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**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 CONJUNCTION WITH ALL CONTRACT DOCUMENTS.

No.	Issue/Description	Sheet Changed	Date	By

\\091005\0081\DRAWINGS\DRAMNGS\01-COVER.DWG JAN 25, 2010 2:46PM HAUSM006B2

ITEM NO. 1A

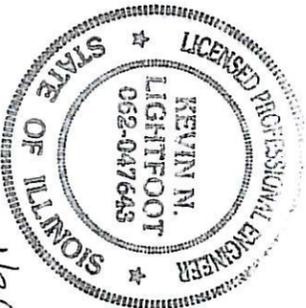
**CONSTRUCTION PLANS**

**REPLACE AIRPORT BEACON AND TOWER**

**WAUKEGAN PORT DISTRICT  
 WAUKEGAN REGIONAL AIRPORT (UGN)  
 WAUKEGAN, LAKE COUNTY, ILLINOIS**

**AIP PROJECT NO. 3-17-0105-B47  
 IDA PROJECT NO. UGN-3985**

WA062  
 TOTAL SHEETS = 14



SHEET NO. 1 OF 14  
 EXPIRES: 11/30/2011  
 COVERING ELECTRICAL DESIGN

Seal

Date of Plans

Seal

Date of Plans

*Kevin N. Lightfoot*  
 Kevin N. Lightfoot, P.E.  
 JANUARY 29, 2010

*Lindsay Denet Hausman*  
 Lindsay D. Hausman, P.E.  
 JANUARY 29, 2010



VICINITY MAP



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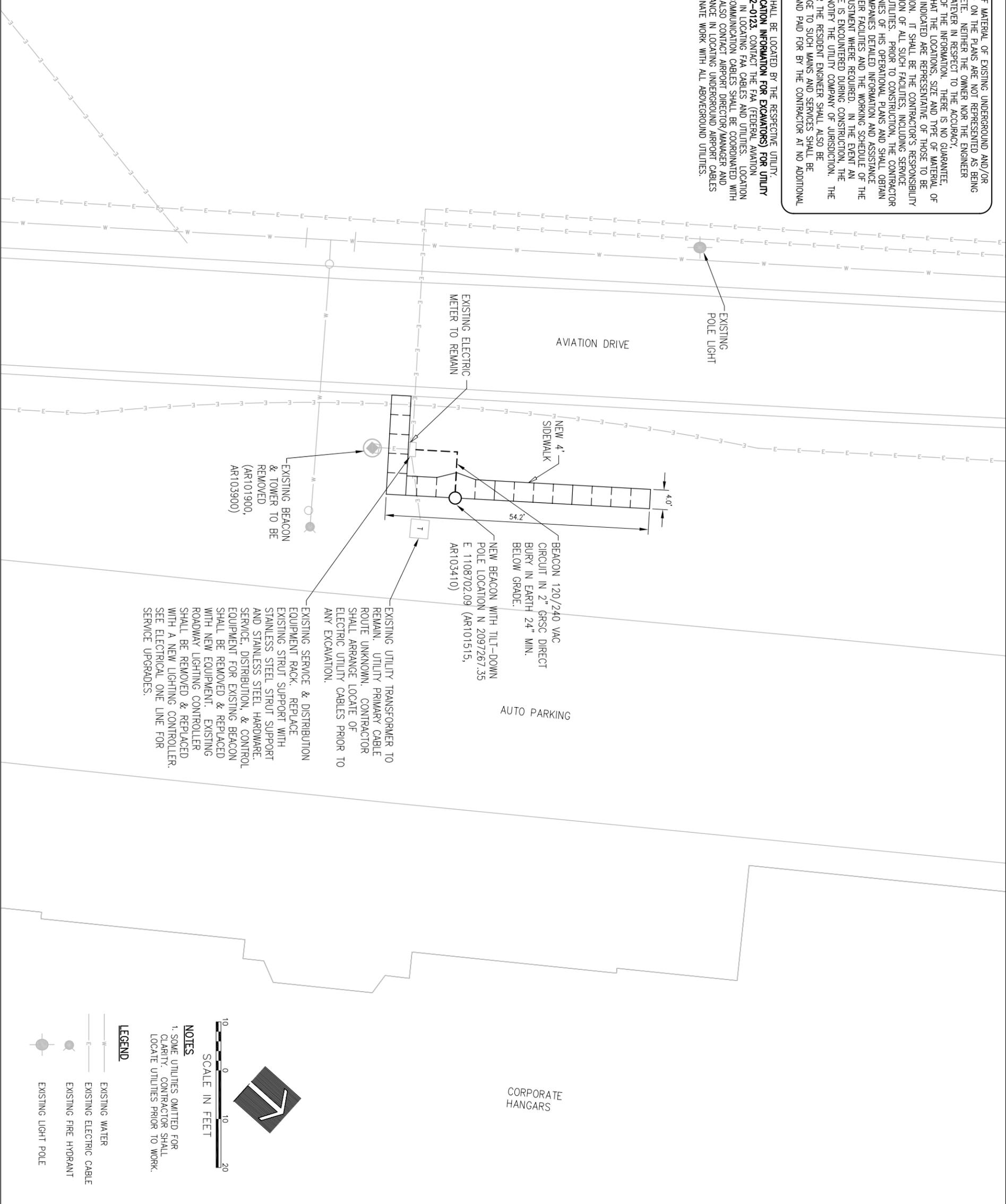






THE LOCATION, SIZE, AND TYPE OF MATERIAL OF EXISTING UNDERGROUND AND/OR ABOVEGROUND UTILITIES INDICATED ON THE PLANS ARE NOT REPRESENTED AS BEING ACCURATE, SUFFICIENT OR COMPLETE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY WHATSOEVER IN RESPECT TO THE ACCURACY, COMPLETENESS, OR SUFFICIENCY 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 CONTRACTOR. **CONTACT JULE (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.



EXISTING UTILITY TRANSFORMER TO REMAIN. UTILITY PRIMARY CABLE ROUTE UNKNOWN. CONTRACTOR SHALL ARRANGE LOCATE OF ELECTRIC UTILITY CABLES PRIOR TO ANY EXCAVATION.

EXISTING SERVICE & DISTRIBUTION EQUIPMENT RACK. REPLACE EXISTING STRUT SUPPORT WITH STAINLESS STEEL STRUT SUPPORT AND STAINLESS STEEL SUPPORT EQUIPMENT FOR EXISTING BEACON SHALL BE REMOVED & REPLACED WITH NEW EQUIPMENT. EXISTING ROADWAY LIGHTING CONTROLLER SHALL BE REMOVED & REPLACED WITH A NEW LIGHTING CONTROLLER. SEE ELECTRICAL ONE LINE FOR SERVICE UPGRADES.



**NOTES**  
1. SOME UTILITIES OMITTED FOR CLARITY. CONTRACTOR SHALL LOCATE UTILITIES PRIOR TO WORK.

**LEGEND**

- EXISTING WATER
- EXISTING ELECTRIC CABLE
- EXISTING FIRE HYDRANT
- EXISTING LIGHT POLE

WA062



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WAUKEGAN, ILLINOIS**

**REPLACE AIRPORT BEACON  
AND TOWER**

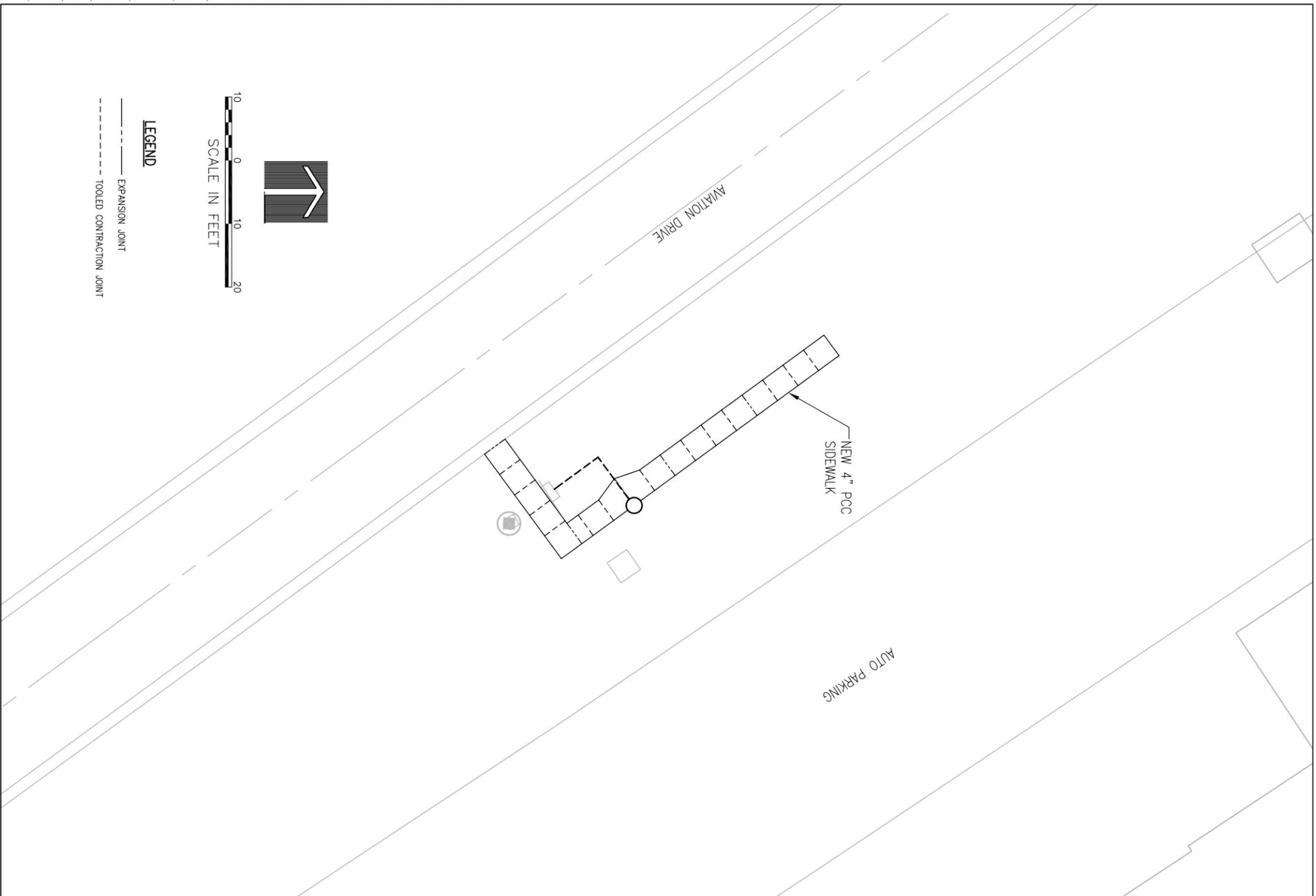
**AIP PROJECT NO. 3-17-0105-B47  
IDA PROJECT NO. UGN-3985**

