ADMINISTRATION, NFPA is NATIONAL FIRE PROTECTION ASSOCIATION. CONTRACTOR where used means electrical contractor responsible for work under this section. OWNER where used shall refer to either the landlord or the

6100.02 DRAWINGS AND SPECIFICATIONS

. Drawings and specifications are complementary to each other and what is called for by one shall be as if called for by both.

3. Electrical drawings are diagrammatic and indicate general design, layout, and arrangement of equipment and various systems. However, being diagrammatic the drawings do not necessarily show all details such as junction boxes, pull boxes, conduit runs or sizes, wiring, etc. necessary for a complete and operable system. . Do not scale drawings for dimensions.

D. All dimensions and measurements shall be taken from architectural drawings and actual equipment to be furnished. The exact locations of apparatus, fixtures, equipment, conduits, outlets, receptacles, lighting fixtures, etc. shall be ascertained from the OWNER representative in the field, and the work shall be laid out accordingly. The CONTRACTOR shall verify and be responsible for all measurements taken in the field. Should the CONTRACTOR fail to ascertain the above locations, the work shall be changed at his own expense when so ordered

. OWNER reserves the right to make minor changes in the location of conduit and equipment up to the time of installation, without additional cost.

. Study and review all contract documents including drawings and specifications for architectural, structural, mechanical, and other portions of the work to avert possible installation conflicts. Adjust electrical work to conform to all conditions indicated therein

Should conflicts arise which require changes in the contract documents, otify OWNER. Secure written approval and agreement on necessary djustments before the bidding.

. Discrepancies between drawings, between drawings and specifications, or between drawings and actual field conditions, or errors on either drawings or specifications shall be promptly brought to the attention of Architect and OWNER for a decision before the specific bidding.

16100.03 EXAMINATION OF PROJECT SITE

A. Prior to bidding examine the site carefully and be fully familiar with existing conditions and be fully informed of all utility, state and local requirements and

16100.04 EXISTING CONDUITS, PIPES, EQUIPMENT, ETC.

A. (Refer to General Specifications for additional requirements). Existing conduits, pipes, utility lines, tanks, equipment or other constructions are not in general indicated on drawings. Locate such obstructions prior to start of work and plan work so as to route and locate all new work to avoid these obstructions. Repair or replace existing installations where damaged during the course of construction.

6100.05 PERMITS, FEES, TAXES AND ROYALTIES A. Arrange and pay for all necessary permits, fees, taxes, and royalties in

connection with electrical work. 16100.06 CODES AND REGULATIONS

Comply with the latest applicable requirements of the NEC, NESC, OSHA, the IFPA, and the local Electrical Inspection Authority who shall have final jurisdiction. Comply also with all requirements of local utility and telephone

Report to the engineer prior to submitting bids, any part or portion of the electrical design which does not conform to the requirements of the applicable ocal or state codes or requirements of local utility or telephone companies, otherwise be held responsible to provide installation which will comply with these codes and regulations.

Applicable codes and ordinances and local interpretations are to take precedence when they conflict with or are more stringent than the electrical design. Drawings and specifications take precedence where design is more stringent than codes and ordinances. 6100.07 STANDARDS

A. Materials and installation shall also conform to latest standards and ices of the Institute of Electrical and Electronic Engineers (IEEE), the ational Electrical Manufacturers Association (NEMA), Insulated Power Cable ingineers Association (IPCEA), American National Standards Institute (ANSI), American Society of Testing Materials (ASTM), and the National Bureau of

3. The foregoing rules, standards, and regulations shall not relieve the contractor from furnishing and installing higher grades of materials and orkmanship which are specified herein or indicated on drawings. 6100.08 PROGRESS OF WORK

. Schedule the progress of work so as to conform to the schedule of the work of other trades. Complete the entire electrical installation in accordance with schedules as determined for the general completion of the entire building. Cooperate with all other trades so that the installation of all electrical outlets may be properly coordinated and located.

Carefully check the location of outlet boxes after the installation of materials and equipment by other trades. Any cost resulting from defective or II—timed work performed under this division of the specifications shall be borne by this contractor under this section.

16100.09 PRODUCT DATA AND SUBMITTALS

. Furnish product data and submittals for review by Architect and DWNER prior to installation.

. Furnish detailed and dimensioned product data, submittals, and shop drawings for all electrical distribution equipment, lighting fixtures and lamps, special equipment, special systems, and special apparatus which are to be provided for stallation in this work.

Include catalog cuts, dimensional and operating data, wiring diagrams for special systems, and such other data as may be required by Architect Contractor shall review these submittals prior to submission for review. Do not order equipment prior to review of Architect and OWNER. Submit samples of equipment when so requested by Architect and OWNER.

16100.10 MINOR DEVIATIONS AND CHANGES

. Furnish and install entire electrical installations as designed and in accordance with contract drawings and specifications. Minor deviations recessitated by field conditions or equipment being supplied may be made upon approval of Architect and OWNER. Changes in design and installation shall be done in the manner provided for in the GENERAL

6100.11 CUTTING AND REPAIRING

A. Provide all cutting, patching, channeling, core drilling, etc., in building structure necessary for electrical work. Locate holes to be drilled, outlets, etc., coordinate work with all other trades on the job, and make arrangements for ecessary openings and chases. Seal all holes cut for wiring runs.

