## GENERAL REQUIREMENTS

1. THE CONTRACTOR SHALL PROVIDE AND PAY FOR ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY FOR A COMPLETE AND FUNCTIONAL ELECTRICAL SYSTEM(S). ITEMS AND ACCESSORIES REASONABLY INFERRED AS NECESSARY TO COMPLETE THE PROPER OPERATION OF THE SYSTEM(S) SHALL BE PROVIDED.
   A. GENERAL PURPOSE AND SPECIAL POWER OUTLETS AND POWER WIRING.
   B. NEW LIGHTING, LIGHTING CONTROL PANEL, MOUNTING ACCESSORIES, CONTROLS AND POWER WIRING.
   C. EXIT AND EMERGENCY LIGHTING SYSTEM, COMPLETE WITH ASSOCIATED CONDUIT AND WIRING.
   D. FIRE ALARM SYSTEM IN CONFORMANCE WITH THE APPLICABLE CODES.
   E. EMPTY CONDUIT FOR COMMUNICATION AND DATA SYSTEM.
   F. PROVIDE POWER, COMMUNICATION, AND DATA RACEWAY ASSEMBLIES, FLEXIBLE CONDUIT AND POWER WIRING.
   G. PROJECT RECORD DRAWINGS.
   H. ALL PERMITS, TESTING AND INSPECTION FEES.
2. NO EXTRA COMPENSATION WILL BE CONSIDERED FOR WORK REFERENCED OR IMPLIED IN THE CONTRACT DOCUMENTS. THE CONTRACT DOCUMENTS MAY INCLUDE BUT NOT BE LIMITED TO: ELECTRICAL, MECHANICAL, PLUMBING, ARCHITECTURAL OR STRUCTURAL.
3. NO EXTRA COMPENSATION WILL BE CONSIDERED FOR WORK REFERRED TO OR IMPLIED ON THE CONTRACT DOCUMENT BUT "NOT INCLUDED" IN THE BID UNLESS ABSOLUTELY NOTED AS SUCH ON THE SUBMITTED BID DOCUMENTS.
4. MATERIALS AND INSTALLATION SHALL COMPLY WITH CODES, UTILITY REQUIREMENTS, LAWS AND ORDINANCES OF FEDERAL, STATE, OSHA AND LOCAL GOVERNING BODIES HAVING JURISDICTION.
5. THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP FOR A PERIOD OF 12 MONTHS AFTER FINAL ACCEPTANCE OF THE WORK.
6. THE INTENT IS TO FURNISH, ERECT, INSTALL, CONNECT, CLEAN, ADJUST, TEST AND PLACE IN SERVICE ALL MATERIALS, EQUIPMENT AND SYSTEMS FOR ALL WORK SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS. SHOULD THERE BE ANY DISCREPANCIES OR A QUESTION OF INTENT, REFER THE MATTER TO THE ARCHITECT/ ENGINEER FOR A FINAL DECISION.
7. ALL QUESTIONS DURING THE CONSTRUCTION PROCESS SHALL BE DIRECTED TO THE ENGINEER IN A WRITTEN FORM OF AN "RFI". ANY FORMAL OR INFORMAL DISCUSSION OR PHONE CONVERSATION DOES NOT CONSTITUTE THE AUTHORIZATION TO PROCEED OR ENGINEER'S APPROVAL. THE "RFI" MUST CONTAIN THE FOLLOWING INFORMATION. FAILURE TO COMPLY WILL RENDER THE "RFI" VOID AND IT WILL BE RETURNED UNANSWERED:
   A. PROJECT NAME.
   B. FIRM'S NAME.
   C. DATE.
   D. AUTHOR'S NAME (PRINTED)
   E. AUTHOR'S NAME (SIGNED)
   F. DRAWING NUMBER
   G. DATE OF DRAWING.
8. MISCELLANEOUS APPARATUS, MATERIAL OR WORK NOT SHOWN ON DRAWINGS, OR ANY INCIDENTAL ACCESSORIES SUCH AS WIRING, RELAYS, SWITCHES, TRANSFORMERS (LINE VOLTAGE TO LOW VOLTAGE). ETC., NECESSARY TO MAKE THE WORK COMPLETE SHALL BE FURNISHED AND INSTALLED WITHOUT ADDITIONAL EXPENSE TO THE OWNER.
9. THE ELECTRICAL CONTRACTOR SHALL FOLLOW THE STANDARDS AND SPECIFICATIONS CONTAINED HEREIN AS WELL AS:
   A. CHICAGO ELECTRIC CODE
   B. ALL APPLICABLE LOCAL AND MUNICIPAL CODES, AMENDMENTS AND ORDINANCES.
   C. UNDERWRITERS LABORATORIES (U.L).
   D. NFPA, NEMA, ANSI, IES AND IEEE STANDARDS.
   E. NFPA LIFE SAFETY CODE 101.
   F. ASHRAE 90.1, INTERNATIONAL ENERGY CONSERVATION CODE.
10. THE ELECTRICAL CONTRACTOR SHALL BID ALL WORK AS SHOWN AND NOTED AND THE EXACT MATERIAL AND EQUIPMENT AS SPECIFIED. ANY UNAPPROVED SUBSTITUTION OF MATERIAL AND EQUIPMENT DURING THE BIDDING PROCESS TO SECURE THE AWARD OF CONTRACT WILL NOT BE ACKNOWLEDGED.
11. THE ELECTRICAL CONTRACTOR SHALL BE FINANCIALLY LIABLE FOR ANY REQUIRED ENGINEERING REVIEW TIME DUE TO ANY PROPOSED PRODUCT CHANGE AND/OR VOLUNTARY "VALUE ENGINEERING" DURING THE BIDDING PROCEDURE THROUGH THE SUBMITTAL PROCESS.
12. ANY CONFLICTING INFORMATION DEPICTED OR IMPLIED ON THE DRAWINGS IDENTIFIED DURING THE BIDDING PROCESS SHALL BE SUBMITTED FOR CLARIFICATION OF INTENT. FAILURE TO CLARIFY THE ENGINEERS INTENT MAY MAKE THE ELECTRICAL CONTRACTOR LIABLE FOR ANY ASSOCIATED COSTS RELATIVE TO CHANGES DURING THE CONSTRUCTION PROCESS.
13. NO EXTRA CHARGES SHALL BE ACCEPTED BY THE OWNER FOR WORK THAT HAS TO BE PERFORMED DUE TO THE CONTRACTOR'S NEGLIGENCE TO VERIFY THE EXISTING CONDITIONS.
14. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL MATERIAL AND LABOR SO THAT THIS CONSTRUCTION IS IN COMPLIANCE WITH THE APPLICABLE BUILDING CODES.
15. THE CONTRACTOR COVENANTS AND AGREES THAT HE AND HIS SUBCONTRACTORS AND HIS AND THEIR AGENTS, AND EMPLOYEES WILL PROVIDE AND MAINTAIN A SAFE PLACE TO WORK AND THAT HE AND THEY WILL COMPLY WITH ALL LAWS AND REGULATIONS OF ANY GOVERNMENTAL AUTHORITY HAVING JURISDICTION HEREOF, AND THE CONTRACTOR AGREES TO INDEMNIFY, DEFEND AND HOLD HARMLESS THE ARCHITECT/ENGINEER(S) AND THE OWNER FROM AND AGAINST ANY LIABILITY, LOSS, INJURY, DEATH, DAMAGE OR EXPENSE, INCLUDING ATTORNEYS' FEES.