No.	Drawing Issue Description	Date	By

Date: JANUARY 29, 2010  
Sheet Title: PROJECT SITE PLAN

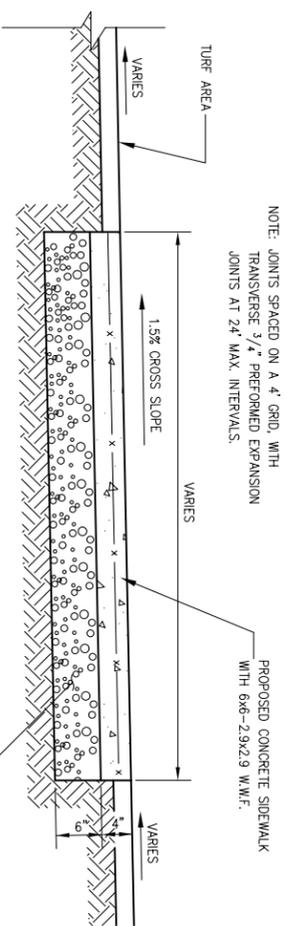
**PROJECT SITE PLAN**

Project Number: 09A0081
Design Date: 06/29/09
Design By: LDH
Reviewed By: RMH
Scale: 1/25/10
Sheet No. 5



**LEGEND**

- EXPANSION JOINT
- TOOLED CONTRACTION JOINT



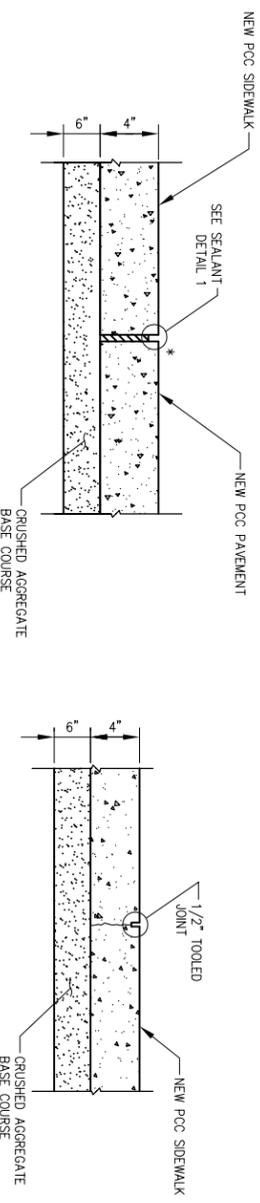
NOTE: JOINTS SPACED ON A 4' GRID, WITH TRANSVERSE 3/2" PREFORMED EXPANSION JOINTS AT 24' MAX. INTERVALS.

PROPOSED CONCRETE SIDEWALK WITH 6x6-2.9x2.9 W.W.F.

NOTES  
3/4" PREFORMED JOINT FILLER TO BE USED IN ALL LOCATIONS WHERE SIDEWALK IS ADJACENT TO EXISTING PAVEMENT.

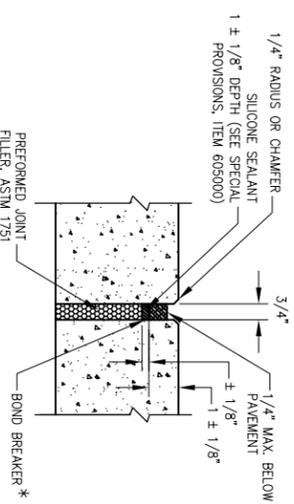
CRUSHED AGGREGATE BASE COURSE, 6 INCH, ITEM AR209606

**SIDEWALK CROSS SECTION DETAIL**



**EXPANSION JOINT**

**TOOLED CONTRACTION JOINT**



\* POLYETHYLENE OR POLYESTER TAPE (3 MIL. MIN.) OR MARKING TAPE, RUBBER TAPE, 1/8" WIDER THAN WIDTH OF JOINT.

**DETAIL 1 - SEALANT**

No.	Drawing Issue Description	Date	By

Date: JANUARY 29, 2010  
Sheet Title

**SIDEWALK JOINTING PLAN AND DETAILS**

09A0081
Project Number
LDH 8/25/09
Drawn By
LDH 8/25/09
Designed By
LDH 8/25/09
Reviewed By
LDH 1/25/10
Date
LDH
Drawn By
Sheet No.



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REPLACE AIRPORT BEACON  
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AIP PROJECT NO. 3-17-0105-B47  
IDA PROJECT NO. UGN-3985

No.	Drawing Issue Description	Date	By

Date JANUARY 29, 2010  
Sheet Title

ELECTRICAL LEGEND  
AND ABBREVIATIONS

09A0081
Project Number
KNL 07/07/09
Label By Date
KNL 07/07/09
Designed By Date
RMH 1/25/10
Reviewed By Date
MV --- ---
Drawn By Sheet No.

ELECTRICAL ABBREVIATIONS (CONTINUED)

NIS	NOT TO SCALE
OHE	OVERHEAD ELECTRIC
OL	OVERLOAD
PB	PULL BOX
PC	PHOTO CELL
PDB	POWER DISTRIBUTION BLOCK
PML	PANEL
PVC	POLY-VINYL CHLORIDE
RCP1	RECEPTACLE
R	RELAY
S	STARTER
SPD	SURGE PROTECTION DEVICE
SPST	SINGLE POLE SINGLE THROW
TB	TERMINAL BLOCK
TSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TP	TYPICAL
UG	UNDERGROUND
UE	UNDERGROUND ELECTRIC
UL	UNDERWRITER'S LABORATORIES
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTS
W/	WITH
W/O	WITHOUT
WP	WEATHER PROOF
XFER	TRANSFER
XTR	TRANSFORMER

AIRPORT EQUIPMENT ABBREVIATIONS

CCR	CONSTANT CURRENT REGULATOR
DME	DISTANCE MEASURING EQUIPMENT
FAA	FEDERAL AVIATION ADMINISTRATION
FAR	FEDERAL AVIATION REGULATION
GS	GLIDE SLOPE FACILITY
HRL	HIGH INTENSITY RUNWAY LIGHT
IM	INNER MARKER
LR	LOW IMPACT-RESISTANT
LOC	LOCALIZER FACILITY
MAS	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM
MASR	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATING LIGHTS
MRL	MEDIUM INTENSITY RUNWAY LIGHT
MRL	MEDIUM INTENSITY TAXIWAY LIGHT
NDB	NON-DIRECTIONAL BEACON
PAPI	PRECISION APPROACH PATH INDICATOR
PLSI	PULSE LIGHT APPROACH SLOPE INDICATOR
PAL	RUNWAY ALIGNMENT INDICATING LIGHTS
REL	RUNWAY END IDENTIFIER LIGHT
RVR	RUNWAY VISUAL RANGE
VADI	VISUAL APPROACH DESCENT INDICATOR
VASI	VISUAL APPROACH SLOPE INDICATOR
WC	WIND CONE

ELECTRICAL ABBREVIATIONS

A.F.F.	ABOVE FINISHED FLOOR
A AMP	AMPERES
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BKR	BREAKER
C	CONDUIT
CB	CIRCUIT BREAKER
CRT	CIRCUIT
CR	CONTROL RELAY
CU	COPPER
DEB	DIRECT EARTH BURY
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
EES	EARTH ELECTRODE SYSTEM
EM	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
EP	EXPLOSION PROOF
ES	EMERGENCY STOP
ETL	INTERTEX - ELECTRICAL TESTING LABS
ETW	ELAPSE TIME METER
GFCl	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 AMPERES(S)
KW	KILOWATTS
LC	LIGHTING CONDUCTOR
LITMC	LIQUID TIGHT FLEXIBLE METAL CONDUIT (UL LISTED)
LIG	LIGHTING
LP	LIGHTING PANEL
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MCM	THOUSAND CIRCULAR MIL
MCP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
MH	METAL HALIDE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
NEC	NATIONAL ELECTRICAL CODE (NFPA 70)
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NPT	NATIONAL PIPE THREAD

ELECTRICAL LEGEND - SCHEMATIC

— —	NORMALLY OPEN (N.O.) CONTACT
— /—	NORMALLY CLOSED (N.C.) CONTACT
⊙	STARTER COIL, * = STARTER NUMBER
— /—	OVERLOAD RELAY CONTACT
⊙	CONTROL RELAY, * = CONTROL RELAY NUMBER
⊙	RELAY, * = RELAY NUMBER
⊙	TOGGLE SWITCH / 2 POSITION SWITCH
⊙	2-POSITION SELECTOR SWITCH
⊙	3-POSITION SELECTOR SWITCH (H-O-A SHOWN)
⊙	3 POLE DISCONNECT SWITCH
⊙	PHOTOCELL
⊙	TERMINAL BLOCK, * = TERMINAL NUMBER
⊙	DEVICE TERMINAL, * = DEVICE TERMINAL NUMBER
⊙	INTERNAL PANEL WIRING
⊙	FIELD WIRING
⊙	FUSE
⊙	GROUND BUS OR TERMINAL
⊙	NEUTRAL BUS
⊙	GROUND, GROUND ROD, GROUND BUS

ELECTRICAL LEGEND - ONE-LINE DIAGRAM

—○—	CABLE TERMINATOR/LUG
⊕	TRANSFORMER
— /—	DISCONNECT SWITCH
— /—	FUSIBLE DISCONNECT SWITCH
— /—	CIRCUIT BREAKER
— /—	THERMAL MAGNETIC CIRCUIT BREAKER
⊙	FUSE
⊕	TRANSIENT VOLTAGE SURGE SUPPRESSOR OR SURGE PROTECTOR DEVICE
⊕	GROUND - GROUND ROD, GROUNDING ELECTRODE, OR AT EARTH POTENTIAL
⊕	INDICATING LIGHT
⊕	MOTOR
⊕	LOAD, MOTOR, # = HORSEPOWER
⊕	ELECTRIC UTILITY METER BASE
⊕	JUNCTION BOX WITH SPLICE
⊕	EQUIPMENT, XXX = DEVICE DESCRIPTION
⊕	GROUND BAR, GROUND BUS, OR GROUND TERMINAL
⊕	SOLID NEUTRAL, NEUTRAL BUS, OR NEUTRAL TERMINAL
⊕	PANELBOARD WITH MAIN LUGS
⊕	PANELBOARD WITH MAIN BREAKER
⊕	FUSE PANEL WITH MAIN FUSE PULLOUT
⊕	DUPLEX RECEPTACLE 120V SINGLE PHASE GROUNDING TYPE
⊕	CONTROL STATION
⊕	TRANSFER SWITCH
⊕	ENGINE GENERATOR SET