No cutting, channeling, core drilling, etc., shall be done without prior approval of the architect. Make necessary repairs to finished building where patching or refinishing is necessary due to electric work. Actual work involved in these repairs shall be done by skilled craftsmen in the trades involved.

A. Furnish and install all material, equipment, and devices which are new, first quality, bear the listed label of the Underwriters Laboratories, Inc. and which are accepted by Architect and OWNER for installation in this project.

B. Replace, in a manner accepted by Architect and OWNER, and pay for all equipment or materials damaged in the course of installation or testing.

C. Basic bid shall include manufacturers and catalog numbers as shown in these specifications or on the drawings with NO EQUALS unless specifically indicated. Specified materials, equipment, and devices shall be furnished and installed under the contract unless changed by mutual agreement between contractor and Architect and OWNER

D. Where several manufacturers are indicated for material, equipment, or devices, contractor shall have the choice of manufacturers listed, but must indicate which is to be used. Equipment of other manufacturers which is equal to or superior than that specified may be proposed in accordance with the General Specification Manufacturers and cetalog numbers shown in these specifications or on the drawings followed by OR EQUAL are intended as a guide to quality.

E. Substitute equipment of other manufacturers which is equivalent to or superior than that specified may be proposed. However, such substitutions must be accepted in writing by Architect and OWNER prior to bidding. If substitutions are not requested or granted, the specified materials and equipment must be installed. The decision of OWNER regarding substitutions shall be final.

F. It shall be the electrical contractors responsibility under this section of the specification to notify all related trades of the accepted substitutions and to assume full responsibility for all costs caused as a result of the substitution. prior to start of work, submit to Architect and OWNER a complete list of types, materials, and equipment and manufacturers of these items which are to be furnished for this work.

G. Copper wire must be used. Aluminum wire will not be accepted. H. Equipment and materials must comply with the requirements of the Utility Company, and where required shall be submitted to them for their approval.

16100.13 PROJECT RECORD DOCUMENTS

A. Hold one set of electrical drawings and specifications on job site and keep up to date with project record data and revisions. Do not use this set for construction. Locate all underground runs including service entrances and feeders, and circuits exterior to building. Upon completion of work, furnish OWNER with one set of marked up mylar sepias of the electrical drawings showing project record installation.

16100.14 OPERATING INSTRUCTIONS AND MANUALS

A. At completion of project provide the OWNER with two sets of written instructions and manuals including manufacturers certificates of warranty, shop drawings, wiring diagrams, and parts lists of all systems and equipment installed. Bind separately in 3-ring binders with hard covers. Indicate to OWNER location and operation of distribution equipment and panel boards. Provide direct instruction to OWNER's representative for operation and maintenance of special

16100.15 GUARANTEE

A. Furnish to OWNER a formal guarantee covering entire electrical system including equipment provided by Others and installed by electrical Contractor, to be free from defective materials and workmanship for a period of one year after date of acceptance of installation by OWNER. During this period provide all labor and new materials where required to repair or replace all defects to the satisfaction of OWNER at no additional cost.

16100.16 FINAL ACCEPTANCE AND WORK CLOSE-OUT

A. Contractor shall inspect the entire electrical installation to assure that all work is completed and all systems are completely operational before calling for a final acceptance of the work. All certificates including acceptance of local inspection authority must be presented at that time.

16100.17 BASIC MATERIALS AND METHODS A. Furnish and install the basic materials, equipment, and devices for the

electrical installation as indicated on the drawings and specified herein. 16100.18 DELIVERY AND STORAGE OF MATERIALS

A. Make own provisions for the delivery and safe storage of materials and equipment. Make arrangements for introduction into the building of equipment too large to pass through finished openings. Arrange to have materials delivered to the job at such stages of the work as will expedite the work as a whole. Mark materials and store in such a manner as to be easily checked or

B. Store all materials and equipment out of the weather and mechanically protect from damage, theft, and vandalism.

C. Where materials are indicated to be furnished by others for installation by the electrical contractor, make a complete and careful check of all materials delivered and furnish a receipt acknowledging acceptance, assume full responsibility for the safe-keeping of same until such time as the completed installation has been accepted.

16100.19 CLEANING AND PAINTING

A. In general, except where specified otherwise herein, finish painting conduits, boxes, poles, and equipment where specified to be done in field, shall be done by other trades under another section of the specifications. Protect electrical apparatus, cabinets, boxes, and all other equipment normally furnished on the job with factory applied finish, either painted or galvanized, during storage and installation. Clean all electrical equipment, such as lighting fixtures, lamps, switchboards, panelboards, transformers, etc., of construction dirt. drill chips, debris, dust, paint smears, etc., before completion of work. Clean or touch-up and repaint all scars, blemishes, rust spots, etc., to original state of

16100.20 TRENCHING AND BACK FILL

A. Provide all trenching and back filling required for electrical work.

16100.21 SCOPE OF WORK

A. Work under this Contract comprises the providing of all labor, material, equipment, transportation, scaffolding, rigging, tools and related items and subcontract work for a complete operating electrical system and includes but is

Removals, alterations, relocations and connections to existing systems. Temporary light and power. Cutting and patching. Shop drawings. Testing and adjustments Cleaning and painting. Low Voltage Feeders. Light and Power Distribution Panels.

