

PLUMBING SPECIFICATIONS

1. EXECUTION OF ALL WORK TO BE IN COMPLIANCE WITH THE LATEST APPLICABLE FEDERAL, STATE AND MUNICIPAL LAWS, AND ORDINANCES.
2. PROVIDE ALL SUBMITTALS, RECORD DOCUMENTS AND MAINTENANCE MANUALS.
3. CONTRACTOR SHALL VISIT SITE AND EXAMINE, INSPECT AND MEASURE ALL EXISTING CONDITIONS AND COMPARE TO THE CONTRACT DOCUMENTS, PRIOR TO BIDDING PROJECT.
4. CONTRACTOR SHALL SCHEDULE ON SITE DEMONSTRATIONS TO ALL OWNER MAINTENANCE PERSONNEL FOR ALL AIR EQUIPMENT, AND CONTROLS.
5. ALL PIPING AND EQUIPMENT LABELING SHALL COMPLY WITH ANSI 253.1-1971 AND A13.1-1981. LABELS SHALL BE PLACED NEAR LOCATIONS ADJACENT TO CHANGES IN DIRECTION, CLOSE TO VALVES, ON ACCESS DOORS OR NEAR MOTOR, AND AT INTERVALS OF STRAIGHT PIPE NOT TO EXCEED 25'. ALL EQUIPMENT LABELS SHALL BE PHENOLIC WITH BLACK BACKGROUND AND WHITE LETTERS. EQUIPMENT LABELS SHALL CONTAIN THE FULL SCHEDULED TAG# AND ID TAG#. ALL PIPE LABELS SHALL BE FULL WRAP AROUND TYPE WITH ARROWS SHOWING THE DIRECTION OF FLOW.
6. CONDENSATE PIPING AT WATER HEATER SHALL BE TYPE "M" COPPER PROVIDED WITH 1" FIBERGLASS INSULATION COVERED BY A WHITE VAPOR BARRIER JACKET. ALL INSULATION SEAMS SHALL OVER LAP 2" AND SHALL BE SEALED WITH PRESSURE OR HEAT SENSITIVE TAPE WITH THE INSULATION PROVIDED THROUGH THE HANGER. SOLDERED JOINTS ACCEPTED.
7. ALL SUSPENDED PIPING TO BE PROVIDED WITH CLEVIS HANGERS RATED FOR THE PIPING SIZE, TYPE AND CARRY FLUID WEIGHT. SADDLES SHALL BE PROVIDED FOR ALL PVC AND INSULATED PIPING. ALL INSULATION SHALL BE PROVIDED THROUGH THE HANGER WITHOUT EXCEPTION.
8. ALL VERTICAL PIPING TO BE PROVIDED WITH UNISTRUT SUPPORT SECURED TO WALL GIRTS AND B-LINE CLAMP. SADDLES SHALL BE PROVIDED FOR ALL PVC AND INSULATED PIPING. ALL INSULATION SHALL BE PROVIDED THROUGH THE HANGER WITHOUT EXCEPTION.
9. ALL ABOVE GAS PIPING TO BE SCHEDULE 40 IRON, PIPING 14"WIC AND LOWER TO BE SCREWED, PROVIDE VENTED CONTAINMENT FOR ALL PIPING INSTALLED BEHIND WALLS OR IN INACCESSIBLE CEILINGS. ALL GAS VALVES TO BE BALL TYPE RATED FOR THE PRESSURE AND SERVICE.
10. 9" MERCURY, IMMERSION, SCALE, THERMOMETERS WITH ROTATING KNUCKLE TO BE PROVIDED AT THE INLET AND OUTLET OF ALL THERMAL EQUIPMENT. STEM SHALL BE A LENGTH TO INSERT INTO 1/2 OF THE PIPE DIAMETER.
11. ALL SANITARY SEWER, VENT, AND STORM PIPING TO BE SCHEDULE 40 DWV WITH GLUED SLIP ON JOINTS.
12. ALL ABOVE GRADE DOMESTIC WATER PIPING TO BE TO BE TYPE M HARD DRAWN COPPER. PROVIDE 1" PRE-FORMED FIBERGLASS INSULATION FOR ALL DOMESTIC WATER PIPING. ALL INSULATION TO RUN THROUGH THE HANGER. DOMESTIC WATER VALVES TO BE ONE PIECE BRONZE WITH FULL PORT BRONZE. PROVIDE HANDLE EXTENSIONS ON INSULATED PIPE.
13. PENETRATIONS: SEAL ALL MECHANICAL FLOOR, WALL AND ROOF PENETRATIONS WATERTIGHT AND WEATHERTIGHT. CAULK AROUND MECHANICAL PENETRATIONS WITH 3M CP-25 FIRE BARRIER CAULK (THICKNESS AS REQUIRED AND RECOMMENDED BY MANUFACTURER) TO MAINTAIN FIRE RESISTANCE RATING OF FIRE-RATED ASSEMBLIES. PROVIDE LINK-SEAL AT ALL SLAB PENETRATION.
14. CUTTING, PATCHING AND ROUGH-IN WORK: THIS CONTRACTOR SHALL DO ALL CUTTING OF WALLS, ROOFS, CEILING, ETC. AS REQUIRED TO INSTALL WORK UNDER THIS SECTION. ALL HOLES SHALL BE CUT AS SMALL AS POSSIBLE. GENERAL CONTRACTOR SHALL PATCH WALLS, ROOFS FLOORS, ETC. AS REQUIRED BY WORK UNDER THIS SECTION. ALL PATCHING SHALL BE THOROUGHLY FIRST CLASS AND SHALL MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION. COORDINATE WITHOUT DELAY ALL ROUGHING-IN WITH GENERAL CONSTRUCTION. ALL PIPING, CONDUIT, ROUGH-IN SHALL BE CONCEALED EXCEPT IN UNFINISHED AREAS AND WHERE OTHERWISE SHOWN. INSULATION THROUGH PENETRATION. FILL ALL VOIDS WITH EXPANDABLE FOAM.
15. ALL DRAIN, WASTE, AND VENT PIPING SHALL BE WATER TESTED WITH 10' OF HEAD PRESSURE AND WITNESSED BY THE AHJ AND/OR BUILDING INSPECTOR.
16. ALL WATER LINES SHALL BE AIR TESTED TO 60# FOR 20 MINUTES OR WATER TESTED WITH SERVICE PRESSURE.
17. ALL GAS PIPING SHALL BE AIR TESTED TO 20# FOR 20 MINUTES. ANY WELDED GAS LINE SHALL BE 60# FOR 20 MINUTES.
18. EQUIPMENT, APPROVED EQUALS:
WATER HEATERS
JO SMITH
BRADFORD WHITE
RHEEM

PEX AND PEX MANIFOLDS
PEX
VIEGA
SUKUN CHIEF
ZURN

PLUMBING FIXTURES
REFER TO PLANS, OWNER REQUEST SPECIFIC FIXTURES

COMMISSIONING PROCEDURE:

