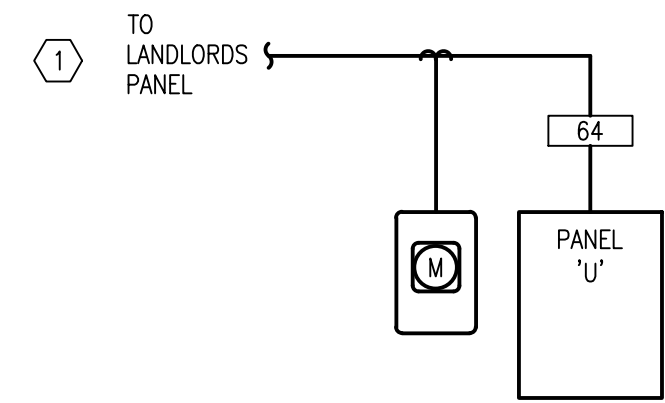


ELECTRICAL SYMBOL LEGEND	
SYMBOL	DESCRIPTION
\$	SINGLE POLE SINGLE THROW TOGGLE SWITCH
\$ IR	SINGLE POLE SINGLE THROW TOGGLE SWITCH WITH INTEGRAL OCCUPANCY SENSOR
Φ / □	DUPLEX / GFCI DUPLEX RECEPTACLE OUTLET
⓪ / Ⓢ / □	JUNCTION BOX, CEILING/WALL/FLOOR MOUNTED
	ARROWHEAD INDICATES HOMERUN. X-1,3,5 ADJACENT TO HOMERUN ARROWHEADS INDICATES HOMERUN TO PANEL X CIRCUIT NUMBERS 1,3, AND 5.
	RACEWAY/CABLE CONCEALED IN WALL AND/OR ABOVE CEILING
	RACEWAY CONCEALED BELOW GRADE OR IN-SLAB
	GROUNDING CONNECTION (SYSTEM AND/OR EQUIPMENT)
	CONDUIT TURNING UP/DOWN
	CONDUIT STUB. TERMINATE IN INSULATED BUSHING OR CAP IF UNDERGROUND
○ / ◯	LIGHTING FIXTURE – OVERHEAD/WALL MOUNTED
● / ⚡	EMERGENCY LIGHTING FIXTURE – OVERHEAD/WALL MOUNTED
●-□	POLE MOUNTED LIGHT FIXTURE WITH ARM. SEE PLANS FOR NUMBER OF LUMINAIRES.
■	PANELBOARD
ⓧ 60/3/3R	NONFUSIBLE DISCONNECT SWITCH, RATING/POLES/NEMA ENCLOSURE
ⓧ 60/3/3R/40	FUSIBLE DISCONNECT SWITCH, RATING/POLES/NEMA ENCLOSURE/FUSE RATING
CT	CURRENT TRANSFORMER CABINET
⓪	POWER METER AND SOCKET
▽	COMBINATION TELEPHONE/DATA OUTLET, WALL MOUNTED

PANELBOARD SCHEDULE - U																			
MAIN GDA MCB				VOLTAGE: 208/120				PHASE: 3				WIRE: 4				MOUNTING:			
OKT #	TRIP	LOAD (KVA)				PHASE				LOAD (KVA)				MISC				TRIP	OKT #
#	POLE	DESCRIPTION				LTG	REC	MTR	A/C	HTG	KIT	MISC	A	B	C	DESCRIPTION	POLE	#	
1	60/3	MAIN CIRCUIT														1.5	ATM	20/1	2
3	-	BREAKER											0.2				SECURITY RECEPTACLE	20/1	4
5	-												0.4				CANOPY LIGHTING	20/1	6
7	20/1	SPARE															SPARE	20/1	8
9	20/1	AREA LTG				0.8							0.2				LIGHTING CONTROLS	20/1	10
11	20/1	SPARE				0.1	0.2										SPARE	20/1	12
13	SPACE																SPACE		14
15	SPACE																SPACE		16
17	SPACE																SPACE		18
LIGHTING (KVA):				1.3	0.9	0.2	0.0	0.0	0.0	0.0		0.4	0.4	0.0	0.0	0.0	1.5	CONNECTED LOAD (KVA):	3.4
RECEPTACLES (KVA):				0.6														DEMAND LOAD (KVA):	3.4
MOTORS (KVA):				0.0															
A/C (KVA):				0.0					PHASE A	2	12.5							CONNECTED LOAD (AMPS):	9.3
HEATING (KVA):				0.0					PHASE B	1	9.7							DEMAND LOAD (AMPS):	9.3
KITCHEN (KVA):				0.0					PHASE C	1	5.8								
MISCELLANEOUS (KVA):				1.5							KVA	AMPS						AMPACITY REQUIRED:	10.2

LIGHTING FIXTURE SCHEDULE			
TYPE	DESCRIPTION	MANUFACTURER CATALOG NO.	LAMPS
A	4" LED STRIP	LITHONIA ZL2N-L48-2000-MDD-120-40K-80	32W LED
D-1	RECESSED LED CANOPY LIGHT	E-CONOLIGHT E-CSA02A-50W	28W LED
S-1	AREA LIGHTING LED FIXTURE ON 10' POLE	LITHONIA DSXWPM-LED-20C-700-40K-T5M-MVOLT	47W LED
W-1	WALL MOUNTED LED LUMINAIRE AT 15'	LITHONIA DSX21-LED-20C-700-40K-T2M-MVOLT	47W LED

NOTES:
1. ALL LIGHTING FIXTURES MAY NOT NECESSARILY BE USED.
2. ALL FIXTURES SHALL BE UL LISTED.
3. ALL OUTDOOR EMERGENCY FIXTURES SHALL BE DAMP AND/OR WET LOCATION LISTED (AS APPLICABLE TO INSTALLATION) AND SHALL BE PROVIDED WITH 0F, COLD WEATHER BALLASTS AND DRIVERS (FLUORESCENT, HID, AND LED FIXTURES).
4. ALL EXTERIOR AND SITE/LANDSCAPE LIGHTING MUST ADHERE TO ALL LOCAL LIGHTING ORDINANCES AND REQUIREMENTS. PROVIDE SHIELDING, GLARE CONTROL, HARDWARE OPTIONS AND ACCESSORIES AS NECESSARY TO COMPLY.
5. FINAL APPROVAL OF ALL LIGHT FIXTURES TO BE BY THE ARCHITECT AND OWNER DURING SUBMITTAL PHASE AND PRIOR TO ANY ORDERING, PURCHASE OR INSTALLATION OF LIGHT FIXTURES.



KEY NOTES:

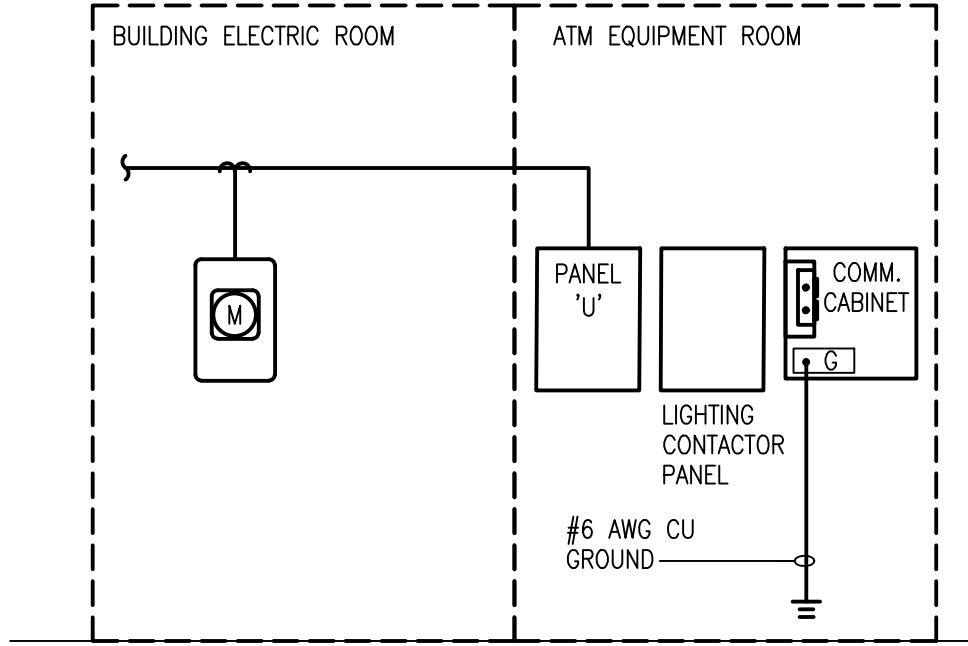
1. CONNECT PANEL TO LANDLORDS PANEL WITH NEW 60 AMP, 3 POLE BREAKER IN EXISTING SPACE. NEW BREAKER SHALL MATCH A/C RATING OF EXISTING EQUIPMENT. PROVIDE FEEDER AS INDICATED.

CIRCUIT SCHEDULE:

ALL CONDUCTOR SIZES ARE BASED ON 75 DEG C RATED TERMINATION AND COPPER CONDUCTORS WITH TYPE THHN/THWN-2 INSULATION.

64 60A, (4) #6, #8 G. IN 1-1/4".