NOTES:

- ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED IN CONFORMANCE WITH NFPA 70 - NATIONAL ELECTRICAL CODE (NEC) MOST CURRENT ISSUE IN FORCE. CITY OF WAUKEGAN AMENDMENT TO THE NATIONAL ELECTRICAL CODE, 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, 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 ALL TIMES DURING CONSTRUCTION FOR USE AS A REFERENCE.
- ALL WORK, POWER OUTAGES, AND /OR SHUT DOWN OF EXISTING SYSTEMS SHALL BE COORDINATED WITH THE AIRPORT MANAGER AND THE RESPECTIVE FAA PERSONNEL. 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).
- COLOR CODE PHASE AND NEUTRAL CONDUCTOR INSULATION FOR NO. 6 AWG OR SMALLER. PROVIDE COLORED INSULATION OR COLORED MARKING TAPE FOR PHASE NEUTRAL CONDUCTORS FOR NO. 4 AWG AND LARGER. INSULATED GROUND CONDUCTORS SHALL HAVE GREEN COLORED INSULATION FOR ALL CONDUCTORS. ALL 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
- PROVIDE LIQUID TIGHT FLEXIBLE METAL CONDUIT (LITMC) AT CONNECTIONS TO EQUIPMENT SUBJECT TO VIBRATION OR WHERE FLEXIBILITY IS REQUIRED. LIQUID TIGHT FLEXIBLE METAL CONDUIT AND ASSOCIATED FITTINGS SHALL BE UL LISTED TO MEET THE REQUIREMENTS OF NEC 350.6. SUITABLE FOR GROUNDING, SUNLIGHT RESISTANT, AND RESISTANT TO OIL, GASOLINE, AND GREASE. LIQUID TIGHT FLEXIBLE METAL CONDUIT THAT IS USED FOR FLEXIBILITY (INCLUDING CONNECTIONS TO MOTORS & TRANSFORMERS) 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. CONFRM LITMC BEARS THE UL LABEL PRIOR TO INSTALLING IT.
- CONDUCTORS FOR SERVICE ENTRANCE APPLICATIONS SHALL BE XHHW-2 OR USE-2. POWER CONDUCTORS FOR DIRECT EARTH BURIAL (600 VOLT APPLICATIONS) SHALL BE XLP-USE-2. CONDUCTORS FOR BRANCH CIRCUIT WIRING LOCATED INSIDE BUILDINGS OR RACINGS SHALL BE XHHW-2 OR THHN-2. ALL CONDUCTORS SHALL BE COPPER. WHERE USE TYPE CONDUCTORS ARE USED, INSTEAD OF THHN OR XHHW CONDUCTORS, INCREASE CONDUIT SIZES AS APPLICABLE TO MEET NEC CONDUIT & TUBING FILL REQUIREMENTS.
- JUNCTION BOXES SHALL BE SIZED PER NEC 314 FOR THE RESPECTIVE SPLICES, WIRING AND CONDUITS. JUNCTION BOXES SHALL BE RATED SUITABLE FOR THE RESPECTIVE LOCATION WHERE INSTALLED. SURFACE MOUNTED EXTERIOR JUNCTION BOXES LOCATED IN NON-HAZARDOUS, NON-CLASSIFIED AREAS SHALL BE RATED NEMA 4X STAINLESS STEEL. BOXES SHALL BE UL LISTED. PROVIDE NEMA 4 WATERIGHT HUBS FOR ALL CONDUIT ENTRIES INTO NEMA 4 RATED ENCLOSURES TO MAINTAIN NEMA 4 RATING.
- ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL STAINLESS STEEL STRUT SUPPORT & CORROSION RESISTANT HARDWARE FOR MOUNTING ELECTRICAL PANELS, SWITCHES, OUTLETS, CONTROL PANELS, BOXES, & OTHER EQUIPMENT.
- FURNISH & INSTALL A WEATHERPROOF WARNING LABEL FOR EACH METER SOCKET, SERVICE DISCONNECT, SAFETY SWITCH, PANELBOARD, & CONTROL PANEL TO WARN PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS, PER THE REQUIREMENTS OF NEC 110.16 "FLASH PROTECTION".
- THE LOCATION, SIZE AND TYPE OF MATERIAL OF EXISTING UNDERGROUND UTILITIES INDICATED ON THE PLANS IS NOT REPRESENTED AS BEING ACCURATE. SUFFICIENT OR COMPLETE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE ACTUAL LOCATION OF ALL SUCH FACILITIES, INCLUDING SERVICE CONNECTIONS TO UNDERGROUND UTILITIES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES OF HIS OPERATIONAL PLANS AND SHALL OBTAIN FROM THE RESPECTIVE UTILITY COMPANIES DETAILED INFORMATION AND ASSISTANCE RELATIVE TO THE LOCATION OF THEIR FACILITIES AND THE WORKING SCHEDULE OF THE COMPANIES FOR REMOVAL OR ADJUSTMENT WHERE REQUIRED. IN THE EVENT AN UNEXPECTED UTILITY INTERFERENCE IS ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE UTILITY COMPANY OF JURISDICTION. THE ENGINEER SHALL ALSO BE IMMEDIATELY NOTIFIED. ANY SUCH MANS AND SERVICES SHALL BE RESTORED TO SERVICE AT ONCE AND PAID FOR BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACT. CALL JULIE. FOR UTILITY INFORMATION AT 1-800-892-0123. ALSO CONTACT AIRPORT MANAGER AND/OR RESPECTIVE AIRPORT PERSONNEL FOR ASSISTANCE IN LOCATING UNDERGROUND AIRPORT CABLES AND/OR UTILITIES.



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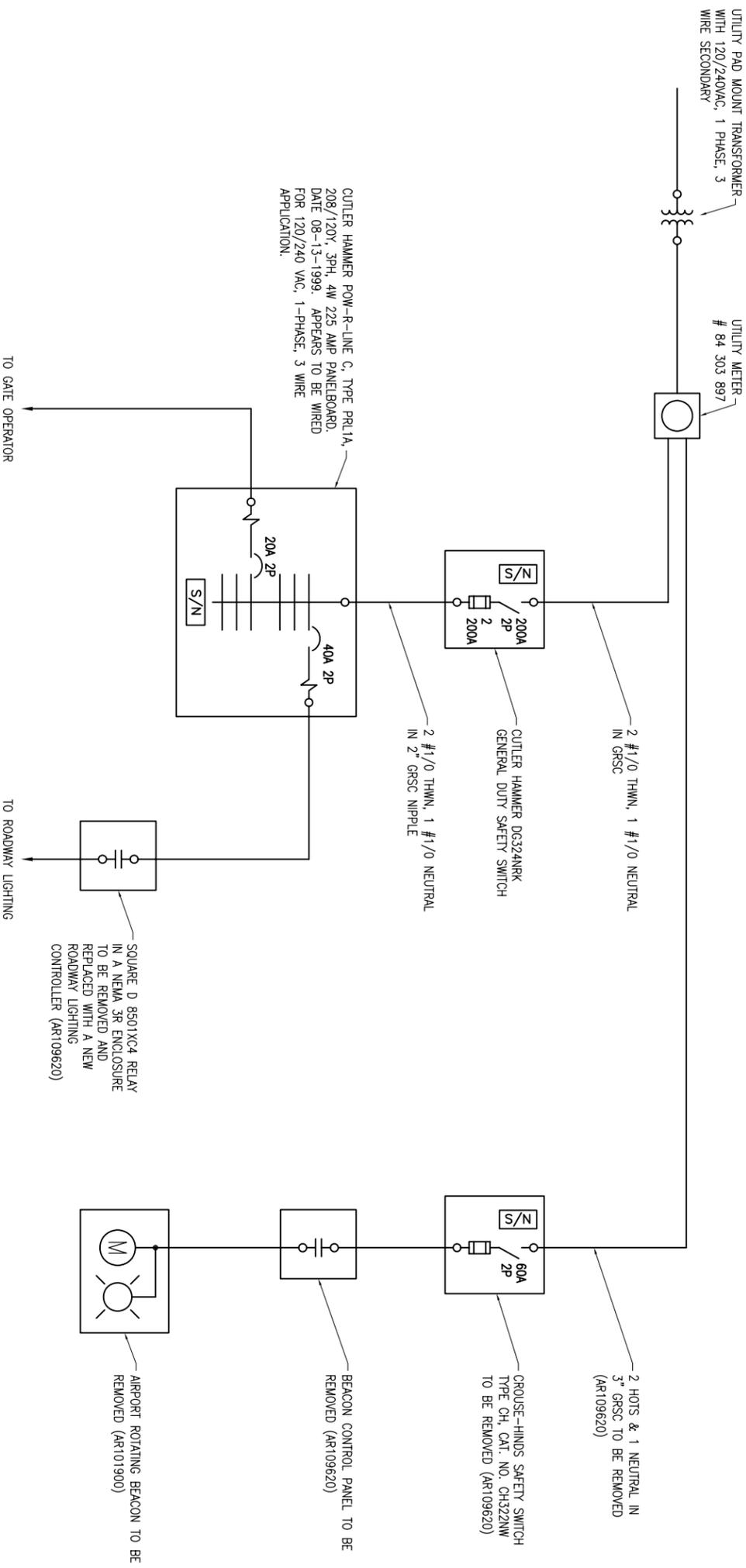
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WAUKEGAN, ILLINOIS

REPLACE AIRPORT BEACON  
AND TOWER

AIP PROJECT NO. 3-17-0105-B47  
IDA PROJECT NO. UGN-3985



**EXISTING ELECTRICAL ONE-LINE DIAGRAM  
FOR AIRPORT ROTATING BEACON**

- NOTES:**
1. CONTRACTOR SHALL OBTAIN A PERMIT FROM THE CITY OF WAUKEGAN BUILDING DEPARTMENT, (PHONE: 847-625-6868) TO PERFORM THE ELECTRICAL WORK FOR THIS PROJECT.
  2. ELECTRICAL ONE LINE DIAGRAM IS BASED ON FIELD SURVEY. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS, PRIOR TO PERFORMING ANY WORK.
  3. COORDINATE DISCONNECTING THE BEACON SERVICE CONDUCTORS AT THE LOAD SIDE OF THE UTILITY METER WITH THE SERVING ELECTRIC UTILITY COMPANY AND THE AIRPORT MANAGER.
  4. ALL WORK, POWER OUTAGES, AND/OR SHUT DOWN OF EXISTING SYSTEMS SHALL BE COORDINATED WITH THE AIRPORT MANAGER AND THE RESPECTIVE AIRPORT MAINTENANCE PERSONNEL. 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).
  5. REMOVAL OF EXISTING AIRPORT ROTATING BEACON WILL BE PAID FOR UNDER ITEM AR101900 BEACON REMOVAL PER EACH.
  6. REMOVAL OF EXISTING BEACON TOWER WILL BE PAID FOR UNDER ITEM AR103900 REMOVE BEACON TOWER PER EACH.
  7. REMOVAL OF EXISTING ELECTRICAL POWER & CONTROL EQUIPMENT FOR THE AIRPORT ROTATING BEACON WILL BE PAID FOR UNDER ITEM AR109620 LIGHTING CONTROL SYSTEM, REMOVAL OF THE EXISTING ROADWAY LIGHTING RELAY PANEL WILL BE PAID FOR UNDER ITEM AR109620 LIGHTING CONTROL SYSTEM.
  8. EXISTING EQUIPMENT TO REMAIN SHALL HAVE THE EXISTING STRUT SUPPORT REPLACED WITH STAINLESS STEEL STRUT, UNISTRUT P1000-SS OR EQUAL WITH STAINLESS STEEL HARDWARE.