1. Title: Commissioning Procedure to Ensure Compliance with C408
2. Introduction:
2.1. The commissioning process detailed herein is designed to adhere to the requirements set forth in C408, ensuring that all building systems perform optimally, efficiently, and in accordance with the design specifications. This process encompasses the stages of planning, execution, verification, and documentation, aiming to validate the functionality and performance of mechanical, electrical, plumbing, and other relevant building systems.
3. Pre-Commissioning Phase:
3.1. Appointment of Commissioning Authority (CxA): The project team designates a qualified CxA responsible for overseeing the commissioning process.
3.2. Development of Commissioning Plan: The CxA collaborates with the design and construction teams to create a comprehensive commissioning plan. This plan outlines the scope, objectives, responsibilities, testing procedures, and timelines for commissioning activities.
4. Design Review and Documentation:
4.1. The CxA reviews design documents, specifications, and equipment submittals to ensure alignment with commissioning requirements and project goals.
4.2. Identification of Testing Protocols: Detailed test procedures are established for each system, encompassing functional performance tests and sequence of operations.
5. Installation Verification:
5.1. The CxA monitors and verifies the installation of building systems, ensuring compliance with approved submittals, manufacturer's guidelines, and industry standards.
5.2. Documenting Installation: The CxA maintains records and documentation of installed systems to confirm their conformity with design intent.
6. Functional Performance Testing:
6.1. Conducting Tests: System-specific tests are executed to verify functionality, performance, and integration of components. This includes HVAC, lighting, controls, plumbing, and other relevant systems.
6.2. Reporting and Analysis: Test results are documented, and any discrepancies or issues are identified, reported, and rectified in collaboration with the project team.
7. Training and Handover:
7.1. Training Sessions: The CxA coordinates training sessions for building operators and maintenance personnel to ensure proper understanding and operation of systems.
7.2. Documentation and Handover: Comprehensive commissioning documentation, including test reports, operation manuals, and record drawings, is compiled and handed over to the owner.
8. Post-Occupancy Evaluation:
8.1. Ongoing Monitoring: The CxA conducts periodic evaluations post-occupancy to address any performance issues that may arise.
8.2. Fine-Tuning: Adjustments and fine-tuning are performed as necessary to optimize system performance and efficiency.
9. Conclusion:
9.1. This commissioning process, as outlined, ensures compliance with C408 by systematically verifying and validating the performance of building systems. The comprehensive documentation generated throughout the process provides a valuable resource for ongoing maintenance, troubleshooting, and future renovations, contributing to the overall success and efficiency of the constructed facility.

9.2. This narrative provides a structured approach to commissioning, demonstrating a commitment to compliance with C408 while ensuring that building systems meet the intended design and operational objectives.