1 RISER DIAGRAM
SCALE: NONE



2 EQUIPMENT ELEVATION
SCALE: NONE

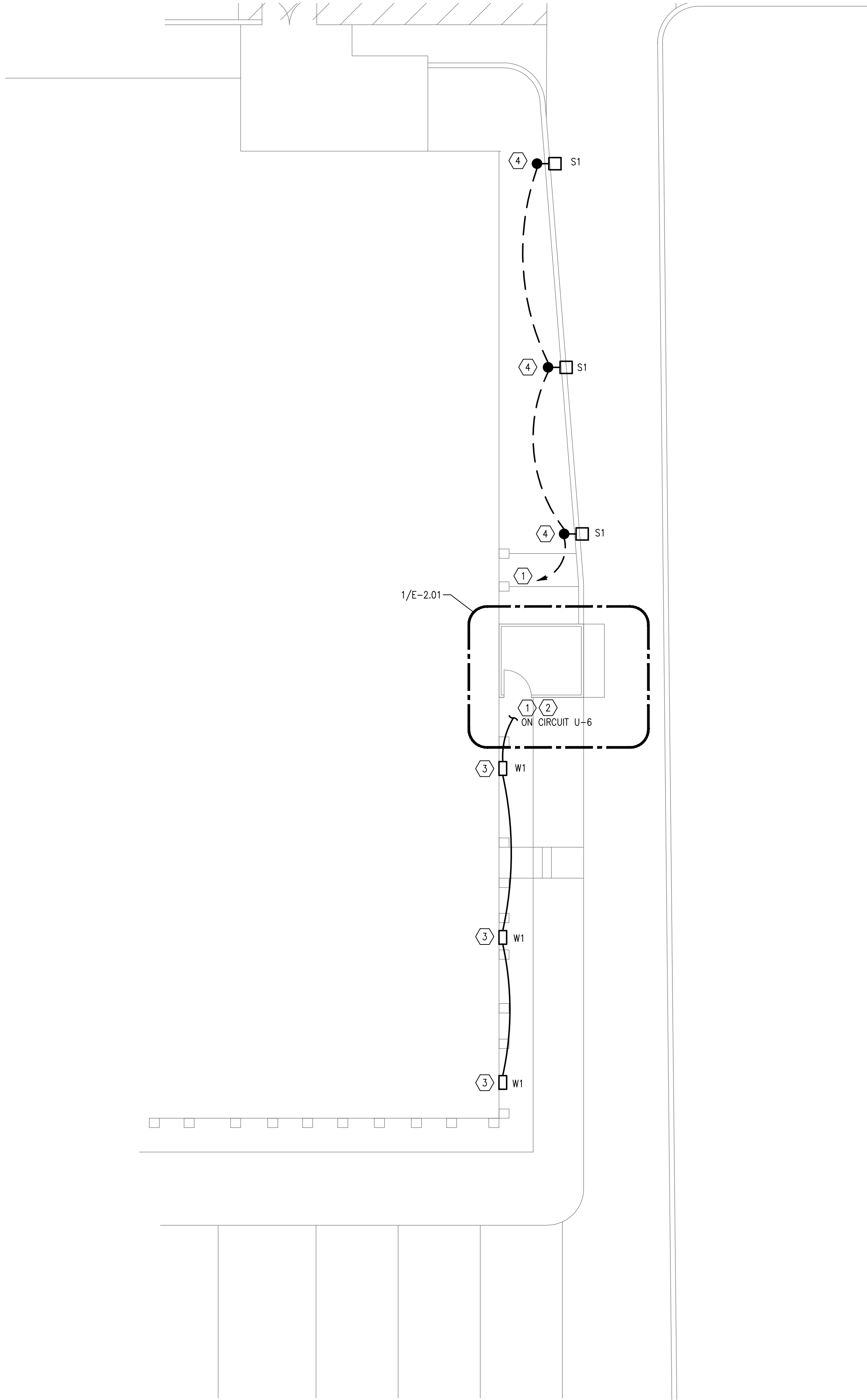


USAA ATM
527 MAPLE EAST
VIENNA, VA 22180



Issue #	Date	Description

LEGENDS, NOTES,
& SCHEDULES



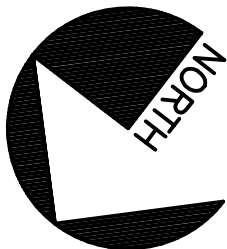
- GENERAL NOTES:
- G-1 ALL WORK SHALL COMPLY WITH APPLICABLE NATIONAL, STATE AND LOCAL CODES, RULES, REGULATIONS AND REQUIREMENTS OF THE SERVICE UTILITY COMPANY.
- G-2 GENERAL CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS OCCUR BETWEEN ELECTRICAL SYSTEMS AND SYSTEMS OF ANY OTHER TRADE. DO NOT PROCEED WITH INSTALLATION IN THAT AREA UNTIL CONFLICT HAS BEEN RESOLVED TO THE SATISFACTION OF THE ENGINEER.
- G-3 ALL CONDUCTORS FOR SITE CIRCUITS SHALL BE #10 AWG UNLESS NOTED OTHERWISE.
- G-4 ALL WIRING CONDUCTORS SHALL BE COPPER.

- KEY NOTES:
- ① PROVIDE CIRCUIT AS INDICATED FOR EXTERIOR LIGHTING. CIRCUIT SHALL BE CONTROLLED BY LIGHTING CONTROL PANEL. LIGHTING SHALL BE TURN ON AT SUNSET AND TURN ON AT SUNRISE..
- ② CIRCUIT SHALL BE CONNECTED TO CANOPY LIGHT OVER ATM. REFERENCE SHEET E-2.01.
- ③ WALL MOUNTED LUMINAIRES SHALL BE INSTALLED AT 15 FEET.
- ④ AREA LIGHTING POLES TO BE INSTALLED BETWEEN TREES. CANOPY OF TREES SHALL BE TRIMMED TO ALLOW SPACE FOR 10' LIGHT POLE.

1

PARTIAL SITE PLAN — ELECTRICAL

SCALE: 1/8" = 1'-0"

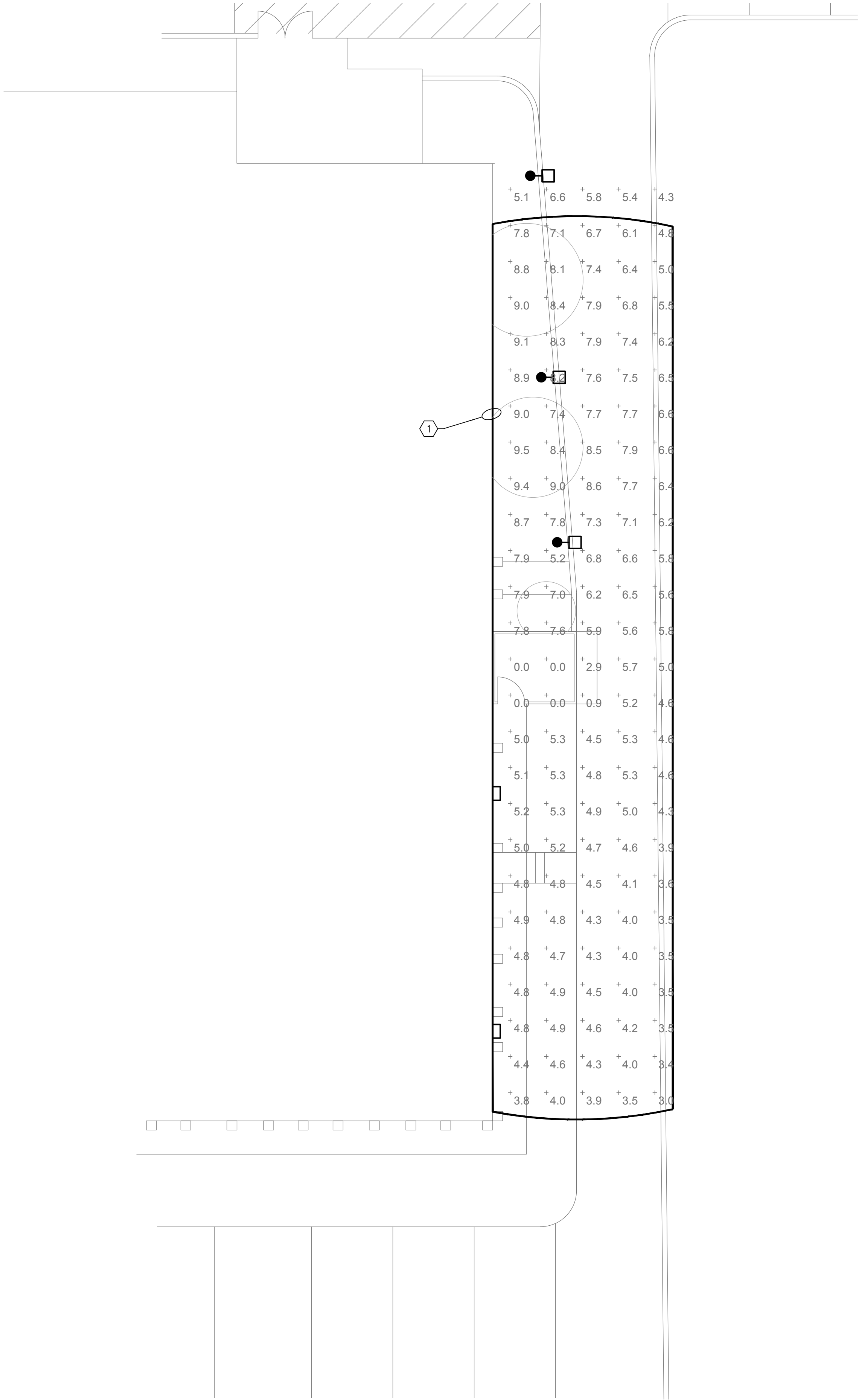


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Issue #	Date	Description

SITE PLAN -
ELECTRICAL



KEY NOTES:

① ATM LIGHTING COMPLIANCE ZONE.