## PERMITS, FEES

1. THE CONTRACTOR SHALL PREPARE AND SUBMIT ANY AND ALL DATA, DRAWINGS, AND DETAILS REQUIRED TO SECURE AND PAY FOR ALL PERMITS, GOVERNMENTAL FEES, TAXES, INSPECTIONS AND LICENSES NECESSARY FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK.
2. ARRANGE FOR AND PAY ALL APPLICABLE FEES FOR TEST AND INSPECTIONS REQUIRED BY LOCAL AUTHORITIES HAVING JURISDICTION.
3. WHERE REGULATIONS OF ELECTRIC UTILITY AND TELEPHONE COMPANIES APPLY, CONFORMANCE WITH THEIR REGULATIONS IS MANDATORY AND ANY COSTS INVOLVED SHALL BE INCLUDED IN THE CONTRACT.

## REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS

1. THE CONTRACTOR SHALL CAREFULLY EXAMINE THE CONTRACT DOCUMENTS, VISIT THE SITE, AND BECOME THOROUGHLY FAMILIAR WITH THE BUILDING STANDARDS AND LOCAL CONDITIONS RELATING TO THE WORK PRIOR TO SUBMITTING THE BID PROPOSAL. FAILURE TO DO SO SHALL NOT RELIEVE THE CONTRACTOR OF THE OBLIGATIONS OF THE CONTRACT. IDENTIFY ALL DISCREPANCIES TO THE ENGINEER.
2. THE DRAWINGS SHALL SERVE TO INDICATE THE GENERAL LAYOUT OF THE VARIOUS ITEMS OF EQUIPMENT. THE LAYOUT OF THE EQUIPMENT, ACCESSORIES AND OTHER COMPONENTS ARE DIAGRAMMATIC UNLESS SPECIFICALLY SHOWN OR DIMENSIONED.
3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY MATERIALS, EQUIPMENT OR CONFIGURATION BELIEVED TO BE INADEQUATE, UNSUITABLE, IN VIOLATION OF LAWS, ORDINANCES, RULES OR REGULATIONS OF AUTHORITIES HAVING JURISDICTION PRIOR TO INSTALLATION.
4. THE EXISTING POWER, SIGNAL AND COMMUNICATION SYSTEMS ARE TO REMAIN IN SERVICE TO PROVIDE FOR THE OWNER'S FUNCTION. SHOULD IT BECOME NECESSARY TO SHUT-DOWN ANY SYSTEM OR PORTION OF A SYSTEM, APPROVAL IN WRITING SHALL BE OBTAINED FROM THE OWNER AND SHALL BE ONLY FOR THE PERIOD AND TIME AGREED UPON. THE BID IS TO INCLUDE THE COST OF ANY TEMPORARY WIRING AND PREMIUM TIME REQUIRED FOR THE SHUT-DOWN.
5. THE BID SHALL INCLUDE ANY RELOCATION COSTS TO THE EXISTING ELECTRICAL SYSTEM AND COMPONENTS OR EQUIPMENT REQUIRED TO ACCOMMODATE THE NEW CONSTRUCTION.