MECHANICAL SPECIFICATIONS

1. EXECUTION OF ALL WORK TO BE IN COMPLIANCE WITH THE LATEST APPLICABLE FEDERAL, STATE AND MUNICIPAL LAWS, AND ORDINANCES.
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3. CONTRACTOR SHALL VISIT SITE AND EXAMINE, INSPECT AND MEASURE ALL EXISTING CONDITIONS AND COMPARE TO THE CONTRACT DOCUMENTS, PRIOR TO BIDDING PROJECT.
4. CONTRACTOR SHALL SCHEDULE ON SITE DEMONSTRATIONS TO ALL OWNER MAINTENANCE PERSONNEL FOR ALL AIR EQUIPMENT, AND CONTROLS.
5. ALL PIPING AND EQUIPMENT LABELING SHALL COMPLY WITH ANSI 253.1-1971 AND A13.1-1981. LABELS SHALL BE PLACED NEAR LOCATIONS ADJACENT TO CHANGES IN DIRECTION, CLOSE TO VALVES, ON ACCESS DOORS OR NEAR MOTOR, AND AT INTERVALS OF STRAIGHT PIPE NOT TO EXCEED 25'. ALL EQUIPMENT LABELS SHALL BE PHENOLIC WITH BLACK BACKGROUND AND WHITE LETTERS. EQUIPMENT LABELS SHALL CONTAIN THE FULL SCHEDULED TAG# AND ID TAG#. ALL PIPE LABELS SHALL BE FULL WRAP AROUND TYPE WITH ARROWS SHOWING THE DIRECTION OF FLOW.
6. EMC SQUARED AND Q7AB ARE APPROVED TEST AND BALANCE CONTRACTORS FOR THE PROJECT. ALL TESTING TO BE DONE PER NEBB STANDARDS. AIR SYSTEMS SHALL BE BALANCED TO PLUS/MINUS 10%. ALL DEFICIENCY ITEMS NOTED IN THE TAB REPORT SHALL BE REPAIRED BY THE CONTRACTOR AND THE SYSTEM REBALANCED UNTIL DESIGN TOLERANCES CAN BE OBTAINED.
7. ALL INTERIOR SUPPLY AIR DUCTWORK SHALL BE GALVANIZED CONSTRUCTED PER SMACNA STANDARDS FOR 2" OR LESS STATIC PRESSURE WITH ONLY LONGITUDINAL JOINTS SEALED. PROVIDE WRAPPED FOIL FACED FIBERGLASS INSULATION HAVING AN "R" VALUE OF 6 OR MORE THE ENTIRE LENGTH OF THE DUCT. ALL INSULATION JOINTS SHALL OVERLAP A MINIMUM OF 4" AND BE SEALED WITH HEAT SENSITIVE TAPE.
8. ALL INTERIOR RETURN AND OUTSIDE AIR DUCTWORK SHALL BE GALVANIZED CONSTRUCTED PER SMACNA STANDARDS FOR 1" OR LESS STATIC PRESSURE WITH ONLY LONGITUDINAL JOINTS SEALED. PROVIDE WRAPPED FOIL FACED FIBERGLASS INSULATION HAVING AN "R" VALUE OF 6 OR MORE THE ENTIRE LENGTH OF THE DUCT. ALL INSULATION JOINTS SHALL OVERLAP A MINIMUM OF 4" AND BE SEALED WITH HEAT SENSITIVE TAPE.
9. ALL INTERIOR EXHAUST AIR DUCTWORK SHALL BE GALVANIZED CONSTRUCTED PER SMACNA STANDARDS FOR 1" OR LESS STATIC PRESSURE WITH ONLY LONGITUDINAL JOINTS SEALED. PROVIDE WRAPPED FOIL FACED FIBERGLASS INSULATION HAVING AN "R" VALUE OF 6 OR MORE ONLY 25' FROM THE EXTERIOR WALL PENETRATION. ALL INSULATION JOINTS SHALL OVERLAP A MINIMUM OF 4" AND BE SEALED WITH HEAT SENSITIVE TAPE.
10. WHERE LAY-IN CEILING DIFFUSER TERMINATIONS ARE SHOWN, TERMINATE METAL DUCTING WITH A FLEXIBLE DUCT CONNECTION NO LONGER THAN 5' FLEXIBLE DUCT TO BE CLASS 1, 2-PLY VINYL FILM SUPPORTED BY HELICALLY WOUND SPRING STEEL WIRE WITH FIBERGLASS INSULATION AND POLYETHYLENE VAPOR BARRIER FILM. FLEXIBLE DUCTING SHALL BE SECURED TO THE DIFFUSER AND DUCTWORK BY MEANS OF NYLON BAND CLAMPS WITH EXTERIOR INSULATION PULLED OVER THE CONNECTION AND SEALED WITH HEAT SENSITIVE TAPE.
11. WHERE DUCTING TERMINATES AT MOTOR DRIVEN EQUIPMENT AND AT BUILDING EXPANSION JOINTS, PROVIDE NEOPRENE CONNECTORS THAT ARE RATED FOR THE EXTERNAL ENVIRONMENT THEY ARE INSTALLED IN.
12. ALL SQUARE 45 & 90 DEGREE DUCTWORK ELBOWS SHALL BE PROVIDED WITH DOUBLE WALL TURNING VANES.
13. ALL BRANCH DUCTWORK TO DIFFUSERS SHALL HAVE A BALANCING DAMPER PROVIDED WITH AN EXTENDED SHAFT THAT EXTENDS THE CONTROL HANDLE BEYOND THE INSULATION.
14. PROVIDE SHEET METAL SLEEVES FOR ALL DUCTWORK WALL PENETRATIONS. PROVIDE CAST IRON SLEEVES FOR ALL PIPING FLOOR AND WALL PENETRATIONS. SIZE GRADE WALL/FLOOR SLEEVES TO ACCOMMODATE A LINK-SEAL BETWEEN THE PIPE AND THE SLEEVE.
15. ALL SUSPENDED PIPING TO BE PROVIDED WITH CLEVIS HANGERS RATED FOR THE PIPING SIZE, TYPE AND CARRY FLUID WEIGHT. SADDLES SHALL BE PROVIDED FOR ALL PVC AND INSULATED PIPING. ALL INSULATION SHALL BE PROVIDED THROUGH THE HANGER WITHOUT EXCEPTION.
16. ALL VERTICAL PIPING TO BE PROVIDED WITH UNISTRUT SUPPORT SECURED TO WALL GIRTS AND B-LINE CLAMP. SADDLES SHALL BE PROVIDED FOR ALL PVC AND INSULATED PIPING. ALL INSULATION SHALL BE PROVIDED THROUGH THE HANGER WITHOUT EXCEPTION.
17. ALL SUSPENDED DUCTWORK TO BE PROVIDED WITH SHEET METAL DUCT STRAP. SECURED TO STRUCTURAL STEEL WITH C-CLAMPS. PROVIDE DUCT INSULATION A MINIMUM OF 6" UP THE HANGER STRAP.
18. ALL VERTICAL DUCTWORK TO BE PROVIDED WITH UNISTRUT SUPPORT SECURED TO WALL GIRTS AND SHEET METAL BAND CLAMP. PROVIDE DUCT INSULATION A MINIMUM OF 6" UP THE HANGER STRAP.
19. 9" MERCURY, IMMERSION, SCALE, THERMOMETERS WITH ROTATING KNUCKLE TO BE PROVIDED AT THE INLET AND OUTLET OF ALL THERMAL EQUIPMENT. STEM SHALL BE A LENGTH TO INSERT INTO 1/2 OF THE PIPE DIAMETER.
20. PENETRATIONS: SEAL ALL MECHANICAL FLOOR, WALL AND ROOF PENETRATIONS WATERTIGHT AND WEATHERTIGHT. CAULK AROUND MECHANICAL PENETRATIONS WITH 3M CP-25 FIRE BARRIER CAULK (THICKNESS AS REQUIRED AND RECOMMENDED BY MANUFACTURER) TO MAINTAIN FIRE RESISTANCE RATING OF FIRE-RATED ASSEMBLIES. PROVIDE LINK-SEAL AT ALL SLAB PENETRATION.
21. CUTTING, PATCHING AND ROUGH-IN WORK: THIS CONTRACTOR SHALL DO ALL CUTTING OF WALLS, ROOFS, CEILING, ETC. AS REQUIRED TO INSTALL WORK UNDER THIS SECTION. ALL HOLES SHALL BE CUT AS SMALL AS POSSIBLE. GENERAL CONTRACTOR SHALL PATCH WALLS, ROOFS FLOORS, ETC. AS REQUIRED BY WORK UNDER THIS SECTION. ALL PATCHING SHALL BE THOROUGHLY FIRST CLASS AND SHALL MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION. COORDINATE WITHOUT DELAY ALL ROUGHING-IN WITH GENERAL CONSTRUCTION. ALL PIPING, CONDUIT, ROUGH-IN SHALL BE CONCEALED EXCEPT IN UNFINISHED AREAS AND WHERE OTHERWISE SHOWN. INSULATION THROUGH PENETRATION. FILL ALL VOIDS WITH EXPANDABLE FOAM.
22. EQUIPMENT, APPROVED EQUALS:
AIR HANDLERS
TRANE
ADP
GOODMAN

CONDENSING UNITS
TRANE
LENNOX
CARRIER

GRILLES, REGISTERS, & DIFFUSERS
PRICE
TITUS
NAILOR
KREUER

FANS
COOKS
GREENHECK

MINI SPLIT
LG
YORK
TRANE
DAIKIN

DOAS (DEDICATED OUTSIDE AIR UNITS)

PACKAGED DX STAGED ROOF TOP UNITS (RTU)