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TDRS Firm # 8513 • TDRS Firm # 1012200



Issue #	Date	Description

PHOTOMETRIC PLAN

PERMIT SET
JOB NO. 206-KA-09
DATE: DECEMBER 12, 2017

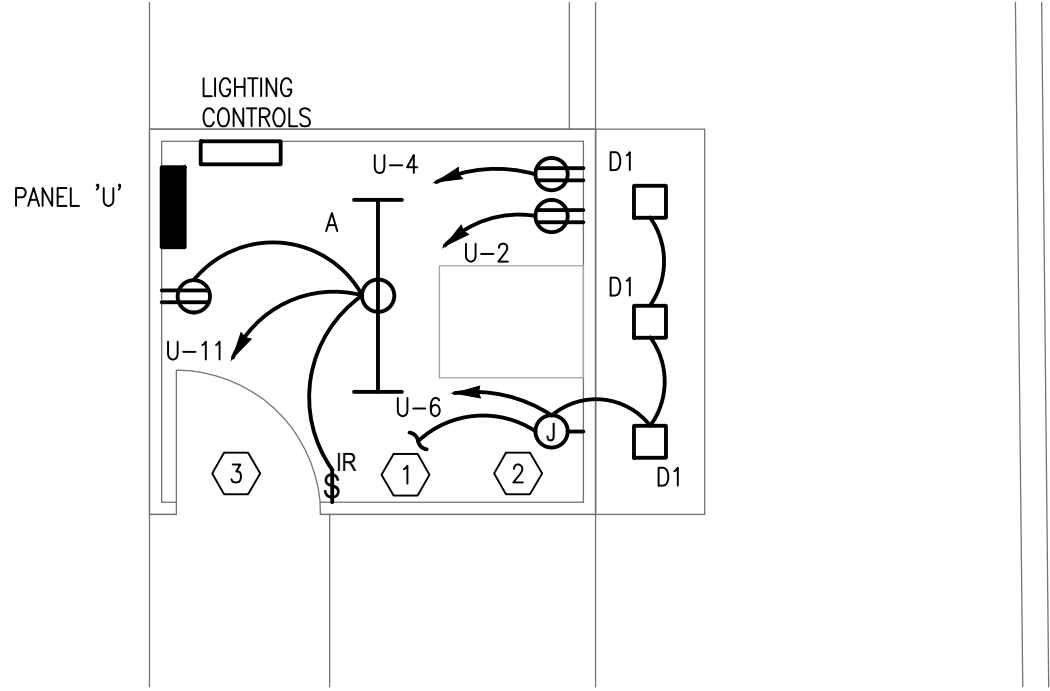
E-1.02

1

PHOTOMETRIC PLAN

SCALE: 1/8" = 1'-0"





1 ATM PLAN — ELECTRICAL
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

- G-1 ALL WORK SHALL COMPLY WITH APPLICABLE NATIONAL, STATE AND LOCAL CODES, RULES, REGULATIONS AND REQUIREMENTS OF THE SERVICE UTILITY COMPANY.
- G-2 GENERAL CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS OCCUR BETWEEN ELECTRICAL SYSTEMS AND SYSTEMS OF ANY OTHER TRADE. DO NOT PROCEED WITH INSTALLATION IN THAT AREA UNTIL CONFLICT HAS BEEN RESOLVED TO THE SATISFACTION OF THE ENGINEER.
- G-3 ALL CONDUCTORS FOR SITE CIRCUITS SHALL BE #10 AWG UNLESS NOTED OTHERWISE.
- G-4 ALL WIRING CONDUCTORS SHALL BE COPPER.

KEY NOTES:

- 1 CONTINUE CIRCUIT TO WALL MOUNTED LIGHTS ON BUILDING. REFERENCE E-1.01.
- 2 JUNCTION BOX FOR LIGHTING IN ATM SURROUND.
- 3 ALL EXISTING WIRING DEVICES SHALL BE REMOVED. ALL NEW WORK SHALL BE CONNECTED TO NEW PANEL 'U'.



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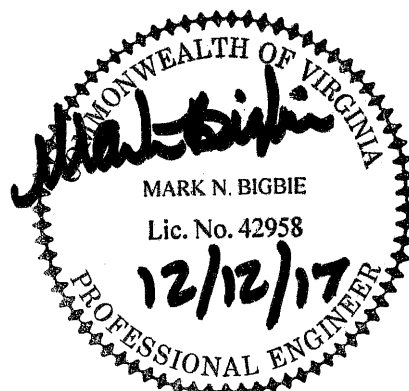


Issue #	Date	Description

SITE PLAN -
ELECTRICAL



USAA ATM
527 MAPLE EAST
VIENNA, VA 22180



JSE

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Project Number - 173-0849

Drawn By: DM

Texas Firm Registration # F-4990

Checked By: MB

Issue #	Date	Description

ELECTRICAL
SPECIFICATIONS

PERMIT SET
FOR NO. 28-04-09
DATE: DECEMBER 12, 2017

E-3.01

2.2 BUSHINGS AND LOCKNUTS

A. RIGIDLY TERMINATE CONDUITS ENTERING SHEET METAL ENCLOSURES TO THE ENCLOSURE WITH A BUSHING AND LOCKNUT ON THE INSIDE AND A LOCKNUT OR AN APPROVED HUB ON THE OUTSIDE. CONDUIT SHALL ENTER THE ENCLOSURE SQUARELY.

B. PROVIDE BUSHINGS AND LOCKNUTS MADE OF GALVANIZED MALLEABLE IRON WITH SHARP, CLEAN-CUT THREADS.

C. USE INSULATED, GROUNDING, OR COMBINATION, BUSHINGS WHEREVER CONNECTION IS SUBJECT TO VIBRATION OR MOISTURE, WHEN REQUIRED BY NFPA 70, OR BOTH.

2.3 CONDUCTORS AND CABLES

A. CONDUCTOR MATERIAL:

1. ANNEALED (SOFT) COPPER COMPLYING WITH ICEA 5-95-658/NEMA WC70;

a. TERMINATIONS: TINNED, [COMPRESSION] [MECHANICAL] TYPE ONLY; UL-LISTED FOR COPPER CONDUCTORS AT 75 DEGREES C MINIMUM.

2. CONDUCTOR INSULATION TYPES: 90-DEGREE C-RATED, TYPE THHN/THWN-2 OR XHHW-2 COMPLYING WITH ICEA 5-95-658/NEMA WC70.

3. SIZES OF CONDUCTORS AND CABLES INDICATED OR SPECIFIED ARE IN AMERICAN WIRE GAGE (AWG - BROWN AND SHARPE).

4. ALL FEEDER AND BRANCH CIRCUIT CONDUCTORS NO. 8 AWG AND LARGER: STRANDED.

5. ALL CONDUCTORS, NO. 10 & 12 AWG: SOLID OR STRANDED COPPER.

6. ALL BRANCH CIRCUIT WIRING; NOT SMALLER THAN NO. 12 AWG. IF NO CONDUCTOR SIZE IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE CONDUCTORS AND CONDUIT SIZED PER NFPA 70 AND BASED ON THE INDICATED BRANCH CIRCUIT OVERCURRENT PROTECTIVE DEVICE (OCPD) RATING AND NUMBER OF POLES. WHERE NO CIRCUIT SIZE (I.E., CONDUCTORS AND OCPD) IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE THREE NO. 12 AWG CONDUCTORS, IN 3/4-INCH RACEWAY, AND A 20A CIRCUIT BREAKER.

B. INSTALLATION OF CONDUCTORS AND CABLES

1. INSTALL ALL WIRING IN APPROVED RACEWAY AND ENCLOSURES.

2. INSTALL ALL CONDUCTORS AND CABLE IN RACEWAYS CONTINUOUS WITHOUT TAPS OR SPLICES. SPLICE OR TAP ONLY IN APPROVED BOXES AND ENCLOSURES WITH APPROVED SOLDERLESS CONNECTORS, OR CRIMP CONNECTORS AND TERMINAL BLOCKS FOR CONTROL WIRING, AND KEEP TO THE MINIMUM REQUIRED. INSULATE ALL SPLICES, TAPS, AND JOINTS AS REQUIRED BY CODES.

3. ALL MATERIALS USED TO TERMINATE, SPLICE OR TAP CONDUCTORS: DESIGNED FOR, PROPERLY SIZED FOR, AND UL LISTED FOR THE SPECIFIC APPLICATION AND CONDUCTORS INVOLVED, AND INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, USING THE MANUFACTURER'S RECOMMENDED TOOLS.

4. THE DIRECTION OF BRANCH CIRCUIT "HOME RUN" ROUTING IS INDICATED ON THE DRAWINGS, COMPLETE WITH CIRCUIT NUMBERS AND PANELBOARD DESIGNATION. CONTINUE ALL SUCH "HOME RUN" WIRING TO THE DESIGNATED PANELBOARD, AS THOUGH "CIRCUIT RUNS" WERE INDICATED IN THEIR ENTIRETY.

5. MULTI-WIRE BRANCH CIRCUITS (I.E., SHARED NEUTRALS) ARE NOT ALLOWED FOR THIS INSTALLATION. ALL BRANCH CIRCUITS SHALL HAVE DEDICATED NEUTRAL CONDUCTORS.

6. WHEN MULTIPLE HOME RUNS ARE COMBINED INTO A SINGLE RACEWAY SUCH THAT THE NUMBER OF CONDUCTORS EXCEEDS FOUR (CONDUCTOR COUNT IS MADE UP OF ANY COMBINATION OF PHASE AND NEUTRAL CONDUCTORS), THE FOLLOWING RESTRICTIONS APPLY, WHICH ARE IN ADDITION TO THOSE IN NFPA 70:

a. MAXIMUM OF 16 CONDUCTORS IN A SINGLE RACEWAY. FOR UP TO EIGHT CONDUCTORS IN A RACEWAY, MINIMUM RACEWAY SIZE: 3/4-INCH. FOR GREATER THAN EIGHT CONDUCTORS, MINIMUM RACEWAY SIZE: 1-INCH.

b. THE MINIMUM WIRE SIZE FOR ALL CONDUCTORS IN THIS RACEWAY: NO. 10 AWG.

c. ONLY 15A AND 20A BRANCH CIRCUIT HOMERUNS MAY BE COMBINED INTO ONE RACEWAY.

7. PROVIDE AN EQUIPMENT-GROUNDING CONDUCTOR, OR BONDING JUMPER, AS APPLICABLE, IN ALL FEEDERS AND BRANCH CIRCUITS, SIZED IN ACCORDANCE WITH NFPA 70 TABLES 250.66 OR 250.122, AS APPLICABLE, UNLESS INDICATED AS LARGER ON THE DRAWINGS.