No.	Drawing Issue Description	Date	By

Date: JANUARY 29, 2010  
Sheet Title

**EXISTING ELECTRICAL  
ONE LINE DIAGRAM FOR  
ROTATING BEACON**

09A0081  
Project Number  
KNL 07/07/09  
Drawn By Date  
KNL 07/07/09  
Designed By Date  
RMH 1/25/10  
Reviewed By Date  
MV ---  
Drawn By Sheet No.



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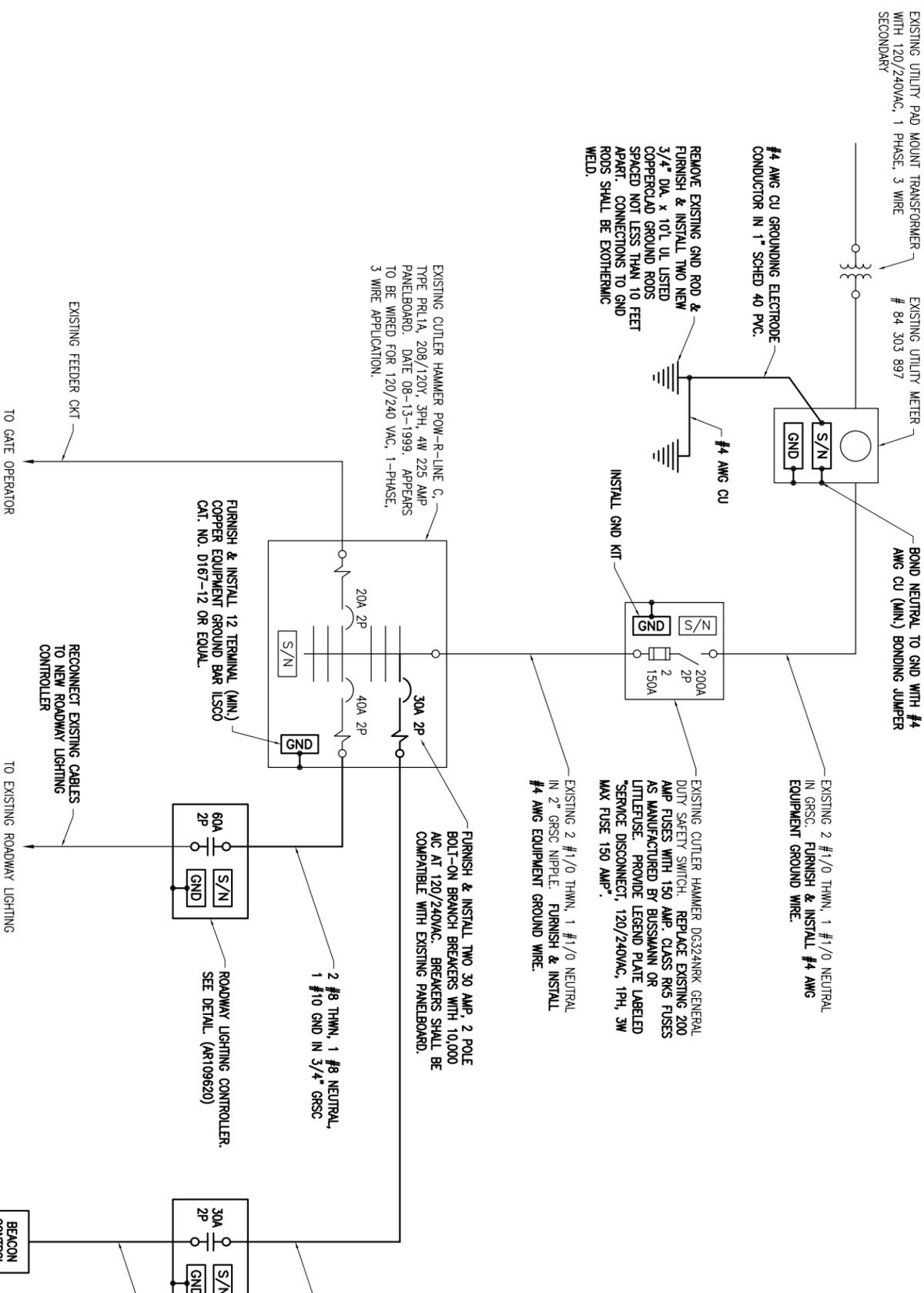
**WAUKEGAN REGIONAL AIRPORT  
WAUKEGAN, ILLINOIS**

**REPLACE AIRPORT BEACON  
AND TOWER**

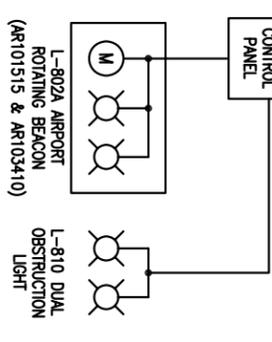
**AIP PROJECT NO. 3-17-0105-B47  
IDA PROJECT NO. UGN-3985**

**NOTES:**

1. SEE "ELECTRICAL LEGEND AND ABBREVIATIONS" SHEET FOR GENERAL NOTES AND REQUIREMENTS.
2. EQUIPMENT NOT LABELED AS "EXISTING" IS NEW.
3. INCLUDE 2 SPARE FUSES OF SAME SIZE, TYPE, AND MANUFACTURER AS THOSE USED IN EACH FUSIBLE SAFETY SWITCH. FUSES SHALL BE MANUFACTURED BY BUSSMANN OR LITTELFUSE.
4. CONTRACTOR SHALL COORDINATE ELECTRIC SERVICE ENTRANCE WORK AND REQUIREMENTS WITH THE SERVING ELECTRIC UTILITY COMPANY & THE AIRPORT MANAGER. THE SERVING ELECTRIC UTILITY COMPANY IS COMMONWEALTH EDISON COMPANY NEW BUSINESS DEPARTMENT PHONE: 866-639-3532 AND MR. PATRICK BUCHANAN, COM ED SERVICE REPRESENTATIVE PHONE: 847-816-5509.
5. PROVIDE GROUNDING BUSHINGS WITH MINIMUM #4 AWG GROUND WIRE BONDING JUMPERS FOR ALL METAL CONDUITS ENTERING/LEAVING METERING EQUIPMENT & SERVICE EQUIPMENT ENCLOSURES.
6. NEW BEACON WILL BE PAID FOR UNDER ITEM AR101515 HIGH INTENSITY AIRPORT BEACON PER EACH.
7. BEACON TOWER WILL BE PAID FOR UNDER ITEM AR103410 BEACON TOWER PER EACH.
8. SERVICE ENTRANCE WORK & UPGRADES, POWER DISTRIBUTION WORK & CONTROL WORK WILL BE PAID FOR UNDER ITEM AR109620 LIGHTING CONTROL SYSTEM PER LUMP SUM.
9. ALL CONDUCTORS/ WIRING SHALL BE COPPER.
10. PROVIDE NEMA 4 HUBS FOR ALL CONDUIT ENTRIES INTO NEMA 4, 4X RATED ENCLOSURES.
11. PROVIDE STAINLESS STEEL STRUT SUPPORT UNISTRUT P1000SS WITH STAINLESS STEEL HARDWARE FOR EXISTING & NEW ELECTRICAL EQUIPMENT ENCLOSURES.



**NEW ELECTRICAL ONE-LINE DIAGRAM  
FOR AIRPORT ROTATING BEACON**



No.	Drawing Issue Description	Date	By

Date: JANUARY 29, 2010  
Sheet Title: NEW ELECTRICAL ONE LINE DIAGRAM FOR ROTATING BEACON

Project Number: 09A0081
Project Name: KNL 07/07/09
Drawn By: KNL 07/07/09
Designed By: RMH 1/25/10
Reviewed By: MV
Sheet No. 9