ELECTRICAL SPECIFICATIONS

- A. GENERAL:
1. SCOPE OF SERVICES - WORK SHALL INCLUDE THE FURNISHING AND INSTALLING OF A COMPLETE AND FUNCTIONING ELECTRICAL SYSTEMS FOR COMPONENTS INDICATED ON THE DRAWINGS AND THESE SPECIFICATIONS. THIS SHALL INCLUDE ACCESSORIES NECESSARY, WHETHER SPECIFICALLY STATED OR NOT, TO MAKE THE REQUIRED ELECTRICAL SYSTEMS COMPLETE AND OPERATIONAL. THIS WILL INCLUDE EVERY ARTICLE, DEVICE OR ACCESSORY NECESSARY TO FACILITATE EACH SYSTEM FUNCTIONING AS INDICATED BY THE DESIGN AND THE EQUIPMENT SPECIFIED. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE SITE AND ALL EXISTING CONDITIONS PRIOR TO BIDDING.
2. MATERIAL AND WORKMANSHIP - ALL EQUIPMENT AND MATERIALS PROVIDED SHALL BE NEW EXCEPT AS OTHERWISE STATED ON THE DRAWINGS. ALL EQUIPMENT PROVIDED SHALL BE LISTED WHEN SUCH STANDARDS EXIST FOR THE TYPE OF EQUIPMENT FURNISHED AND ACCEPTABLE FOR INSTALLATION OF THE LOCAL BUILDING AUTHORITY. ALL WORKMANSHIP SHALL BE BY LICENSED AND EXPERIENCED ELECTRICIANS OR JOURNEYMEN. ALL TOOLS, MACHINERY AND EQUIPMENT REQUIRED OF THE PERFORMANCE OF THE ELECTRICAL WORK SHALL BE FURNISHED BY THIS CONTRACTOR.
3. COORDINATION - THE CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER CONTRACTORS AND SUBCONTRACTORS SO THAT VARIOUS COMPONENTS OF THE ELECTRICAL SYSTEMS WILL BE INSTALLED AT THE PROPER TIME, WILL FIT THE AVAILABLE SPACE, AND WILL ALLOW PROPER SERVICE ACCESS TO ALL EQUIPMENT. THE CONTRACTOR SHALL REFER TO ARCHITECTURAL, STRUCTURAL AND MECHANICAL DRAWINGS AND TO RELEVANT EQUIPMENT DRAWINGS TO DETERMINE THE EXTENT OF CLEAR SPACES.
4. ORDINANCES AND CODES - CONTRACTOR'S PERFORMANCE, WORKMANSHIP AND MATERIALS SHALL COMPLY WITH APPLICABLE NATIONAL FIRE PROTECTION ASSOCIATION CODES, STATE AND LOCAL BUILDING CODES, AND/OR ALL OTHER APPLICABLE CODES AND ORDINANCES. ALL PERMITS, LICENSES AND FEES THAT ARE REQUIRED BY THE GOVERNING AUTHORITIES FOR THE PERFORMANCE OF THE ELECTRICAL WORK SHALL BE OBTAINED AND PAID FOR BY THE CONTRACTOR. FILLING OUT FORMS FOR APPLICATIONS BY THE ENGINEER WILL BE BILLED HOURLY TO THE CONTRACTOR.
B. COMMON WORK AND BASIC MATERIALS/EQUIPMENT:
1. GUARANTEE - GUARANTEE AGAINST DEFECTIVE WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL PAYMENT. GUARANTEE SHALL INCLUDE MATERIAL/EQUIPMENT TO BE REPLACED AND ALL LABOR REQUIRED.
2. TESTING, CHECK-OUT AND CLEANING - REPLACE ALL BURNED-OUT LAMPS. THE CONTRACTOR SHALL CLEAN ALL MATERIAL AND EQUIPMENT INSTALLED UNDER THE ELECTRICAL CONTRACT. DIRT, DUST, PLASTER, STAINS AND FOREIGN MATTER SHALL BE REMOVED FROM ALL SURFACES. ALL EQUIPMENT SHALL HAVE FINISH TOUCHED UP PRIOR TO INSPECTION. DAMAGED ELECTRICAL EQUIPMENT DURING THE CONSTRUCTION PROCESS SHALL BE REPLACED WITH NEW EQUIPMENT. ALL COSTS ASSOCIATED WITH THE DAMAGED EQUIPMENT SHALL BE ASSUMED BY THE INSTALLING CONTRACTOR.
3. CUTTING AND PATCHING - THIS CONTRACTOR SHALL DO ALL CUTTING OF WALLS, FLOORS, CEILINGS, ETC. AS REQUIRED TO INSTALL WORK UNDER THIS SECTION. CONTRACTOR SHALL PATCH WALLS, FLOORS, ETC. TO MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION. CONTRACTOR SHALL REPAIR ALL FIRE/SMOKE RATED PENETRATIONS TO RETAIN RATING.
4. UTILITY REQUIREMENTS - THE SECONDARY SERVICE SHALL EXTEND FROM A PAD MOUNTED TRANSFORMER TO THE MAIN SWITCHBOARD. PRIMARY DUCTBANK SHALL BE PROVIDED BY THE CONTRACTOR IF REQUIRED BY THE LOCAL UTILITY COMPANY. FINAL TERMINATIONS AT THE PAD MOUNTED TRANSFORMER SHALL BE COORDINATED WITH THE UTILITY COMPANY.

THE FOLLOWING ELECTRICAL SERVICE CHARACTERISTICS SHALL BE COORDINATED WITH THE UTILITY COMPANY:
A. SERVICE VOLTAGE
B. POWER COMPANY CONNECTION CHARGES
C. AVAILABLE SHORT CIRCUIT CURRENT
D. LOAD ANALYSIS, CONNECTED AND ESTIMATED DEMAND
E. POWER COMPANY CHARGES FOR ESTABLISHING SERVICE WHICH ARE TO BE PAID BY THE OWNER.

CONTRACTOR SHALL PROVIDE PROPER TERMINATION, METERING PROVISIONS, ETC. FOR ELECTRICAL AND TELEPHONE SERVICES FOR CONNECTION BY THE SERVING UTILITY. IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF ALL CODES HAVING JURISDICTION AND OF THE SERVING UTILITY INVOLVED, UTILITY COSTS SHALL BE INCLUDED IN THE BID. COORDINATE ALL INSTALLATION REQUIREMENTS WITH THE LOCAL UTILITY PRIOR TO BIDDING.

5. CONDUIT INSTALLATION - ALL WIRING SHALL BE ROUTED IN CONDUIT. CONDUIT SHALL BE INSTALLED CONCEALED WHEREVER POSSIBLE. EXPOSED CONDUIT SHALL BE PAINTED TO MATCH SURROUNDINGS. ALL CONDUIT BOXES SHALL BE ACCESSIBLE TO COMPLY WITH THE NEC. THE MINIMUM CONDUIT SIZE SHALL BE 1/2" UNLESS OTHERWISE NOTED ON THE DRAWINGS. CONDUIT TYPES SHALL BE THE FOLLOWING:

EMT - SHALL BE USED FOR INDOOR, ABOVE GRADE POWER FEEDERS, BRANCH CIRCUITS, AND IN CONCEALED LOCATIONS. SHALL ALSO BE USED FOR FIRE ALARM, TELEDATA, SECURITY, AV, NURSE CALL, AND PAGING SYSTEMS. ALL CONDUIT FITTINGS FOR EMT CONDUIT SHALL BE COMPRESSION TYPE FITTINGS. INDENTURE FITTINGS WILL NOT BE ALLOWED.

RMC - SHALL BE USED IN HAZARDOUS LOCATIONS, MECHANICAL AND ELECTRICAL ROOMS WHERE PHYSICAL ABUSE IS PROBABLE, UNDERGROUND CONDUIT ELBOWS AND ELBOWS EXTENDING UP THROUGH THE SLAB. SHALL ALSO BE USED IN OUTDOOR, EXPOSED APPLICATIONS.

PVC - SHALL BE USED IN UNDERGROUND CONDUIT APPLICATIONS.

FMC - SHALL BE USED IN INTERIOR, DRY APPLICATIONS FOR CONNECTIONS TO EQUIPMENT SUBJECT TO MOISTURE OR VIBRATION. CONDUIT SHALL BE NO GREATER THAN 36" IN LENGTH. CONDUIT SHALL BE PROVIDED WITH SEPARATE GROUND CONDUCTOR. CONDUIT MAY NOT BE UTILIZED AS GROUND PATH. FMC WILL BE ALLOWED IN USE OF EMT FOR INDOOR, CONCEALED APPLICATIONS ONLY WHERE DEMAED ACCEPTABLE BY THE OWNER AND AHJ. IMCEC WILL NOT ACCEPT FMC UNLESS PERMITTED BY BOTH AUTHORITIES. ACCEPTANCE OF THIS INSTALLATION MUST BE SUBMITTED IN WRITING TO THE ENGINEER FROM BOTH THE OWNER AND AHJ VIA THE INSTALLING CONTRACTOR.

