicated.
- Provide dowels in all footings equal in size, number and location to vertical wall reinforcing.
- J. Provide corner bars in all footings, walls, masonry bond beams, etc., equal in size and number to horizontal reinforcing
- Concrete Batching and mixing: Equipment an procedures for mixing and transporting concrete shall conform to ASTM C94. 3.18 except as modified in this Section. Placing Concrete
- A. Concrete shall be transported with segregation of loss of ingredient as continuously and rapidly as practicable to the place of final deposit until completion of the approved
- B Concrete shall be placed as nearly as practicable in final position, in uniform approximately horizontal layers not over 12 inches deep. Concrete splashed on forms or reinforcement shall be removed before placing subsequent lifts. A tremie or other approved means shall be used to limit the distance of free drop to 5 feet or less. Cold Weather Requirements: Concrete shall not be placed
- without special protection when freezing temperatures can be anticipated with the specified curing period. Approval must be obtained for the placement of concrete under low temperatures conditions. When placed, the concrete temperature shall be between 50 and 70 degrees Fahrenheit. The mixture water and/or aggregates shall be heated as required to provide the minimum concrete temperature. All methods and equipment shall be subject to approval.
- Hot Weather Requirements . Except as modified in this section, hot weather concreting shall comply with ACI 305 At air temperatures of 90 degrees Fahrenheit or above, concrete shall be kept as cool as possible during placement and curing. The temperature of the concrete when place in the work shall not exceed 90 degrees Fahrenheit.
- Plastic shrinkage cracking, due to rapid evaporation o moisture, shall be prevented. Concrete shall not be placed when the evaporation rate (actual or anticipate) equals or exceeds 0.2 pounds per square foot per hour, as determined by Figure 2.1.4 in ACI 305.
- Compaction: Compaction shall be by internal concrete vibrators supplemented by hand-spading, rodding, and tamping. Forms shall not be externally tapped or vibrated. Concrete shall not be transported inside forms by vibrators. Vibrators shall maintain 7,000 impulses or more per minute when submerged in concrete.
- 03.15 Finishes of Concrete: Surface defects shall be remedied as specified with 24 hours of form removal. Fins and loose material shall be removed. Honeycomb, aggregate pockets, voids over 1/2 inch in diameter, and holes left by the tie rods or bolts shall be cut out to solid concrete, thoroughly wetted. brushed-coated with neat cement grout, and filled with mortar. Mortar shall be stiff mix of 1 part blended portland white cements to 2 parts fine aggregate and minimum amount of water. Patchwork rubbed to match adjacent surfaces and shall then be damp cured for a minimum of 72 hours.
  - A. All exterior flatwork shall be given a light broomed finish, All interior flatwork shall be given a slick power trowel finish.
  - Curing: concrete and surface treatments shall be protected against moisture loss and rapid temperature change for 7 days. Concrete shall be maintained in a moist condition and above 50 degrees Fahrenheit throughout the period. Concrete shall be protected from rapid temperature change and rapid drying for 24 hours after protection is removed. Curing activities shall be started as soon as possible after placing an finishing. Formed surfaces may be moist cured in the forms for the full curing period or by other approved means. Curing shall be accomplished by any the following methods or combination thereof. as approved, except that surfaces with a smooth ubbed finish and building floor slabs must be mist cured.
  - A. Moist Curing: Surfaces shall be covered with mats or two layers of burlap, wetted before placing, overlapped at least 6 inches, and then kept continually wet and in intimated contact with the surface.
  - B. Impervious-Sheet Curing: All surfaces shall be thoroughly wetted and covered with the specified materials. Covering shall be lapped at least 12 inches or at least 4 inches if taned to form continuously closed joints. Sheets shall be weighted to prevent displacement of billowing from winds, Sheets with tears or holes shall be immediately repaired.

#### 03.00 Concrete (Continued)

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- C. Membrane Forming Compound Curing: the compound shall be applied as soon as the moisture film has disappeared, The curing compound shall be applied in strict conformance with directions furnished by the manufacture. Surfaces subsequently damaged with the curing period or subjected to heavy rainfall with 3 hours of application shall be recoated. Membrane curing compound shall not be used in construction joints. Repairing Defective Concrete
- Defects in formed concrete surfaces shall be repaired with 24 hours, to the satisfaction of the Architect/Engineer, and defective concrete shall be replaced with 48 hours after the adjacent forms have been removed. All concrete with is honeycombed or otherwise defective shall be cut out and removed to sound concrete with edges square cut to avoid feathering.
- H. Concrete repair work shall conform to Chapter 9 of ACI 301 and shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. Repair work shall be rubbed to match adjacent surfaces and shall be moist cured for a minimum of 72 hours. Finishing Formed Surfaces
- A. Fins and other surface projections shall be removed from all formed surfaces, except exterior surfaces that will be in contact with earth backfill and are not specified to be dampproofed. A power grinder shall be used, if necessary, to remove projections and provide a flush surface
- B. Surfaces to be dampproofed shall have fins removed and tie holes filled, by no additional finishing will be required. Tie holes in all formed surfaces shall be cleaned, wetted, and filled with patching mortar. Patches shall be finished flush and shall be rubbed to match the texture of the adjacent concrete. 07 02
- Tolerances: ACI 301 1/8" in 10'-0" as determined by a 10'-0" straight edge placed anywhere on the slab in any direction.

## 04.00 Masonry

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- Materials A. Brick: All brick shall conform to ASTM C216. Grade MW. 07.03 The brick shall be dark read with random pattern. The brick color and texture shall be approved by the 07.04 Architect/Engineer before purchase. The Contractor shall insure that all brick is uniform in color and texture by purchasing all brick at one time.
- B. Concrete Masonry Units (CMU): CMU shall be standard weight apprenate confroming to ASTM C90. Grade N1 and/or Grade N2. Provide a fire resistive rating of 3-hours. Dimension of CMU shall be within 1/16 inch of the modular size dimension which allows 3/8 inch for joints. CMU shall be plant cured at least 28 days under cover in dry stoarge in addition to the necessary steam curing. All CMU is to be smooth faced.
- C. CMU Joint Reinforcement: Hot dip galvanized 9 gauge cross rods with 3/16 inch diameter side rods. Eves and nooks are 3/16 inch diameter. Equal to Hohmann & Barnard, Inc. 170 Adjustable Truss Eye-Wire.
- D. Mortar: Mortar used for laving of all masonry work may be composed of one part Portland Cement to three parts sand, or pre-mix mortar may be used. All mortar shall be Tyne N
- Grout: Type M or S
- Flashing Stainless steel drip edge and pan Type 304, 28
- flexible flashing: Butyl Rubber Flashing, 0.30 inches thick with termination bar
- 1/4 inch diameter cotton rope weep material. Construction of Masonry Walls
- A. Clean and wet all surfaces prior to laying masonry thereon. All masonry shall be laid true to dimensions, plumb, square, and in running bond style.
- B. No masonry shall be laid if the outdoor temperature is expected to fall below 32 degrees Fahrenheit within the following 72 hours.
- C. Form all chasses for installation of piping , conduit, switch and outlet boxes, etc.
- D. Lay CMU in running bond. Lay with "shove" joints to completely fill head joints. ("Chipping" of corners of CMU with mortar will not be accepted.) All courses shall be laid level with horizontal and vertical joints of uniform width. Align head joints win alternate courses. Joints shall be tooled. Cuts an niters shall be made with masonry saw. Brick used in sills shall be sawed, not broken, No hipped or broken CMU will be permitted. E. Flashings: Flashing shall be placed above all lintels.
- below all sills, and at all other lodations shown on the plans. Through-wall flashings shall turn down over the stainless steel base flashing flush with outside edge of the brick face. Fasten the top edge of flexible flashing against the CMU face with a termination bar. Seal with compatible sealant
- F. Insulation: Fill CMU cell voids not filled with grout with non-setting foam, pumped into the cores after CMU construction. Polystyrene core fill insulation may be used in areas that would be difficult to fill with pumped foam.

#### 05.00 Metals

- All structural steel work shall be in conformance with AISC 05.01 Manual of Steel Construction, 3rd edition, 2001. Unless noted otherwise, all structural steel shall be ASTM
- 05.02 Fv = 36 KSIAll structural steel pipe shall be ASTM A501, Fy = 36 KSI 05.03
- ASTM A53 type E or S, Grade B Fy = 36 KSI. 05.04 All anchor bolts shall be ASTM A 307. All welding shall be performed by AWS certified welders a 05.05
- shall be per Structural Welding code AWS D.1.1-88. Use E-70xx electrodes

#### 06.00 Wood, Plastic and Composites 06.01

- Pre-fabricated wood roof trusses to be prepared under sea Registered Illinois Structural Engineer. Shop drawings to approved by Architect prior to ordering materials for proje 06.02 Plywood sheathing to conform to APA PS1 grade All lumber used for project shall be S4S, S-Dry grade mar 06.03 complying with PS20.
- 06 04 All lumber used for structural framing to be #2 Douglas F other species with equivalent structural characteristics 06.05 All fasteners and Anchorage devices to be of size and type recommended by manufacturer; hot-dip galvanized for w exposed to weather, in ground contact or where exposed t high humidity. 06.06

Wood Trim: Wood trim shall No.1 pine.