## SUBMITTALS AND SHOP DRAWINGS

1. THE CONTRACTOR SHALL PREPARE AND SUBMIT TO GOVERNMENTAL AGENCIES AND UTILITY COMPANIES THE SHOP DRAWINGS, WHICH ARE REQUIRED BY THESE AGENCIES, FOR THEIR APPROVAL.
2. THE CONTRACTOR SHALL PREPARE AND SUBMIT TO THE FIRE PREVENTION BUREAU, THE DOCUMENTS, INCLUDING DRAWINGS, REQUIRED TO OBTAIN APPROVAL OF EMERGENCY LIGHTING AND EXIT SIGN TYPES AND LOCATIONS. A COPY OF THE APPROVED DRAWINGS SHALL BE PROVIDED TO THE ENGINEER BEFORE THE START OF CONSTRUCTION.
3. THE CONTRACTOR SHALL PREPARE AND SUBMIT TO THE FIRE PREVENTION BUREAU, THE DOCUMENTS, INCLUDING DRAWINGS, REQUIRED TO OBTAIN APPROVAL OF THE EQUIPMENT AND LOCATIONS OF THE DEVICES THAT COMPRISE THE FIRE ALARM LIFE SAFETY SYSTEM. A COPY OF THE APPROVED DRAWINGS SHALL BE PROVIDED TO THE ENGINEER BEFORE THE START OF CONSTRUCTION.
4. CONTRACTOR SHALL SUBMIT COMPLETE FLOOR PLAN AND CEILING PLANS DRAWN TO THE SCALE OF 1/8" = 1'-0", SHOWING ALL EQUIPMENT, WIREWAYS AND CONDUIT TO BE INSTALLED. THE COMPLETE BRANCH WIRING DISTRIBUTION SYSTEM SHALL ALSO BE SHOWN, ACCURATELY INDICATING BRANCH CIRCUIT RUNS, CIRCUIT DESIGNATIONS AND LOCATIONS IN WALLS, FLOORS OR CEILINGS. THE DRAWING SHALL ALSO SHOW THE WORK COORDINATED WITH ALL OTHER TRADES. ALL DRAWINGS SHALL BE SUBMITTED PRIOR TO STARTING THE WORK, AND IN ACCORDANCE WITH AN APPROVED SCHEDULE, PROVIDED BY THE CONTRACTOR, TO AVOID ANY DELAY ON PROJECT.
5. SHOP DRAWINGS SHALL INCLUDE CONTRACTOR'S NAME, JOB ADDRESS, MANUFACTURERS' NAMES, CATALOG NUMBERS, CUTS, DIAGRAMS AND OTHER SUCH DESCRIPTIVE DATA AS MAY BE REQUIRED TO IDENTIFY AND REVIEW THE EQUIPMENT. SUBMITTALS SHALL BE IN LOGICAL GROUPS: FOR EXAMPLE, ALL LIGHTING FIXTURES. PARTIAL SUBMITTALS SHALL NOT BE REVIEWED. THE CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF THE FOLLOWING SHOP DRAWINGS FOR REVIEW:
   A. LIGHTING FIXTURES, LIGHTING CONTROLS, LAMPS AND BALLASTS
   B. RECEPTACLES, SWITCHES, WIRING DEVICES, DIMMERS, FLOOR FITTINGS, RELAYS, TIME SWITCHES
   C. FUSES, DISCONNECT SWITCHES
   D. PANELBOARDS AND OTHER DISTRIBUTION EQUIPMENT
   E. SMOKE DETECTION, FIRE ALARM, SIGNAL DEVICES CONTROLLERS AND ANNUNCIATORS. A COMPLETE FIRE ALARM SYSTEM, INCLUDING POINT-TO-POINT DRAWINGS
   F. SWITCHBOARDS AND METER CENTERS
6. PREPARE AND MAINTAIN IN CURRENT STATUS A COMPLETE SET OF DETAILED DRAWINGS COMPLETELY CIRCUITED WITH ALL BRANCH CIRCUIT LOAD SCHEDULES FOR ALL WORK INCLUDED UNDER THIS CONTRACT. THESE DRAWINGS SHALL BE MADE ON MYLAR SHEETS AT THE CONTRACTOR'S EXPENSE.
7. THE ELECTRICAL CONTRACTOR IS NOT ALLOWED TO USE THE CONTRACT DOCUMENTS FOR "AS-BUILT" DRAWINGS. THE BACKGROUNDS SHALL BE IN THE LATEST RELEASE OF AUTOCAD. AT THE CONTRACTORS OPTION THE AUTOCAD BACKGROUNDS CAN BE OBTAINED FROM THE ENGINEERING FIRM AT THE COST OF $100.00 PER DRAWING FILE.
8. PRIOR TO ROUGHING IN ANY ELECTRICAL WORK AND ORDERING EQUIPMENT, SUBMIT DRAWINGS TO ARCHITECT AND ENGINEER FOR REVIEW AND APPROVAL.
9. CONTRACTOR SHALL NOT ORDER ANY LIFE SAFETY EQUIPMENT OR ROUGH-IN ANY CONDUITS PRIOR TO SECURING APPROVAL OF RELATED SHOP DRAWINGS FROM THE LOCAL AUTHORITIES.
10. ONE (1) WEEK PRIOR TO THE FINAL INSPECTION, DELIVER TO THE ARCHITECT FOUR (4) TYPEWRITTEN COPIES EACH OF THE FOLLOWING:
    A. CERTIFICATION FROM CONTRACTOR THAT ALL EQUIPMENT AND SYSTEMS HAVE BEEN PROPERLY INSTALLED, ADJUSTED AND TESTED.
    B. CERTIFICATION FROM THE RESPECTIVE MANUFACTURER'S AUTHORIZED REPRESENTATIVE THAT THE EQUIPMENT AND SYSTEMS HAVE BEEN PROPERLY INSTALLED, ADJUSTED AND TESTED.
    C. FIRE ALARM SYSTEM
    D. LIGHTING CONTROL SYSTEM