8. WIRING SHALL HAVE INSULATION OF THE PROPER COLOR TO MATCH COLOR CODE SYSTEM IN THE TABLE BELOW. IN LARGER SIZES, WHERE PROPERLY COLORED INSULATION IS NOT AVAILABLE, USE VINYL PLASTIC ELECTRICAL TAPE OF THE APPROPRIATE COLOR AROUND EACH CONDUCTOR AT ALL TERMINATION POINTS, JUNCTION AND PULL BOXES.

a. 208/120V, THREE PHASE SYSTEM

PHASE A - BLACK

PHASE B - RED

PHASE C - BLUE

NEUTRAL - WHITE

EQUIPMENT GROUND GREEN

9. USE OF MC CABLE: MC CABLE MAY NOT BE USED FOR THIS INSTALLATION.

2.4 JUNCTION BOXES, PULL BOXES, CABINETS AND WIREWAYS

A. PROVIDE JUNCTION BOXES, PULL BOXES, CABINETS AND WIREWAYS WHEREVER NECESSARY FOR PROPER INSTALLATION OF VARIOUS ELECTRICAL SYSTEMS ACCORDING TO NFPA 70 AND WHERE INDICATED ON THE DRAWINGS. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. CONSTRUCTION SHALL BE OF A NEMA DESIGN SUITABLE FOR THE ENVIRONMENT INSTALLED.

2.5 OUTLET BOXES

A. ALL OUTLETS INCLUDING LIGHT FIXTURE, SWITCH, RECEPTACLE, AND SIMILAR OUTLETS: NATIONAL ELECTRICAL, APPLETON, STEEL CITY, RACO, OR APPROVED EQUAL, GALVANIZED STEEL KNOCKOUT BOXES, SUITABLE IN DESIGN TO THE PURPOSE THEY SERVE AND THE SPACE THEY OCCUPY. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. SET ALL OUTLET BOXES SO THEY ARE FLUSH WITH THE FINISHED SURFACE, ACCURATELY SET, AND RIGIDLY SECURED IN POSITION. PROVIDE EXTENSION RINGS AND/OR MASONRY RINGS AS REQUIRED FOR FLUSH MOUNTING. PROVIDE APPROVED CAST OUTLET BOXES, WITH HUBS AND WEATHERPROOF COVERS, IN ALL AREAS SUBJECT TO DAMP, WET, OR HARSH CONDITIONS.

2.6 OUTLET LOCATIONS

A. COORDINATE LOCATIONS OF OUTLET BOXES, OUTLETS ARE ONLY APPROXIMATELY LOCATED ON THE SMALL SCALE DRAWINGS. USE GREAT CARE IN THE ACTUAL LOCATION BY CONSULTING THE VARIOUS LARGE SCALE DETAILED DRAWINGS USED BY OTHER DIVISION TRADES, AND BY SECURING DEFINITE LOCATIONS FROM THE ENGINEER.

B. RECEPTACLES: INSTALL WHERE LOCATED ON PLANS.

C. SWITCHES: INSTALL WHERE LOCATED ON PLANS.

2.7 WIRING DEVICES

A. WIRING DEVICES SHALL BE 20A RATED DEVICES.

B. ALL RECEPTACLES LOCATED OUTDOORS OR IN DAMP OR WET LOCATIONS: SHALL BE LISTED AS "WEATHER RESISTANT," DESIGNATED BY A "W" ON THE FACEPLATE.

C. PROVIDE WIRING DEVICES WHERE SHOWN ON DRAWINGS OR REQUIRED; MINOR CHANGES RELATIVE TO THE LOCATION OF ELECTRICAL EQUIPMENT MAY BE MADE TO COMPLY WITH REQUIREMENTS AS DETERMINED IN THE COURSE OF CONSTRUCTION. WIRING DEVICES SHALL BE PROVIDED BY THE SAME MANUFACTURER AND NOT MIXED ON THE PROJECT.

2.8 SWITCH AND OUTLET COVER PLATES

A. SWITCH AND OUTLET PLATES:

1. BY THE SAME MANUFACTURER AS THE WIRING DEVICES, WHEREVER POSSIBLE. VERIFY DESIRED MATERIALS AND COLORS WITH ENGINEER BEFORE INSTALLATION.

B. WEATHERPROOF COVER PLATES:

1. PROVIDE GFCI RECEPTACLES FOR DESIGNATED WEATHERPROOF RECEPTACLES, UNLESS INDICATED OTHERWISE ON THE DRAWINGS.

2. FOR EXTERIOR UNATTENDED, WET LOCATIONS OR OTHER LOCATIONS AS INDICATED: IN-USE NEMA 3R RECESSED OR FLUSH MOUNT, UL-LABELED PLATES MOLDED FROM A CLEAR HIGH IMPACT ULTRAVIOLET STABILIZED POLYCARBONATE MATERIAL FOR EASY VERIFICATION THAT CORDS ARE PLUGGED IN AND THAT THE GFCI IS FUNCTIONING. BACK BOX MUST BE SUITABLE FOR CONDUIT CONNECTING, COORDINATE BACK BOX WITH WALL DEPTH, INTERMATIC WF1000CR/HRC OR EQUAL.

3. FOR ATTENDED WET OR DAMP LOCATIONS: WEATHERPROOF COVER PLATES, UL-LISTED FOR WET LOCATIONS WITH COVER(S) CLOSED; DIE-CAST ALUMINUM OR TYPE 302 STAINLESS STEEL; SLIDE-COVER FOR SWITCHES AND VERTICALLY MOUNTED RECEPTACLES; DOUBLE-COVER FOR HORIZONTALLY MOUNTED RECEPTACLES; SELF-CLOSING COVERS.

4. COVER PLATES: BY THE SAME MANUFACTURER AS THE WIRING DEVICES; COMPLYING WITH NFPA 70 406.8 (A) OR (B) REQUIREMENTS FOR ATTENDED OR UNATTENDED USE AS APPLICABLE.

2.9 DISTRIBUTION EQUIPMENT

A. SERVICE ENTRANCE CIRCUIT BREAKER - ENCLOSED, 100A - 6000A

B. ENCLOSED CIRCUIT BREAKER: SQUARE D TYPE NODD OR NF, AS APPLICABLE, BASED ON VOLTAGE AND AMPERE RATINGS AND REQUIRED SHORT-CIRCUIT INTERRUPTING RATINGS AS SCHEDULED ON THE DRAWINGS, OR APPROVED EQUAL BY SIEMENS, CUTLER HAMMER, OR GENERAL ELECTRIC, COMPLETE WITH THERMAL MAGNETIC, MOLDED CASE CIRCUIT BREAKERS ASSEMBLED IN A DEAD-FRONT FINISHED CABINET CONTAINING A TYPEWRTEN CARD DIRECTORY INDICATING EXACTLY WHAT EACH CIRCUIT BREAKER CONTROLS; FULLY-RATED AND WITH THE INTEGRATED SHORT CIRCUIT CURRENT RATINGS INDICATED ON THE DRAWINGS. PLUS-IN-TYPE BREAKERS WILL NOT BE ACCEPTABLE. ALL TWO POLE BREAKERS: COMMON TRIP TYPE. BREAKERS USED AS SWITCHES FOR 120V LIGHTING CIRCUITS: APPROVED FOR THE PURPOSE AND MARKED "SMD," BREAKERS USED.

SUBMITTAL FORM, WITH A LIST OF PROPOSED SUBSTITUTIONS TOGETHER WITH A DEDUCT PRICE FOR EACH SUBSTITUTION. THE ENGINEER WILL THEN REVIEW THE PROPOSED SUBSTITUTIONS.

D. THE ENGINEER WILL HAVE THE FINAL AUTHORITY AS TO WHETHER THE LIGHT FIXTURE IS AN ACCEPTABLE REPLACEMENT TO THE SPECIFIED ITEM. THE PROPOSED SUBSTITUTION MAY ALSO BE REJECTED BY THE ARCHITECT, THE ENGINEER OR THE OWNER FOR AESTHETIC REASONS IF FELT NECESSARY OR DESIRABLE. IN THE EVENT THE PROPOSED SUBSTITUTIONS HEREIN DESCRIBED ARE REJECTED, FURNISH THE SPECIFIED ITEM.

1.10 SUBMITTALS

A. ASSEMBLE AND SUBMIT FOR ENGINEER'S REVIEW, MANUFACTURERS' PRODUCT LITERATURE FOR MATERIAL AND EQUIPMENT TO BE FURNISHED, INSTALLED, OR BOTH, UNDER THIS DIVISION, INCLUDING SHOP DRAWINGS, MANUFACTURERS' PRODUCT DATA AND PERFORMANCE SHEETS, AND OTHER SUBMITTALS REQUIRED BY THIS DIVISION. HIGHLIGHT, MARK, LIST OR INDICATE THE MATERIALS, PERFORMANCE CRITERIA AND ACCESSORIES THAT ARE BEING PROPOSED. BEFORE SUBMITTING, VERIFY THAT ALL MATERIALS AND EQUIPMENT SUBMITTED ARE MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE, FIT THE AVAILABLE SPACES, AND ALLOW AMPLE AND CODE-REQUIRED ROOM FOR ACCESS AND MAINTENANCE. SUBMITTALS SHALL CONTAIN THE FOLLOWING INFORMATION. SUBMITTALS NOT SO IDENTIFIED WILL BE RETURNED TO THE CONTRACTOR WITHOUT ACTION.

1. THE PROJECT NAME.

2. THE APPLICABLE SPECIFICATION SECTION AND PARAGRAPH.

3. THE SUBMITAL DATE.

B. THE CONTRACTOR'S STAMP, WHICH SHALL CERTIFY THAT THE STAMPED DRAWINGS HAVE BEEN CHECKED BY THE CONTRACTOR, COMPLY WITH THE DRAWINGS AND SPECIFICATIONS, AND HAVE BEEN COORDINATED WITH OTHER TRADES.

C. SUBMITTALS AND SHOP DRAWINGS SHALL NOT CONTAIN CTS GROUP FIRM NAME OR LOGO, NOR SHALL IT CONTAIN THE CTS GROUP ENGINEERS' SEAL AND SIGNATURE. THE SUBMITTALS SHALL NOT BE COPIES OF THE ENGINEERS WORK PRODUCT.