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#### 07.00 Thermal & Moisture Protection All roof flashing & sheet metal shall be fabricated and insta 07.01

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$\begin{array}{l} \label{eq:stars} \end{tabular} \begin{tabular}{lllllllllllllllllllllllllllllllllll$		Consecutive
ASTM A53 type E or S, Grade B - Fy = 36 KSI. All anchor botts shall be ASTM A 307. All welding shall be performed by AWS certified welders and shall be per Structural Welding code AWS D.1.1-88. Use E-70xx electrodes.	09.00 <sup>09.01</sup>	Finishes (FSP-11-30-19) Unless noted otherwise, all gypsum wallboard to be equal to U.S. Gypsum, type 'X" - 5/8" thick. All wallboard surfaces to be taped, sanded, and painted unless noted otherwise. All unsum wallboard work to be in
Wood, Plastic and Composites Pre-fabricated wood roof trusses to be prepared under seal of Registered Illinois Structural Engineer. Shop drawings to be approved by Architect prior to ordering materials for project. Plywood sheathing to conform to APA PS1 grade. All lumber used for project shall be S4S, S-Dry grade marked, complying with PS20.	09.02 09.03	Concrete Floors - exposed. Interior Face of CMU A. Surface Preparation: Motar joints shall be aged at least 28 days. All excess mortar, fins and protrusions and any other surface contaminants shall be removed. All surfaces shall be clean and dry prior to painting.
An united according and the structural characteristics. All fasteners and Anchorage devices to be of size and type recommended by manufacturer; hot-dip galvanized for work exposed to weather, in ground contact or where exposed to high humidity. Wood Trim: Wood trim shall No 1 pine	09.04	<ul> <li>B. Painting: Painting shall consist of an Epoxy Polyamide system as follows:</li> <li>1. First Coat: Masonry Filler at 75-100 st/gal</li> <li>2. Second Coat: Epoxy at 4.0-6.0 mils</li> <li>3. Third Coat: Epoxy at 4.0-6.0 mils</li> <li>Interior Wood &amp; Drywall</li> </ul>
wood mm: wood mm snan No. I pine.	00.01	A. Surface Preparation: The surface shall be clean and
Thermal & Moisture Protection All roof flashing & sheet metal shall be fabricated and installed in accordance with quality, procedures and methods recommended by SMACNA Architectural Sheet Metal Manual. Unless noted otherwise, all sheet metal materials shall be fabricated Galvalume coated steel 26 gauge minimum with ellicence polytects conting	09.05	dry. B. Painting: Painting shall consist of an Alkyd Gloss system as follows: 1. First Coat: Undercoat at 2.0-3.5 mils 2. Second Coat: Gloss at 1.5-3.5 mils 3. Third Coat: Gloss at 1.5-3.5 mils Steel Doors and Frames: All surfaces of all steel doors,
Sincone pulyester coaing, Joint sealers to be polyurethane base – single component, chemical curing, type 2 / non-sagging equal to Sonneborn Sonolastic NP1; Sika Sikaflex 1A; Williams Products Dynaseal W100; or approved equal. Use ASTM D1622-75 extruded, closed cell round polyethylene foam backer rod equal to Sonneborn "Sonnofoam Backer-Rod".		<ul> <li>interior and exterior, shall be painted in accordance with the following:</li> <li>A. Surface Preparation: Doors shall be clean and dry and free of all oil residues. Solvent cleaning may be required to meet this condition.</li> <li>B. Painting: Over the factory-applied primer, painting shall consist of an Acrylic Polywerthane Fnamel as</li> </ul>
Fluid Applied Water Resistive Barrier (WRB): Equal to Dupont Tyvec Fluid Applied WB.		follows:
Concealed fastener metal roofing: 26 gauge Galvalume coated		2. Second Coat: Enamel at 2-3 mils
steet with sincone polyester coaling. Bottom regults turned under to hook to a continuous cleat. American Building Components, SL-16 or equal. Install over 30 pound asphalt impregnated felt. Pre-formed soffit material shall be ribbed & vented 29 gauge Galvalume coated steel with silicone polyester coating. Color selected from manufacturer's standard by Architect/Engineer. American Building Components Pre-cut Soffit or equal.	<b>10.00</b> 10.01	Specialities Metal Louvers shall conform to ANSI/ASTM B221 and Metal Louvers shall conform to ANSI/ASTM B221 and fluorocarbon paint finish. All louvers to be provided with interwoven wire mesh bird and insect screens.
Downspouts: 0.025 inch aluminum with Kynar or Dynar finish. Color selected by Architect/Engineer. Gutters: 0.025 inch aluminum with Kynar or Dynar finish. Color selected by Architect/Engineer.	31.00 31.01	Earthwork Clearing: Areas requiring site work shall be stripped with topsoil being saved and separated in a stockpile for later use as the finished earthen layer. Unsuitable rubble or
Openings Exterior metal door frames to be min. 14 ga. galvanized welded type. Frame to be factory primed and have a bituminuous coating on interior. Acorn, Steelcraft, Amweld, Ceco, Republic or approved equal. Exterior metal doors to be 16 na flush type nalvanized with	31.02	debris must be removed from the project site and properly disposed of by the Contractor. Building Excavation: All excavations shall be kept dry until forms are set and concrete is poured and has attained its initial set. Sub-grade soil for all concrete structures, regardless of type or location, shall be firm, dense, and
bonded polyurethane core. Frame to be factory primed. Acorn, Steelcraft, Arnweld, Ceco, Republic or approved equal. Door Hardware: Match the style, grade and function of the hardware within the hardware schedule. The following manufacturers are consider equal, unless noted otherwise,		Indication of the second secon
ensewinete: Hinges: Hager, Stanley, Pemko, McKinny Panic Devices: Von Duprin, Monarch, Yale, Sargent Corbin-Russwin Closers: LCN, Norton, Sargent Stops: Rockwood, Ives, Quality, Glynn-Johnson		obtained thereby. Such material shall be applied in thin layers, each layer being entirely embedded in the subsoil by thorough tamping. All excess soil shall be removed to compensate for the displacement of the gravel or crushed stone, and the finished elevation of any subsoil reinforced
Seals: NGP, Pemko, Reese	31.03	In this manner shall not be above the specified sub-grade. Building Backfill A. After completion of foundation footings, walls, and other construction below the elevation of the final grade, and prior to backfilling, all forms shall be
		removed and the excavation cleaned of all debris. Unless otherwise shown, material for backfilling shall consist of suitable excavated material, imported sand, gravel, or select material. Backfill material shall be free of trash, lumber, or other debris.
		B. Borrow material may be obtained from excess excavation form other parts of the project, and the source must be approved by the Architect/Engineer.     C. Backfill shall be placed in horizontal layers not exceeding 6 inches in longe thickness and shall have a
		moisture content such that the required degree of compaction may be obtained. Each layer shall be compacted by hand, machine tampers, or by other suitable equipment to a density of at least 95 percent
		of standard proctor density of the soil. D. During and after backfill operations around structure, heavy construction equipment and tamping rollers shall be kept at least 5 feet feet from the face of the wall to prevent damage by lateral pressures.
		3 2 1 INCHES





#### GENERAL NOTES

1. SEE "PROPOSED ELECTRICAL ONE-LINE FOR VAULT AND AIRFIELD" FOR LOW VOLTAGE INPUT POWER WIRING REQUIREMENTS TO CCR'S (CONSTANT CURRENT REGULATORS). SEE HIGH VOLTAGE WIRING SCHEMATICS FOR CCR OUTPUT WIRING REQUIREMENTS. SEE "AIRFIELD LIGHTING CONTROL WIRING SCHEMATIC" AND FOR CCR CONTROL WIRING REQUIREMENTS. PROVIDE 5 FEET MINIMUM CLEAR WORKING SPACE IN FRONT OF EACH CCR AND EACH SERIES PLUG CUTOUT.

2. CONSTANT CURRENT REGULATORS AND THEIR RESPECTIVE SERIES PLUG CUTOUTS SHALL BE CLEARLY LABELED TO IDENTIFY THE RESPECTIVE REGULATOR DESIGNATION. AND RUNWAY OR TAXIWAY SERVED

3. SEE ELEVATION VIEWS FOR ADDITIONAL INFORMATION ON PROPOSED EQUIPMENT LAYOUTS

4. COORDINATE CONDUIT & SLEEVE ENTRANCES THROUGH FLOOR SLAB AND WALLS.

[21] 3-WAY 3" CONCRETE ENCASED DUCT FROM LOW VOLTAGE WIREWAY TO LOW VOLTAGE HANDHOLE ON EAST SIDE. PROVIDE 4-3" PVC COATED GRSC WITH PVC COATED GRSC ELBOWS AT ENTRY TO VAULT. 3" GRSC

22 4-WAY 3" CONCRETE ENCASED DUCT FROM HIGH VOLTAGE WIREWAY TO HIGH VOLTAGE MANHOLE ON SOUTH SIDE. PROVIDE 4-3" PVC COATED GRSC WITH PVC COATED GRSC ELBOWS AT ENTRY TO VAULT. 3" GRSC

FURNISH AND INSTALL A UL RATED, 10 POUND CARBON DIOXIDE FIRE EXTINGUISHER SUITABLE FOR USE ON CLASS C FIRES AND A 10 POUND CLASS 4A:80B:C DRY CHEMICAL ABC FIRE EXTINGUISHER SUITABLE FOR USE ON CLASS A,B,C FIRES, IN THE VAULT SHELTER. PER NFPA 10 "PORTABLE FIRE EXTINGUISHERS" CLASS C ARE FOR FIRES THAT INVOLVE ENERGIZED ELECTRICAL EQUIPMENT. FIRE EXTINGUISHERS SHALL BE MADE IN THE UNITED STATES OF AMERICA TO COMPLY WITH BUY AMERICAN REQUIREMENT. FIRE EXTINGUISHER TYPE CO2 SHALL BE AMEREX MODEL 330, BUCKEYE MODEL 10CD OR APPROVED EQUAL. FIRE EXTINGUISHER DRY CHEMICAL TYPE ABC SHALL BE AMEREX MODEL B456, BUCKEYE MODEL 10-TALL-ABC, OR APPROVED EQUAL. PROVIDE WALL MOUNTING BRACKET FOR EACH FIRE EXTINGUISHER. CONFIRM MODEL NUMBERS WITH THE

NEW 3KVA 240 VAC TO 480 VAC STEP-UP TRANSFORMER FOR RUNWAY 9 PAPI RELOCATED FROM OLD VAULT TO NEW VAULT, MAINTAIN 12" CLEARANCE ON BOTH SIDES, TOP, AND BOTTOM. PROVIDE LIQUID-TIGHT FLEX



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PEKIN MUNICIPAL AIRPORT 111 South Capitol Street Pekin, Illinois 61554 Telephone: 309.477.2300

**REPLACE AIRFIELD** ELECTRICAL VAULT, REPLACE BEACON UNIT AND TOWER; RELOCATE **REGULATOR; REPLACE** REMAINING AIRFIELD LIGHTING, SIGNAGE AND NAVIGATIONAL AIDS

IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 Contract No. PN010

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ISSUE:	09/22/20	)17			
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CAD FIL	CAD FILE: E-101.DWG				
DESIGN	DESIGN BY: KNL 08/08/2017				
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REVIEWED BY: BSS 08/21/2017

SHEET TITLE

PROPOSED VAULT ELECTRICAL EQUIPMENT PLAN



#### NOTES

- SUBMITTAL.