## CUTTING AND PATCHING

1. ALL CUTTING, DRILLING AND PATCHING OF BUILDING CONCRETE, MASONRY, STEEL OR IRON WORK SHALL BE INCLUDED BY THE CONTRACTOR, SO THAT THE WORK SHALL BE PROPERLY INSTALLED. UNDER NO CONDITIONS MAY STRUCTURAL WORK BE CUT, WITHOUT WRITTEN APPROVAL FROM THE STRUCTURAL ENGINEER PRIOR TO THE START OF WORK.
2. FIRE SEAL ALL PENETRATIONS THROUGH RATED WALLS, CEILINGS AND FLOORS WITH 3M MODEL #FIRE BARRIER CP-25, OR THOMAS & BETTS MODEL #FLAME SAFE.
3. PROVIDE DRILLING, CUTTING, FITTING AND PATCHING NECESSARY FOR THE INSTALLATION OF CONDUITS, WIRE WAYS AND OTHER ELECTRICAL EQUIPMENT, AND PROVIDE SUPPORTS FOR BRACING AND ANCHORAGE OF WORK. NO CUTTING OF STRUCTURAL WORK OR OF FIREPROOFING SHALL BE DONE WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT AND STRUCTURAL ENGINEER.
4. NO CORING, DRILLING OR OTHER PENETRATIONS IN POST TENSION SLABS IS ALLOWED UNLESS AUTHORIZED BY THE STRUCTURAL ENGINEER. COORDINATE WORK WITH THE GENERAL CONTRACTOR AND BUILDING ENGINEER.
5. THE SLAB SHALL BE X-RAYED PRIOR TO CUTTING TO DETERMINE THE EXACT LOCATION OF STRUCTURAL MEMBERS. CUTTING OF ANY STRUCTURAL MEMBERS IS UNACCEPTABLE.

## CONSTRUCTION REQUIREMENTS

1. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY POWER, LIGHTING AND WIRING FOR THE PERFORMANCE OF ALL TRADES, FOR THE ENTIRE PERIOD OF CONSTRUCTION AND SHALL REMOVE ALL TEMPORARY SERVICES AT THE COMPLETION OF CONSTRUCTION.
2. MATERIALS AND EQUIPMENT SHALL BE LISTED AND/OR LABELED BY UL, ETL, CSA OR ANOTHER NATIONALLY RECOGNIZED TESTING LABORATORY.
3. ALL MATERIAL, EQUIPMENT, WIRING DEVICES, ETC. SHALL BE NEW, UNLESS SPECIFICALLY INDICATED AS EXISTING TO BE REUSED. ACCEPTABLE MANUFACTURERS:
   A. SQUARE D COMPANY
   B. CUTLER-HAMMER
   C. GENERAL ELECTRIC COMPANY
4. ALL MATERIALS AND EQUIPMENT SHALL BE STORED, HANDLED, ERECTED, INSTALLED, CONNECTED, CLEANED, ADJUSTED, TESTED, CONDITIONED AND PLACED IN SERVICE IN ACCORDANCE WITH THE MANUFACTURERS' DIRECTIONS AND RECOMMENDATIONS.
5. EXCEPT AS NOTED OTHERWISE, ALL WORK REQUIRED INCLUDING LABOR, EQUIPMENT AND MATERIALS SHALL BE IN STRICT COMPLIANCE WITH THE BUILDING STANDARD.
6. THE CONTRACTOR IS RESPONSIBLE FOR ALL MEANS AND METHODS INCLUDING ALL SAFETY REQUIREMENTS ON THE PROJECT SITE AND SHALL COORDINATE ALL WORK ACTIVITIES WITH THE GENERAL CONTRACTOR.
7. THE ELECTRICAL CONTRACTOR WITH THE APPROVAL OF THE ARCHITECT/ENGINEER AND WITHOUT ADDITIONAL COST TO THE OWNER, MAY MAKE MINOR MODIFICATIONS IN THE WORK AS REQUIRED BY INTERFERENCE'S AND WORK OF OTHER TRADES
8. THE ELECTRICAL CONTRACTOR SHALL REFER TO ALL CONTRACT DOCUMENTS FOR DETAILS, REFLECTED CEILING PLANS, AND LARGE SCALE DRAWINGS FOR ARCHITECTURAL, STRUCTURAL AND MECHANICAL WORK.
9. THE ELECTRICAL CONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWINGS/ELEVATIONS FOR THE EXACT LOCATION OF ALL LIGHT FIXTURES, RECEPTACLES AND WALL OUTLETS FOR ALL DIMENSIONS AND LOCATIONS.
10. COORDINATE THE UTILITY COMPANY SERVICE CORRESPONDENCE, FEEDS, AND INSTALLATION. ARRANGE ALL MEETINGS AS REQUIRED.
11. DELIVER MATERIALS IN ADEQUATE TIME TO MAINTAIN APPROVED CONSTRUCTION SCHEDULE AND STORE IN A SAFE DRY LOCATION OUT OF THE WAY OF CONSTRUCTION OPERATIONS WHERE APPROVED BY THE BUILDING ENGINEER..
12. THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF CONDUIT, BOXES, EQUIPMENT, FIXTURES AND OTHER WORK. EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS SHALL BE DETERMINED AT THE SITE AND SHALL BE SUBJECT TO THE APPROVAL OF THE ARCHITECT/ENGINEER. THE ELECTRICAL CONTRACTOR SHALL CHECK DRAWINGS OF OTHER TRADES TO VERIFY LOCATIONS IN WHICH WORK WILL BE INSTALLED. FURNISH ALL OTHER TRADES AFFECTED WITH ADVANCE INFORMATION ON LOCATIONS, SIZES OF FRAMES, BOXES, SLEEVES, AND OPENINGS NEEDED FOR THE COMPLETION OF ALL WORK.