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WAUKEGAN REGIONAL AIRPORT  
WAUKEGAN, ILLINOIS

REPLACE AIRPORT BEACON  
AND TOWER

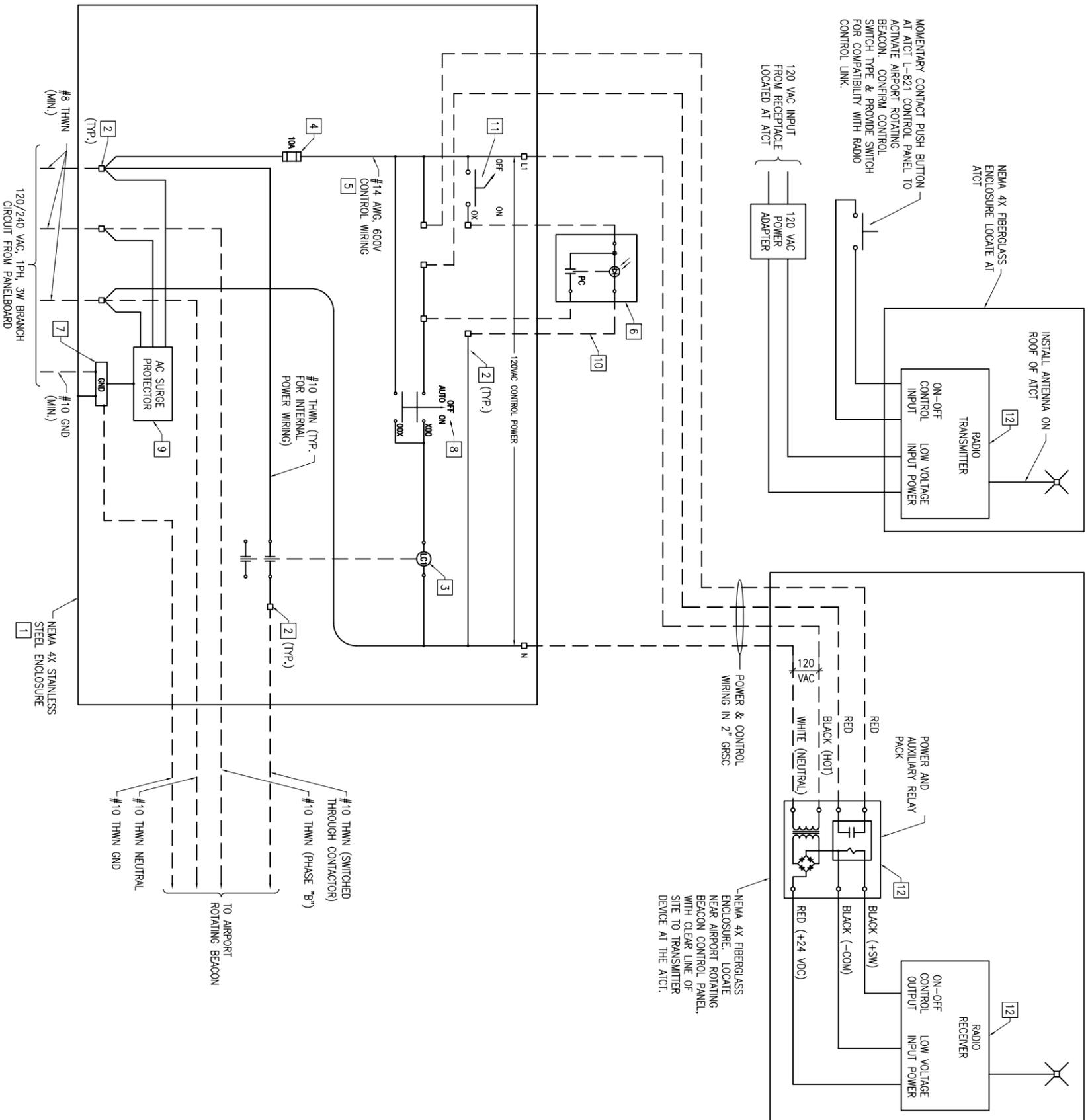
AIP PROJECT NO. 3-17-0105-B47  
IDA PROJECT NO. UGN-3985

**KEYED NOTES:**

1. THE EXISTING BEACON CONTROL PANEL SHALL BE REMOVED AND REPLACED WITH A NEW BEACON CONTROLLER. THIS WORK SHALL BE PAID FOR UNDER ITEM AR109620 LIGHTING CONTROL SYSTEM PER LUMP SUM.
2. FURNISH AND INSTALL A 30 AMP, 2 POLE, BOLT-ON BREAKER WITH 10,000 AIC AT 120/240VAC FOR THE AIRPORT ROTATING BEACON. BREAKER SHALL BE COMPATIBLE WITH EXISTING PANELBOARD.
3. STRUT SUPPORT FOR NEW CONTROLLER SHALL BE STAINLESS STEEL, UNISTRUT P1000-SS OR EQUAL, WITH STAINLESS STEEL HARDWARE.

**KEYED NOTES:**

1. UL LISTED NEMA 4X STAINLESS STEEL CONTROL PANEL ENCLOSURE WITH HINGED COVER ADEQUATELY SIZED TO HOLD THE RESPECTIVE COMPONENTS AND EQUIPMENT. INCLUDE LEGEND PLATES LABELED "AIRPORT ROTATING BEACON CONTROLLER", "120/240 VAC, 1 PHASE, 3 WIRE", AND "CAUTION DISCONNECT POWER BEFORE SERVICING". INCLUDE INNER DOOR TO MOUNT SELECTOR SWITCHES & TO PROVIDE A BARRIER FROM THE INTERIOR POWER & CONTROL COMPONENTS. LEGEND PLATES SHALL BE WEATHERPROOF AND ABRASION RESISTANT PHENOLIC MATERIALS. LETTERING SHALL BE BLACK ON WHITE BACKGROUND, UNLESS OTHERWISE NOTED.



**AIRPORT ROTATING BEACON CONTROLLER**

2. TERMINAL BLOCKS FOR POWER & CONTROL WIRING SHALL BE 600 VOLT, WITH AMPERAGE RATINGS IN CONFORMANCE WITH NEC TABLE 310-16 USING 75 DEGREE C WIRE FOR THE RESPECTIVE WIRE LUG RANGE, BOX LUG TYPE, SQUARE D CLASS 9080, TYPE CG6, OR APPROVED EQUAL.
3. LIGHTING CONTRACTOR: LIGHTING CONTRACTOR SHALL BE 80 AMP, 2-POLE, ELECTRICALLY HELD CONTACTOR SUITABLE OF FOR LIGHTING LOADS, WITH 120 VAC, 60 HZ COIL, SQUARE D CLASS 8903, TYPE SPO1V02, OR APPROVED EQUAL. PHASE "A" SHALL BE SWITCHED THROUGH LIGHTING CONTRACTOR. PHASE "B" SHALL BE CONTINUOUS FROM BRANCH BREAKER TO THE BEACON UNIT.
4. FUSING FOR CONTROL WIRING SHALL BE 10 AMP, 600 VAC, BUSSMANN CATALOG FNO-R-10, OR APPROVED EQUAL, WITH FUSE BLOCKS, WITH BOX LUG TERMINALS, SIZED AS REQUIRED FOR THE RESPECTIVE APPLICATION. INCLUDE HARDWARE FOR MOUNTING. PROVIDE ONE BOX (5 MINIMUM QUANTITY) OF EACH TYPE AND SIZE OF FUSE, UPON COMPLETION OF THE JOB FOR USE AS SPARES.
5. CONTROL WIRING SHALL BE SIZED AS REQUIRED PER NEC MINIMUM #14 AWG TYPE MTW, THW, OR THWN COPPER.
6. PHOTOCELL RATED 2000 WATTS AT 120 VAC, WITH OFF DELAY, AND -40 DEGREE C TO 60 DEGREE C OPERATING TEMPERATURE RANGE, TORX MODEL NO. 2101, INTERATIC MODEL K4121M, OR APPROVED EQUAL. PROVIDE MOUNTING HARDWARE, JUNCTION BOX AND WATERTIGHT HUBS FOR INTERFACE TO THE LIGHTING CONTRACTOR ENCLOSURE. PHOTOCELL SHALL BE MOUNTED JUST ABOVE ROOF LEVEL OF RESPECTIVE BUILDING WHERE CONTROL PANEL IS INSTALLED. PHOTOCELL SHALL FACE NORTH. ADJUST LOCATION WHERE APPLICABLE FOR PROPER OPERATION.
7. EQUIPMENT GROUNDING BAR: PROVIDE A GROUNDING BAR MOUNTED AND BONDED INSIDE THE PANEL ENCLOSURE, ADEQUATELY SIZED TO ACCOMMODATE ALL GROUND CONDUCTORS TO OR FROM THE LIGHTING CONTROLLER, ILSCO CAT. NO. D167-6 OR APPROVED EQUAL.
8. THREE-POSITION MAINTAINED "HAND-OFF-AUTO" SELECTOR SWITCH, HEAVY DUTY, WATERTIGHT/OIL TIGHT (NEMA 4/13), SQUARE D CLASS 9001, TYPE KS437BH13 OR APPROVED EQUAL. INCLUDE LEGEND PLATES LABELED "BEACON" & LABELED "AUTO-OFF-ON". MOUNT SELECTOR SWITCH ON PANEL INNER DOOR.
9. AC SURGE PROTECTOR, UL 1449 SECOND EDITION LISTED, SURGE CURRENT RATING OF 40KA, SUITABLE FOR USE ON A 120/240 VAC, 1 PHSE, 3 WIRE SYSTEM WITH LED INDICATING OPERATIONAL STATUS, JOSLYN MODEL 1265-21, SQUARE D CAT. NO. TV5120XR40S OR APPROVED EQUAL. INCLUDE MOUNTING BRACKET.
10. PHOTOCELL WIRING SHALL BE 2 #14 THWN, 1 #14 NEUTRAL IN 3/4" GSSC. PROVIDE WATER SEAL OR DRAIN FITTING FOR CONDUIT TO PREVENT WATER ACCUMULATION IN PANEL ENCLOSURE. INCLUDE NEMA 4 HUB AT CONDUIT ENTRY TO ENCLOSURE.
11. TWO-POSITION MAINTAINED "OFF-ON" SELECTOR SWITCH, HEAVY DUTY, WATERTIGHT/OIL TIGHT (NEMA 4/13), SQUARE D CLAS 9001, TYPE KS11FH13 OR APPROVED EQUAL. INCLUDE LEGEND PLATES LABELED "PHOTOCELL" & LABELED "OFF-ON". MOUNT SELECTOR SWITCH ON PANEL INNER DOOR.
12. SEE SPECS (ITEM AR109620) FOR INFO ON RADIO LINK (INDUSTRIAL WIRELESS RELAY CONTROL SYSTEM) REQUIREMENTS BETWEEN THE AIR TRAFFIC CONTROL TOWER AND THE AIRPORT ROTATING BEACON.

No.	Drawing Issue Description	Date	By

Date JANUARY 29, 2010  
Sheet Title

**AIRPORT ROTATING  
BEACON CONTROLLER**

Project Number	09A0081
KNL	07/07/09
Issued By	07/07/09
Designed By	07/07/09
Reviewed By	1/25/10
Checked By	---
Drawn By	---
Sheet No.	10



