PART I - ELECTRICAL GENERAL PROVISIONS RELATED DOCUMENTS A. THE PROVISIONS OF THE INSTRUCTIONS TO BIDDERS, GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, ALTERNATES, ADDENDA'S', AND DIVISION 1 ARE A PART OF THIS SPECIFICATION. CONTRACTORS AND SUBCONTRACTORS SHALL EXAMINE SAME AS WELL AS OTHER DIVISIONS OF THE SPECIFICATIONS WHICH AFFECT WORK UNDER THIS DIVISION. <u>SUMMAR`</u> A. THIS SECTION INCLUDES GENERAL ADMINISTRATIVE AND PROCEDURAL REQUIREMENTS FOR ELECTRICAL INSTALLATIONS COMMON TO ALL SECTIONS OF DIVISION 16. THE ADMINISTRATIVE AND PROCEDURAL REQUIREMENTS IN THIS SECTION EXPAND AND SUPPLEMENT THE <u>DESCRIPTION OF WORK</u> A. ELECTRICAL, ARCHITECTURAL, MECHANICAL, PLUMBING, FIRE PROTECTION, STRUCTURAL, ETC., AND ALL OTHER DRAWINGS AS WELL AS THE SPECIFICATIONS FOR ALL THE DIVISIONS ARE A PART OF THE CONTRACT DOCUMENTS. .12 PRODUCT DELIVERY, STORAGE, AND HANDLING DRAWINGS AND SPECIFICATIONS ARE TO BE CONSIDERED AS SUPPLEMENTING EACH OTHER. WORK SPECIFIED BUT NOT SHOWN, OR SHOWN BUT NOT SPECIFIED, SHALL BE PERFORMED OR FURNISHED AS THOUGH MENTIONED IN BOTH SPECIFICATIONS AND DRAWINGS. C. VISIT THE SITE OF THE WORK AND BECOME FAMILIAR WITH CONDITIONS AFFECTING THE INSTALLATION. SUBMISSION OF A PROPOSAL SHALL PRESUPPOSE KNOWLEDGE OF SUCH CONDITIONS AND NO ADDITIONAL COMPENSATION SHALL BE ALLOWED WHERE EXTRA LABOR OR MATERIALS ARE REQUIRED BECAUSE OF IGNORANCE OF THESE CONDITIONS. WORK INCLUDES A. INCLUDE ALL LABOR, MATERIAL, EQUIPMENT, SERVICES, AND PERMITS NECESSARY FOR THE PROPER COMPLETION OF ALL ELECTRICAL WORK SHOWN. ITEMS OMITTED, BUT NECESSARY TO MAKE THE ELECTRICAL SYSTEM COMPLETE AND WORKABLE, SHALL BE UNDERSTOOD TO FORM PART OF THE WORK. OF ALL EQUIPMENT, OUTLETS, ETC. ASCERTAIN EXACT LOCATIONS AND ARRANGE WORK ACCORDINGLY. THE RIGHT IS RESERVED TO EFFECT REASONABLE CHANGES IN THE LOCATION OF OUTLETS UP TO THE TIME OF ROUGHING—IN, WITHOUT ADDITIONAL COST TO THE OWNER. CHANGES IN LOCATION OF OUTLETS OR EQUIPMENT NECESSITATED BY INTERFERENCE WITH THE WORK OF OTHER TRADES SHALL BE MADE ONLY WITH THE CONSENT OF THE ARCHITECT AND ENGINEER OR OWNER'S REPRESENTATIVE, AND AT NO 1.13 <u>PROTECTION OF WORK AND PROPERT</u> C. AS USED IN THIS SPECIFICATION, "PROVIDE" MEANS "FURNISH AND INSTALL" AND "HVAC" MEANS "HEATING, VENTILATING AND AIR CONDITIONING" AND "POS" MEANS "PROVIDED UNDER OTHER SECTIONS". "FURNISH" MEANS "TO PURCHASE AND DELIVER TO THE PROJECT SITE COMPLETE WITH EVERY NECESSARY APPURTENANCE AND SUPPORT," AND "INSTALL" MEANS "TO UNLOAD AT THE DELIVERY POINT AT THE SITE AND PERFORM EVERY OPERATION NECESSARY FOR PROPER INSTALLATION PER CODES AND MANUFACTURERS REQUIREMENTS, TO ESTABLISH SECURE MOUNTING AND CORRECT OPERATION AT THE PROPER LOCATION IN THE PROJECT." D. WORK INCLUDES, BUT IS NOT LIMITED TO HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS ELECTRICAL IDENTIFICATION CONDUCTORS AND CABLES GROUNDING AND BONDING RACEWAYS AND BOXES
WIRING DEVICES
LIGHTING CONTROL DEVICES LUMINAIRES, INCLUDING LAMPS AND BALLASTS D.RE-WORKING AND NEW DEVICES TO THE EXISTING FIRE ALARM SYSTEM 12. NAMEPLATES LABELS, AND TAGS 13. COORDINATION DRAWINGS 5. OPERATION AND MAINTENANCE INSTRUCTIONS AND MANUALS E. THE ELECTRICAL DESIGN IS BASED ON THE CURRENT EDITION NFPA 70 — "THE NATIONAL ELECTRICAL CODE". THE CONTRACTOR SHALL INCLUDE IN THEIR BID THE COST OF INSTALLING MATERIALS AND EQUIPMENT NECESSARY TO SATISFY ALL LOCAL, AND/OR STATE CODES. WORK OR MATERIALS NOT INCLUDED A. THE EXACT WIRING REQUIREMENTS SHALL BE AS RECOMMENDED BY THE MANUFACTURER OF THE EQUIPMENT AND SHALL BE VERIFIED BY THE ELECTRICAL CONTRACTOR WITH THE EQUIPMENT MANUFACTURER BEFORE SUBMITTING THE BID. . STARTERS SUPPLIED AS AN INTEGRAL PART OF THE EQUIPMENT SHALL BE FURNISHED UNDER THE DIVISION PROVIDING THE EQUIPMENT. POWER WIRING DISCONNECT SHALL BE UNDER DIVISION 16. ALL OTHER STARTERS AND AUXILIARY CONTROL EQUIPMENT SHALL BE SUPPLIED AND WIRED UNDER DIVISION 16, UNLESS OTHERWISE SHOWN. .6 <u>RELATED WORK SPECIFIED ELSEWHERE</u> A. DIVISION 13 - SPECIAL CONSTRUCTION CODES, PERMITS, AND FEES A. INSTALL WORK IN FULL ACCORDANCE WITH RULES AND REGULATIONS OF STATE, COUNTY, AND CITY AUTHORITIES HAVING JURISDICTION (AHJ) OVER PREMISES. THIS SHALL INCLUDE SAFETY REQUIREMENTS OF THE STATE OF MAINE DEPARTMENTS OF COMMERCE AND NATURAL RESOURCES. DO NOT CONSTRUE THIS AS RELIEVING CONTRACTOR FROM COMPLIANCE WITH ANY REQUIREMENTS OF SPECIFICATION WHICH ARE IN EXCESS OF CODE REQUIREMENTS AND NOT IN CONFLICT THEREWITH. WORK SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE PROVISIONS OF THE NATIONAL ELECTRICAL CODE, AS INTERPRETED BY THE LOCAL AUTHORITY HAVING JURISDICTION, AS WELL AS ANY FURTHER MODIFICATIONS OR REGULATIONS PUBLISHED BY LOCAL OR STATE AUTHORITIES. 1.15 FIRE STOPPING B. GIVE PROPER AUTHORITIES NOTICE AS REQUIRED BY LAW RELATIVE TO THE WORK IN THEIR CHARGE. COMPLY WITH THE REGULATIONS REGARDING TEMPORARY ENCLOSURES, OBSTRUCTIONS, OR EXCAVATIONS AND PAY ALL LEGAL FEES INVOLVED.