D. TRANSMIT SUBMITTALS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT SCHEDULE. ALLOW FOR TWO WEEKS ENGINEER REVIEW TIME, PLUS MAILING TIME, PLUS A DUPLICATION OF THIS TIME FOR RESUBMITTALS, IF REQUIRED. TRANSMIT SUBMITTALS AS SOON AS POSSIBLE AFTER NOTICE TO PROCEED AND BEFORE CONSTRUCTION STARTS. THE ENGINEER'S SUBMITTAL REVIEWS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, OR QUANTITIES, OR FOR OMITTING COMPONENTS OR FITTINGS; OR FOR NOT COORDINATING ITEMS WITH UNFORESEEN CONDITIONS.

E. ELECTRONIC SUBMITTALS ARE REQUIRED FOR THIS PROJECT. THE CONTRACTOR SHALL SUBMIT THE DOCUMENTS IN ACCORDANCE WITH THE OWNER'S PROCEDURES. CONTRACTOR SHALL NOTIFY THE ENGINEER THAT THE SHOP DRAWINGS HAVE BEEN POSTED TO THE PROJECT FTP SITE. IF ELECTRONIC SUBMITTAL PROCEDURES ARE NOT DEFINED, CONTRACTOR SHALL INCLUDE THE WEBSITE, USER NAME AND PASSWORD INFORMATION NEEDED TO ACCESS THE SUBMITTALS. FOR SUBMITTALS SENT BY E-MAIL, CONTRACTOR SHALL COPY THE ENGINEER'S DESIGNATED REPRESENTATIVES. CONTRACTOR SHALL ALLOW THE ENGINEER REVIEW TIME AS SPECIFIED ABOVE IN THE CONSTRUCTION SCHEDULE. CONTRACTOR SHALL SUBMIT ONLY THE DOCUMENTS REQUIRED TO PURCHASE THE MATERIALS AND/OR EQUIPMENT IN THE ELECTRONIC SUBMITTAL AND SHALL CLEARLY INDICATE THE MATERIALS PERFORMANCE CRITERIA AND ACCESSORIES BEING PROPOSED. GENERAL PRODUCT CATALOG DATA NOT SPECIFICALLY NOTED TO BE PART OF THE SPECIFIED PRODUCT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.

1.11 OPERATION AND MAINTENANCE INSTRUCTIONS

A. SUBMIT FOR ENGINEER'S REVIEW, COPIES EACH OF OPERATIONS AND MAINTENANCE INSTRUCTION MANUALS, APPROPRIATELY BOUND INTO MANUAL FORM INCLUDING APPROVED COPIES OF THE FOLLOWING, REVISED IF NECESSARY TO SHOW SYSTEM AND EQUIPMENT AS ACTUALLY INSTALLED: PROVIDE THE NUMBER OF SUBMITTALS REQUIRED BY DIVISION 1; HOWEVER, AT A MINIMUM, SUBMIT THREE (3) SETS, AND INCLUDE, AT A MINIMUM, THE FOLLOWING INFORMATION:

1. MANUFACTURERS' CATALOGS AND PRODUCT DATA SHEETS.

2. WIRING DIAGRAMS.

3. MAINTENANCE INSTRUCTIONS.

4. OPERATING INSTRUCTIONS.

5. PARTS LISTS.

6. TEST REPORTS AS DEFINED IN NETA ATS FOR THE SYSTEMS AND EQUIPMENT PROVIDED OR FURNISHED OR INSTALLED UNDER THIS CONTRACT.

7. NAMES, ADDRESSES, TELEPHONE NUMBERS, AND E-MAIL ADDRESSES OF LOCAL CONTACTS FOR WARRANTY SERVICES AND SPARE PARTS.

B. SCHEDULE TRAINING WITH OWNER WITH AT LEAST 7 DAYS' ADVANCE NOTICE.

1.13 WARRANTIES

A. WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, DESIGN OR MATERIAL, FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THE CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS, OCCURRING WITHIN THE WARRANTY PERIOD(S), AS STATED IN THE GENERAL CONDITIONS.

B. ALSO WARRANT THE FOLLOWING ADDITIONAL ITEMS:

1. ALL RACEWAYS ARE FREE FROM OBSTRUCTIONS, HOLES, CRUSHING, OR BREAKS OF ANY NATURE.

2. ALL RACEWAY SEALS ARE EFFECTIVE.

3. THE ENTIRE ELECTRICAL SYSTEM IS FREE FROM ALL SHORT CIRCUITS AND UNWANTED OPEN CIRCUITS AND GROUNDS.

C. THE ABOVE WARRANTIES SHALL INCLUDE LABOR AND MATERIAL. MAKE REPAIRS OR REPLACEMENTS WITHOUT ANY ADDITIONAL COSTS TO THE OWNER.

D. PERFORM THE REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER.

E. AT THE TIME OF SUBSTANTIAL COMPLETION, DELIVER TO THE OWNER ALL WARRANTIES, IN WRITING AND PROPERLY EXECUTED, INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND THE ONE YEAR PERIOD, EACH WARRANTY INSTRUMENT BEING ADDRESSED TO THE OWNER AND STATING THE COMMENCEMENT DATE AND TERM.

PART 2 – ELECTRICAL MATERIALS AND METHODS

2.1 RACEWAYS

A. METALLIC CONDUIT AND TUBING:

1. INTERMEDIATE METAL CONDUIT (IMC): HOT-DIP GALVANIZED RIGID STEEL CONDUIT: ANSI C80.6, UL 1242.

2. LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC): FLEXIBLE STEEL CONDUIT WITH PVC JACKET: UL 360.

3. RIGID METAL CONDUIT (RMC): HOT-DIP GALVANIZED RIGID STEEL CONDUIT (GRS): ANSI C80.1, UL 6.

B. NON-METALLIC CONDUIT AND TUBING:

1. RIGID NONMETALLIC CONDUIT (RNC): SCHEDULE 40 PVC, 90 DEG C RATED, NEMA TC-2, UL 651; FITTINGS: NEMA TC 3, TC 6; UL 514, COMPATIBLE WITH CONDUIT/TUBING TYPE AND MATERIAL, UL LISTED.

2. LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC): UL 1660.

3. LFNC FITTINGS: COMPATIBLE WITH CONDUIT/TUBING TYPE AND MATERIAL, UL LISTED.

C. RACEWAY INSTALLATION

1. ABOVE GROUND USE:

a. PROVIDE GRS FOR ALL CONDUITS RUN EXPOSED TO WEATHER.

2. UNDERGROUND USE:

a. PROVIDE GRS INSTALLED BELOW GRADE WITH A CORROSION RESISTANT BONDED-PLASTIC OR APPROVED MASTIC COATING. THIS SHALL INCLUDE THE 90-DEGREE ELBOW BELOW GRADE AND THE ENTIRE VERTICAL TRANSITION TO ABOVE GRADE.

b. RNC CONDUIT MAY BE USED UNDERGROUND WHERE PERMITTED BY LOCAL CODE AND WHERE NOT SPECIFICALLY RESTRICTED BY THESE DOCUMENTS. WHEN USED, PROVIDE COATED GRS AS SPECIFIED ABOVE, FOR ALL BENDS GREATER THAN 30 DEGREES, INCLUDING THE 90-DEGREE ELBOWS BELOW GRADE AND THE ENTIRE VERTICAL RISERS FOR TRANSITIONS FROM BELOW TO ABOVE GRADE OR ABOVE-SLAB.

3. GENERAL RACEWAY INSTALLATION REQUIREMENTS:

a. INSTALL RACEWAYS SET IN FORMS FOR CONCRETE STRUCTURE IN SUCH A MANNER THAT INSTALLATION WILL NOT AFFECT THE STRENGTH OF THE STRUCTURE.

b. INSTALL RACEWAYS CONTINUOUS BETWEEN CONNECTIONS TO OUTLETS, BOXES AND CABINETS WITH A MINIMUM POSSIBLE NUMBER OF BENDS AND NOT MORE THAN THE EQUIVALENT OF FOUR 90-DEGREE BENDS BETWEEN CONNECTIONS. USE MANUFACTURED ELBOWS FOR ALL 45- AND 90-DEGREE BENDS, UNLESS APPROVED BY THE ENGINEER IN ADVANCE. MAKE OTHER BENDS SMOOTH AND EVEN AND WITHOUT FLATTENING RACEWAY OR FLAKING GALVANIZING OR ENAMEL. RADI OF BENDS SHALL BE AS LONG AS POSSIBLE AND NEVER SHORTER THAN THE CORRESPONDING TRADE ELBOW.

c. USE LONG RADIUS ELBOWS FOR ALL UNDERGROUND INSTALLATIONS, WHERE NECESSARY OR INDICATED.

d. REAM RACEWAY ENDS, THOROUGHLY CLEAN RACEWAYS BEFORE INSTALLATION, AND KEEP CLEAN AFTER INSTALLATION. PLUG OR COVER OPENINGS AND BOXES AS REQUIRED TO KEEP RACEWAYS CLEAN DURING CONSTRUCTION AND FISH ALL RACEWAYS CLEAR OF OBSTRUCTIONS BEFORE PULLING CONDUCTORS WIRES. PROVIDE RACEWAYS OF AMPLF SIZE FOR PULLING OF WIRE AND NOT SMALLER THAN THOSE INDICATED ON DRAWINGS.

e. PROTECT ALL RACEWAY INSTALLATIONS AGAINST DAMAGE DURING CONSTRUCTION. REPAIR ALL RACEWAYS DAMAGED OR MOVED OUT OF LINE AFTER ROUGHING-IN TO MEET ENGINEER'S APPROVAL WITHOUT ADDITIONAL COST TO THE OWNER.

f. ALIGN AND INSTALL TRUE AND PLUMB ALL RACEWAY TERMINATIONS AT PANELBOARDS, CABINETS, AND JUNCTION BOXES.

g. INSTALL A PULL WIRE IN EACH EMPTY RACEWAY THAT IS LEFT FOR INSTALLATION OF CONDUCTORS OR CABLES UNDER OTHER DIVISIONS OR CONTRACTS. USE POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB TENSILE STRENGTH. LEAVE AT LEAST 24 INCHES OF SLACK AT EACH END OF PULL WIRE.

h. MAKE ALL JOINTS AND CONNECTIONS IN A MANNER THAT WILL ENSURE MECHANICAL STRENGTH AND ELECTRICAL CONTINUITY.