LMC - SHALL BE USED IN OUTDOOR APPLICATIONS AS PER FMC ABOVE.

6. UNDERGROUND CONDUIT - SCHEDULE 40 PVC WITH RMC FOR ELBOWS AND ABOVE GRADE. WHERE INSTALLED BELOW SLAB, CONDUIT SHALL BE SURROUNDED ON ALL SIDES WITH 2" OF AGGREGATE.

7. WIRE - ALL WIRE SHALL HAVE COPPER CONDUCTORS, WITH UL LISTING. SERVICE ENTRANCE CABLE SHALL BE THWN OR XHHW WITH STRANDED CONDUCTORS. ALL FEEDER AND BRANCH CIRCUIT WIRE #8 AWG AND LARGER SHALL BE TYPE THWN OR XHHW, BOTH WITH STRANDED CONDUCTORS. ALL WIRE #10 AND SMALLER AWG SHALL BE TYPE THWN (WET OR DAMP LOCATIONS, OR IN CONDUIT BELOW GRADE OR SLAB) OR THHN (DRY LOCATIONS ONLY AND ABOVE GROUND). BOTH WITH SOLID CONDUCTORS. ALL BRANCH CIRCUIT WIRING SHALL BE NOT SMALLER THAN #12 AWG WIRE.

8. WIRING INSTALLATION - ALL WIRING SHALL BE INSTALLED IN APPROVED RACEWAY AND ENCLOSURES. ALL SPLICES OR TAPS SHALL OCCUR IN APPROVED BOXES AND ENCLOSURES, AND SHALL BE MADE UP WITH APPROVED SOLDERLESS CONNECTORS. FOR #10 CONDUCTORS AND SMALLER THE CONDUCTORS SHALL HAVE INSULATION OF THE PROPER COLOR TO MATCH NEC COLOR CODE SYSTEM. FOR CONDUCTORS OF #8 AND LARGER THE CONTRACTOR MAY USE COLORED PRESSURE SENSITIVE PLASTIC TAPE AT EACH END TO PROPERLY IDENTIFY THE CONDUCTOR VOLTAGE PER THE NEC. ALL BRANCHES SHALL HAVE EQUIPMENT GROUNDING CONDUCTOR INSTALLED IN THE RACEWAY, SIZED IN ACCORDANCE WITH NEC 250-122. COMPLY WITH VOLTAGE DROP SECTION IN THIS SPECIFICATION.

9. HANGERS AND SUPPORTS - SUPPORTS FOR EMT AND RMC SHALL BE AS REQUIRED BY NFPA 70. THE MINIMUM HANGER ROD SIZE SHALL BE 1/4" DIAMETER. TRAPEZE STYLE SUPPORTS FABRICATED TO SUPPORT MULTIPLE RACEWAYS SHALL BE SIZED SUCH THAT CAPACITY CAN BE INCREASED BY 25% IN FUTURE WITHOUT EXCEEDING LOAD LIMITS. COORDINATE MOUNTING ANCHORAGE TYPES WITH STRUCTURAL SUPPORT SYSTEM PRESENT IN BUILDING. THE FOLLOWING ANCHORAGE TYPES WILL BE ALLOWED BASED ON APPROVAL FROM THE STRUCTURAL ENGINEER:
WOODEN: FASTEN WITH LAG SCREWS OR THROUGH BOLTS. LAG SCREWS SHALL BE INSTALLED ONLY IN HORIZONTAL POSITION.
NEW CONCRETE: BOLT TO CONCRETE INSERTS.
EXISTING CONCRETE: EXPANSION ANCHOR FASTENERS.
MASONRY: APPROVED TOGGLE TYPE BOLTS ON HOLLOW MASONRY UNITS AND EXPANSION ANCHOR FASTENERS ON SOLID MASONRY UNITS.
STEEL: WELDED THREADED STUDS WITH LOCK WASHERS AND NUTS OR BEAM CLAMPS.
LIGHT STEEL: SHEET METAL SCREWS.
EXTERIOR STRUT STANDS SHALL BE GALVANIZED STEEL RATED FOR USE IN AN OUTDOOR ENVIRONMENT. ALL STRUT STANDS SHALL BE PAINTED GRAY AFTER FABRICATION TO PROVIDE ADDITIONAL WEATHER RESISTANCE.

10.DEVICES - DEVICES SHALL BE SPECIFICATION GRADE. COMMERCIAL OR RESIDENTIAL GRADE DEVICES ARE NOT ACCEPTABLE. COORDINATE DEVICE AND COVERPLATE COLOR WITH THE ARCHITECT AND ENGINEER PRIOR TO SUBMITTAL OF EQUIPMENT. DEVICE PLATES SHALL BE NYLON. ACCEPTABLE MANUFACTURERS SHALL BE ARROW HART, BRYANT, HUBBELL, LEVITON, AND PASS & SEYMOUR. CONVENIENCE RECEPTACLES SHALL BE NEMA 5-20R TYPE.

GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES SHALL BE NEMA 5-20R TYPE WITH FAULT SENSOR DESIGNED TO DETECT 14.8 kV LEAKAGE IN 25 MILLISECONDS OR LESS.
RECEPTACLES INSTALLED OUTDOORS SHALL BE NEMA 5-20R WEATHER RESISTANT, GROUND FAULT TYPE DEVICES WITH CLEAR PLASTIC IMPACT RESISTANT WEATHERPROOF COVER.
SWITCHES SHALL BE 20A, SINGLE POLE, DOUBLE THROW, 3-WAY AND 4-WAY SWITCHES CAN BE DOUBLE POLE.
DIMMERS SHALL BE COORDINATED WITH THE LAMP TYPE IN WHICH THEY SERVE. COORDINATE REQUIRED DIMMER TYPE WITH INCANDESCENT OR FLOURESCENT BALLASTS AS REQUIRED TO PROVIDE A FUNCTIONAL SYSTEM.

11)BOXES - ALL BOXES SHALL BE METALLIC TYPE UNLESS OTHERWISE NOTED ON THE DRAWINGS.
INTERIOR BOXES SHALL BE GALVANIZED SHEET STEEL. BOXES FOR SWITCHES AND RECEPTACLES SHALL BE 4" SQUARE, 2-1/8" DEEP. BOXES SHALL BE INSTALLED SUCH THAT DEVICE COVERS ARE TIGHT AND
- PLUMB WITH FINISHED SURFACE.
EXTERIOR BOXES SHALL BE CORROSION RESISTANT, CAST-METAL, WEATHERPROOF OUTLET WIRING BOXES.
VOLTAGES SHALL BE PROVIDED IN ALL BOXES WITH WIRING OF DIFFERENT VOLTAGE TO SEPARATE VOLTAGES.
JUNCTION BOXES AND PULP BOXES SHALL BE INSTALLED WHERE REQUIRED FOR CONDUCTOR PULLING AND BEND RADIUS REQUIREMENTS PER THE NEC.