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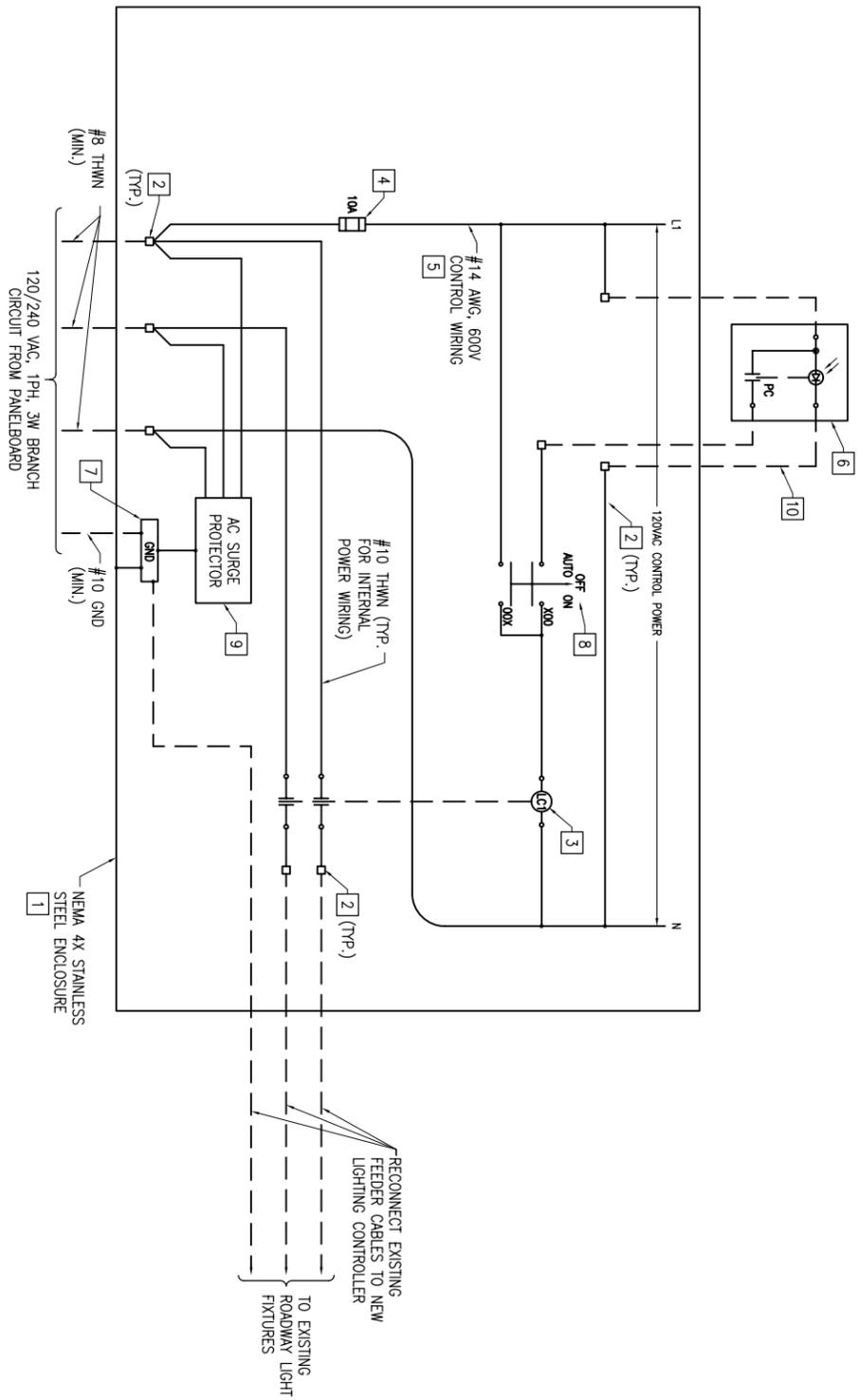
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WAUKEGAN REGIONAL AIRPORT  
WAUKEGAN, ILLINOIS

REPLACE AIRPORT BEACON  
AND TOWER

AIP PROJECT NO. 3-17-0105-B47  
IDA PROJECT NO. UGN-3985

**ROADWAY LIGHTING CONTROLLER**



**KEYED NOTES:**

1. THE EXISTING ROADWAY LIGHTING RELAY PANEL SHALL BE REMOVED AND REPLACED WITH A NEW LIGHTING CONTROLLER. THIS WORK SHALL BE PAID FOR UNDER ITEM AR109620 LIGHTING CONTROL SYSTEM PER LUMP SUM.
2. STRUT SUPPORT FOR NEW CONTROLLER SHALL BE STAINLESS STEEL: UNISTRUT P1000-SS OR EQUAL, WITH STAINLESS STEEL HARDWARE.

**KEYED NOTES:**

- 1 UL LISTED NEMA 4X STAINLESS STEEL CONTROL PANEL ENCLOSURE WITH HINGED COVER ADEQUATELY SIZED TO HOLD THE RESPECTIVE COMPONENTS AND EQUIPMENT. INCLUDE LEGEND PLATES LABELED "ROADWAY LIGHTING CONTROLLER", "120/240 VAC, 1 PHASE, 3 WIRE", AND "CAUTION DISCONNECT POWER BEFORE SERVICING". INCLUDE INNER DOOR TO MOUNT "HAND-OFF-AUTO" SELECTOR SWITCH & TO PROVIDE A BARRIER FROM THE INTERIOR POWER & CONTROL COMPONENTS. LEGEND PLATES SHALL BE WEATHERPROOF AND ABRASION RESISTANT PHENOLIC MATERIALS. LETTERING SHALL BE BLACK ON WHITE BACKGROUND, UNLESS OTHERWISE NOTED.
- 2 TERMINAL BLOCKS FOR POWER & CONTROL WIRING SHALL BE 600 VOLT, WITH AMPERAGE RATINGS IN CONFORMANCE WITH NEC TABLE 310-16 USING 75 DEGREE C WIRE FOR THE RESPECTIVE WIRE LUG RANGE, BOX LUG TYPE, SQUARE D CLASS 9080, TYPE CG6, OR APPROVED EQUAL.
- 3 LIGHTING CONTACTOR: LIGHTING CONTACTOR SHALL BE 60 AMP, 2-POLE, ELECTRICALLY HELD CONTACTOR SUITABLE OF FOR LIGHTING LOADS, WITH 120 VAC, 60 HZ COIL, SQUARE D CLASS 8903, TYPE SPO1V02, OR APPROVED EQUAL.
- 4 FUSING FOR CONTROL WIRING SHALL BE 10 AMP, 600 VAC, BUSSMANN CATALOG FNO-R-10, OR APPROVED EQUAL, WITH FUSE BLOCKS, WITH BOX LUG TERMINALS, SIZED AS REQUIRED FOR THE RESPECTIVE APPLICATION. INCLUDE HARDWARE FOR MOUNTING. PROVIDE ONE BOX (5 MINIMUM QUANTITY) OF EACH TYPE AND SIZE OF FUSE, UPON COMPLETION OF THE JOB FOR USE AS SPARES.
- 5 CONTROL WIRING SHALL BE SIZED AS REQUIRED PER NEC MINIMUM #14 AWG TYPE MTW, THW, OR THWN COPPER.
- 6 PHOTOCELL RATED 2000 WATTS AT 120 VAC, WITH OFF DELAY, AND -40 DEGREE C TO 60 DEGREE C OPERATING TEMPERATURE RANGE, TORQ MODEL NO. 2101, INTERMATIC MODEL K4121M, OR APPROVED EQUAL. PROVIDE MOUNTING HARDWARE, JUNCTION BOX AND WATERTIGHT HUBS FOR INTERFACE TO THE LIGHTING CONTROLLER ENCLOSURE. PHOTOCELL SHALL BE MOUNTED JUST ABOVE ROOF LEVEL OF RESPECTIVE BUILDING WHERE CONTROL PANEL IS INSTALLED. PHOTOCELL SHALL FACE NORTH. ADJUST LOCATION WHERE APPLICABLE FOR PROPER OPERATION.
- 7 EQUIPMENT GROUNDING BAR: PROVIDE A GROUNDING BAR MOUNTED AND BONDED INSIDE THE PANEL ENCLOSURE, ADEQUATELY SIZED TO ACCOMMODATE ALL GROUND CONDUCTORS TO OR FROM THE LIGHTING CONTROLLER, ILSCO CAT. NO. D167-6 OR APPROVED EQUAL.
- 8 THREE-POSITION MAINTAINED "HAND-OFF-AUTO" SELECTOR SWITCH, HEAVY DUTY, WATERTIGHT/OIL TIGHT (NEMA 4/13), SQUARE D CLASS 9001, TYPE KS43FBH13 OR APPROVED EQUAL. INCLUDE LEGEND PLATE LABELED "AUTO-OFF-ON". MOUNT SELECTOR SWITCH ON PANEL INNER DOOR.
- 9 AC SURGE PROTECTOR, UL 1449 SECOND EDITION LISTED, SURGE CURRENT RATING OF 40KA, SUITABLE FOR USE ON A 120/240 VAC, 1 PHSE, 3 WIRE SYSTEM WITH LED INDICATING OPERATIONAL STATUS, JOSLYN MODEL 1265-21, SQUARE D CAT. NO. TVS120XR40S OR APPROVED EQUAL. INCLUDE MOUNTING BRACKET.
- 10 PHOTOCELL WIRING SHALL BE 2 #14 THWN, 1 #14 NEUTRAL IN 3/4" GRSC. PROVIDE WATER SEAL OR DRAIN FITTING FOR CONDUIT TO PREVENT WATER ACCUMULATION IN PANEL ENCLOSURE. INCLUDE NEMA 4 HUB AT CONDUIT ENTRY TO ENCLOSURE.

No.	Drawing Issue Description	Date	By

Date: JANUARY 29, 2010  
Sheet Title: ROADWAY LIGHTING CONTROLLER

09A0081  
Project Number: KNL 07/07/09  
Issued By: Date: 07/07/09  
Designed By: Date: 1/25/10  
Reviewed By: Date: ---  
Drawn By: Sheet No. 11



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**WAUKEGAN REGIONAL AIRPORT  
WAUKEGAN, ILLINOIS**

**REPLACE AIRPORT BEACON  
AND TOWER**

**AIP PROJECT NO. 3-17-0105-B47  
IDA PROJECT NO. UGN-3985**

**AIRPORT ROTATING BEACON NOTES**

- MAX. HEIGHT FROM TOP OF LIGHTNING ROD TO FINISHED GRADE SHALL NOT EXCEED 57 FEET, 5 INCHES, ADJUST LENGTH OF AIR TERMINAL/LIGHTNING ROD TO COMPLY WITH THIS REQUIREMENT.
- INSTALL ROTATING BEACON WITH OBSTRUCTION LIGHTING IN CONFORMANCE WITH FAA AC NO. 150/5340-30C AND FAA AC NO. 150/5370-10C, ITEM L-101, INSTALLATION OF AIRPORT ROTATING BEACONS CONFIRM BEACON INSTALLATION REQUIREMENTS WITH THE RESPECTIVE MANUFACTURER.
- AIRPORT ROTATING BEACON WILL BE PAID FOR UNDER ITEM AR101515 HIGH INTENSITY AIRPORT BEACON PER EACH.
- BEACON TIP DOWN POLE WITH FOUNDATION, GROUNDING, WINCH, & ACCESSORIES WILL BE PAID FOR UNDER ITEM AR103410 BEACON TOWER, PER EACH.