Motor Branch Circuit Wiring. Lighting Branch Circuit Wiring Connections to Equipment Furnished by Others. Lighting Fixtures and Lamps.

Receiving, handling, setting and connecting all motors, motor driven equipment and controls specified to be provided by the Owner. Miscellaneous Signal and Control Systems.

Plumbing and heating, ventilation and air conditioning wiring, including Emergency electric systems, equipment and lighting,

B. Items mentioned in the above schedule are listed for the purpose of describing basic specification contents and shall not be construed as relieving the Contractor from executing any work described throughout the specification or indicated on drawings because of its detailed omission in this schedule.

16100.22 SHOP DRAWINGS AND MANUFACTURER'S SUPERVISION REQUIRED

A. Provide shop drawings for the following prior to fabrication, including all

accessories and manufacturer's supervision where indicated: Electrical Panels

Lighting Fixtures and Lamps

16100.23 GROUNDING

A. Provide all electrical system grounding in accordance with the NEC and any state and local code requirements even if not shown on the drawings. Include additional grounding conductors in non-metallic race ways even though the drawings show only circuit and/or neutral conductors.

B. Receptacles which do not have their mounting yokes connected to receptacle grounding point shall be grounded with a green insulated grounding jumper connected to outlet box. Provide a separate ground conductor with branch circuit wiring when indicated on drawings or when required by Code.

C. Provide additional grounding where shown on the drawings. D. Ground cables shall be continuous without joints or splices throughout its length. If bare ground conductors are run through metallic conduit, they shall be securely bonded to each conduit at the entrance and exit. All connections to equipment or conduit shall be made with approved type of solderless connector, and same shall be thoroughly cleaned and bright before connection is made so as to insure a good metal contact. Connections which will be inaccessible after completion of project shall be made by the Cadweld or Thermo Weld process.

E. Grounding connections: Utilize Burndy "Thermoweld" process for all cable—to—cable, cable—to—steel, and cable—to—ground rod connections. F. Where a grounding electrode is not available, a 3/4" diameter by 10'-0" lang copperweld driven ground rod shall be provided for ground connections. This electrode shall have a resistance to ground not exceeding limits as set by State and Local Codes.

G. When the maximum resistance to ground specified above cannot be achieved, the Contractor shall increase the length and quantity of ground rods to achieve this resistance required. Where increased quantity and length of ground rods do not produce the maximum specified resistance, soil treatment around ground rods shall be provided.

16100.24 WIRING-GENERAL

A. All branch circuit wiring run within the building and not exposed to moisture, shall be installed in electrical-metallic tubing; Armored cable "AC" is permitted in concealed walls, partitions, & lights to the extent allowed by code.

B. All branch circuit wiring run outside of the building and exposed to moisture shall be installed in rigid intermediate galvanized conduit and run concealed in new construction, but exposed on existing construction.

C. All wiring for low tension, controls, communications and all other systems shall be in raceway specified for branch circuits unless specifically noted in other D. All feeder wiring run within the building shall be installed in electrical-metallic tubing. Exceptions are noted on the drawings. Aluminum conduit shall not be

installed in concrete containing chloride additives. E. Flexible metal conduit with approved type fittings may be used in limited lengths of connections to motors and recessed fixtures where it is necessary to provide flexible connections. It may also be used where structural members preclude the use of electrical metallic tubing or conduits.

F. Liquid tight flexible metal conduit in lengths of 3' or less with approved type fittings shall be used for connections to vibrating equipment, motors, and other outlets where wiring will be exposed to weather, moisture or vibrations.

G. Rigid nonmetallic conduit shall not be allowed in structural slabs unless approved by the Structural Engineers.

H. Install raceways from box to box or terminations as shown on the drawings or as required to effect circuiting described with circuit numbers adjacent to equipment. Grouping home runs or combining wires in common raceways will be allowed, with a maximum of four single pole branch circuits in a raceway. Increase wire sizes and raceways where required to avoid loss of ampacity as required by National Electrical Code. I. Provide 'OZ' or equal conduit seals for all raceways, wires or cables passing

through foundations, floors, walls, or footings. J. All underground wiring and raceways located outside of building shall be a minimum of 24" below finished grade except wiring over 600 volts which shall be

30" below finished grade unless noted otherwise. K. Exposed wiring within building shall be in E.M.T. with compression fittings. Concealed wiring in walls, partitions and ceilings may be MC for #10 wire and smaller (where allowed by code) and E.M.T. for #8 wire and larger.

L. Wiring in slab shall be rigid galvanized steel or underfloor duct. Short final connections to vibrating equipment shall be Sealtite.

M. All wiring shall be copper. Aluminum is not acceptable.

16100.25 CONDUITS AND RACEWAYS

A. All conduits shall be 3/4" minimum trade size diameter unless specified

B. All rigid steel conduits shall have threads painted with Thomas and Betts copper shield where conduit is exposed to weather or dampness.

C. Raceways shall be capped with bushings during construction and swabbed clean before drawing in wire.

D. Conduits shall be cut square and reamed and all terminals shall be made up E. Rigid conduit system shall be made up with threaded fittings and couplings. F. Exposed raceways shall run parallel to or at right angles to surfaces wired over and shall be provided with fittings or standard manufactured elbows.