12.VOLTAGE DROP - ALL BRANCH CIRCUITS SUPPLYING EQUIPMENT, LIGHTING, OR DEVICES SHALL BE SIZED NOT TO EXCEED 3% VOLTAGE DROP, AND NOT EXCEED 5% VOLTAGE DROP FROM SOURCE (E.G. TRANSFORMER, SERVICE, ETC.) TO LOAD. DERATE CONDUCTORS PER NEC WHEN ROUTED IN RACEWAY CONTAINING MORE THAN THREE CURRENT CARRYING CONDUCTORS. PROVIDE BUCK-BOOST TRANSFORMERS MEETING THE REQUIREMENTS OF THE TRANSFORMER SECTION WHEN VOLTAGE DROP EXCEEDS 3% FROM OVERCURRENT DEVICE TO END DEVICE.

13.EQUIPMENT AND DEVICE GROUNDING - ALL CONDUCTORS, CONDUITS, MOTOR FRAMES, ETC., WHICH REQUIRE GROUNDING SHALL BE PERMANENTLY AND EFFECTIVELY GROUNDED BY THIS CONTRACTOR IN A THOROUGH AND EFFICIENT MANNER CONFORMING IN ALL PARTICULARS TO THE NATIONAL ELECTRICAL CODE. ALL CIRCUITS MUST BE PROVIDED WITH A SEPARATE GROUND CONDUCTOR. CONTRACTOR SHALL NOT UTILIZE THE RACEWAY AS A GROUND PATH UNDER ANY CIRCUMSTANCE.

CONTRACTOR SHALL ROUTE A DEDICATED #8 BARE COPPER WIRE FROM THE SERVICE ENTRANCE GROUND BUS TO THE TELEPHONE TERMINAL BOARD (TTB) IF A TTB IS INSTALLED ON THE PROJECT.

14.BUILDING GROUNDING - GROUND THE BUILDING ELECTRICAL SERVICE PER THE ADOPTED VERSION OF THE NEC AND DETAILS INDICATED ON THE DRAWINGS. GROUND RODS UTILIZED FOR BUILDING GROUNDING SHALL BE 3/4" DIAMETER AND 10'-0" IN LENGTH. A MINIMUM OF (2) GROUND RODS SHALL BE INSTALLED WITH A COUPLER TO CREATE A 20'-0" LONG GROUND ROD. CONTRACTOR SHALL BOND THE BUILDING GROUND TO ALL AVAILABLE GROUNDING LOCATIONS PER ARTICLE 250 OF THE NEC.

15.EXTRA MATERIALS - PROVIDE MINIMUM 1 EACH TYPE AND 1 ADDITIONAL FOR EVERY 10' OF THE FOLLOWING: LAMPS, BALLASTS, BATTERIES FOR EMERGENCY LIGHTING, AND GLOBES/DIFFUSERS. PROVIDE IN PROTECTIVE COVERING/PACKAGING WITH LABEL OF CONTENTS.

16.EQUIPMENT PADS AND CONCRETE BASES -

EXTERIOR PADS AND BASES - UNLESS SPECIFIED ELSEWHERE IN THE CONTRACT DRAWINGS, PROVIDE MINIMUM 6" THICK CONCRETE PAD 28 DAY 3000 PSI WITH #6 REBAR AT 12" CENTER, EACH WAY FOR REINFORCING. PAD SHALL EXTEND MINIMUM 4' BEYOND EQUIPMENT FOOTPRINT ON ALL SIDES. COORDINATE ADDITIONAL REQUIREMENTS FOR UTILITY TRANSFORMER PAD WITH LOCAL UTILITY COMPANY.

INTERIOR PADS AND BASES - UNLESS SPECIFIED ELSEWHERE IN THE CONTRACT DRAWINGS, PROVIDE MINIMUM 4" THICK CONCRETE PAD 28 DAY 3000 PSI. PAD SHALL EXTEND 4' BEYOND EQUIPMENT FOOTPRINT ON ALL SIDES.

17)MOTORS - CONTRACTOR SHALL FURNISH AND INSTALL ALL COMPONENTS FOR A COMPLETE AND FUNCTIONING SYSTEM INCLUDING BUT NOT LIMITED TO DISCONNECTS, STARTERS AND CONTROL WIRING. SIZE FEEDER TO ACCOUNT FOR VOLTAGE DROP PER THIS SPECIFICATION.

18.LABELING - ALL DEVICES SHALL BE LABELED THAT ARE MODIFIED IN ANY WAY BY THIS PROJECT.

a. ALL PANELBOARDS (NEW OR THAT HAVE CIRCUITS MODIFIED) SHALL HAVE INSTALLED A NEW TYPED CIRCUIT DIRECTORY UPDATED WITH ALL AVAILABLE INFORMATION.
c. ALL NEW OR AFFECTED DISCONNECTS, STARTERS, TRANSFORMERS, AND PANELS SHALL HAVE A PHENOLIC, WHITE TEXT ON BLACK, MINIMUM 1/2 INCH HIGH TEXT LABELING WITH THE DEVICES SERVICE VOLTAGE AND WIRING SYSTEM (EXAMPLE: "PANEL A, 120/208V, 3 PHASE, 4 WIRE) AND OTHER INFORMATION PER THE OWNER.
d. ALL NEW, RELOCATED, OR REWIRED RECEPTACLES, SWITCHES AND OTHER DEVICES INCLUDING THOSE ABOVE SHALL BE LABELED WITH THE SOURCE OF POWER. THIS LABEL SHALL BE ON THE DEVICE COVER PLATE AND SHALL HAVE BLACK ON WHITE HELVETICA MEDIUM FONT LETTERING. 1/4 INCH HIGH DESIGNATING PANELBOARD AND CIRCUIT NUMBER SEPARATED BY COLON. THE SAME TYPE LABEL SHALL ALSO BE INSTALLED ON THE DEVICE BEHIND THE COVERPLATE.

C. DISTRIBUTION EQUIPMENT:

1. MANUFACTURERS - ALL COMPONENTS SHALL BE BY ONE OF THE FOLLOWING UNLESS OTHERWISE NOTED: EATON CUTLER HAMMER, GENERAL ELECTRIC, SIEMENS, OR SQUARE D.

2. BUILDING SERVICE MAIN CIRCUIT BREAKER - THE BUILDING MAIN CIRCUIT BREAKER WHETHER LOCATED IN A PANEL, DISTRIBUTION PANEL OR SWITCHBOARD SHALL BE A GROUND FAULT TYPE CIRCUIT BREAKER IF THE SERVICE IS RATED GREATER THAN 240V AND IS 1000A AND GREATER.