ELECTRICAL SPECIFICATIONS

PART 1 – ELECTRICAL INSTRUCTIONS

1.1 GENERAL REQUIREMENTS

A. ALL REQUIREMENTS UNDER THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS APPLY TO THIS SECTION AND DIVISION. BECOME THOROUGHLY FAMILIAR WITH ALL THEIR CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION, SECTION OR BOTH. WORK REQUIRED UNDER THIS DIVISION INCLUDES ALL MATERIAL, EQUIPMENT, APPLIANCES, AND LABOR REQUIRED TO COMPLETE THE ENTIRE ELECTRICAL SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS, OR REASONABLY INFERRED TO BE NECESSARY TO FACILITATE EACH SYSTEM'S FUNCTIONING AS IMPLIED BY THE DESIGN AND THE EQUIPMENT SPECIFIED.

B. THE SPECIFICATIONS AND DRAWINGS FOR THE PROJECT ARE COMPLEMENTARY, AND PORTIONS OF THE WORK DESCRIBED IN ONE, SHALL BE PROVIDED AS IF DESCRIBED IN BOTH. IN THE EVENT OF DISCREPANCIES, NOTIFY THE ENGINEER AND REQUEST CLARIFICATION PRIOR TO PROCEEDING WITH THE WORK INVOLVED.

C. DRAWINGS ARE GRAPHIC REPRESENTATIONS OF THE WORK UPON WHICH THE CONTRACT IS BASED. THEY SHOW THE MATERIALS AND THEIR RELATIONSHIP TO ONE ANOTHER, INCLUDING SIZES, SHAPES, LOCATIONS, AND CONNECTIONS. THEY ALSO CONVEY THE SCOPE OF WORK, INDICATING THE INTENDED GENERAL ARRANGEMENT OF THE EQUIPMENT, FIXTURES, OUTLETS AND CIRCUITS WITHOUT SHOWING ALL OF THE EXACT DETAILS AS TO ELEVATIONS, OFFSETS, CONTROL LINES, AND OTHER INSTALLATION REQUIREMENTS. USE THE DRAWINGS AS A GUIDE WHEN LAYING OUT THE WORK AND TO VERIFY THAT MATERIALS AND EQUIPMENT WILL FIT INTO THE DESIGNATED SPACES, AND WHICH, WHEN INSTALLED PER MANUFACTURERS' REQUIREMENTS, WILL ENSURE A COMPLETE, COORDINATED, SATISFACTORY AND PROPERLY OPERATING SYSTEM.

D. DRAWINGS ARE SCHEMATIC IN NATURE, SHOW THE VARIOUS COMPONENTS OF THE SYSTEMS APPROXIMATELY TO SCALE AND ATTEMPT TO INDICATE HOW THEY SHALL BE INTEGRATED WITH OTHER PORTIONS OF THE WORK. REQUIRED DIMENSIONS TAKE PRECEDENCE TO SCALED DIMENSIONS. DETERMINE EXACT LOCATIONS BY JOB MEASUREMENTS, BY CHECKING THE REQUIREMENTS OF OTHER TRADES, AND BY REVIEWING ALL CONTRACT DOCUMENTS. CORRECT ERRORS THAT COULD HAVE BEEN AVOIDED BY PROPER CHECKING AND INSPECTION, AT NO ADDITIONAL COST TO THE OWNER.

E. SPECIFICATIONS DEFINE THE QUALITATIVE REQUIREMENTS FOR PRODUCTS, MATERIALS, AND WORKMANSHIP UPON WHICH THE CONTRACT IS BASED.

1.2 DEFINITIONS

A. WHENEVER USED IN THESE SPECIFICATIONS OR DRAWINGS, THE FOLLOWING TERMS SHALL HAVE THE INDICATED MEANINGS:

1. FURNISH: "TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLING, INSTALLING, AND SIMILAR OPERATIONS."

2. INSTALL: "TO PERFORM ALL OPERATIONS AT THE PROJECT SITE, INCLUDING, BUT NOT LIMITED TO, AND AS REQUIRED: UNLOADING, UNPACKING, ASSEMBLING, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, TESTING, COMMISSIONING, STARTING UP AND SIMILAR OPERATIONS, COMPLETE, AND READY FOR THE INTENDED USE."

3. PROVIDE: "TO FURNISH AND INSTALL COMPLETE, AND READY FOR THE INTENDED USE."

4. FURNISHED BY OWNER (OR OWNER-FURNISHED) OR FURNISHED BY OTHERS: "AN ITEM FURNISHED BY THE OWNER OR UNDER OTHER DIVISIONS OR CONTRACTS, AND INSTALLED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE, AND READY FOR THE INTENDED USE, INCLUDING ALL ITEMS AND SERVICES INCIDENTAL TO THE WORK NECESSARY FOR PROPER INSTALLATION AND OPERATION. INCLUDE THE INSTALLATION UNDER THE WARRANTY REQUIRED BY THIS DIVISION."

5. ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSIONAL FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF, THE ARCHITECT, AS DEFINED IN THE GENERAL AND/OR SUPPLEMENTARY CONDITIONS. WHEN USED IN THIS DIVISION, IT MEANS INCREASED INVOLVEMENT BY, AND OBLIGATIONS TO, THE ENGINEER, IN ADDITION TO INVOLVEMENT BY, AND OBLIGATIONS TO, THE "ARCHITECT."

6. AHJ: THE LOCAL CODE AND/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER THE WORK.

7. NRTL: NATIONALLY RECOGNIZED TESTING LABORATORY, AS DEFINED AND LISTED BY OSHA IN 29 CFR 1910.7 (E.G., UL, ETL, CSA), AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

8. HOMERUN: THAT PORTION OF AN ELECTRICAL CIRCUIT ORIGINATING AT A JUNCTION BOX, TERMINATION BOX, RECEPTACLE OR SWITCH WITH TERMINATION AT AN ELECTRICAL PANELBOARD.

9. THE TERMS "APPROXIMATE," "EQUAL," "EQUIVALENT," OR "EQUAL" ARE USED SYNONYMOUSLY AND SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED". THE TERM "APPROVED" SHALL MEAN LABELED, LISTED, CERTIFIED, OR ALL THREE, BY AN NRTL, AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

1.3 PRE-BID SITE VISIT

A. PERSONALLY INSPECT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED OF CONDITIONS UNDER WHICH THE WORK IS TO BE DONE. FAILURE TO DO SO WILL NOT BE CONSIDERED SUFFICIENT JUSTIFICATION TO REQUEST OR OBTAIN EXTRA COMPENSATION OVER AND ABOVE THE CONTRACT PRICE.

1.4 MATERIAL AND WORKMANSHIP

A. PROVIDE ALL MATERIAL AND EQUIPMENT NEW AND IN FIRST CLASS CONDITION. PROVIDE MARKINGS OR A NAMEPLATE FOR ALL MATERIAL AND EQUIPMENT IDENTIFYING THE MANUFACTURER AND PROVIDING SUFFICIENT REFERENCE TO ESTABLISH QUALITY, SIZE AND CAPACITY. ALL WORKMANSHIP SHALL BE OF THE FINEST POSSIBLE BY EXPERIENCED MECHANICS OF THE PROPER TRADE. IN GENERAL, PROVIDE THE FOLLOWING QUALITY GRADE(S) FOR ALL MATERIALS AND EQUIPMENT.

1. COMMERCIAL SPECIFICATION GRADE

B. PROVIDE ALL HOISTS, SCAFFOLDS, STAGING, RUNWAYS, TOOLS, MACHINERY AND EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE ELECTRICAL WORK. STORE AND MAINTAIN material and equipment in clean condition, and PROTECTED FROM WEATHER, MOISTURE, AND PHYSICAL DAMAGE.

C. FURNISH ONLY MATERIAL AND EQUIPMENT THAT ARE LISTED, LABELED, CERTIFIED, OR ALL THREE, BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL), WHENEVER ANY LISTING OR LABELING EXISTS FOR THE TYPES OF MATERIAL AND EQUIPMENT SPECIFIED.

D. AT A MINIMUM, GENERAL WORK PRACTICES FOR ELECTRICAL CONSTRUCTION SHALL BE IN ACCORDANCE WITH:

1. NECA 1 (LATEST EDITION), "STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION"

1.5 MANUFACTURERS

A. IN OTHER ARTICLES WHERE LISTS OF MANUFACTURERS ARE INTRODUCED, SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE MANUFACTURERS SPECIFIED.

B. WHERE A LIST IS PROVIDED, MANUFACTURERS ARE LISTED ALPHABETICALLY AND NOT IN ACCORDANCE WITH ANY RANKING OR PREFERENCE.

C. WHERE MANUFACTURERS ARE NOT LISTED, PROVIDE PRODUCTS SUBJECT TO COMPLIANCE WITH REQUIREMENTS FROM MANUFACTURERS THAT HAVE BEEN ACTIVELY INVOLVED IN MANUFACTURING THE SPECIFIED PRODUCT FOR NO LESS THAN 5 YEARS.

1.6 COORDINATE ALL WORK WITH OTHER DIVISIONS AND TRADES SO THAT VARIOUS COMPONENTS OF THE ELECTRICAL SYSTEMS ARE INSTALLED AT THE PROPER TIME, FIT THE AVAILABLE SPACE, AND ALLOW PROPER SERVICE ACCESS TO ALL EQUIPMENT. REFER TO ALL DRAWINGS INCLUDING, BUT NOT LIMITED TO, CIVIL, ARCHITECTURAL, AND STRUCTURAL, AND TO RELEVANT EQUIPMENT SUBMITTALS AND SHOP DRAWINGS TO DETERMINE THE EXTENT OF CLEAR SPACES. MAKE ALL OFFSETS REQUIRED TO CLEAR EQUIPMENT, STRUCTURAL MEMBERS, AND TO FACILITATE CONCEALING RACEWAYS IN THE MANNER ANTICIPATED IN THE DESIGN. PROVIDE MATERIALS WITH TRIM THAT WILL FIT PROPERLY WITH THE PRODUCTS INSTALLED.