## INSTALLATION

1. MOUNTING HEIGHTS AND ORIENTATION OF ALL DEVICES, EQUIPMENT, OUTLETS, JUNCTION BOXES AND LIGHTING FIXTURES SHALL BE PER ARCHITECTURAL ELEVATIONS.
2. ALL FEEDERS AND BRANCH CIRCUITS SHALL BE CONNECTED TO PANELBOARDS, SO THAT LOADS ARE DISTRIBUTED EQUALLY ON ALL PHASES.
3. A VERIFICATION OF POLARITY SHALL BE MADE, AND IT SHALL BE ENSURED THAT ALL FUSES, CIRCUIT BREAKERS AND CONTROL DEVICES ARE CONNECTED IN THE LINE SIDE (HOT) CONDUCTORS ONLY. BAYONET AND EDISON SOCKET LAMP HOLDERS SHALL HAVE THEIR OUTER SHELL CONNECTED TO THE NEUTRAL. POLARITY OF THE RECEPTACLES SHALL BE VERIFIED.

## EXECUTION

1. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS AND MOUNTING HEIGHTS OF THE ELECTRICAL EQUIPMENT. UNLESS OTHERWISE NOTED, MOUNTING HEIGHTS SHALL BE AS DIRECTED BY ARCHITECT:
   A. RECEPTACLES AND COMMUNICATIONS OUTLETS SHALL BE MOUNTED 15"AFF ON CENTERLINE. THE LONG DIMENSION SHALL BE VERTICALLY MOUNTED.
   B. SWITCHES SHALL BE MOUNTED 48"AFF.
   C. ABOVE COUNTER OUTLETS AND SWITCHES SHALL BE MOUNTED AT 48"AFF TO CENTERLINE, BUT NOT LESS THAN 3-1/2" ON CENTERLINE ABOVE THE BACKSPLASH.
   D. WALL MOUNTED TELEPHONES SHALL BE MOUNTED 54"AFF TO CENTERLINE.
   E. HVAC USER LOCAL DISCONNECT SWITCHES SHALL BE MOUNTED 54"AFF TO CENTERLINE.
   F. FIRE ALARM DEVICES:
      1) AUDIO/VISUAL ALARM DEVICES SHALL BE WALL MOUNTED 80"AFF TO CENTERLINE OR 6" BELOW CEILING, WHICHEVER IS LOWER.
2. NUMBERED CIRCUITS ARE TO ILLUSTRATE DESIGN INTENT TO ELECTRICAL CONTRACTOR. FIELD CONDITIONS MAY ARISE TO CHANGE DESIGN. INDICATE THE ACTUAL CIRCUIT NUMBERS USED ON THE "AS-BUILT" DRAWINGS.
3. ALL WORK INSTALLED WITHIN THE CEILING PLENUM SHALL BE IN ACCORDANCE WITH WIRING METHOD REQUIREMENTS FOR AIR HANDLING CEILING SPACES. REFER TO THE MECHANICAL AND ARCHITECTURAL DRAWINGS FOR PLENUM AREAS AND ADDITIONAL INFORMATION.
4. ALL OF THE PIPE SLEEVED, INSERTS, CASTING, FRAMES AND OTHER APPURTENANCES ARE NOT SHOWN ON THE ELECTRICAL DRAWINGS. THE CONTRACTOR SHALL COORDINATE THE ELECTRICAL DRAWINGS WITH ALL OTHER CONTRACT DOCUMENTS AND TRADES FOR LOCATIONS, SIZES AND DETAILS.
5. PRIOR TO ANY DIGGING, TRENCHING, ETC. CONTACT ALL LOCAL UTILITY COMPANIES AND MUNICIPALITIES AND CONFIRM EXACT LOCATIONS OF ALL EXISTING UTILITIES.