G. Supports on all raceways shall run parallel to or at right angles to surfaces wired over and shall be spaced at a maximum of 10'. Supports on raceways larger than 2" shall be spaced at a maximum of 6'. H. Fastenings shall be lead shields, rawl plugs, wood screws, lag bolts, beam

I. Conduits and hangers shall be installed in a manner not to interfere with the work of other trades. This shall include trapeze hangers to straddle ducts, pipes or other obstructions where necessary. No perforated strap iron will be J. Provide a conduit expansion fitting wherever run crosses an expansion joint in

clamps or toggle bolts. No wooden plugs will be permitted. No nails will be

the structure and where conduit is attached to separate structures. Expansion fitting shall be "OZ" type "AX", Thomas and Betts, Steel City or approved equal. K. Rigid IMC Conduit shall be "ETP Uni-Swivel" or approved equal. L. Rigid heavy—wall galvanized conduit shall be Republic, National, Triangle, or

M. Rigid aluminum conduit shall be Alco, Reynolds, Kaiser or approved equal. N. Rigid non-metallic conduit shall be polyvinyl chloride Schedule 40 heavy wall

made by Carlon or approved equal. O. Surface metal raceway shall be Wiremold, Kindorf or approved equal. P. Flexible metallic conduit shall be Anaconda, Columbia, General Cable or National. Liquid—tight type shall be Anaconda, Columbia or American Flexible Conduit Company.

Q. Rigid conduit bushings shall be impact resistant plastic insulating type as made by Thomas & Betts, Appleton, Steel City or approved equal. R. Electrical—metallic tubing shall be Republic, ETP, National or approved equal with screw-type fittings. S. All steel conduits in direct contact with earth shall be painted with two (2)

coats of black asphalt prior to installation. T. Provide a continuous red plastic strip 1'-0" above top of all underground

U. Conduit supports and hangers shall be galvanized by Steel City, Kindorf, or equal.

16100.26 OUTLET BOXES

A. Outlet boxes for ceiling fixtures shall be 4" octagonal galvanized steel boxes not less than 1 1/2" deep provided with 3/8" galvanized malleable iron

B. Outlet boxes set in concrete slabs for ceiling fixtures shall be 4" octagonal galvanized steel boxes of sufficient depth to have conduit entering from the sides clear of reinforcing steel. Box shall have 3/8" galvanized malleable iron fixture stud.

C. Concealed outlet boxes for wall brackets, switches and receptacles shall be 4" square galvanized steel boxes 1 1/2" deep with raised plaster covers of

sufficient depth to accommodate wall surface material. D. Exposed outlet boxes in dry locations for switches and receptacles shall be 4" square galvanized steel boxes not less than 1.1/2" deep with raised covers with rounded corners. If rounded corner covers cannot be provided in proper number of gangs, boxes shall be Wiremold or cast F.S. boxes so that corners of flat plates or covers do not project over box edge.

E. Exposed outlet boxes in damp locations or where exposed to weather shall be case galvanized steel with plates or covers. F. Outlet boxes for switches and receptacles in tile or other hollow masonry construction shall be 3 1/2" deep galvanized changeable switch boxes.

Through—the—wall boxes shall not be used.

requirements.

G. Concealed outlet boxes shall have all unused knockouts closed with snap— in blanks. Exposed outlet boxes, except cast type with screw plugs, shall have no snap-in blanks or holes. Exposed boxes shall be replaced, if necessary, to achieve this result.

H. Pressed steel boxes shall be Steel City, Raco, Appleton, General Electric, or Thomas and Betts. I. Cast boxes shall be Crouse Hinds, Pyle—National or General Electric.

J. All outlet boxes shall be of approved size for the number of wires to be accommodated according to NEC requirements. 16100.27 PULL OR JUNCTION BOXES AND WIRING TROUGHS

B. Boxes shall be formed of hot dipped galvanized sheet steel except where specified otherwise.

A. Furnish and install pull or junction boxes where indicated or where necessary

to facilitate pulling of conductors. All boxes shall be sized according to NEC

C. Boxes installed in wet areas or where exposed to weather shall be cast aluminum with cast bolted covers.

D. Provide wiring troughs where indicated or where necessary to neatly interconnect safety switches, starters, relays, controls, etc. Troughs shall be