1.7 ORDINANCES, CODES, AND STANDARDS

A. COMPLY, AT A MINIMUM, WITH NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS, STATE AND LOCAL BUILDING CODES, AND ALL OTHER APPLICABLE CODES AND ORDINANCES FOR PERFORMANCE, WORKMANSHIP, EQUIPMENT, AND MATERIALS. ADDITIONALLY, COMPLY WITH RULES AND REGULATIONS OF PUBLIC UTILITIES AND MUNICIPAL DEPARTMENTS AFFECTED BY CONNECTION OF SERVICES.

B. WHERE CONFLICTS BETWEEN VARIOUS CODES, ORDINANCES, RULES, AND REGULATIONS EXIST, COMPLY WITH THE MOST STRINGENT. WHEREVER REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, EXCEED THOSE OF THE ABOVE ITEMS, THE REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, SHALL GOVERN. CODE COMPLIANCE, AT A MINIMUM, IS MANDATORY. CONSTRUE NOTHING IN THESE CONSTRUCTION DOCUMENTS AS PERMITTING WORK NOT IN COMPLIANCE, AT A MINIMUM, WITH THESE CODES.

C. PROMPTLY BRING ALL CONFLICTS OBSERVED BETWEEN CODES, ORDINANCES, RULES, REGULATIONS, REFERENCED STANDARDS, AND THESE DOCUMENTS TO THE ENGINEER'S ATTENTION FOR FINAL RESOLUTION. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY VIOLATION OF THE LAW.

D. PROVIDE AND MAINTAIN ALL NECESSARY SIGNAL LIGHTS AND GUARDS FOR THE SAFETY OF THE PUBLIC. OBTAIN AND PAY FOR ALL PERMITS FOR WORK IN THIS DIVISION.

1.8 PROTECTION OF EQUIPMENT AND MATERIALS

A. STORE AND PROTECT FROM DAMAGE EQUIPMENT AND MATERIALS DELIVERED TO JOB SITE, IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS. MATERIALS AND EQUIPMENT SUSCEPTIBLE TO CHANGING WEATHER CONDITIONS, DAMPNESS, OR TEMPERATURE VARIATIONS: STORE THEM INSIDE IN CONDITION SPACES. FOR MATERIALS AND EQUIPMENT NOT SUSCEPTIBLE TO THESE CONDITIONS, COVER WITH WATERPROOF, TEAR-RESISTANT, HEAVY TARP OR POLYETHYLENE PLASTIC AS REQUIRED TO PROTECT FROM DIRT, WATER, OR PHYSICAL DAMAGE. EQUIPMENT AND MATERIAL THAT HAS BEEN DAMAGED BY CONSTRUCTION ACTIVITIES WILL BE REJECTED, AND CONTRACTOR SHALL FURNISH NEW EQUIPMENT AND MATERIAL OF A LIKE KIND.

B. PLUG OR CAP OPEN ENDS OF CONDUITS TO PREVENT THE ENTRANCE OF DEBRIS INTO THE SYSTEMS. PLUG OR CAP SHALL BE INSTALLED WHILE CONDUIT IS STORED AND DURING CONSTRUCTION WHEN INSTALLED BUT NOT IN USE.

1.9 SUBSTITUTIONS

A. INCLUDE IN THE BASE BID THE PRODUCTS SPECIFICALLY NAMED IN THESE SPECIFICATIONS OR ON THE DRAWINGS. SUBMIT, IN THE FORM OF ALTERNATES, WITH BID, PROPOSALS OF ANY OTHER MANUFACTURERS FOR SIMILAR USE, PROVIDED THE DIFFERENCES IN COST, IF ANY, ARE INCLUDED FOR EACH PROPOSED ALTERNATE.

B. PRIOR TO THE BID DATE, SUBSTITUTIONS WILL NOT BE CONSIDERED UNLESS SUBMITTED FOR ENGINEER'S REVIEW, AT LEAST TEN CALENDAR DAYS PRIOR TO DATE OF RECEIPT OF BIDS. INCLUDE THE NAME OF THE PRODUCT, MATERIAL, OR EQUIPMENT FOR WHICH IT IS TO BE SUBSTITUTED AND A COMPLETE DESCRIPTION OF THE PROPOSED SUBSTITUTE INCLUDING OUTSHEETS, PHOTOMETRIC DATA, AND ALL OTHER INFORMATION NECESSARY FOR AN EVALUATION FOR EACH SUBSTITUTION. PROVIDE FACTORY GENERATED POINT-BY-POINT CALCULATIONS FOR ALL EXTERIOR LIGHT FIXTURES (PHOTOMETRIC FILES SUPPLIED SO THE ENGINEER CAN GENERATE A POINT-BY-POINT DO NOT SUFFICE FOR THE POINT-BY-POINT CALCULATIONS). PROVIDE INTERIOR POINT-BY-POINT CALCULATIONS AT THE DISCRETION OF THE ENGINEER. SUBMIT A \$100.00 REVIEW FEE TO THE ENGINEER WITH EACH SUCH POINT-BY-POINT CALCULATION FOR USE OF ELECTRONIC BASE FILES.

C. AFTER THE BID DATE, PROPOSALS TO SUBSTITUTE LIGHT FIXTURES FOR THOSE SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN, WILL ONLY BE CONSIDERED AS A DEDUCT. SUBMIT PROPOSED SUBSTITUTIONS SEPARATELY, IN

THIS DOCUMENT HAS BEEN PROCESSED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN UNINTENTIONALLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL.

E-3.01



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Drawn By: DM Checked By: MB

Issue #	Date	Description

ELECTRICAL SPECIFICATIONS

PERMIT SET
JOB NO. 268-08-09
DATE: DECEMBER 12, 2017

- 2.10 LIGHT FIXTURES, LAMPS AND BALLASTS

A. LIGHT FIXTURE LOCATIONS

1. LIGHT FIXTURES SHOWN ON THE ELECTRICAL DRAWINGS REPRESENT GENERAL ARRANGEMENTS ONLY. COORDINATE LOCATION WITH ALL OTHER TRADES BEFORE INSTALLATION TO AVOID CONFLICTS.

B. LIGHT FIXTURES

1. PROVIDE LIGHT FIXTURES AS SCHEDULED ON DRAWINGS, INCLUDING ALL LAMPS, ALL NECESSARY ACCESSORIES, MATERIAL AND LABOR TO MAKE LIGHT FIXTURES COMPLETELY READY FOR USE. LIGHT FIXTURE MODEL NUMBERS SCHEDULED ON THE DRAWINGS SHOW ONLY THE MANUFACTURER, GRADE AND STYLE OF LIGHT FIXTURES REQUIRED.

C. LAMPS

1. PROVIDE LAMPS AS INDICATED ON THE DRAWINGS FOR ALL LIGHT FIXTURES; OR, IF NOT INDICATED, AS RECOMMENDED BY THE LIGHT FIXTURE MANUFACTURER. IN ALL CASES, LAMPS SHALL BE COMPATIBLE WITH THE SPECIFIED LIGHT FIXTURE. ACCEPTABLE LAMP MANUFACTURERS: GENERAL ELECTRIC, OSRAM/SYLVANIA, PHILIPS, OR VENTURE.

D. LED DRIVERS

1. COMPLY WITH UNDERWRITERS LABORATORY (UL) 1029; PROVIDE NORMAL OPERATION AND LIGHT OUTPUT WITH THE INPUT VOLTAGE IS WITHIN 10 PERCENT OF NOMINAL DRIVER; SHALL HAVE A MINIMUM STARTING TEMPERATURE OF -20 DEGREES F.

E. PARKING LOT LIGHTING

1. PROVIDE ALL COMPONENTS OF THE OUTDOOR LIGHTING SYSTEM, INCLUDING POLE ASSEMBLIES AS DETAILED ON THE DRAWINGS AND DESCRIBED BELOW. ALL MATERIAL FURNISHED SHALL BE OF THE BEST QUALITY AND WORKMANSHIP, AND THE MANUFACTURER MAY BE REQUIRED TO FURNISH SATISFACTORY EVIDENCE OF THE ABILITY TO SUPPLY THE MATERIAL IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS.

2. POLES AND LIGHT FIXTURES SHALL BE AS NOTED ON THE DRAWINGS. IF CONTRACTOR DESIRES TO SUBSTITUTE OTHER THAN THE SPECIFIED MANUFACTURER(S), REFER TO ARTICLE "SUBSTITUTIONS" IN THIS DIVISION, FOR REQUIREMENTS. NO ALTERNATE MANUFACTURERS WILL BE CONSIDERED FOR APPROVAL WITHOUT THIS PRIOR SUBMITTAL.

3. FURNISH ALL POLES WITH HAND HOLES AND NO LESS THAN FOUR HIGH-STRENGTH STEEL ANCHOR BOLTS FOR POLE MOUNTING. EACH ANCHOR BOLT SHALL BE THREADED AT THE TOP, FITTED WITH HEXAGON NUTS, AND SHALL HAVE AN "L" BEND ON THE BOTTOM OF THE BOLT. ALL ANCHOR BOLTS AND NUTS SHALL BE HOT-DIP GALVANIZED. ALL OTHER SMALL HARDWARE REQUIRED (BOLTS, NUTS, WASHERS, SHIMS, ETC.) SHALL BE GALVANIZED. PROVIDE POLE FINISHES AS NOTED ON THE DRAWINGS.
- 2.11 MISCELLANEOUS ELECTRICAL

A. LIGHTING CONTROL PANEL WITH INTEGRAL TIME SWITCH AND CONTACTORS

1. TIME SWITCHES: ELECTRONIC DIGITAL ASTRONOMICAL, TYPE AS INDICATED, WITH MANUAL BYPASS SWITCH, NEMA ENCLOSURE, SUITABLE FOR THE ENVIRONMENT INSTALLED; NUMBER AND TYPES OF CONTACTS, SEQUENCE, AND VOLTAGE AS INDICATED ON THE DRAWINGS, OR AS REQUIRED, BASED ON THE TIME SWITCH FUNCTION AND THE NUMBER OF BRANCH CIRCUITS OR CONTACTORS CONTROLLED. PROVIDE WIRING TO PHOTOCELLS, CONTACTORS, RELAYS OR OTHER CONTROL POINTS AS REQUIRED. MANUFACTURER: COOPER LIGHTING IS BASIS OF DESIGN.