REMOTE MOUNTED EMERGENCY BALLAST OR SELF CONTAINED EMERGENCY BALLAST. WIRE

PER MANUFACTURERS RECOMMENDATIONS



	ELECTRICAL LEGEND - PLANS
	Conduit (exposed)
	CONDUIT OR DUCT (CONCEALED OR BURIED)
₽	DUPLEX CONVENIENCE RECEPTACLE, 120V, 20 AMP SINGLE PHASE, NEMA 5–20R, GROUNDING TYPE.
Ю <b>0</b> •	WALL OR CEILING MT'D. JUNCTION BOX. CONFIGURATION VARIES WITH USE
ģ	SINGLE THROW DISCONNECT SWITCH
Ч	SINGLE THROW, FUSIBLE DISCONNECT SWITCH
ЧШ	DOUBLE THROW SAFETY SWITCH, MANUAL TRANSFER SWITCH
œ	CONTROL PANEL
۲	MOTOR
T	TRANSFORMER
8	ELECTRIC UTILITY METER
	ENCLOSURE
	CIRCUIT BREAKER PANEL-SEE SCHEDULES
۲	GROUND ROD
<u>₩</u>	#12 AWG TWHN COPPER UNLESS NOTED OTHERWISE. LONG SLASHES INDICATE NEUTRAL SHORT SLASHES INDICATE HOT OR SWITCHED LEG, "G" OR SLASHES WITH DOT INDICATE SEPARATE GROUND WIRE.
PNL A 1,3,5	Homerun to Panel PNL A Indicates Panel 1,3,5 Indicates circuit numbers
F1-X	surface mounted fluorescent fixture. Letter with number indicates fixture type. X= circuit number
F1-X	Surface mounted fluorescent fixture with emergency Ballast Battery Backup. Letter with number indicates fixture type. X= circuit number
щ¤	WALL OR CEILING MT'D. COMPACT FLOURESCENT OR HID FIXTURE.
\$	SINGLE POLE SWITCH

H							
	FIXT. TYPE	DESCRIPTION	MANUFACTURER & CATALOG NO.	lamps/ Watts	VOLTS	MOUNTING	REMARKS
	F1	4 FT. WET LOCATION LISTED ENCLOSED AND GASKETED INDUSTRIAL LED LIGHT FIXTURE, IMPACT RESISTANT, UV RESISTANT REINFORCED POLYESTER FIBERGLASS HOUSING, HIGH IMPACT ACRYLIC DIFFUSER.	LITHONIA: DMW2-L24-4000LM- AFL-WD-MV0LT-GZ1- 40K-80CRI-USPOM, PHILIPS DAY BRITE DWA-43L-840-4-UNV H.E. WILLIAMS 96-4-L40-840- HIAFR-DRV-UNV, OR APPROVED EQUAL	LED. APPROX. 40 INPUT WATTS	120	SURFACE TO HARD CEILING	
	F1A	SAME AS F1 EXCEPT PROVIDE AN EMERGENCY BATTERY PACK CAPABLE OF OPERATING THE LIGHT FIXTURE FOR 90 MINUTES.	LITHONIA: DMW2-L24-4000LM- AFL-WD-MV0LT-GZ1- 40K-80CRI-USPOM WITH PS1050 BATTERY PACK, PHILIPS DAYBRITE DWA-431_840-4-UNV- EMLED, H.E. WILLIAMS 96-4-L40-840-HIAFR- DRY-UNY WITH EMERGENCY DRIVER/BATTERY PACK, OR APPROVED EQUAL.	LED. APPROX. 40 INPUT WATTS	120	SURFACE TO HARD CEILING	
	F2	LED WALL LUMINAIRE SUITABLE FOR WET LOCATIONS, DIE CAST ALUMINUM HOUSING WITH POWDER COAT FINISH, HIGH-IMPACT POLYCARBONATE OR ACRYLIC LENS OR GLASS, SEALED AGAINST MOISTURE AND ENVIRONMENTAL CONTAMINANTS (IP65 RATED, UL1598 RATED OR EQUIVALENT)	LITHONIA: TWHLED-10C-1000-40K- T3M-MVOLT-DDBXD- USPOM, LUMECON LWP- DOC-25-DB-1-NW-F, H.E. WILLIAMS WPS2-L28-850, OR APPROVED EQUAL.	LED. APPROX. 30 TO 40 INPUT WATTS	120	SURFACE TO WALL ABOVE INTAKE LOUVER APPROX. EVEN TO THE TOP OF DOOR FRAME. ADJUST FOR BUILDING CONDITIONS	Connect to wall switch located on the inside of the building.



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REPLACE AIRFIELD ELECTRICAL VAULT, REPLACE BEACON UNIT AND TOWER; RELOCATE REGULATOR; REPLACE REMAINING AIRFIELD LIGHTING, SIGNAGE AND NAVIGATIONAL AIDS

IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 Contract No. PN010

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SHEET TITLE

PROPOSED VAULT LIGHTING AND RECEPTACLE PLAN

1. 15 AMP & 20 AMP BRANCH CIRCUITS FOR LIGHTING & RECEPTACLES SHALL USE #12 AWG THWN (MIN.). EMT MAY BE USED FOR LIGHTING AND RECEPTACLE BRANCH CIRCUITS.

2. LIGHT FIXTURES SHALL BE MANUFACTURED IN THE UNITED STATES TO COMPLY WITH THE AIRPORT IMPROVEMENT PROGRAM BUY AMERICAN REQUIREMENTS. PROVIDE CERTIFICATION OF MANUFACTURE IN THE UNITED STATES WITH SHOP DRAWINGS

3. ADJUST RECEPTACLE LOCATIONS WHERE NECESSARY TO ACCOMODATE EQUIPMENT LAYOUT.

4. TEST EMERGENCY LIGHTING AND CONFIRM PROPER OPERATION.

5. "USPOM" SUFFIX ON LITHONIA LIGHT FIXTURE CATALOG NUMBERS INDICATES UNITED STATES POINT OF MANUFACTURE.

" GRSC FOR RADIO ANTENNA. PROVIDE SCHED 40 PVC NIPPLE AT ENTRY TO VAULT. BOND EXTERIOR METAL CONDUIT TO GND RING 3/4" GRSC TO PHOTOCELL. PROVIDE SCHED. 40 PVC NIPPLE -AT ENTRY TO VAULT. BOND EXTERIOR METAL CONDUIT TO WITH PIPE CLAMP & #2 AWG BARE CU WIRE. EXTEND CONDUIT AND RADIO ANTENNA CABLE TO ABOVE ROOF LINE OF ADJACENT GND RING WITH PIPE CLAMP & #2 AWG BARE CU WIRE HANGAR. MOUNT ABOVE HANGAR ROOF FOR PROPER OPERATION. LIGHTING BRANCH CKT L-854 RADIO RECEIVER IN 3/4" EMT OR GRSC RADIO RELAY 1.5" GRSC NIPPLE-INTERFACE PANEL -3" GRSC NIPPLE JRGE PROTECTOR PAPI RADIO RELAY -RELOCATED 3KVA 240 VAC TO 480 VAC MAINTAIN 10" MIN. CLEARANCE STEP-UP XFMR FOR RWY 9 PAPI. INTERFACE PANEL FROM HEATER TO SURGE MAINTAIN 12" CLEARANCE BOTH SIDES, ΜΔΙΝ LIGHTING PROTECTOR ENCLOSURE TOP & BOTTOM. DIST. CONTACTOR -120VAC, 20A PANEL ELECTRIC PANEL LOW VOLTAGE 6"x6" RECEPT. WALL HEATER WIREWAY, PROVIDE STRUT WITH T-STAT -1" LTFMC 1" GRSC SUPPORT TO OFFSET FIRE EXTINGUISHERS FROM THE WALL. 2" GRSC  $\mathbf{\nabla}$ LOCATED HERE 3/4" LTFMC $\rightarrow$ - 3" GRSC 1/4" x 2" COPPER BUS BAR-3/4" SCHED-(TYP FOR 2) -#6 AWG CU (VAULT GND BUS) 40 PVC 3/4" SCHED 40 PVC #2 CU —∕ TO GND RING← 4" GRSC NIPPLE -#2 AWG CU -3/4" PVC COATED GRSC 120/240VAC, 1PH 3W WITH GND FOR REMOTE PHOTOCELL BYPASS CONTROL CIRCUIT FEEDER CIRCUIT. 3-3" PVC COATED GRSC ELBOWS AND PVC COATED WIRING TO TERMINAL GRSC TO LOW VOLTAGE HANDHOLE. MAINTAIN 3" MIN BUII DING SEPARATION BETWEEN CONDUITS COORDINATE LOCATIONS WITH VAULT FLOOR AND FOUNDATIONS AND INTERFACE TO LOW VOLTAGE HANDHOLE VAULT NORTH WALL ELEVATION SCALE 1/2"=1'-0" 4 FEET 2 0 PAPI CUTOUT. TOP OF ENCLOSURE 5 FT. ABOVE RUNWAY 9-27 CUTOUT. FLOOR. ADJUST TO AVOID 4#8 FAA L-824, TYPE C, TOP OF ENCLOSURE 5 FT. INTERFERENCES WITH CCR'S 5000 VOLT CABLES, 1#8 GND ABOVE FLOOR. TAXIWAY CUTOUT ENCLOSURE IN 1.5" LTFMC. PROVIDE ADJUST TO AVOID SUFFICIENT SLACK AND ROUTE INTERFERENCES WITH CCR'S BEHIND LOW VOLTAGE WIREWAY 4 #8 FAA L-824, TYPE C TO ACCOMMODATE ACCESS. HIGH VOLTAGE 6"X6" 5000 VOLT CABLE, 1#8 GND WIREWAY. PROVIDE STRUT 2'-6" IN 1.5" LTFMC. -120VAC, 20A SUPPORT RECEPT. RWY PAPI TAXIWAY LOW VOLTAGE 6"X6" WIREWAY. PROVIDE 9-27 CCR CCR STRUT SUPPORT TO OFFSET FROM THE WALL CCR AND ALLOW HIGH VOLTAGE CONDUIT TO ROUTE BEHIND THE LOW VOLTAGE WIREWAY #6 AWG CU 1'–6" 6666 TO GND ROD/RING ← /4" X 2" COPPER BUS BAR (TO BE INSTALLED ON EACH WALL EXCEPT DOORWAY 3/4" SCHED 40 PVC 3'-6" AREA), MOUNT APPROX, 6" ABOVE FLOOR TO #2 AWG CU CENTER OF BUS. ADJUST AS NECESSARY. 4-3" PVC COATED GRSC ELBOWS AND 4-3" PVC COATED GRSC AT ENTRY TO VAULT. MAINTAIN 3" MIN. SEPARATION BETWEEN CONDUITS. TRANSITION TO 4-WAY CONCRETE ENCASED DUCT BELOW GRADE AND EXTEND TO HIGH VOLTAGE MANHOLE. VAULT SOUTH WALL ELEVATION SCALE 1/2"=1'-0" 4 FEET