E. All covers on boxes and troughs shall be screw cover type, or combination

A. Wiring shall be type THWN or THW unless otherwise noted below or on the

B. MC cable shall be UL labeled type "MC" two, three, or four conductor type

C. Cables in high temperature areas shall have an insulation type suitable for

D. All wire and cable conductors shall be copper with insulation rated 600

volts. Conductors #10 and smaller shall be solid; larger conductors shall be

E. Branch circuits for power and lighting shall be not less than #12 AWG or as

F. Fixture wires shall be not less than #14 AWG type SFF-2 and flexible cords

H. Color coding shall be used throughout the system using black, red and blue

grounding conductors. Electrical Contractor shall comply with applicable of the

for phase wires, white for grounded neutral wires and green for equipment

I . Where wire or cable is installed in areas with an ambient temperature in

excess of 86 degrees F, its current carrying capacity shall be decreased in

accordance with the NEC. The wire and cable sizes shall be increased to obtain

a current carrying capacity equal to or greater than the trip or fuse rating of

J. Copper conductor wires and cables shall be as manufactured by Anaconda,

A. Splices of wires up to 3 #8 conductors shall be made with pressure type

connectors. Wire nuts or screw caps will not be permitted. Splices above this

size shall be made with approved mechanical connectors. Scotchfill and Scotch

B. Splices in cables #6 gauge and larger shall be made with cast sleeve type

C. Copper conductor terminations shall be made with mechanical, set screw.

sufficient contact surface of 200 amperes per square inch capacity, to maintain

E. Large wire splices shall be made with "OZ" type XW and "OZ" type XTP, or

F. Terminal lugs shall be pressed copper screw lugs as made by Mac or equal.

specified herein or on the drawings. Where more than one device is indicated in

one location, they shall be ganged together in one box and under one plate as

16100.31 WIRING IN CONNECTION WITH OTHER TRADES AND OWNER'S EQUIPMENT

Contractor who provides this item. All remote buttons, relays, control cabinets,

specified to be supplied by the Electrical Contractor shall be turned over to

B. The plans and specifications as prepared for bidding purposes indicate the

the Electrical Contractor guarantees he has performed similar work and is

familiar with the type and scope of work to be done, as all electrical work

C. This Contractor shall carefully review the plans and specifications of the

Conditioning Contractors) and (Plumbing Contractors), and other equipment

operation of this equipment not specified as being furnished by others shall be

D. Detailed wiring diagrams, instructions and shop drawings of equipment will be

E. Should operation faults be found in the interconnecting of mechanical and

Contractor responsible for same. In the event of dispute, the Engineer shall

electrical equipment, the fault when determined shall be attributed to the

make the final decision as to responsibility for correction. Improper wiring

diagrams or shop drawings shall not be the responsibility of the Electrical

F. For the nature and extent of control wiring involved, refer to drawings and

specifications of other trades, and review the equipment to be provided by

must be verified by shop drawings before proceeding with the installation.

shall be provided by (other) contractors except as noted on the Electrical

1. This Contractor shall furnish all disconnect switches for motors and

Provide fused disconnect switches wherever manufacturer requires them.

A. Provide fixtures as shown on the fixture schedule and described below. The

necessary for their function. Fixtures shall be securely fastened to the ceiling

B. This Contractor shall provide all stems, rods, supports, hang straight swivels,

channel or angle iron bracing, etc., of the proper length and size as required

Regular fixture stem and canopy sets shall be used in all cases unless specified

otherwise. A minimum of one stem or support shall be furnished for each four

foot sections, in which case a stem or support may be placed at eight (8') foot

intervals. Provide clips for lay-in fixtures in accordance with Article 410-16C of

electronic, high frequency, high light output, unless specified otherwise and shall

be equipped with an internal, thermal protection system. Ballasts shall be Class

P in accordance with UL requirements. Provide low temperature (-20 DEG. C)

ballasts in all HID and fluorescent fixtures mounted outside of building, unless

- A

- A

distortion (THD). Indicate ballasts as specified on drawings.

E. Ballast shall have the following minimum sound ratings:

specified otherwise. Ballasts shall be Advance with less than 20 % total harmonic

(4') feet of fixture chassis except where the chassis is manufactured in eight (8')

fixtures shall be supplied complete with lamps and any auxiliary devices

structure as well as the outlet box where necessary to maintain proper

to install fixtures in a neat and secure manner in their proper positions.

D. All ballasts for fluorescent fixtures shall be ETL and UL listed, shall be

H. This Contractor shall receive, place and connect Owner's equipment requiring

equipment as required by Code. Lock—out type buttons shall not be permitted.

OWNER. Any control wiring diagrams shown are for estimating purposes only and

G. Motor starters, manual and magnetic, and starter control buttons or switches

other trades, (Kitchen Equipment Contractors), (Heating, Ventilating, Air

requiring electrical connections, as all electrical work required for the

provided to this Contractor by other trades, or by OWNER.

connections, installation of starters, remote starting buttons, control motors.

relays, wiring interconnections and all associated work shall be provided by the

required to properly operate this equipment, line connections, control

work to be done, but are not detailed shop drawings and details of connections

will not be available until shop drawings and other pertinent data is supplied by

the Mechanical Contractors and Manufacturers of equipment. In submitting a bid,

control motors, starters, TMCC, etc. and other electrical equipment not shown or

A. The Mechanical Contractors or OWNER will provide motor drives. Motorized

equipment (except control motors), electric heaters and electric controls

attached to pipes and/or equipment shall be installed by the Mechanical

A. Provide at every indicated outlet the proper devices and plates as

C. Devices listed are to establish type, color, operation and capacity.

Manufacturers shall be Hubbell, Pass and Seymour, or Arrow Hart.

pressed copper lugs. Two bolt lugs shall be used if necessary to obtain

D. Small wire splices shall be made with Thomas and Betts Wire nuts or

General Cable, General Electric, Hatfield Wire and Cable Company.

16100.29 WIRE SPLICING AND TERMINATING OF 600 VOLT CONDUCTORS

connectors with set screws, Scotchfill and Scotch #88 vinyl tape.

G. Control wiring shall be not less than #14 AWG, unless otherwise noted.

the temperature cables used in spaces for environmental air shall conform with

drawings; for conductors larger than #6 AWG, type XHHW will also be accepted.