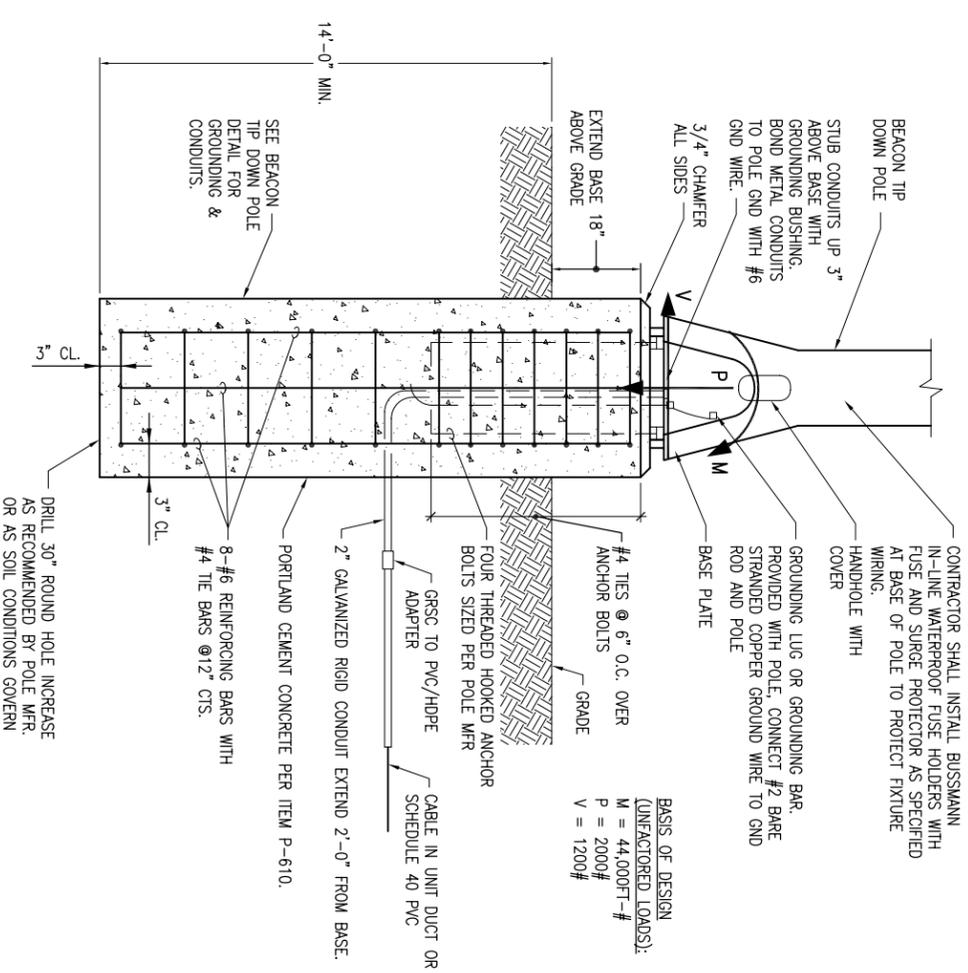
**FOUNDATION NOTES**

**EXCAVATION**

- EXCAVATION SHALL BE CLEAN AND FREE OF DEBRIS, STANDING WATER AND LOOSE SOIL AND APPROVED BY THE RESIDENT ENGINEER PRIOR TO PLACEMENT OF CONCRETE.
- DRILLED PIER SHALL BE CASD AS REQUIRED TO ENSURE STABILITY OF THE SIDES OF THE HOLE. THE CASING SHALL BE REMOVED AS THE CONCRETE IS BEING PLACED.
- DRILLED PIER EXCAVATION SHALL NOT REMAIN OPEN OVERNIGHT.

**CONCRETE NOTES**

- CONCRETE FOR FOUNDATION SHALL CONFORM TO ITEM P-610 STRUCTURAL PORTLAND CEMENT CONCRETE. THE CONCRETE SHALL BE AIR ENTRAINED (6.5 ±1.5%) WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4000 P.S.I.
- ALL REINFORCING BARS SHALL CONFORM TO ASTM A615, GRADE 60, AND SHALL BE CLEAN AND FREE OF GREASE AND SCALING RUST. REINFORCING BARS SHALL BE MANUFACTURED FROM 100% DOMESTIC STEEL.

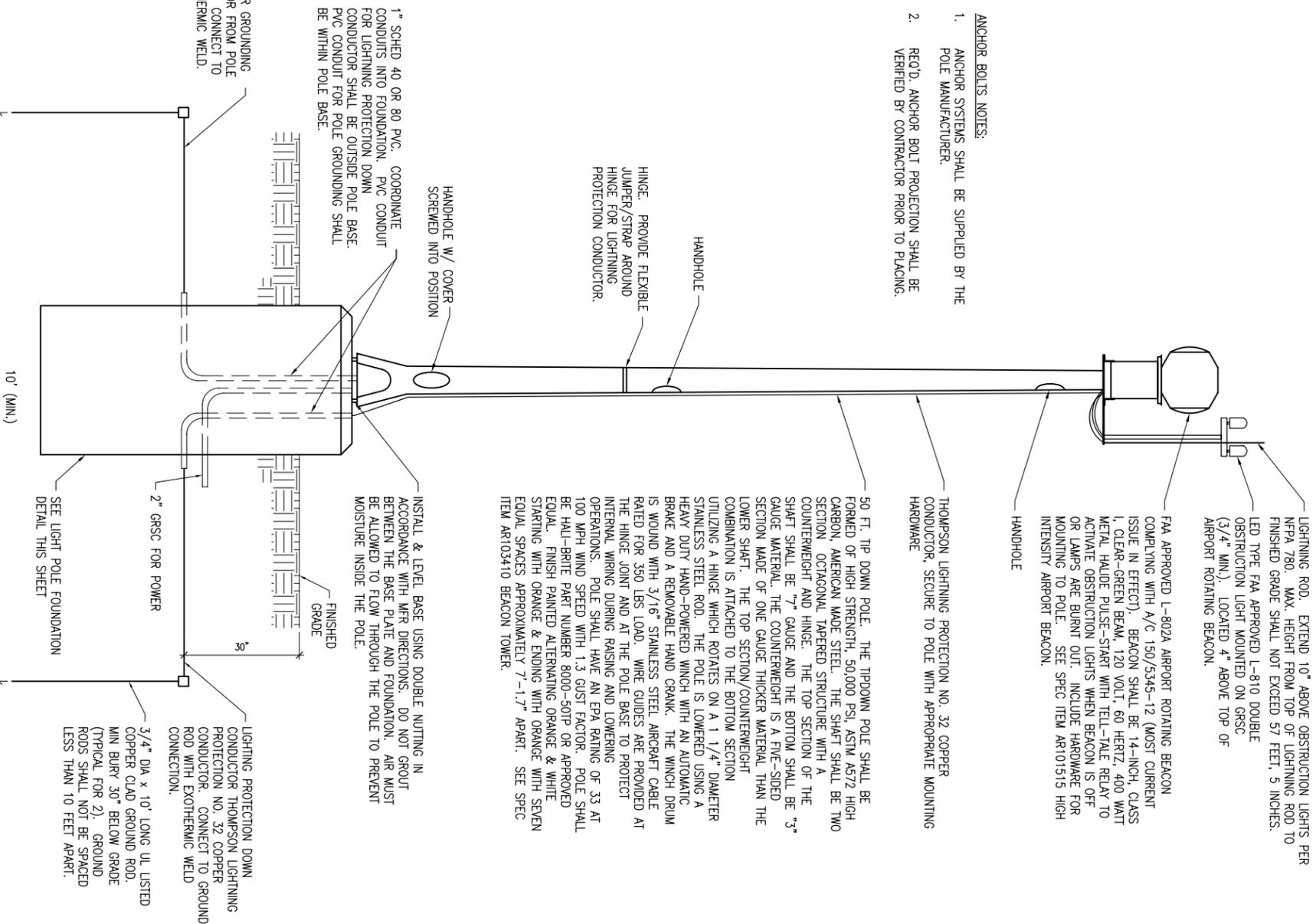


**BEACON POLE FOUNDATION DETAIL**

SCALE: NONE

**ANCHOR BOLTS NOTES:**

- ANCHOR SYSTEMS SHALL BE SUPPLIED BY THE POLE MANUFACTURER.
- REQ'D. ANCHOR BOLT PROTECTION SHALL BE VERIFIED BY CONTRACTOR PRIOR TO PLACING.



**BEACON TIP-DOWN POLE DETAIL**

SCALE: NONE

Project Number	09A10081
Project Name	KNL
Issue Date	07/07/09
Design Date	07/07/09
Revised Date	1/25/10
Drawn By	MV
Checked By	
Sheet No.	12