3. GROUND BUS - ALL PANELS SHALL BE PROVIDED WITH A COPPER GROUND BUS.

4. SERIES RATING - SERIES RATING OF CIRCUIT BREAKERS IN NOT ALLOWED UNLESS SPECIFICALLY NOTED ON THE CONTRACT DRAWINGS.

5. PANELBOARDS - FURNISH AND INSTALL PANELBOARDS AS SCHEDULED AND NOTED ON THE DRAWINGS. THE PANELBOARDS SHALL BE COMPLETE WITH THERMAL MAGNETIC PLASTIC CASE CIRCUIT BREAKERS OF THE BOLT-ON TYPE ASSEMBLY. ALL 2 AND 3 POLE BREAKERS HAVE COMMON TRIP. EACH PANEL SHALL CONTAIN A TYPEWRITTEN OR COMPUTER PRINTED CIRCUIT DIRECTORY. ALL PANELBOARDS SHALL BE FURNISHED WITH A HINGED FRONT COVER. PANELBOARDS SHALL BE INSTALLED WITH TOP AT 6'-6" AFF. UNLESS OTHERWISE NOTED SUCH THAT BREAKER ACCESSIBILITY LOCATIONS COMPLY WITH NFPA 70.
PANELBOARDS 400A AND SMALLER SHALL BE LIGHTING AND APPLIANCE TYPE PANELS. PANELS 600A AND LARGER SHALL BE DISTRIBUTION TYPE.
PANELBOARDS SHALL BE DEAD FRONT TYPE AND BUS BARS SHALL BE TIN PLATED ALUMINUM.
IF 10% SPACE IS NOT INDICATED ON THE DRAWINGS, PROVISION A MINIMUM OF 10% SPARE CAPACITY (SPACE) IN THE PANELBOARD FOR ADDITIONAL DEVICES.
THE MINIMUM SHORT CIRCUIT RATING OF ANY DEVICE INSTALLED IN A PANEL SHALL BE 10,000 AIC OPERATING AT 120/208V.

6. SAFETY SWITCHES - FURNISH AND INSTALL FUSED OR NON-FUSED (AS REQUIRED) HEAVY DUTY SAFETY SWITCHES WHERE NOT FURNISHED WITH THE EQUIPMENT, AND AT ALL OTHER POINTS REQUIRED BY CODE. CONSTRUCTION SHALL BE OF A NEMA DESIGN SUITABLE FOR THE ENVIRONMENT INSTALLED. ALL FUSES SHALL BE BUSSMAN, LITTELFUSE OR FERRAZ-SHAWMUT, SIZE AND TYPE AS REQUIRED OR INDICATED.

7. SURGE PROTECTIVE DEVICES - PROVIDE SURGE PROTECTIVE DEVICES AS INDICATED ON THE DRAWINGS. SURGE PROTECTIVE DEVICES LOCATED INTEGRAL TO THE PANEL MAY BY SUPPLIED BY EATON CUTLER HAMMER, SQUARE D, SIEMENS, OR GE. SURGE PROTECTIVE DEVICES MOUNTED OUTSIDE OF THE PANEL MAY BE SUPPLIED BY LIEBERT, CURRENT TECHNOLOGY, OR ADVANCED PROTECTION TECHNOLOGIES.
SURGE PROTECTIVE DEVICES SHALL BE RATED AS FOLLOWS:
SERVICE ENTRANCE LOCATIONS: 250 kA PER PHASE AND 125 kA PER MODE.
BRANCH PANELS: 120 kA PER PHASE AND 80 kA PER MODE.
SERVICE ENTRANCE LOCATIONS: 250 kA PER PHASE AND 125 kA PER MODE.
SPOTS MOUNTED EXTERNAL TO PANELS SHALL BE LOCATED SUCH THAT THE CONDUCTOR/CONDUIT RUN BETWEEN THE EQUIPMENT IS AS SHORT AND STRAIGHT AS POSSIBLE. PROVIDE OVERCURRENT PROTECTION OF THE SPD AS REQUIRED BY THE EQUIPMENT MANUFACTURER.

8. LIGHTING CONTACTORS - CONTRACTOR SHALL BE ELECTRICALLY OPERATED AND MECHANICALLY LATCH, COMPLYING WITH NEMA I-23 AND UL 508. CURRENT RATING FOR SWITCHING SHALL BE LISTED OR RATED CONSISTENT WITH TYPE OF LOAD SERVED, INCLUDING TUNGSTEN FILAMENT, INDUCTIVE, AND HIGH INRUSH BALLAST (BALLAST WITH 20 PERCENT OR LESS TOTAL HARMONIC DISTORTION OF NOMINAL LOAD CURRENT). CONTROL COIL VOLTAGE SHALL MATCH CONTROL POWER SOURCE. PROVIDE ALL CONTACTORS WITH RED PILOT LIGHT.

D. LIGHTING:

1. GENERAL - THE LOCATIONS, NUMBERS, SIZES AND TYPES OF LIGHTING FIXTURES SHALL BE AS SHOWN ON THE CONTRACT DOCUMENTS. ALL LIGHTING FIXTURES FURNISHED UNDER THIS CONTRACT TO HAVE UL LABELS ATTACHED TO EACH FIXTURE OR AN INTEGRAL PART OF THE DEVICES FOR 120V AND 277V, MULTI-STATE EQUIPMENT. FOR DEVICES WITHOUT INTEGRAL LINE VOLTAGE SURGE PROTECTION, FIELD MOUNTING SURGE PROTECTION SHALL COMPLY WITH IEEE Q24.1, WITH UL 1449. METAL PARTS SHALL BE FREE FROM BURRS, SHARP EDGES, DOORS, FRAMES AND OTHER INTERNAL ACCESSSES SHALL BE SMOOTH OPERATING, FREE FROM LIGHT LEAKAGE UNDER OPERATING CONDITIONS, AND ARRANGED TO PERMIT RELAMPING WITHOUT USE OF TOOLS. ARRANGE DOORS, FRAMES, LENSES, DIFFUSERS AND OTHER PIECES TO PREVENT ACCIDENTAL FALLING DURING RELAMPING AND WHEN SECURED IN OPERATING POSITION. LENSES, DIFFUSERS, COVERS AND GLOBES SHALL BE 100 PERCENT VIRGIN ACRYLIC PLASTIC OR ANNEALED CRYSTAL GLASS, UNLESS OTHERWISE INDICATED. PLASTIC SHALL BE HIGH RESIS ANCE TO YELLOWING AND OTHER CHANGES DUE TO AGING, EXPOSURE TO HEAT AND ULTRAVIOLET RADIATION. CLEAN ALL LIGHT FIXTURES AFTER INSTALLATION AND PRIOR TO OWNER ACCEPTANCE. TEST EACH FIXTURE AND REPLACE ALL MALFUNCTIONING LAMPS AND BALLASTS.

2. LED FIXTURES AND DRIVERS - MANUFACTURERS SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS. LED DRIVER AND HEAT SINK SHALL BE MATCHED TO PROVIDE 50,000 HOURS OF LAMP LIFE.