16100.28 WIRES AND CABLES - 600 VOLT INSULATION

noted. Wires to be sized for appropriate voltage drop.

the protective device protecting the wire or cable.

applicable NEC requirements.

shall be not less than #14 type S.

Phelps-Dodge, Essex or Kerite.

rigidity in terminating large cables.

16100.30 WIRING DEVICES AND PLATES

B. Wall plates finish to be selected by OWNER.

the Electrical Contractor for installation.

Electrical Contractor.

the responsibility of this Contractor.

Drawings and installed by this Contractor.

16100.32 LAMPS AND FIXTURES

the NEC.

Trigger Start

Rapid Start - 430 ma

High Output - 800 ma

Power Groove - 1500 ma

Preheat

Circline

electrical connections, unless specified otherwise.

approved equal connectors.

approved equal connectors.

#88 vinyl tape.

Square D, or approved equal.

hinged and screwed type.

G. Fixture/Ballast combination shall be designed to limit maximum ballast case temperature to 90 degrees C.

combination with all units in place in the room or space shall have an inaudible

F. Fixtures shall be designed and applied such that the ballast/fixture

H. Lighting fixtures shall conform to Articles 410 and 300-22 of the NEC.

1. This Contractor shall verify final types of ceiling construction for each fixture and shall provide plaster frames, special supports or bracing as required for the particular ceiling.

J. This provision shall supersede and take precedence over any type mounting detailed on the drawings, or the drawing schedules, or further delineated in these specifications. No additional compensation will be allowed for failure to observe this provision.

K.. Fixture catalog numbers may be shown for four (4') foot or other modular sections. This represents the series type required, not necessarily the correct length. The plans show the actual length of units or runs required. Fixture catalog numbers or partial numbers for accessories are to be interpreted as requiring a complete and operating fixture unit with all such intended accessories, including mounting, guards, lenses, supports, plaster frames, bodies,

L. Where lenses, enclosures or other parts of lighting fixtures are specified as "acrylic," it shall be 100 % virgin acrylic.

M. All lighting fixtures, lamps, and lenses shall be cleaned free of dust, dirt. grease, smudges, and loose labels or debris.

N. Where fixture canopies are to be mounted on exposed outlet boxes, the boxes shall be Wiremold fixture boxes of proper size to prevent canopies overhanging the box edges. Where the wiring system is conduit or cable, the proper Wiremold adapter shall be provided at the box to make the transition. 16100.33 WIRING FOR STORE FIXTURES AND EQUIPMENT

GENERAL

A. Furnish and install circuits, feeders, and outlets specified herein. Completely connect and leave cases, store fixtures, and equipment in proper operating condition. A general description of such work follows; however, any omission of details will not relieve the contractor of the responsibility of completely connecting the various items. It shall be the duty of the contractor to familiarize himself with details involved by actual examination of equipment and fixtures.

B. Cases and checkout stands are subject to some relocations, and all dimensions and locations indicated shall be verified with representative of Owner before actual installation. Type of junction box outlet to be provided for each piece of equipment and case shall be determined by the type of fixtures or cases to be installed. Verify location of all electrical requirements with Owner immediately prior to rough-in. Connect wiring between adjacent cases, store fixtures, equipment of all items in each line-up, etc. for complete wiring.

16100.34 WIRING FOR BUILDING MECHANICAL EQUIPMENT AND SYSTEMS

A. Furnish and install all material, equipment, devices, wiring, and connections for mechanical equipment as indicated on drawings and specified herein. In addition, furnish and install all other basic materials, equipment and devices in accordance with other sections of this division of the specification which are applicable to the installation of this equipment.

PLUMBING, HEATING, VENTILATING, AND AIR CONDITIONING

B. Furnish and install circuits, outlets, feeders, (disconnect switches, and thermal overload switches), and make all connections to motors and controls for building mechanical equipment such as plumbing, heating, ventilating, and air conditioning equipment as indicated on drawings and herein specified and in accordance with the following SCHEDULE OF WIRING. Refer also to drawings and specifications for HVAC, refrigeration, and plumbing. Provide 120 volt weatherproof receptacle outlet within 25 feet of all heating and air conditioning units located outdoors. Provide UL listed wet location HPS fixture with guard and switch at all unit locations. Provide disconnect switches complete with fusetrons of class of fuses as indicated on drawings, or circuit breakers in panelboard where so indicated on drawings, for all feeder circuits to motors. Provide thermal overload switches with relays in each phase conductor for running protection of fractional horsepower motors unless motors are furnished with built-in thermal protection in which case a toggle switch shall be installed as a disconnect device. C. Provide disconnect switches or motor rated toggle switches to disconnect main line current for all motors where out of sight, per N.E.C., from main disconnect device and controller. Provide rain tight switches for units located on roof or where exposed to the weather.

D. Provide outlet on separate circuit for control voltage in mechanical rooms. Install and connect magnetic starters.

E. Provide all starters unless otherwise noted or when they are furnished as part of the equipment. F. Include disconnect switches for all equipment, where they are required by Code, also cutoff switches for all equipment which is automatically controlled

from remote points such as unit heaters.