## NOTES

- 1. COORDINATE CONDUIT ENTRIES INTO THE VAULT BUILDING WITH EQUIPMENT LAYOUT AND VAULT FOUNDATION.
- 2. AIRFIELD LIGHTING SERIES CIRCUIT CABLE SHALL EXIT THE RESPECTIVE CONSTANT CURRENT REGULATOR (CCR) AT THE HIGH VOLTAGE SECTION. 240 VAC INPUT POWER SHALL ENTER THE RESPECTIVE CCR AT THE INPUT POWER SECTIONS. CONTROL CIRCUITS SHALL ENTER THE RESPECTIVE CCR AT THE CONTROL SECTION. MAINTAIN THE SEPARATION OF LOW VOLTAGE CIRCUITS FROM HIGH VOLTAGE CIRCUITS. CONFIRM CCR INSTALLATION REQUIREMENTS WITH EACH RESPECTIVE CCR MANUFACTURER'S INSTRUCTIONS.



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SHEET TITLE

PROPOSED VAULT WALL ELEVATIONS (SHEET 1)



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ELECTRIC WALL HEATER WITH T-STAT	Illinois Licensed Professional Service Corporation #184-001084
3/4" LTFMC 120 VAC, 20 AMP RECEPT	9 (2017 9 (2017 9 (2017 9 (2017 9 (2017) 9 (2017)
	PEKIN MUNICIPAL AIRPORT 111 South Capitol Street
	Pekin, Illinois 61554 Telephone: 309.477.2300 REPLACE AIRFIELD ELECTRICAL VAULT, REPLACE BEACON UNIT
_	AND TOWER; RELOCATE REGULATOR; REPLACE REMAINING AIRFIELD LIGHTING, SIGNAGE AND NAVIGATIONAL AIDS
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	PROPOSED VAULT WALL ELEVATIONS (SHEET 2)



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NEUTRAL AND GROUND 600V NOT FUSIBLE SAFETY SWITCH IN A NEMA 4X STAINLESS

NEW L-810 DUAL OBSTRUCTION LIGHTS



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PROPOSED ELECTRICAL ONE LINE FOR VAULT AND AIRFIELD - SHEET 2



### NOTES:

- 1. ALL WORK, POWER OUTAGES, AND/OR SHUT DOWN OF EXISTING SYSTEMS SHALL BE COORDINATED WITH THE AIRPORT MANAGER AND THE BE LABELED AS SUCH TO PREVENT ACCIDENTAL ENERGIZING OF THE RESPECTIVE CIRCUITS. ALL PERSONNEL SHALL FOLLOW U.S. DEPARTMENT OR LABOR OCCUPATIONAL SAFETY & HEALTH HEALTH STANDARDS FOR ELECTRICAL SAFETY AND LOCKOUT/TAGOUT PROCEDURES INCLUDING, BUT NOT LIMITED TO, 29 CFR SECTION 1910.147 THE CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT).
- ISSUE IN FORCE, THE RESPECTIVE EQUIPMENT MANUFACTURE'S DIRECTIONS AND ALL OTHER APPLICABLE LOCAL CODES, LAWS, PERMITTED
- SHALL CONFIRM REQUIREMENTS WITH SERVING ELECTRIC UTILITY COMPANY. THE SERVING ELECTRIC UTILITY IS AMEREN. PHONE 1-800-755-5000 OR 1-888-672-5252. AMEREN DISTRIBUTION DESIGN SPECIALIST IS MR. SAM HEPPARD, PHONE: 309-444-7917, CELL PHONE: 309-210-7170.
- THE SERVICE DISCONNECT TO THE AIRPORT ELECTRICAL VAULT MAIN ELECTRICAL EQUIPMENT PER LUMP SUM.
- 6. PROVIDE 6" MIN. THICK CONCRETE PAD EXTENDING 2' PERIMETER OF SUPPORT STRUCTURE.

![](_page_43_Figure_8.jpeg)

CONCRETE PAD DETAIL NOT TO SCALE

OPERATIONS SUPERINTENDENT. ONCE SHUT DOWN, THE CIRCUITS SHALL ADMINISTRATION (OSHA) 29 CFR PART 1910 OCCUPATIONAL SAFETY & 2. ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED IN CONFORMANCE WITH NFPA 70 - NATIONAL ELECTRICAL CODE (NEC) MOST CURRENT ORDINANCES AND REQUIREMENTS IN FORCE. ANY INSTALLATIONS WHICH VOID THE U.L LISTING, ETL LISTING, (OR OTHER THIRD PARTY LISTING) AND/OR THE MANUFACTURER'S WARRANTY OF A DEVICE WILL NOT BE 3. CONTRACTOR SHALL COORDINATE NEW ELECTRICAL SERVICE WITH THE SERVING ELECTRIC UTILITY AND THE AIRPORT MANAGER. CONTRACTOR 4. CONDUIT ENTRIES INTO NEMA 4, 4X ENCLOSURES SHALL HAVE NEMA 4. 4X HUBS TO MAINTAIN THE NEMA 4, 4X RATING OF THE ENCLOSURE. 5. NEW ELECTRICAL SERVICE AND ASSOCIATED FEEDER CONDUCTORS FROM DISCONNECT PANEL WILL BE PAID FOR UNDER ITEM AR109200 INSTALL

OPENING FOR CONDUITS. ADJUST SIZE OF OPENING FOR RESPECTIVE CONDUITS. BACKFILL OPENING WITH GRAVEL

![](_page_43_Picture_14.jpeg)

![](_page_43_Picture_15.jpeg)

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![](_page_43_Picture_19.jpeg)

![](_page_43_Picture_20.jpeg)

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SHEET TITLE

ELECTRIC SERVICE AND BEACON DISCONNECT **ELEVATION DETAILS** 

	VAULT MAIN DISTRIBUTION PANEL							
CKT #	DUTY	SIZE				SIZE	DUTY	TCKT #
1	AC SURGE PROTECTOR	60A 2P	I Τ_			10A. 1P	I-854 RADIO & CONTROL POWER	2
3			니스	T	$\Gamma \sim$	30A. 1P	VAULT EXHAUST FAN	4
5	ELECTRIC HEATER EH-1	25A 2P	I		L~	15A, 1P	VAULT INTERIOR LIGHTS	6
7			니스	Ĭ		15A, 1P	VAULT EXTERIOR LIGHTS	8
9	ELECTRIC HEATER EH-2	25A 2P	I <u>_</u>			20A 1P	RECEPTACLE	1 10
11			스_	L		20A 1P	SPARE	12
13	RUNWAY 9-27 CCR	60A 2P	l π_		LΥ	20A 2P	AIRPORT ROTATING BEACON	14
15			스_	L				16
17	TAXIWAY CCR	60A 2P	l π_		LΥ	20A 2P	RUNWAY 9 PAPI	18
19			스_	L				20
21	SPARE	60A 2P	l τ_		L~	20A 1P	WIND CONE AND WIND TEE	22
23			^_				BLANK	24
25	BLANK		l _		LΤ	40A 2P	RUNWAY 27 PAPI CCR	26
27	BLANK		l _					28
29	BLANK		l _		LΤ	30A 2P	SPARE	30
31	BLANK		l _					32
33	BLANK			L		15A 1P	SPARE	34
35	BLANK					20A 1P	SPARE	36
37	BLANK			L		25A 1P	SPARE	38
39	BLANK					30A 1P	SPARE	40
41	BLANK			L	L		BLANK	42
225AMF	2 120/240VAC, 1 PHASE 3 WIRE 42 CIRCL		ARD WIT	<u>S/N</u>	DOAMP.		IN BREAKER WITH 22,000 AIC AT 240VAC IN	
1 ENCL	OSURE UL-LISTED SUITABLE FOR SERVICE E	NTRANCE. P/	ANELBO	ARD	SHALL	ACCOMMODA	TE FEEDER AND BRANCH BREAKERS UP TO	150AMP,

2 POLE FRAME & TRIP RATING. PANELBOARD SHALL BE SQARE D NQ CAT. NO. NQ42L2C WITH COPPER NEUTRAL & COPPER GROUND BAR KIT, EQUIVALENT PANELBOARD BY EATON CUTLER HAMMER, OR APPROVED EQUAL.