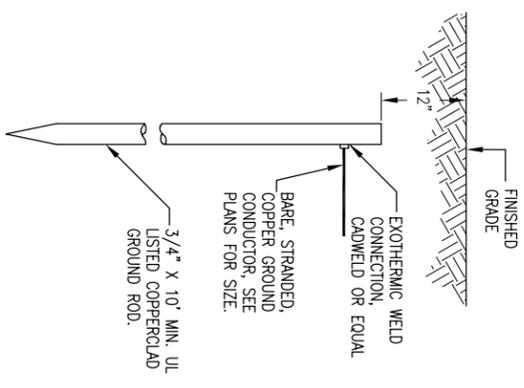
**AIRPORT ROTATING  
BEACON DETAILS**

No.	Drawing Issue Description	Date	By

Date: JANUARY 29, 2010  
Sheet Title: AIRPORT ROTATING BEACON DETAILS

**GROUNDING NOTES**

1. 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 NATIONAL ELECTRICAL CODE (NFPA 70) IN FORCE AND CITY OF WAUKEGAN AMENDMENT TO THE NATIONAL ELECTRICAL CODE. 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:
  2. FURNISH AND INSTALL GROUND RODS AS DETAILED HEREIN. GROUND RODS SHALL BE 3/4"-IN. DIAMETER BY 10'-FT LONG, UL-LISTED, COPPER CLAD WITH 10-MIL MINIMUM COPPER COATING. GROUND RODS SHALL IN NO CASE BE SPACED LESS THAN ONE ROD LENGTH APART. ALL CONNECTIONS TO GROUND RODS AND GROUNDING ELECTRODE CONDUCTORS LOCATED BELOW GRADE SHALL BE MADE WITH EXOTHERMIC WELD TYPE CONNECTORS, CADWELD BY ERCO PRODUCTS, INC., SOLON, OHIO, (PHONE 1-800-248-9353), THERMOWELD BY CONTINENTAL INDUSTRIES, INC., TULSA, OKLAHOMA (PHONE 918-663-1440) OR ULTRAWELD BY HARGER, GRAYS LAKE, ILLINOIS (PHONE 1-800-842-7437). 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.
  3. CONTRACTOR SHALL TEST THE MADE ELECTRODE GROUND ROD/GROUND FIELD, GROUND RING WITH AN INSTRUMEN SPECIFICALLY DESIGNED FOR TESTING GROUND FIELD SYSTEMS. IF GROUND RESISTANCE EXCEEDS 25 OHMS, CONTACT THE RESIDENT ENGINEER FOR FURTHER DIRECTION. COPIES OF GROUND FIELD TEST RESULTS SHALL BE FURNISHED TO THE RESIDENT ENGINEER, UPON REQUEST, FOR REVIEW AND RECORD PURPOSES.
  4. ALL PRODUCTS ASSOCIATED WITH THE GROUNDING SYSTEM SHALL BE UL-LISTED AND LABELED.
  5. ALL BOLTED OR MECHANICAL CONNECTIONS SHALL BE COATED WITH A CORROSION PREVENTATIVE COMPOUND BEFORE JOINING, SANICHEM INC. "NO-OX-ID "A-SPECIAL" COMPOUND, OR EQUAL.
  6. METALLIC SURFACES TO BE JOINED SHALL BE PREPARED BY THE REMOVAL OF ALL NON-CONDUCTIVE MATERIAL, PER 2008 NATIONAL ELECTRICAL CODE ARTICLE 250-12. ALL COPPER BUS BARS MUST BE CLEANED PRIOR TO MAKING CONNECTIONS TO REMOVE SURFACE OXIDATION.
  7. METALLIC RACEWAY FITTINGS SHALL BE MADE UP TIGHT TO PROVIDE A PERMANENT LOW 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 JUMPEES FOR ALL METAL CONDUITS ENTERING SERVICE EQUIPMENT (METER BASE, CT CABINET, MAIN SERVICE BREAKER ENCLOSURE, ETC.). PROVIDE GROUNDING BUSHINGS WITH BONDING JUMPEES 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 LOOKOUTS OR BUSHINGS SHALL NOT BE THE SOLE MEANS FOR BONDING WHERE A CONDUIT ENTERS AN ENCLOSURE THROUGH A CONCENTRIC OR ECCENTRIC KNOCKOUT
  8. ALL CONNECTIONS, LOCATED ABOVE GRADE, BETWEEN THE DIFFERENT TYPES OF GROUNDING CONDUCTORS SHALL BE MADE USING UL-LISTED DOUBLE COMPRESSION CRIMP TYPE CONNECTORS OR UL-LISTED BOLTED GROUND CONNECTORS. FOR GROUND CONNECTIONS TO ENCLOSURES, CASES AND FRAMES OF ELECTRICAL EQUIPMENT NOT SUPPLIED WITH GROUND LUGS THE CONTRACTOR SHALL DRILL REQUIRED HOLES FOR MOUNTING A BOLTED GROUND CONNECTOR. ALL BOLTED GROUND CONNECTORS SHALL BE BURNDY, THOMAS AND BETTS, OR EQUAL. TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUES IN UL STANDARD 486A TO ASSURE PERMANENT AND EFFECTIVE GROUNDING.
  9. ALL METAL EQUIPMENT ENCLOSURES, CONDUITS, CABINETS, BOXES, RECEPTACLES, MOTORS, ETC. SHALL BE BONDED TO THE RESPECTIVE GROUNDING SYSTEM.
  10. PROVIDE ALL BOXES FOR PROPOSED OUTLETS, SWITCHES, CIRCUIT BREAKERS, ETC. WITH GROUNDING SCREWS. PROVIDE ALL PANELEBOARD, SWITCHGEAR, ETC., ENCLOSURES WITH GROUNDING BARS WITH INDIVIDUAL SCREWS, LUGS, CLAMPS, ETC., FOR EACH OF THE GROUNDING CONDUCTORS THAT ENTER THEIR RESPECTIVE ENCLOSURES.
  11. EACH FEEDER CIRCUIT AND/OR BRANCH CIRCUIT SHALL INCLUDE AN EQUIPMENT GROUND WIRE. METAL RACEWAY OR CONDUIT SHALL NOT MEET THIS REQUIREMENT. THE EQUIPMENT GROUND WIRE FROM EQUIPMENT SHALL NOT BE SMALLER THAN ALLOWED BY 2008 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 2008 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 2008 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 POSITELY BONDED TO THE RESPECTIVE GROUNDING SYSTEM. CONDUIT CONNECTORS WILL NOT BE CONSIDERED AS ADEQUATE GROUNDING.
  14. 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 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 GROUND NEUTRAL CONDUCTOR, EXCEPT AT SUPPLY SIDE OF SERVICE DISCONNECTING MEANS, WHERE GROUNDING AND NEUTRAL SYSTEMS ARE TO BE CONNECTED TO SERVICE GROUND.
  15. EACH AND ALL GROUNDED CASED AND METAL PARTS ASSOCIATED WITH ELECTRICAL 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, OR EQUAL.
  17. BOND ALL NONCURRENT-CARRYING PARTS OF METAL EQUIPMENT TO GROUND SYSTEM.
  18. INSTALL GROUNDING ELECTRODE CONDUCTORS, LIGHTNING PROTECTION DOWN 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 ENCLOSE 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 GROUNDING OF GROUND CONDUCTORS. GROUNDING 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 GROUNDING 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.
  19. 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 2008 NEC 250-102. NOTE THIS DOES NOT APPLY TO AC EQUIPMENT GROUNDING CONDUCTORS RUN WITH AC CIRCUITS.
  20. WHERE A CONFLICT IS DETERMINED WITH RESPECT TO GROUNDING REQUIREMENTS PER MANUFACTURER INSTALLATION INSTRUCTIONS, NEC, AND/OR THE CONTRACT DOCUMENTS, CONTACT THE RESIDENT ENGINEER FOR FURTHER DIRECTIONS.



- NOTES:
1. TYPE AND MINIMUM NUMBER OF GROUND RODS SHALL BE AS SPECIFIED ON THE PLAN.
  2. THE RESISTANCE TO GROUND OF THE GROUNDING SYSTEM SHALL NOT EXCEED 25 OHMS.
  3. COST OF GROUND RODS IS INCIDENTAL TO THE ASSOCIATED ITEMS REQUIRING GROUNDING UNLESS OTHERWISE SPECIFIED.
  4. GROUND RODS SHALL BE SPACED AS DETAILED ON THE PLANS AND SHALL NOT BE SPACED LESS THAN ONE ROD LENGTH APART.

**GROUND ROD**  
(NOT TO SCALE)

No.	Drawing Issue Description	Date	By

Date: JANUARY 29, 2010  
Sheet Title

**GROUNDING NOTES**

09A10081	Project Number
07/07/09	Issued By
07/07/09	Designed By
1/25/10	Revised By
	Drawn By



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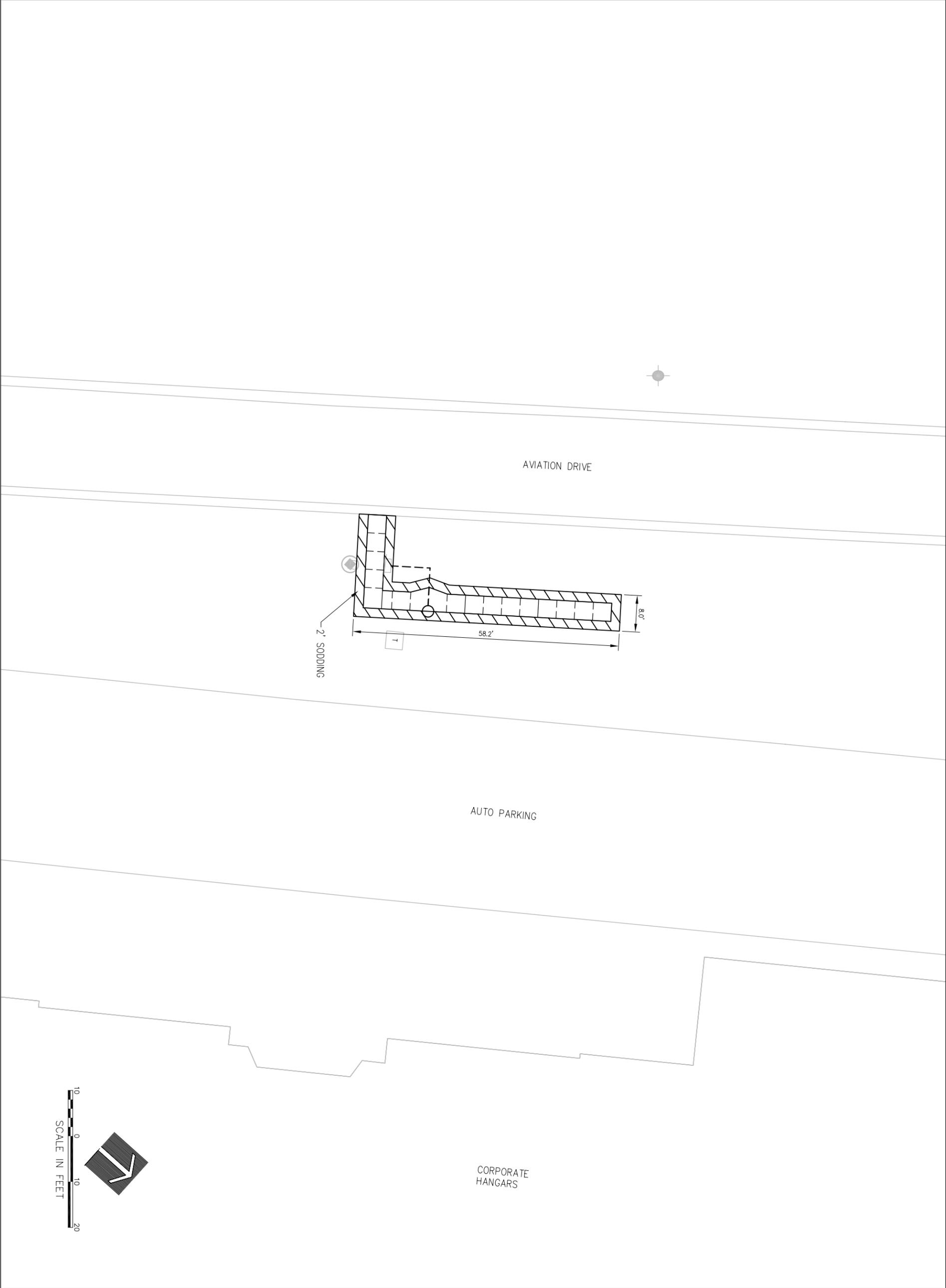
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**WAUKEGAN REGIONAL AIRPORT  
WAUKEGAN, ILLINOIS**

**REPLACE AIRPORT BEACON  
AND TOWER**

**AIP PROJECT NO. 3-17-0105-B47  
IDA PROJECT NO. UGN-3985**



WA062



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LANDSCAPING PLAN

09A0081  
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Landscape By Date  
LDH 06/29/09  
Designed By Date  
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Reviewed By Date  
LDH  
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