2. LIGHTING CONTACTORS: HEAVY DUTY TYPE; SILVER ALLOY, DOUBLE BREAK CONTACTS, CONVERTIBLE WITH NO AND NC INDICATORS; CAPABLE OF ADDING POLES IN THE FIELD; NUMBER AND RATING OF POLES AS INDICATED ON THE DRAWINGS OR REQUIRED BY THE LOAD CONTROLLED; TYPED DIRECTORY AFFIXED TO THE INSIDE OF THE ENCLOSURE DOOR LISTING ALL BRANCH CIRCUITS SWITCHED AND THE CONTROL POWER BRANCH CIRCUIT.

3. ENCLOSURE: NEMA 3R DESIGN SUITABLE FOR THE ENVIRONMENT IN WHICH INSTALLED OR AS INDICATED.

B. PHOTO CONTROL

1. PROVIDE AUTOMATIC SWITCHING FOR LIGHTING LOADS USING A THERMAL DESIGN WITH BUILT IN DELAY TO ENSURE THAT THE CONTROLLED LIGHTING DOES NOT SWITCH OFF DUE TO AMBIENT LIGHT OR LIGHTNING STRIKING THE PHOTOCELL.

2. PROVIDE WITH A RATING BASED ON UL TESTING AT 50% POWER FACTOR FOR BALLAST LOADS, BE UL LISTED, AND MEET ALL APPLICABLE AGENCY REQUIREMENTS.

3. PROVIDE WITH ALL NECESSARY MOUNTING HARDWARE AND INSTRUCTIONS; VERIFY THAT HOUSING IS CONSTRUCTED OF HIGH IMPACT POLY-CARBONATE; PHOTO CONTROL COMPONENTS CONSISTING OF A METAL FILM RESISTOR, DUAL TEMPERATURE COMPENSATING Bi METAL BLADES, SNAP ACTION CONTACT BLADES, CHEMICALLY TREATED/POLYMER ENCAPSULATED CADMIUM SULFIDE PHOTOCELL AND SILVER ALLOY CONTACTS TO ENSURE RELIABLE 5 YEAR MANUFACTURER WARRANTED OPERATION. PHOTO CONTROL SHALL BE 100% FACTORY TESTED FOR FUNCTION WITHIN MANUFACTURER'S SPECIFIED LIGHT LEVELS.

4. PROVIDE FROM THE SAME MANUFACTURER OF AND TOTALLY COMPATIBLE WITH THE TIME SWITCHES SPECIFIED ABOVE.

C. COMMUNICATIONS PROVISIONS

1. PROVIDE INCOMING COMMUNICATIONS SERVICE RACEWAYS AS INDICATED ON DRAWINGS OR AS REQUIRED BY THE SERVING COMMUNICATIONS COMPANY.

PART 3 - ELECTRICAL EXECUTION

- 3.1 ELECTRICAL SERVICE

A. SEE DRAWINGS FOR TYPE, SIZE, VOLTAGE, PHASE, AND OTHER REQUIREMENTS.

B. PROVIDE, OR ARRANGE WITH THE SERVING UTILITY FOR INSTALLATION TO PROVIDE, A RECORDING VOLTMETER AT THE SERVICE POINT, ON THE FIRST DAY THE SERVICE IS ENERGIZED FOR BUSINESS, FOR A 24-HOUR VOLTAGE TEST, IF VOLTAGE AND REGULATION ARE NOT WITHIN ACCEPTABLE LIMITS, ARRANGE WITH THE UTILITY FOR PROPER VOLTAGE. SUBMIT TO THE OWNER A REPORT OF MAXIMUM AND MINIMUM VOLTAGE AND A COPY OF THE RECORDING VOLTMETER CHART.
- 3.2 CONNECTION TO SERVING UTILITIES

A. PROVIDE RACEWAYS, TERMINATIONS, METERING PROVISIONS, AND MISCELLANEOUS EQUIPMENT, AS REQUIRED, FOR ELECTRICAL AND TELEPHONE SERVICES FOR CONNECTION BY THE SERVING UTILITY, IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF ALL APPLICABLE CODES AND OF THE SERVING UTILITY INVOLVED. VERIFY ALL SERVICE TERMINATIONS AND CONNECTION POINTS IN THE FIELD AND WORK IN CONJUNCTION WITH THE UTILITY INVOLVED IN THE INSTALLATION OF ALL SERVICES. PROVIDE ALL MATERIALS AND EQUIPMENT REQUIRED FOR COMPLETE UTILITY CONNECTION BUT NOT FURNISHED BY THE SERVING UTILITY. NOTIFY THE UTILITY COMPANIES INVOLVED WITHIN TWO WEEKS AFTER NOTICE TO PROCEED, OF ALL REQUIRED INFORMATION NECESSARY FOR THE UTILITY TO SUPPLY THE PROJECT WITHOUT DELAY. PAY ALL CHARGES OF THE SERVING UTILITY FOR THE ELECTRICAL SERVICE(S).
- 3.3 GROUNDING

A. PERMANENTLY AND EFFECTIVELY GROUND AND BOND THE ELECTRICAL INSTALLATION IN A THOROUGH AND EFFICIENT MANNER, AND IN CONFORMANCE, AT A MINIMUM, WITH NFPA 70, OR THESE DOCUMENTS, WHERE THEY EXCEED CODE REQUIREMENTS. USE BARE OR INSULATED CONDUCTORS, AS SPECIFIED HEREIN, AND OTHER MATERIALS INDICATED ON THE DRAWINGS.
- 3.4 EXCAVATION AND BACKFILLING

A. PERFORM EXCAVATION AND BACKFILL REQUIRED FOR INSTALLATION OF UNDERGROUND WORK UNDER THIS CONTRACT. TRENCHES SHALL BE OF SUFFICIENT WIDTH. CRIB OR BRACE TRENCHES TO PREVENT CAVE-IN OR SETTLEMENT. USE PUMPING EQUIPMENT IF REQUIRED TO KEEP TRENCHES FREE OF WATER. BACKFILL TRENCHES IN MAXIMUM 6-INCH LAYERS OF WELL TAMPED DRY EARTH IN A MANNER TO PREVENT FUTURE SETTLEMENT.

B. EXCAVATION AS HEREIN SPECIFIED SHALL BE CLASSIFIED AS COMMON EXCAVATION. COMMON EXCAVATION SHALL COMPRISE THE SATISFACTORY REMOVAL AND DISPOSITION OF MATERIAL OF WHATEVER SUBSTANCES AND OF EVERY DESCRIPTION ENCOUNTERED, INCLUDING ROCK, IF ANY, WITHIN THE LIMITS OF THE WORK AS SPECIFIED AND SHOWN ON THE DRAWINGS. EXCAVATION SHALL BE PERFORMED TO THE LINES AND GRADES INDICATED ON THE DRAWINGS. DISPOSE OF EXCAVATED MATERIALS THAT ARE CONSIDERED UNSUITABLE FOR BACKFILL, AND SURPLUS OF EXCAVATED MATERIAL, WHICH IS NOT REQUIRED FOR BACKFILL, ALL TO THE SATISFACTION OF THE ENGINEER.
- 3.5 COINCIDENTAL DAMAGE

A. REPAIR ALL STREETS, SIDEWALKS, DRIVES, PAVING, WALLS, FINISHES, AND OTHER FACILITIES DAMAGED IN THE COURSE OF THIS WORK. REPAIR MATERIALS SHALL GENERALLY MATCH EXISTING CONSTRUCTION. ALL BACKFILLING AND REPAIRING SHALL MEET ALL REQUIREMENTS OF THE OWNER, CITY AND OTHERS HAVING JURISDICTION. REPAIR WORK SHALL BE THOROUGHLY FIRST CLASS. REFERENCE CIVIL PLANS FOR ALL WORK RELATED TO SITE.
- 3.6 SUPPORT SYSTEMS

A. STEEL SLOTTED SUPPORT SYSTEMS (SLOTTED CHANNEL): COMPLY WITH MFMA-3, FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY: 12-GAUGE, 1-5/8-INCH BY 1-5/8-INCH; COOPER B-LINE, ERICO INTERNATIONAL CORPORATION, HILTI, INC., POWER-STRUT, THOMAS & BETTS CORPORATION, UNISTRUT.

B. FINISHES:

1. METALLIC COATINGS: HOT-DIP GALVANIZED AFTER FABRICATION AND APPLIED ACCORDING TO MFMA-3.

C. FIELD FABRICATION:

1. WHERE FIELD CUTTING OF STANDARD LENGTHS OF CHANNEL ARE REQUIRED, MAKE CUTS STRAIGHT AND PERPENDICULAR TO MANUFACTURED SURFACES.

2. FOR FIELD-CUT OR DAMAGED SURFACES OF COATED CHANNELS, DRESS CUT ENDS, DAMAGED SURFACES, OR BOTH, WITH AN ABRASIVE MATERIAL (E.G., FILE, GRINDING STONE, OR SIMILAR) AND CLEANSER TO REMOVE OILS, RUST, SHARP EDGES AND SHARDS.

3. FOR CHANNEL WITH A FACTORY-APPLIED COATING, RE-FINISH CUT EDGES WITH A COATING COMPATIBLE WITH THE FACTORY FINISH AND AS RECOMMENDED BY THE MANUFACTURER (E.G., MANUFACTURER'S TOUCH-UP PAINT OR ZINC-RICH COLD-GALVANIZING COMPOUND, AS APPLICABLE).