#### NOTES

- 1. PANELBOARD BUSSES SHALL BE COPPER. NEUTRAL SHALL BE COPPER. EQUIPMENT GROUND BAR SHALL BE COPPER.
- 2. ALL BRANCH CIRCUIT & FEEDER BREAKERS SHALL BE BOLT-ON TYPE WITH 10,000 AIC AT 120/240 VAC.
- 3. INCLUDE ENGRAVED, PHENOLIC OR PLASTIC LEGEND PLATE LABELED "VAULT DIST. PANEL B, 120/240 VAC, 1PH, 3W".
- PANELBOARD SHALL BE MANUFACTURED IN THE UNITED STATES TO COMPLY WITH THE AIRPORT IMPROVEMENT PROGRAM BUY AMERICAN REQUIREMENTS. PROVIDE CERTIFICATION OF MANUFACTURE IN THE UNITED STATES WITH SHOP DRAWING SUBMITTAL. 4.
- 5. CIRCUIT BREAKERS AND WIRING SHALL BE SIZED FOR THE ACTUAL EQUIPMENT FURNISHED IN CONFORMANCE WITH THE RESPECTIVE MANUFACTURER'S RECOMMENDATION AND N.E.C. CONTRACTOR SHALL ADJUST CIRCUIT BREAKER SIZES & WIRING WHERE APPLICABLE TO CONFORM WITH THE MANUFACTURER'S RECOMMENDATIONS AND N.E.C.
- 6. CONFIRM EXHAUST FAN MOTOR HORSEPOWER AND FULL LOAD AMPS AND SELECT PROPERLY SIZED CIRCUIT BREAKER IN ACCORDANCE WITH NEC 430.52
- 7. FOR A BOTTOM FEED PANELBOARD, MOVE AC SURGE PROTECTOR BREAKER DOWN TO POSITIONS 39 AND 41.

![](_page_44_Picture_18.jpeg)

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![](_page_44_Picture_22.jpeg)

![](_page_44_Picture_23.jpeg)

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SHEET TITLE

#### VAULT PANELBOARD SCHEDULE

![](_page_45_Figure_0.jpeg)

4:13 PM 23 RELAY INTERFACE CONTROL PANEL SHALL BE MANUFACTURED BY AN FAA APPROVED L-821 PANEL BUILDER OR A UL 508 INDUSTRIAL CONTROL PANEL BUILDER, AND SHALL BE MANUFACTURED IN THE UNITED STATES TO COMPLY WITH THE AIRPORT IMPROVEMENT PROGRAM BUY AMERICAN PREFERENCES REQUIREMENT. RELAY INTERFACE CONTROL PANEL SHALL BE A SEPARATE PANEL. DO NOT COMBINE WITH LIGHTING CONTACTOR PANEL

PANEL SHALL BE IN A NEMA 12 ENCLOSURE WITH HINGED COVER. DRILL HOLE IN BOTTOM OF ENCLOSURE TO ALLOW CONDENSATION TO ESCAPE.

EXTERNAL CONTROL CABLE SHALL BE NO. 12 AWG COPPER, 600 VOLT CABLE. ALL PANEL INTERIOR CONTROL CABLE SHALL BE MINIMUM 16 AWG, COPPER, 600

IN THE AUTOMATIC MODE OF OPERATION THE RUNWAY 9-27 CONSTANT CURRENT REGULATORS (PRIMARY UNIT & SPARE UNIT) SHALL BE CONTROLLED BY THE PHOTOCELL & THE L-854 RADIO CONTROL UNIT IN THE FOLLOWING MANNER: PHOTOCELL - 10% BRIGHTNESS & ACTIVATE RADIO CONTROL 5 CLICKS - 30% BRIGHTNESS 7 CLICKS - 100% BRIGHTNESS

IN THE AUTOMATIC MODE OF OPERATION THE TAXIWAY CIRCUIT WILL BE CONTROLLED BY THE PHOTOCELL & THE L-854 RADIO CONTROL UNIT IN THE PHOTOCELL -10% BRIGHTNESS & ACTIVATE RADIO CONTROL -100% BRIGHTNESS

THE RUNWAY 9 PAPI CIRCUIT WILL BE CONTROLLED IN THE AUTOMATIC MODE BY THE L-854 RADIO CONTROL UNIT IN THE FOLLOWING MANNER. CONFIRM CONTROL WITH AIRPORT MANAGER.

7. THE RADIO OVERRIDE SWITCH WILL ACTIVATE L-854 RADIO CONTROL 24 HOURS PER DAY IN THE "RADIO ON" POSITION. THE PHOTOCELL WILL ACTIVATE RADIO CONTROL IN THE "PHOTOCELL ACTIVATE RADIO" POSITION

IN THE AUTOMATIC MODE OF OPERATION THE WIND CONE & WIND TEE SHALL BE ACTIVATED BY THE PHOTOCELL OR PHOTOCELL BYPASS SWITCH.

IN THE AUTOMATIC MODE OF OPERATION THE AIRPORT ROTATING BEACON SHALL BE ACTIVATED BY THE PHOTOCELL OR PHOTOCELL BYPASS SWITCH.

EQUIPMENT GROUND WIRES SHALL BE INCLUDED WITH EACH BRANCH CIRCUIT &

SURGE PROTECTOR SHALL BE UL LISTED PER UL 1449. SUITABLE FOR 120 VAC, 1 PH, 2 WIRE PLUS GROUND SYSTEM WITH SURGE CURRENT RATING OF 40 KA (MIN.). 8x20 MICROSECOND WAVE, AND STATUS INDICATION LIGHTS IN A WEATHERPROOF HOUSING, JOSLYN MODEL 1260-21, SQUARE D CAT, NO. SDSA1175T, OR APPROVED EQUAL. MAINTAIN LEADS AS SHORT & AS STRAIGHT AS POSSIBLE. INCLUDE MOUNTING BRACKET.

INCLUDE EQUIPMENT GROUND BAR, ILSCO D167-12, SQUARE D 12 TERMINAL (MIN.) COPPER EQUIPMENT GROUND BAR KIT, OR APPROVED EQUAL.

CONTROL RELAYS SHALL HAVE 10 AMP CONTACT RATINGS AT 240 VAC WITH 120 VAC COILS. PROVIDE 3 SPARE RELAYS FOR EACH TYPE USED IN THE RELAY

COLOR CODING FOR THE CONTROL WIRING TO EACH CONSTANT CURRENT REGULATOR SHALL BE CONSISTENT FOR ALL REGULATORS. COLOR CODING -ORANGE -YELLOW

ALSO TAG THE CONTROL WIRES WITH THE RESPECTIVE DESIGNATION (CC, 10%,

16. "N" DESIGNATES NEUTRAL CONNECTION OR NEUTRAL CONDUTOR.

![](_page_45_Picture_22.jpeg)

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![](_page_45_Picture_26.jpeg)

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SHEET TITLE

#### **AIRFIELD LIGHTING** CONTROL WIRING SCHEMATIC

![](_page_46_Figure_0.jpeg)

9.

RELAY INTERFACE CONTROL PANEL SHALL BE MANUFACTURED BY AN FAA APPROVED L-821 PANEL BUILDER OR A UL 508 INDUSTRIAL CONTROL PANEL BUILDER, AND SHALL BE MANUFACTURED IN THE UNITED STATES TO COMPLY WITH THE AIRPORT IMPROVEMENT PROGRAM BUY AMERICAN PREFERENCES REQUIREMENT. RELAY INTERFACE CONTROL PANEL SHALL BE A SEPARATE PANEL. THE PAPI INTERFACE PANEL MAY BE COMBINED WITH THE RELAY INTERFACE CONTROL PANEL FOR AIRFIELD LIGHTING.

2. PANEL SHALL BE IN A NEMA 12 ENCLOSURE WITH HINGED COVER. DRILL HOLE IN BOTTOM OF ENCLOSURE TO ALLOW CONDENSATION TO ESCAPE.

EXTERNAL CONTROL CABLE SHALL BE NO. 12 AWG COPPER, 600 VOLT CABLE. ALL PANEL INTERIOR CONTROL CABLE SHALL BE MINIMUM 16 AWG, COPPER, 600

4. IN THE AUTOMATIC MODE OF OPERATION THE RUNWAY 27 PAPI CONSTANT CURRENT REGULATOR SHALL BE CONTROLLED BY THE L-854 RADIO CONTROL UNIT IN THE FOLLOWING MANNER:

PAPI RADIO CONTROL DAY MODE ILLUMINATION INTENSITY IDLE PERIODS - PAPI ON AT 5% BRIGHTNESS 3 CLICKS – 100% BRIGHTNESS 5 CLICKS – REMAIN 100% BRIGHTNESS 7 CLICKS - REMAIN 100% BRIGHTNESS

PAPI RADIO CONTROL NIGHT MODE ILLUMINATION INTENSITY IDLE PERIODS - PAPI ON AT 5% BRIGHTNESS 3 CLICKS – 5% BRIGHTNESS 5 CLICKS – 25% BRIGHTNESS 7 CLICKS – 100% BRIGHTNESS

EQUIPMENT GROUND WIRES SHALL BE INCLUDED WITH EACH BRANCH CIRCUIT & EACH CONTROL CIRCUIT.

6. INCLUDE PHOTOCELL BYPASS SWITCH.

INCLUDE EQUIPMENT GROUND BAR, ILSCO D167-12, SQUARE D 12 TERMINAL (MIN.) COPPER EQUIPMENT GROUND BAR KIT, OR APPROVED EQUAL.

CONTROL RELAYS SHALL HAVE 10 AMP CONTACT RATINGS AT 240 VAC WITH 120 VAC COILS. PROVIDE 3 SPARE RELAYS FOR EACH TYPE USED IN THE RELAY

COLOR CODING FOR 5 STEP REGULATORS SHALL BE AS FOLLOWS:

ALSO TAG THE CONTROL WIRES WITH THE RESPECTIVE DESIGNATION (CC, B3, B4,

10. "N" DESIGNATES NEUTRAL CONNECTION OR NEUTRAL CONDUCTOR.