## CLOSEOUT

1. UPON COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL BALANCE EACH PANEL SO THAT THERE IS NO MORE THAN 3% DIFFERENCE BETWEEN PHASES. THE LOAD SHALL BE MONITORED DURING THE PEAK A.M. DEMAND PERIOD. HOWEVER, THE RECONFIGURATION OF THE PANEL SHALL OCCUR AFTER CLOSE OF BUSINESS. THE SCHEDULING OF ALL WORK SHALL BE WITH THE CONSTRUCTION MANAGER. SUBMIT REPORT TO ENGINEER. ELECTRICAL CONTRACTOR SHALL TAKE ACTUAL READINGS IF THE OWNER REQUESTS, TO DEMONSTRATE THE PROPER LOAD BALANCE. IN THE EVENT THAT, IN THE OPINION OF THE ARCHITECT AND ENGINEER , THE LOADS ARE NOT PROPERLY BALANCED, THE CONTRACTOR SHALL ADJUST CIRCUITS AT HIS EXPENSE.
2. THE CONTRACTOR SHALL PROVIDE NEW TYPE-WRITTEN PANEL DIRECTORIES FOR ALL PANELS CHANGED OR ADDED. PROVIDE ENGRAVED PLASTIC LABELS PERMANENTLY ATTACHED (NO ADHESIVES) FOR ALL NEW PANELS AND DISTRIBUTION EQUIPMENT.
3. PRIOR TO FINAL ACCEPTANCE, THE CONTRACTOR SHALL PROVIDE A WRITTEN CERTIFICATE THAT ALL EQUIPMENT AND SYSTEMS HAVE BEEN PROPERLY INSTALLED PER CODE, CLEANED, ADJUSTED AND TESTED. INCLUDE IN THE CERTIFICATE, CORRESPONDENCE FROM EACH EQUIPMENT MANUFACTURER'S REPRESENTATIVE THAT THE CONFIGURATION OF THEIR EQUIPMENT, SYSTEM AND THE INSTALLATION CONFORM TO THE MANUFACTURER'S REQUIREMENTS.
4. THE CONTRACTOR SHALL PROVIDE ORIGINAL "AS-BUILT" DRAWINGS. THESE DRAWINGS SHALL BE MADE AT THE CONTRACTOR'S EXPENSE ON REPRODUCIBLE SHEETS OF THE SAME SIZE AS THE ARCHITECTURAL DRAWINGS. SUBMIT "AS-BUILT" DRAWINGS TO ENGINEER.
5. SUBMIT CERTIFIED RECORDS OF ALL TESTS, INCLUDING LOAD BALANCING, IN TABULATED PERMANENT, REPRODUCIBLE FORM, COMPLETELY INDEXED AND EXPLAINED, INDICATING THE SPECIFIC TEST PERFORMED, ENVIRONMENTAL CONDITIONS AND RESULTS OBTAINED UPON COMPLETION OF THE PROJECT AND FULL SCOPE OF WORK.
6. PROVIDE PERMANENT IDENTIFICATION MARKINGS AND NAMEPLATES FOR WIRING AND EACH ITEM OF ELECTRICAL APPARATUS AND ASSOCIATED CONTROLLED EQUIPMENT, WITH THE SAME INSCRIPTIONS AS SHOWN ON THE DRAWINGS, OR AS DIRECTED, CLEARLY AND NEATLY APPLIED ENGRAVED PLASTIC LAMINATE, WHITE WITH BLACK CORE, 1-1/4" X 3" MINIMUM.
7. A GROUND CONTINUITY TEST (MEGGER) SHALL BE MADE BETWEEN MAIN GROUND SYSTEM AND EQUIPMENT FRAME, AND SYSTEM NEUTRAL. A MINIMUM OF TEN AMPS D.C SHALL BE USED BETWEEN GROUND REFERENCES AND EACH GROUND POINT TESTED. RESISTANCE SHALL BE CALCULATED AND SHALL NOT EXCEED 25 OHMS.
8. PROVIDE A PERMANENT PLAQUE IN THE ELECTRICAL ROOM INDICATING THE FEEDER SIZES AND LOCATIONS OF EACH OF THE ELECTRICAL SERVICES.

## RACEWAYS

PROVIDE A RACEWAY SYSTEM OF CONDUITS, CONFIGURED FOR 4 CABLES PER OUTLET, 0.24" OD (VERIFY) UTILIZING WIDE RADIUS BENDS AND OVERSIZED JUNCTION BOXES. THE CONDUITS SHALL TERMINATE WHERE NOTED ON THE PLANS. THE GROUPING OF CABLES SHALL BE AS FOLLOWS:

MAXIMUM QUANTITY OF CABLES IN CONDUIT

| CABLE DIAMETER INCHES | CONDUIT TRADE SIZES 1/2 | 3/4 | 1 | 1-1/4 | 1-1/2 | 2 | 2-1/2 | 3 |
|---|---|---|---|---|---|---|---|---|
| .18 | 1 | 5 | 8 | 14 | 18 | 26 | 40 | 60 |
| .22 | 0 | 4 | 7 | 12 | 16 | 22 | 36 | 50 |
| .24 | 0 | 3 | 6 | 10 | 15 | 20 | 30 | 40 |
| .29 | 0 | 2 | 3 | 6 | 7 | 14 | 17 | 20 |
| .31 | 0 | 2 | 3 | 4 | 6 | 12 | 14 | 20 |