EXHAUST FANS H. Furnish and install circuits, feeders, and make all connections to motors and motor controls for exhaust fans in locations indicated. Where exhaust fans are switched with lights, provide a TWO- Pole toggle switch. Disconnect switches are factory installed in rain tight enclosure for units on roof or where exposed to the weather. Where exhaust fans are not interlocked with other mechanical equipment, install and connect two-speed switches, magnetic starters. push-button stations, thermostats, or other control devices furnished by others. Where exhaust fans are interlocked with other mechanical equipment, provide interlock wiring and final connections.

16100.35 FINAL TESTS A. This Contractor shall, upon completion of the work, make all tests and adjustments under the direction of the Engineer to demonstrate that all

equipment and wiring under this contract will function satisfactorily in the manner B. Electrical wiring and equipment shall be free of electrical short circuits and unintentional grounds.

C. Insulation resistance on all conductors shall not be less than those required

D. All equipment shall be free of mechanical and electrical defects and shall perform as designed or intended. E. This Contractor shall furnish qualified personnel, supplies and equipment to make all tests as may be required. Current and fuel consumption shall be from

the Owner's supply, if connected and available at the time of the test. 16100.36 SAFETY AND DISCONNECT SWITCHES

A. Base named Manufacturer - Square D. B. Provide all safety switches as shown on the drawings and/or required by the NEC for motor and electric heat equipment disconnection

C. For stationery motors smaller than 1/2 HP, the disconnect switch may be a general use snap switch provided all Code provisions are met. D. All motor disconnect switches shall be properly sized for the horsepower

ratings using time delay fuses where indicated on the drawings. E. All units in finished areas or where wiring is concealed shall be flush mounted.

16100.37 PHOTO CELLS A. Provide Tork photo cell #2100 for 120V service. Switch shall be single pole, single throw rated for 1000 volt amperes mercury vapor or fluorescent load.

F. All disconnect switches shall be lockable in the "ON" or "OFF" position.

16100.38 MOLDED CASE CIRCUIT BREAKERS A. Based named Manufacturer - Square D.

B. Circuit breakers shall be of the molded case bolted in type consisting of the number of poles and ampere ratings as noted on the drawings. C. Circuit breakers shall be of the indicating type providing "ON," "OFF," and "TRIPPED" positions of the operating handle. When the breaker is TRIPPED, the handle shall assume a position between "ON" and "OFF" positions. D. Breakers shall be of the quick-make quick- break type with inverse time characteristics secured through the use of a bi-metallic and a magnetic tripping E. Two and three pole breakers shall be the common trip type. Handle

extensions providing common manual operation will not be acceptable.

SSUE DATE: : 09/01/15 :

F. Circuit breakers with 225 ampere or larger frame sizes shall have interchangeable trips.

G. Provide locking tabs on all circuit breakers serving emergency lighting, fire alarm system, sound system, security systems, and other emergency or critical

H. Where the required circuit breaker frame amps is not listed at the minimum interrupting capacity, a listed circuit breaker with a higher interrupting capacity

I. Where a circuit breaker is serving an air conditioning unit with multiple motors.

breaker shall be "HACR" type.

16100.39 LIGHTING AND POWER PANELS A. Base named Manufacturer — Square D.

B. The lighting panelboards shall be of the dead front, automatic molded case circuit breaker type.

C. Cabinets shall be code gauge with minimum 4" side, top, and bottom gutters and a minimum of 20" wide. Provide subfeed lugs and a minimum of 8" top, bottom and side gutters for feeder taps within panelboards and when feeders are installed in side gutters. New panels shall be recessed in all areas, except utility & machine room.

D. When indicated, a separate gutter compartment of the required size shall be provided for these feeder taps and the sub-feed lugs shall not be provided. Front and trim shall be sheet steel with ANSI 61 light gray finish over a cleaned. treated, primed surface. Include door and directory frame, combination lock and latch with two milled-type keys. Lock shall be flush with face of panel trim. Front shall be furnished with concealed adjustable trim clamps so that trim will fit flush and square. All panels shall be keyed alike. Doors shall be provided for access to contactors, time clocks, relays, etc.

E. Special fronts and trims embracing two or more panels located side by side shall be provided as shown on the drawings so that tops, bottoms, and doors line up in a horizontal direction for a neat and uniform appearance. Boxes shall be made correspondingly larger where required to meet this provision.

F. The panels shall be factory assembled complete with breakers. Any circuit breaker shall be capable of replacement without disturbing any other breaker, the main bus bars or branch wire connectors. The panels shall be capable of having branch circuits added without additional machining, drilling, or tapping. Branch circuits shall be sequenced phased on the main bus bars and the main bus carrying capacity shall be determined on a basis of not more than 750 amperes per square inch of cross sectional area for aluminum buses.

G. The panels shall be arranged for (3) phase, (4) wire, 277/480 volt or (3) phase, (4) wire, 120/208 volt service as required. H. Circuit breakers shall be as specified in "Molded Case Circuit Breaker"

section of the specifications. I. Minimum interrupting capacity to be coordinated with local utility companies so

as to interrupt the available fault current.

connected and spare circuits. K. In addition to any spare conduits shown, provide (1) 3/4" empty conduit for each 4 spare circuits or fraction thereof from all panels recessed in walls or partitions to the hung ceiling immediately adjacent, or just below. Terminate conduits in bushings in hung ceilings or flush mounted junction boxes 6" high by 12"

long at the finished ceiling where hung ceilings do not exist.