![](_page_46_Picture_18.jpeg)

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![](_page_46_Picture_22.jpeg)

![](_page_46_Picture_23.jpeg)

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REPLACE AIRFIELD ELECTRICAL VAULT, REPLACE BEACON UNIT AND TOWER; RELOCATE REGULATOR; REPLACE REMAINING AIRFIELD LIGHTING, SIGNAGE AND NAVIGATIONAL AIDS

IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 Contract No. PN010

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SHEET TITLE

#### PAPI CONTROL WIRING SCHEMATIC

![](_page_47_Figure_0.jpeg)

![](_page_48_Figure_0.jpeg)

![](_page_48_Picture_3.jpeg)

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![](_page_48_Picture_7.jpeg)

![](_page_48_Picture_8.jpeg)

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IL Proj. No.: C15-4578 SBG No: 3-17-SBGP-133/139 Contract No. PN010

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DRAWN BY: CWS 07/31/2017 REVIEWED BY: BSS 08/21/2017

SHEET TITLE

CONTROL PANEL FOR NAVAIDS & EXHAUST FAN

15 AMP & 20 AMP INPUT POWER/BRANCH CIRCUITS SHALL BE #10 AWG COPPER THWN FROM THE RESPECTIVE POWER SOURCE TO THE LIGHTING CONTACTOR PANEL. 30 AMP INPUT POWER/BRANCH CIRCUITS SHALL BE #8 AWG COPPER THWN (MIN.) FROM THE RESPECTIVE POWER SOURCE TO THE LIGHTING CONTACTOR PANEL.

2. INPUT CONTROL CIRCUITS SHALL BE #12 AWG COPPER THWN.

FOR 120 VAC BRANCH CIRCUITS THE NEUTRAL CONDUCTOR SHALL NOT BE SWITCHED THROUGH THE RELAY CONTACTS. USE TERMINAL BLOCKS TO TRANSITION FROM VAULT BRANCH CIRCUIT WIRING TO FIFLD WIRING

THE AIRPORT ROTATING BEACON CIRCUIT SHALL HAVE PHASE "A" SWITCHED THROUGH THE LIGHTING CONTACTOR. PHASE "B" SHALL BE UNSWITCHED FROM THE POWER SOURCE TO THE LOAD CENTER AT THE AIRPORT

PROVIDE #10 AWG COPPER BONDING JUMPER FROM PANEL ENCLOSURE FRAME TO ENCLOSURE DOOR.

PROVIDE 3-POSITION MAINTAINED CONTACT "HAND-OFF-AUTO" SELECTOR SWITCH FOR EACH LIGHTING CONTACTOR & MOUNT ON LIGHTING CONTACTOR PANEL ENCLOSURE DOOR. SELECTOR SWITCH SHALL BE SQUARE D CLASS 9001, TYPE KS43FBH13, ALLEN-BRADLEY CAT. NO. 800T-J2A, OR APPROVED EQUAL. INCLUDE LEGEND PLATE TO IDENTIFY THE DEVICE CONTROLLED (EX: "WIND CONE" OR "AIRPORT ROTATING

SEE "LIGHTING CONTACTOR SCHEMATIC" AND "EXHAUST FAN CONTROL SCHEMATIC" FOR ADDITIONAL INFORMATION ON WIRING.

FUSING FOR FAN CIRCUIT CONTROL WIRING SHALL BE 10 AMP, 600 VAC CLASS CC, AS MANUFACTURED BY BUSSMANN, LITTLEFUSE, OR APPROVED EQUAL. WITH FUSE BLOCKS. WITH BOX LUG TERMINALS. SIZED AS REQUIRED FOR THE RESPECTIVE APPLICATION. INCLUDE HARDWARF FOR MOUNTING. PROVIDE ONE BOX (5 MINIMUM QUANTITY) OF EACH TYPE AND SIZE OF FUSE, UPON COMPLETION OF THE JOB FOR USE AS SPARES.

INCLUDE LEGEND PLATE ON CONTROL PANEL ENCLOSURE OUTER DOOR LABELED "NOTICE: CONTACTORS HAVE REMOTE LOCATED CONTROLS AND MAY ACTIVATE AT ANY TIME".

10. 120/240 VAC PHASE "A" CONDUCTORS SHALL HAVE BLACK COLORED INSULATION. 120/240 VAC PHASE "B" CONDUCTORS SHALL HAVE RED COLORED INSULATION. NEUTRAL CONDUCTORS SHALL HAVE WHITE COLORED INSULATION. INSULATED EQUIPMENT GROUND WIRES SHALL HAVE GREEN COLORED INSULATION.

CONTROL PANEL FOR AIRFIELD NAVAIDS & VAULT FAN SHALL BE MANUFACTURED BY A UL 508 INDUSTRIAL CONTROL PANEL BUILDER OR AN FAA APPROVED L-821 PANEL BUILDER. AND SHALL BE MANUFACTURED IN THE UNITED STATES TO COMPLY WITH THE AIRPORT IMPROVEMENT PROGRAM BUY AMERICAN PREFERENCE REQUIREMENTS. WHERE THE CONTROL PANEL IS MANUFACTURED BY AN L-821 PANEL BUILDER IT SHALL BE LABELED AS AN L-821 PANEL.

12. CONTROL PANEL FOR AIRFIELD NAVAIDS & VAULT FAN SHALL BE SEPARATE FROM THE RELAY INTERFACE CONTROL PANEL.

![](_page_49_Figure_0.jpeg)

![](_page_49_Picture_12.jpeg)

LEGEND PLA	TE SCHEDULE
DEVICE	LABEL
SERVICE DISCONNECT	VAULT SERVICE DISCONNECT 120/240 VAC, 1 PH, 3W
SERVICE DISCONNECT	MAX AVAILABLE FAULT CURRENT CALCULATED TO BE AMPS LINE TO LINE AMPS LINE TO NEUTRAL ON (DATE)
VAULT DISTRIBUTION PANEL MAIN BREAKER	VAULT MAIN BREAKER
VAULT DISTRIBUTION PANELBOARD	VAULT MAIN DIST. PANEL 120/240VAC, 1PH, 3W
VAULT DISTRIBUTION PANELBOARD	CONDUCTOR COLOR CODING SHALL BE AS FOLLOWS: PHASE A — BLACK PHASE B — RED NEUTRAL — WHITE GROUND — GREEN
MAIN BREAKER IN VAULT PANEL	SERVICE DISCONNECT
RUNWAY 27 Papi CCR	RWY 27 PAPI
TAXIWAY CCR	TAXIWAY
RUNWAY 9-27 CCR	RUNWAY 9-27
CUTOUT ENCLOSURE FOR RUNWAY 27 PAPI	RWY 27 PAPI CUTOUT
RUNWAY 27 PAPI CUTOUT INPUT SIDE CONNECTION	INPUT
RUNWAY 27 PAPI CUTOUT OUTPUT SIDE CONNECTION	OUTPUT
CUTOUT ENCLOSURE FOR TAXIWAY	TAXIWAY CUTOUT
TAXIWAY CUTOUT INPUT SIDE CONNECTION	INPUT
TAXIWAY CUTOUT OUTPUT SIDE CONNECTION	OUTPUT
CUTOUT ENCLOSURE FOR RUNWAY 9-27	RUNWAY 9-27 CUTOUTS
RUNWAY 9-27 CUTOUT INPUT SIDE CONNECTION	INPUT
RUNWAY 9–27 CUTOUT OUTPUT SIDE CONNECTION	OUTPUT
EACH CUTOUT ENCLOSURE (3 LEGEND PLATES)	CAUTION OPERATE CUTOUTS WITH CCR'S SHUT OFF

LEGEND PLATE SCHE	DULE (CONTINUED)
DEVICE	LABEL
RADIO RELAY INTERFACE PANEL	RADIO RELAY INTERFACE PANEL
WHERE PAPI RADIO INTERFACE PANEL IS SEPARATE PROVIDE LEGEND PLATE LABELED	PAPI RADIO RELAY INTERFACE PANEL
CONTACTOR PANEL FOR AIRFIELD NAVAIDS AND VAULT FAN	CONTACTOR PANEL FOR AIRFIELD NAVAIDS, & VAULT FAN
CONTACTOR PANEL FOR AIRFIELD NAVAIDS AND VAULT FAN	NOTICE CONTACTORS HAVE REMOTE LOCATED CONTROLS AND MAY ACTIVATE AT ANY TIME
LOW VOLTAGE WIREWAY (PROVIDE 8 LEGEND PLATES 1/2" HIGH BLACK LETTERS WHITE BACKGROUND)	LOW VOLTAGE
HIGH VOLTAGE WIREWAY (PROVIDE 4 LEGEND PLATES 1/2" HIGH BLACK LETTERS WHITE BACKGROUND)	HIGH VOLTAGE
VAULT GROUND BUS (PROVIDE 4 LEGEND PLATES 1/2" HIGH WHITE LETTERS GREEN BACKGROUND; INSTALL ABOVE OR BELOW GROUND BUS)	VAULT GROUND BUS
GROUNDING ELECTRODE CONDUCTORS TERMINATED ON VAULT GROUND BUS. (PROVIDE 3 LEGEND PLATES & SECURE TO CONDUCTORS WITH NYLON STRING OR CABLE TIES)	DO NOT DISCONNECT
REMOTE PHOTOCELL BYPASS SWITCH	PHOTOCELL BYPASS SWITCH

NOTES:

- 1.
  - HAZARD WARNING".

![](_page_50_Picture_6.jpeg)

PROVIDE WARNING SIGN ON VAULT EXTERIOR DOORS LABELED "DANGER - HIGH VOLTAGE - KEEP OUT" PER THE REQUIREMENTS OF NEC 110.34 (C). PROVIDE MINIMUM OF 2 SIGNS (ONE ON EACH DOOR TO THE VAULT). SIGNS SHALL BE APPROXIMATELY 10"H X 14"W.

![](_page_50_Picture_8.jpeg)

![](_page_50_Picture_9.jpeg)

APPROXIMATELY 4" X 6" OR 5" X 7".

LEGEND PLATES SHALL BE WEATHERPROOF ENGRAVED PLASTIC OR PHENOLIC MATERIAL, 1/4" HIGH BLACK LETTERS ON A WHITE BACKGROUND UNLESS NOTED OTHERWISE. SECURE WITH WEATHERPROOF ADHESIVE AND MACHINE SCREWS. FURNISH ADDITIONAL LEGEND PLATES WHERE REQUIRED BY CODE, FOR ADDITIONAL EQUIPMENT, AS DETAILED HEREIN ON THE PLANS, AND AS NOTED IN THE SPECIAL PROVISION SPECIFICATIONS.