## RACEWAYS

1. PROVIDE COMPLETE METAL RACEWAY SYSTEMS AND ENCLOSURES FOR ALL LIGHTING, POWER, TELEPHONE/DATA, FIRE ALARM WIRING THROUGHOUT THE EXTENT OF THE REQUIRED SYSTEMS.
2. RACEWAYS SHALL CONSIST OF THE FOLLOWING:
   A. ELECTRICAL METALLIC TUBING (EMT) SHALL BE USED FOR ALL POWER AND LIGHTING BRANCH CIRCUITS. EMT FITTINGS SHALL BE OF THE STEEL COMPRESSION TYPE.
   B. CONDUIT OF ANY SIZE USED FOR COMMUNICATIONS OR DATA WIRING, LOCATED INDOORS, SHALL BE EMT. EMT FITTINGS SHALL BE COMPRESSION TYPE.
   C. RIGID HEAVY WALL GALVANIZED STEEL CONDUIT (HW) OR INTERMEDIATE METAL CONDUIT (IMC) SHALL BE USED FOR POWER CONDUIT 2-1/2" DIAMETER OR LARGER, OR ANY SIZE CONDUIT WHEN ENCASED IN THE FLOOR SLAB. HW SHALL BE USED FOR INCOMING ELECTRICAL SERVICE, ANY SIZE CONDUIT ROUTED OUTDOORS, OR WHERE IN DIRECT CONTACT WITH THE EARTH. ALL HW AND IMC FITTINGS AND COUPLINGS SHALL BE THREADED.
3. MINIMUM CONDUIT SIZE SHALL BE 3/4" UNLESS OTHERWISE INDICATED. ALL EMPTY CONDUITS SHALL HAVE A NYLON PULLSTRING.
4. COMMUNICATIONS SYSTEM RACEWAY THE RACEWAY SYSTEM FOR COMBINATION TELEPHONE/DATA OUTLETS SHALL UTILIZE A 4" SQUARE 2-1/8" DEEP BACKBOX WITH A SINGLE GANG FLUSH WALL OPENING WITH A 3/4" CONDUIT TO THE RACEWAY SYSTEM. TELECOMMUNICATION CONDUITS SHALL BE BASED ON THE QUANTITY OF CABLES ROUTED TO EACH TELECOMMUNICATION DEVICE. CONFIRM ACTUAL CABLE TYPE AND PHYSICAL SIZE PRIOR TO CONDUIT INSTALLATION.
5. PROVIDE A PULL WIRE OR ROPE IN ALL EMPTY CONDUIT.
6. ALL RACEWAYS SHALL BE CONCEALED. DEVICES SHALL BE FLUSH MOUNTED, UNLESS OTHERWISE NOTED.
7. EACH SWITCH, LIGHTING FIXTURE, RECEPTACLE AND OTHER MISCELLANEOUS DEVICES SHALL BE PROVIDED WITH A GALVANIZED PRESSED STEEL OUTLET BOX OF NOT LESS THAN NO. 14 US GAUGE STEEL. RACEWAYS SHALL BE FASTENED WITH LOCKNUTS. ALL UNUSED KNOCKOUTS MUST BE SEALED. THERE MUST BE SUFFICIENT ROOM FOR WIRES AND DEVICES AND DEEP BOXES SHALL BE INSTALLED WHERE REQUIRED. BOXES SHALL BE SECURELY AND ADEQUATELY SUPPORTED.
8. FINAL CONNECTIONS TO MOTORS, TRANSFORMERS AND SIMILAR EQUIPMENT THAT IS SUBJECT TO VIBRATION OR ADJUSTMENT SHALL BE MADE WITH SECTIONS OF FLEXIBLE METAL CONDUIT. THE MINIMUM LENGTH SHALL BE 18" AND THE MAXIMUM SHALL BE 36" LONG.
9. IN SUSPENDED CEILINGS WHERE RECESSED LIGHTING FIXTURES ARE INSTALLED, PROVIDE JUNCTION BOXES NEAR THE FIXTURES FOR EXTENDING THE BRANCH CIRCUIT CONDUCTORS TO THE FIXTURE USING FLEXIBLE METAL CONDUIT. THE FLEXIBLE METAL CONDUIT SHALL BE 3/8" MINIMUM PLENUM RATED, IN LENGTHS NOT EXCEEDING 6'.
10. OUTLET BOXES WHICH ARE INSTALLED IN PLASTER WALLS SHALL BE 4 INCHES SQUARE 1-1/2 INCHES DEEP WITH PLASTER RINGS OF THE SAME DEPTH AS THE PLASTER. MULTIGANG BOXES SHALL BE USED WHERE REQUIRED.
11. IN SUSPENDED CEILINGS, PROVIDE DEDICATED SUPPORT FOR CONDUIT AND JUNCTION BOXES DIRECTLY FROM THE STRUCTURAL SLAB, DECK, OR FRAMING PROVIDED FOR THAT PURPOSE. BRANCH CIRCUIT CONDUITS SHALL NOT BE CLIPPED TO DUCTWORK, THE CEILING SUPPORT WIRES OR SPLINE UNLESS THAT CEILING SYSTEM HAS BEEN SPECIFICALLY DESIGNED FOR THAT PURPOSE.