3. BALLASTS - MANUFACTURERS SHALL BE MADE BY ADVANCE, UNIVERSAL, GENERAL ELECTRIC, MOTOROLA, LUTRON OR AS SHOWN ON THE CONTRACT DRAWINGS.
ALL FLOURESCENT LIGHT FIXTURE BALLASTS SHALL BE PROGRAM START TYPE. BALLASTS SHALL BE DESIGNED FOR THE TYPE AND NUMBER OF LAMPS) AND OPERATING VOLTAGE AS SHOWN ON THE CONTRACT DOCUMENTS. BALLASTS SHALL HAVE A POWER FACTOR OF NOT LESS THAN 0.95. BALLASTS SHALL HAVE A BALLAST FACTOR OF NOT LESS THAN 0.87. BALLASTS SHALL HAVE A CREST FACTOR OF NOT
- GREATER THAN 1.7. BALLASTS SHALL HAVE LESS THAN 10% THD. BALLASTS SHALL BE UL LISTED AND PROVIDED WITH THERMAL PROTECTION AS REQUIRED BY UL 1029. SHALL BE SOUND RATED "A". BALLASTS RATED FOR 0 DEG F STARTING TEMPERATURE SHALL BE USED IN TEMPERATURES FROM 0 DEG F AND ABOVE. BALLASTS DESIGNED FOR USE WITH HIGH OUTPUT LAMPS SHALL BE USED IN TEMPERATURES MINUS 20 DEG F AND ABOVE. BALLASTS SHALL BE DESIGNED TO BE OPERATED IN THE TYPE FIXTURE AS SHOWN ON THE CONTRACT DRAWINGS. BATTERY INVERTER BALLASTS SHALL BE BODINE, POWER SENTRY, OR IOTA. BATTERY BALLASTS SHALL PROVIDE 90 MINUTES OF OUTPUT AS INDICATED ON THE DRAWINGS. INSTALL NON-INTEGRAL BALLASTS IN ACCESSIBLE LOCATIONS. PROVIDE COLE WEATHER TYPE BALLASTS IF EXPOSED TO EXTERIOR TEMPERATURES.

E. CONTROLS:

1. PHOTOELECTRIC SWITCHES - MANUFACTURERS: INTERMATIC, TORK AND WATT STOPPER.

SOLID STATE, WITH SPST DRY CONTACTS RATED FOR 1800VA TO OPERATE CONNECTED LOAD, RELAY OR CONTACTOR COILS; AND COMPLYING WITH UL 773. LIGHT LEVEL MONITORING RANGE TO BE 1.5 TO 10 FC WITH AN ADJUSTMENT FOR TURN ON AND TURN OFF LEVELS WITHIN THAT RANGE. TIME DELAY SHALL BE 15 SECOND MINIMUM TO PREVENT FALSE OPERATION. LIGHTNING ARRESTER SHALL BE AIR GAP TYPE. MOUNTING SHALL BE TWIST LOCK COMPLYING WITH IEEE C138.10 WITH BASE. PROVIDE WITH STEM MOUNTING OR STEM AND SWIVEL MOUNTING ACCESSORIES AS REQUIRED TO DIRECT SENSOR TO THE NORTH SKY EXPOSURE.

F. FIRE ALARM WIRE AND CABLE

1. BASIS-OF-DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT INDICATED ON DRAWINGS OR COMPARABLE PRODUCT BY ONE OF THE FOLLOWING:
1. COMTRAN CORPORATION.
2. DRAKE CABLETQ USA.
3. GENESIS CABLE PRODUCTS; HONEYWELL INTERNATIONAL, INC.
4. ROOKBESTOS-SUPRENNANT CABLE CORP.
5. WEST PENN WIRE.

2. GENERAL WIRE AND CABLE REQUIREMENTS: NRTL LISTED AND LABELED AS COMPLYING WITH NFPA 70, ARTICLE 760.

3. SIGNALING LINE CIRCUITS: TWISTED, SHIELDED PAIR, SIZE AS RECOMMENDED BY SYSTEM MANUFACTURER.
1. CIRCUIT INTEGRITY CABLE: TWISTED SHIELD PAIR, NFPA 70, ARTICLE 760, CLASSIFICATION CI FOR POWER-LIMITED FIRE ALARM SIGNAL SERVICE TYPE FPL, NRTL LISTED AND LABELED AS COMPLYING WITH UL 1424 AND UL 2196 FOR A 2-HOUR RATING.

4. NON-POWER-LIMITED CIRCUITS: SOLID-COPPER CONDUCTORS WITH 600-V RATED, 75 DEG C, COLOR-CODED INSULATION.
1. LOW-VOLTAGE CIRCUITS: NO. 16 AWG, MINIMUM.
2. LINE-VOLTAGE CIRCUITS: NO. 12 AWG, MINIMUM.

G. CONSTRUCTION:

1. SUBMITTALS - SUBMIT FOR REVIEW SIX SETS OF MANUFACTURERS CUT SHEETS AND/OR SHOP DRAWINGS OF LIGHT FIXTURES WITH LAMPS AND LIGHT FIXTURE BASE, POWER PEDESTAL, AND ALL ITEMS IN THIS SPECIFICATION OTHER THAN WIRE AND CONDUIT. ALSO SUBMIT ITEMS REQUIRING COORDINATION BETWEEN CONTRACTORS. BEFORE SENDING SUBMITTALS, THE CONTRACTOR SHALL VERIFY THAT ALL EQUIPMENT SUBMITTED IS MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE, AND SHALL FIT THE AVAILABLE SPACE AND ALLOW AMPLE ROOM FOR MAINTENANCE. THE ENGINEER'S REVIEW AND COMMENT ON SUCH SUBMITTALS SHALL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, OR QUANTITIES, OR OMISSIONS OF COMPONENTS OR FITTINGS, OR FOR COORDINATING ITEMS WITH ACTUAL PROJECT CONDITIONS.

H. SUBSTITUTIONS:

1. MATERIAL ALTERNATES SHALL BE SUBMITTED IN COMPLETE DETAIL TO THE ENGINEER NO LATER THAN 10 CALENDAR DAYS PRIOR TO BID DATE. DECISION ON ACCEPTANCE OF A SUBSTITUTION IS SOLELY UP TO THE ENGINEER.
- ALL WORK SHOWN ON THIS DRAWING IS THE EXCLUSIVE PROPERTY OF HUTTON CORPORATION AND IS NOT TO BE COPIED OR REPRODUCED IN ANY WAY WITHOUT THE EXPRESS WRITTEN CONSENT OF HUTTON CORPORATION.

REGISTERED
ARIZONA
PROFESSIONAL
ENGINEER
No. 21329
SINGH, SANGHVI
04.19.2026

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Project Number: 260050

HOMEGROWN

417 MLK JR BLVD
FAYETTEVILLE, AR

Issue:
FOR PERMIT

Date:
04.20.26

REVISIONS

#	Description	Date
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MEP0.2
MEP SPECIFICATIONS