2. FURNISH & INSTALL A WEATHERPROOF WARNING LABEL FOR EACH SAFETY SWITCH, PANELBOARD, LOAD CENTER, CUTOUT, & CONTROL PANEL TO WARN PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS, PER THE REQUIREMENTS OF NEC 110.16 "ARC-FLASH

3. FAULT CURRENT INFORMATION TO BE PROVIDED BY SERVING ELECTRIC UTILITY COMPANY. CONTACT PROJECT ENGINEER TO CONFIRM FAULT CURRENT CALCULATIONS.

"MAINTENANCE OF AIRPORT VISUAL AID FACILITIES". LABELS SHALL BE

![](_page_50_Picture_16.jpeg)

![](_page_50_Picture_17.jpeg)

![](_page_50_Picture_18.jpeg)

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SHEET TITLE

#### LEGEND PLATE SCHEDULES

![](_page_51_Figure_0.jpeg)

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23

![](_page_52_Figure_0.jpeg)

TO NEAREST

GND ROD

![](_page_52_Figure_1.jpeg)

![](_page_52_Figure_2.jpeg)

CABLE TO GROUND ROD

CABLES TO GROUND ROD

CABLE TO GROUND ROD

CABLE TO CABLE HORIZONTAL PARALLEL TAP

TAP CONDUCTOR SHALL BE ROUTED IN THE DIRECTION TOWARDS THE NEAREST GROUND ROD

![](_page_52_Figure_5.jpeg)

![](_page_52_Figure_6.jpeg)

PIPE GROUNDING	G CL
HUBBELL ELECTRICAL CAT. NO.	
CARZODOTC	
GARJ9UZIC	
GAR3903TC	
GAR3904TC	
GAR3905TC	
GAR3906TC	
GAR3907TC	

2 HOLE LONG BARREL COMPRESSION LUG TABLE (OR APPROVED EQUAL)					
WIRE SIZE	BURNDY CAT. NO.	THOMAS & BETTS CAT. NO.	PENN-UNION CAT. NO.		
#8 AWG STRANDED	YA8C-2TC38	256-30695-1157	BBLU-8D-2TC38		
#6 AWG SOLID	YA8C-2TC38 OR YGA6C-2TC38E2G1				
#6 AWG STRANDED	YA6C-2TC38	256-30695-1158	BBLU-6D-2TC38		
#4 AWG STRANDED	YA4C-2TC38	256-30695-1159	BBLU-4D-2TC38		
#2 AWG STRANDED	YA2C-2TC38	256-30695-1160	BBLU-2D-2TC38		
#2 AWG SOLID	YA3C-2TC38	256-30695-1160	BBLU-3D-2TC38		
#1/0 AWG STRANDED	YA25-2TC38	256-30695-1162	BBLU-1/0D-2TC38		
#2/0 AWG STRANDED	YA26-2TC38	256-30695-1116	BBLU-2/0D-2TC38		
#3/0 AWG STRANDED	YA27-2TC38	54816BE	BBLU-3/0D-2TC38		
#4/0 AWG STRANDED	YA28-2TC38	256-30695-1117	BBLU-4/0D-2TC38		

#### NOTES

- ALL CONNECTIONS TO GROUND BUS BAR SHALL BE WITH 2 HOLE TONGUE LONG BARREL COMPRESSION LUGS BOLTED TO THE BUS BAR.
- 2. GROUND WIRE CONNECTIONS TO EQUIPMENT SHALL BE WITH 2 HOLE TONGUE LONG BARREL COMPRESSION LUGS BOLTED TO THE DEVICE OR WITH THE RESPECTIVE EQUIPT MANUFACTURER'S LUG OR TERMINAL WHERE APPLICABLE.
- 3. GROUNDING ELECTRODE CONDUCTORS, BONDING JUMPERS, & INDIVIDUAL GROUND WIRES SHALL NOT BE INSTALLED IN METAL CONDUIT. WHERE PLASTIC CONDUIT IS USED FOR INDIVIDUAL GROUND WIRES, DO NOT COMPLETELY ENCIRCLE THE CONDUIT WITH FERROUS AND/OR MAGNETIC MATERIALS. WHERE METAL CLAMPS ARE INSTALLED USE NYLON BOLTS, NUTS, WASHERS, & SPACERS TO INTERRUPT A COMPLETE METALLIC APTH FROM ENCIRCLING THE CONDUIT.
- 4. ALL CONNECTIONS SHALL BE COATED WITH A CORROSION PREVENTATIVE COMPOUND (SANCHEM INC. NO-OX-ID "A-SPECIAL", BURNDY PENETROX E, OR APPROVED EQUAL) BEFORE JOINING. ALL COPPER BUS BARS SHALL BE CLEANED PRIOR TO MAKING CONNECTIONS TO REMOVE SURFACE OXIDATION. CLEAN SURFACES, OF RESPECTIVE DEVICES TO BE BONDED, TO BARE METAL, PER NEC 250-12.

## GROUNDING LUG CONNECTION DETAIL

# DETAIL NOTES 1. ALL BELOW GRADE CONNECTIONS TO GROUND RODS & GROUND RING CONDUCTORS SHALL BE EXOTHERMIC WELD TYPE CONNECTIONS. EXOTHERMIC WELDS SHALL BE CADWELD AS MANUFACTURED

- BY PENTAIR ERICO PRODUCTS, ULTRAWELD AS MANUFACTURED BY HARGER LIGHTNING PROTECTION & GROUNDING EQUIPMENT, OR THERMOWELD AS MANUFACTURED BY CONTINENTAL INDUSTRIES OR APPROVED EQUAL. VERIFY PROPER SIZES, MOLDS, TYPES, AND REQUIREMENTS FOR THE RESPECTIVE APPLICATION WITH THE MANUFACTURER, AND INSTALL PER THEIR DIRECTIONS.
- 2. FOR APPLICATIONS TO GALVANIZED STEEL OR PAINTED STEEL, REMOVE GALVANIZING AND/OR PAINT & CLEAN THE SURFACE TO EXPOSE BARE STEEL BEFORE MAKING EXOTHERMIC WELD CONNECTION.
- 3. INDIVIDUAL GROUNDING ELECTRODE CONDUCTORS SHALL NOT BE INSTALLED IN METAL CONDUIT. INSTALL GROUNDING ELECTRODE CONDUCTORS IN SCHED 40 PVC CONDUIT AS REQUIRED IN FOUNDATIONS, FOR PROTECTION, WHERE ENTERING ENCLOSURES, ETC. WHERE PLASTIC CONDUIT IS USED FOR INDIVIDUAL GROUND WIRES, DO NOT COMPLETELY ENCIRCLE THE CONDUIT WITH FERROUS AND/OR MAGNETIC MATERIALS. WHERE METAL CLAMPS ARE INSTALLED USE NYLON BOLTS, NUTS, WASHERS, & SPACERS TO INTERRUPT A COMPLETE METALLIC PATH FROM ENCIRCLING THE CONDUIT.

## EXOTHERMIC WELD DETAILS

![](_page_52_Picture_26.jpeg)

![](_page_53_Figure_0.jpeg)

CURRENT

![](_page_53_Picture_3.jpeg)

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![](_page_53_Picture_7.jpeg)

![](_page_53_Picture_8.jpeg)