12. ALL CONDUIT, WIREWAY AND EQUIPMENT SHALL BE PROTECTED AGAINST ENTRANCE OF LIQUIDS AND FOREIGN MATTER BY MEANS OF PLUGS OR CAPS. COVER FIXTURES, DETECTORS AND DEVICES FURNISHED AND/OR INSTALLED DURING THE CONSTRUCTION PERIOD. DEVICES DAMAGED SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR REPLACED.
13. PROVIDE CORROSION RESISTANT HANGERS, ANGLES, CHANNEL ANCHORS AND OTHER SUPPORTS REQUIRED BY FIELD CONDITIONS TO INSTALL ITEMS OF ELECTRICAL EQUIPMENT. SUPPORTS AND METHODS OF FASTENING TO BUILDING STRUCTURE SHALL BE ACCEPTABLE TO THE ARCHITECT/ENGINEER.
14. NO ELECTRICAL ITEMS SHALL REST ON, OR DEPEND FOR SUPPORT ON SUSPENDED CEILING MEDIA (TILES, PLASTER, SPLINES, ETC.) IN SUSPENDED CEILING, SUPPORT CONDUITS DIRECTLY FROM STRUCTURAL SLABS, DECKS OR FRAMING MEMBER.
15. ELECTRICAL METALLIC TUBING (EMT) "THIN WALL" CONDUIT SHALL BE HOT-DIPPED GALVANIZED 2 INCHES AND SMALLER WHEN USED FOR LIGHTING AND POWER CIRCUITS.
16. FLEXIBLE CONDUIT SHALL BE GALVANIZED STEEL, 3/4 INCH MINIMUM SIZE, EXCEPT FOR LIGHTING FIXTURE WHIPS THAT MAY BE 3/8 INCH MINIMUM SIZE. IN AIR PLENUM AREAS, PROVIDE THE TYPE OF FLEXIBLE CONDUIT IN ACCORDANCE WITH CODE REQUIREMENTS, LENGTH OF FLEXIBLE CONDUIT SHALL BE SIX (6) FEET MAXIMUM.
17. CONDUITS SHALL RUN PARALLEL TO BUILDING CONSTRUCTION AND BE SUITABLY SUPPORTED AT CODE REQUIRED INTERVALS. SUCH CONDUITS SHALL BE PAINTED IN ACCORDANCE WITH THE ARCHITECT'S DIRECTIONS.
18. BUSHINGS FOR 1 INCH CONDUIT AND SMALLER SHALL BE SELF-EXTINGUISHING THERMOPLASTIC TYPE. FOR 1-1/4 INCH CONDUIT AND LARGER SHALL BE MALLEABLE IRON BODY, WITH INSULATING MATERIAL LOCKED IN PLACE.
19. ELECTRICAL CONTRACTOR SHALL PROVIDE RUSTPROOF BOXES, CABLE SUPPORT BOXES AND WIREWAYS FOR PROPER INSTALLATION OF THE ELECTRICAL WORK WITH ALL COVERS ACCESSIBLE. ALL PULL BOXES, CABLE SUPPORT BOXES AND LARGE JUNCTION BOXES FOR INDOOR USE SHALL BE OF CODE GAUGE STEEL. ALL BOXES INSTALLED IN AIR PLENUM CEILINGS SHALL BE IN ACCORDANCE WITH THE CODE.
20. OUTLET BOXES SHALL BE GALVANIZED PRESSED STEEL, KNOCKOUT TYPE, WITH SUITABLE PLASTER RINGS AND COVERS OR PLATES. SIZE IN ACCORDANCE WITH THE NEC OR GOVERNING CODES.
21. ALL CEILING OUTLETS, INSTALLED IN PLASTER CEILING SHALL BE 4 INCHES OCTAGON 2-1/8 INCHES DEEP MINIMUM, CEILING OUTLETS, WHICH ARE TO SUPPORT LIGHTING FIXTURES, SHALL BE EQUIPPED WITH A 3/8 INCH MALLEABLE IRON FIXTURE STUD SECURELY FASTENED INTO THE OUTLET BOX.
22. INSTALL ALL CONDUITS WITH NO MORE THAN 270 DEGREES OF BENDS. ALL CONDUIT THAT REQUIRES MORE THAN THE SPECIFIED DEGREE OF BENDS SHALL HAVE A PULLBOX INSTALLED.
23. ALL PANELBOARD FEEDERS OF MORE THAN 200' SHALL HAVE A PULLBOX INSTALLED.
24. ALL PULLBOXES SHALL BE SIZED IN ACCORDANCE WITH THE CHICAGO ELECTRIC CODE.


LINGLEDESIGNGROUP,INC
WEST MAIN STREET
LENA, IL 61048 158
PHONE: 815-369-9155
FAX: 815-369-4495
WWW.LINGLEDESIGN.COM

LINGLE DESIGN GROUP,INC

Larson Engineering Inc.
1488 Bond Street, Suite 100
Naperville, Illinois 60563-6503
(P) 630.357.0540 (F) 630.357.0164
ILLINOIS LICENSE NO. 184-001442
LEIL Comm. No. 24090046.000



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