N. All new panels shall have fully rated copper bus bars.

16100.40 TEMPORARY LIGHT AND POWER

J.. All panels shall be provided with a complete type written directory of all

the position in the panelboard. Connect the circuits near the top of panel and the more heavily loaded circuits near the bottom. Balance all circuits evenly between phases so feeder wires carry approximately equal current. Rebalance if necessary. M. The panels shall be located and sized as indicated on prints and connected

L. Circuit numbers on the drawings are for identification only and do not indicate

as shown on the riser diagram. All panels must be recessed in finished areas. Panels must be set plumb with tops at one level, approximately 7'-6" to top

temporary electric distribution system for light and power. B. All necessary materials, i.e., panelboards, switches, fuses, cables, receptacle outlets, supports and over current protection including ground fault circuit interrupters, 20 amp. single-phase receptacles, 30 amp single-phase outlets.

and all other accessories required for the temporary distribution system shall

A. The Electrical Contractor shall provide, maintain, and operate a suitable

be provided by the Electrical Contractor. C. All necessary labor and materials required for the installation and tenance and subsequent removal of the temporary distribution syst including all fuses and lamps shall be provided by the Electrical Contractor.

D. All necessary sleeves, and supports, as may be required for the temporary distribution system shall be provided by Electrical Contractor. E. Minimum temporary lighting within all portions of the building shall be based upon a lighting intensity of five (25) foot candles throughout. Properly guarded left hand threaded lamps for meeting OSHA requirements and the following minimum lamping requirements shall be provided by the Electrical Contractor: 1. All wiring, outlets, and lamps as required shall be provided to create proper

adequate lighting in stairs, corridors, and passages. 2. For security reasons lighting in stairs, corridors, and passages shall remain energized constantly, 24 hours of each day.

3. The Electrical Contractor shall maintain higher lighting intensities, as

necessary, in areas where concrete finishing and work of similar nature is in progress, at no additional cost to the Contractor. F. Minimum temporary power within all buildings provided by Electrical Contractor for electrically operated small tools shall be based on a minimum of 0.50 watts per square foot. All power outlets shall be properly grounded conforming to NEC and rules and regulations prescribed by OSHA, as well as all other

agencies having jurisdiction within locale. When such codes, or regulations, are inconsistent, the more stringent shall prevail. G. Electrical Contractor shall furnish and install feeders and lighting/power distribution centers of sufficient capacity for the requirements of the entire space, with sufficient number of outlets at such convenient locations so that grounded extension cords of not over 100 feet in length will reach all work

areas requiring temporary power or light. H. Feeders and branch circuits shall be extended to keep pace with

I. Any subcontractor requiring temporary power in excess of the type and capacity specified herein shall provide the same at his expense. J. No subcontractor shall allow, provide, or make available for use by any

employees, any apparatus, equipment or cord sets not meeting OSHA requirements. K. Electrical Contractor shall provide and maintain a central facility conforming to OSHA requirements, for the use of the Construction Manager and his

L. Electrical Contractor shall be responsible for obtaining all wiring permits

required; prior to, as well as during construction, and adjust the temporary wiring

subcontractors to test cord sets for continuity.

of the permanent system.

09/29/17

system as needed to accommodate the construction of new building elements such as walls, ceiling, architectural work, etc. M. Electrical Contractor shall maintain the temporary light and power system until its use is no longer required as determined by the Construction Manager. Electrical Contractor shall keep the system in good repair and shall promptly replace burned-out, defective, missing or broken lamps. Permanent fixtures may be used for temporary lighting when specifically approved by the Construction Manager. All lamps used for temporary lighting purposes in permanent fixtures shall be replaced with new unused lamps immediately prior to final acceptance

N. Electrical Contractor shall alter and relocate temporary wiring as required when such interferes with construction as determined by the Construction Manager. Upon notification the Electrical Contractor shall disconnect and completely remove the temporary electrical system or portions thereof in a neat workmanlike manner without cost to the Tenant. O. Electrical Contractor shall not disrupt electric power whether temporary or permanent during normal working hours. Any switching, splicing, or other work performed by the Electrical Contractor, necessitating an interruption of power shall be performed during hours other than which temporary light and power are required, as set forth herein, and the cost thereof shall be borne entirely by the Electrical Contractor.

P. Electrical Contractor shall provide 208V/3 phase 60 amp. welding outlets for this Project as required.

DOCUMENT : DOCUMENT :

PLUS, INC. DESIGN, PLANNING AND DEVELOPMENT SUITE 700 101 CONVENTION CENTER DR. LAS VEGAS, NV

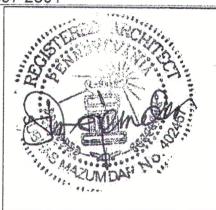
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Las Vegas, NV



PROFESSIONAL CERTIFICATION

I CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF PENNSYLVANIA:

ICENSE NO. 402457, EXPIRING ON 2/17/2018

Description Date

IELECTRICAL SPECIFICATION

Manny Mathai

HEALTHCARE FACILITIES

NURSING HOME (PHASE 2)

roject numbe SK-2015-006 Date 10/14/2015 Drawn by Checked by

1/8" = 1'-0"

Author Checker