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SHEET TITLE

GROUND RESISTANCE **TESTING DETAILS** 

#### GROUNDING NOTES

- THE CONTRACTOR SHALL FURNISH AND INSTALL ALL GROUNDING AS MAY BE NECESSARY OR REQUIRED TO MAKE A COMPLETE GROUNDING SYSTEM AS REQUIRED BY THE LATEST 1. NATIONAL ELECTRICAL CODE (NFPA 70) IN FORCE AND FAA-STD-019e (LIGHTNING AND SURGE PROTECTION, GROUNDING, BONDING, AND SHIELDING REQUIREMENTS FOR FACILITIES AND ELECTRONIC EQUIPMENT). 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
- FURNISH AND INSTALL GROUND RODS AS DETAILED HEREIN. GROUND RODS FOR 2. AIRFIELD LIGHTING (RUNWAY LIGHTING, TAXIWAY LIGHTING, TAXI GUIDANCE SIGNS & NAVAIDS) SHALL BE MINIMUM 3/4-IN. DIAMETER BY 20-FT LONG, UL-LISTED COPPER CLAD WITH 10-MIL MINIMUM COPPER COATING (TWO 3/4-IN. DIAMETER BY 10-FT LONG, UL-LISTED, COPPER CLAD GROUND RODS COUPLED TOGETHER). GROUND RODS FOR OTHER APPLICATIONS SHALL BE MINIMUM 3/4-IN. DIAMETER BY 30-FT LONG, UL-LISTED, COPPER CLAD WITH 10-MIL MINIMUM COPPER COATING. GROUND RODS SHALL BE SPACED OR AS DETAILED ON THE RESPECTIVE PLANS, AND IN NO CASE SPACED LESS THAN ONE ROD LENGTH APART. ALL CONNECTIONS TO GROUND RODS AND THE GROUND RING SHALL BE MADE WITH EXOTHERMIC WELD TYPE CONNECTORS, CADWELD BY PENTAIR ERICO PRODUCTS, INC., THERMOWELD BY CONTINENTAL INDUSTRIES, INC., ULTRAWELD BY HARGER, OR APPROVED 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.
- CONTRACTOR SHALL TEST EACH MADE ELECTRODE GROUND ROD/GROUND FIELD/GROUND RING WITH AN INSTRUMENT SPECIFICALLY DESIGNED FOR TESTING GROUND FIELD 3. SYSTEMS. IF GROUND RESISTANCE EXCEEDS 25 OHMS, CONTACT THE PROJECT ENGINEER FOR FURTHER DIRECTION. COPIES OF GROUND ROD TEST RESULTS SHALL BE FURNISHED TO THE RESIDENT ENGINEER/RESIDENT TECHNICIAN, AND THE PROJECT ENGINEER.
- ALL PRODUCTS ASSOCIATED WITH THE GROUNDING SYSTEM SHALL BE UL-LISTED AND 4. LABELED.
- ALL BOLTED OR MECHANICAL CONNECTIONS SHALL BE COATED WITH A CORROSION 5. PREVENTATIVE COMPOUND BEFORE JOINING, SANCHEM INC. "NO-OX-ID "A-SPECIAL" COMPOUND, BURNDY PENTROX E, OR APPROVED EQUAL
- METALLIC SURFACES TO BE JOINED SHALL BE PREPARED BY THE REMOVAL OF ALL 6. NON-CONDUCTIVE MATERIAL, PER 2017 NATIONAL ELECTRICAL CODE ARTICLE 250-12. ALL COPPER BUS BARS MUST BE CLEANED PRIOR TO MAKING CONNECTIONS TO REMOVE SURFACE OXIDATION.
- METALLIC RACEWAY FITTINGS SHALL BE MADE UP TIGHT TO PROVIDE A PERMANENT LOW 7. IMPEDANCE PATH FOR ALL CIRCUITS. METAL CONDUIT TERMINATIONS IN ENCLOSURES SHALL BE BONDED TO THE ENCLOSURE WITH UL-LISTED FITTINGS SUITABLE FOR GROUNDING. PROVIDE GROUNDING BUSHINGS WITH BONDING JUMPERS FOR ALL METAL CONDUITS ENTERING SERVICE EQUIPMENT (METER BASE, CT CABINET, MAIN SERVICE BREAKER ENCLOSURE, ETC.). PROVIDE GROUNDING BUSHINGS WITH BONDING JUMPERS FOR ALL METAL CONDUITS ENTERING AN ENCLOSURE THROUGH CONCENTRIC OR ECCENTRIC KNOCKOUTS THAT ARE PUNCHED OR OTHERWISE FORMED SO AS TO IMPAIR THE ELECTRICAL CONNECTION TO GROUND. STANDARD LOCKNUTS OR BUSHINGS SHALL NOT BE THE SOLE MEANS FOR BONDING WHERE A CONDUIT ENTERS AN ENCLOSURE THROUGH A CONCENTRIC OR ECCENTRIC KNOCKOUT
- ALL CONNECTIONS, LOCATED ABOVE GRADE, BETWEEN THE DIFFERENT TYPES OF 8. 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
- ALL METAL EQUIPMENT ENCLOSURES, CONDUITS, CABINETS, BOXES, RECEPTACLES, 9. MOTORS, ETC. SHALL BE BONDED TO THE RESPECTIVE GROUNDING SYSTEM.
- PROVIDE ALL BOXES FOR PROPOSED OUTLETS, SWITCHES, CIRCUIT BREAKERS, ETC. WITH 10. GROUNDING SCREWS. PROVIDE ALL PANELBOARD, SWITCHGEAR, ETC., ENCLOSURES WITH GROUNDING BARS WITH INDIVIDUAL SCREWS, LUGS, CLAMPS, ETC., FOR EACH OF THE GROUNDING CONDUCTORS THAT ENTER THEIR RESPECTIVE ENCLOSURES
- EACH NEW FEEDER CIRCUIT AND/OR BRANCH CIRCUIT SHALL INCLUDE AN EQUIPMENT GROUND WIRE. METAL RACEWAY OR CONDUIT SHALL NOT MEET THIS 11. REQUIREMENT. THE EQUIPMENT GROUND WIRE FROM EQUIPMENT SHALL NOT BE SMALLER THAN ALLOWED BY 2017 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.

- 12. ALL EXTERIOR METAL CONDUIT, 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 2017 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 2017 NEC 250-102.
- 13. IT IS THE INTENT OF THIS SPECIFICATION THAT ALL MOTOR FRAMES, PUMP BASES ELECTRICAL EQUIPMENT ENCLOSURES, PANEL HOUSINGS, CONDUITS, BOXES, ETC. HAVE A CONTINUOUS COPPER WIRE GROUND CONNECTION AND SHALL BE POSITIVELY BONDED TO THE RESPECTIVE GROUNDING SYSTEM. CONDUIT CONNECTORS WILL NOT BE CONSIDERED AS ADEQUATE GROUNDING.
- PROVIDE A POSITIVE GROUND BOND FOR ALL OUTLET BOXES, ELECTRICAL EQUIPMENT ENCLOSURES, GROUNDING RECEPTACLES, TOGGLE SWITCHES, ETC. INSTALL A GROUNDING CONDUCTOR IN ALL WIRE AND CABLE RACEWAYS. GROUND CONDUCTOR TO HAVE 14. 600-VOLT INSULATION AND BE IDENTIFIED BY A CONTINUOUS GREEN COLOR COATING. THEY SHALL BE USED SOLELY FOR GROUNDING PURPOSES AND BE ENTIRELY SEPARATE FROM WHITE GROUNDED NEUTRAL CONDUCTOR, EXCEPT AT SUPPLY SIDE OF SERVICE DISCONNECTING MEANS, WHERE GROUNDING AND NEUTRAL SYSTEMS ARE TO BE CONNECTED TO SERVICE GROUND.
- EACH AND ALL GROUNDED CASED AND METAL PARTS ASSOCIATED WITH ELECTRICAL 15. EQUIPMENT SHALL BE TESTED FOR CONTINUITY OF CONNECTION WITH GROUND BUS SYSTEM BY CONTRACTOR IN PRESENCE OF OWNER'S REPRESENTATIVE.
- 16. ALL CONNECTIONS BETWEEN THE DIFFERENT TYPES OF GROUNDING CONDUCTORS ABOVE GRADE SHALL BE MADE USING BOLTED GROUND CONNECTORS. GROUND LUGS SHALL BE PROVIDED IN ALL ENCLOSURES AND WIRING TERMINATION JUNCTION BOXES. EQUIPMENT GROUNDS AND GROUNDING CONDUCTOR SHALL BE CONNECTED TO THESE GROUND LUGS. 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 & BETTS OR APPROVED EQUAL.
- BOND ALL NONCURRENT-CARRYING PARTS OF METAL EQUIPMENT TO GROUND SYSTEM. 17.
- 18. BUILDING STRUCTURAL STEEL SYSTEM SHALL BE BONDED TO ELECTRICAL GROUND
- INSTALL GROUNDING ELECTRODE CONDUCTORS, LIGHTNING PROTECTION DOWN 19. CONDUCTORS AND SEPARATE GROUND CONDUCTORS IN SCHEDULE 40 OR SCHEDULE 80 PVC CONDUIT OR EXPOSED WHERE ACCEPTABLE TO LOCAL CODES. WHERE GROUNDING ELECTRODE CONDUCTORS, LIGHTNING PROTECTION DOWN 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. THIS IS REQUIRED TO AVOID GIRDLING OF GROUND CONDUCTORS. GIRDLING OF A GROUND CONDUCTOR IS THE RESULT OF PLACING THE CONDUCTOR IN A RING OF MAGNETIC MATERIAL. THIS RING COULD BE A METALLIC CONDUIT, U-BOLT OR STRUT SUPPORT PIPE CLAMP, OR OTHER SUPPORT HARDWARE. THE RESULT OF GIRDLING GROUND CONDUCTORS SIGNIFICANTLY INCREASES THE INDUCTIVE IMPEDANCE OF THE GROUND CONDUCTOR. INDUCTIVE AND CAPACITIVE IMPEDANCE IS A TYPE OF RESISTANCE THAT OPPOSES THE FLOW OF ALTERNATING CURRENT. ANY INCREASE IN THE IMPEDANCE OF A GROUND CONDUCTOR REDUCES ITS ABILITY TO EFFECTIVELY MITIGATE RADIO FREQUENCY NOISE IN THE GROUND SYSTEM. THE CONDITION WHERE A GROUND CONDUCTOR IS GIRDLED DURING A LIGHTNING STRIKE RESULTS IN PHENOMENA KNOWN AS SURGE IMPEDANCE LOADING. SURGE IMPEDANCE LOADING IS A RESULT OF VOLTAGE AND CURRENT REACHING 500,000 VOLTS AND 10,000 AMPS FOR A SHORT DURATION. GIRDLING FURTHER INCREASES THE IMPEDANCE AT LIGHTNING FREQUENCIES OF 100 KILOHERTZ TO 100 MEGAHERTZ. AT THESE POWER AND FREQUENCY LEVELS ANY INCREASE IN THE IMPEDANCE OF THE GROUND CONDUCTOR MUST BE CONTROLLED. DURING LIGHTNING DISCHARGE CONDITIONS A LOW INDUCTIVE IMPEDANCE PATH IS MORE IMPORTANT THAN A LOW DC RESISTANCE PATH.
- 20. IF LOCAL CODES DICTATE THAT INDIVIDUAL GROUNDING CONDUCTORS MUST BE RUN IN METAL CONDUIT OR RACEWAY, THEN THE CONDUIT OR RACEWAY MUST BE BONDED AT EACH END OF THE RUN WITH A BONDING JUMPER SIZED EQUAL TO THE INDIVIDUAL GROUNDING CONDUCTOR OR AS REQUIRED BY 2017 NEC 250-102. NOTE THIS DOES NOT APPLY TO AC EQUIPMENT GROUNDING CONDUCTORS RUN WITH AC CIRCUITS.
- WHERE A CONFLICT IS DETERMINED WITH RESPECT TO GROUNDING REQUIREMENTS PER 21. MANUFACTURER INSTALLATION INSTRUCTIONS, NEC, AND/OR THE CONTRACT DOCUMENTS, CONTACT THE RESIDENT ENGINEER OR PROJECT ENGINEER FOR FURTHER DIRECTIONS.
- GROUND RODS SHALL BE MANUFACTURED IN THE UNITED STATES OF AMERICA FROM 100 PERCENT DOMESTIC STEEL TO COMPLY WITH THE AIRPORT IMPROVEMENT PROGRAM BUY AMERICAN REQUIREMENTS AND THE STEEL PRODUCTS PROCUREMENT ACT. 22.

![](_page_54_Figure_23.jpeg)

![](_page_54_Picture_37.jpeg)

#### **GROUNDING NOTES**