C. SECURE AND PAY FOR PERMITS AND CERTIFICATES OF INSPECTIONS INCIDENTAL TO THIS WORK, AS REQUIRED BY ALL FOREGOING AUTHORITIES. BE RESPONSIBLE FOR PAYMENTS TO ALL PUBLIC UTILITIES FOR WORK PERFORMED BY THEM IN CONNECTION WITH PROVISION OF SERVICE CONNECTIONS REQUIRED UNDER THIS DIVISION OF SPECIFICATIONS. TURN OVER CERTIFICATES OF APPROVAL TO THE CONSTRUCTION MANAGER AND/OR OWNER PROMPTLY WHEN RECEIVED, AND BEFORE PAYMENT IS MADE FOR THE WORK. DELIVER ALL CERTIFICATES TO ARCHITECT IN DUPLICATE. D. PROVISIONS OF THE LATEST REVISIONS TO THE FOLLOWING CODES AND STANDARDS SHALL 2. CITY OF PORTLAND BUILDING CODES
2. CITY OF PORTLAND BUILDING CODES
3. NFPA 70 - NATIONAL ELECTRIC CODE (NEC)
4. NFPA 101 - LIFE SAFETY CODE
5. TIA/EIA - 568, 569, AND J-STD-607
6. AMERICANS WITH DISABILITIES ACT (ADA)

'. FEDERAL OCCUPATIONAL SAFETY AND HÉALTH ACT (OSHA) 1.8 COORDINATION WITH OTHER TRADES

A. CONSULT THE DRAWINGS, PRODUCT DATA, AND SHOP DRAWINGS COVERING THE WORK FOR VARIOUS OTHER TRADES, THE FIELD LAYOUTS OF THE CONTRACTORS FOR THE TRADE AND MAKE ADJUSTMENTS ACCORDINGLY IN LAYING OUT THE ELECTRICAL WORK. THAT IS TO BE CONCEALED WITHIN THE BUILDING CONSTRUCTION IN SUFFICIENT TIME TO SECURE PROPER LOCATION WITHOUT DELAY TO THE WORK OF OTHER TRADES. ALL CONDUIT AND OUTLET BOXES CONCEALED IN MASONRY CONSTRUCTION SHALL BE INSTALLED DURING WALL CONSTRUCTION. ATTEND TO ELECTRICAL WORK DURING THE PROGRESS OF BUILDING—IN TO PREVENT MISALIGNMENTS AND DAMAGES TO THE ELECTRICAL WORK. C. EXAMINE THE WORK OF OTHER TRADES WHEN IT COMES IN CONTACT WITH, OR IS COVERED BY WORK IN THIS DIVISION. DO NOT ATTACH TO, COVER UP, OR FINISH AGAINST ANY DEFECTIVE WORK, OR INSTALL WORK IN A MANNER WHICH WILL PREVENT PROPER

D. ALL OUTLETS, SWITCHES, AND RECEPTACLES SHALL BE CENTERED WITH REGARD TO PANELING, WALL COVERINGS, TRIM, EQUIPMENT, ETC., AND SHALL LINE UP WITH EITHER BOTTOM OR TOP OF MASONRY COURSES. CHANGES, TO THE SPECIFIED MOUNTING HEIGHTS OF ANY DEVICE SHALL BE APPROVED BY THE OWNER'S REPRESENTATIVE BEFORE ROUGH—IN. E. TAKE ALL FIELD MEASUREMENTS NECESSARY AND ASSUME RESPONSIBILITY FOR THEIR ACCURACY. F. BEFORE BEGINNING CONSTRUCTION OF THE PROJECT, THE CONTRACTOR SHALL PROVIDE TO THE MECHANICAL CONTRACTOR, MARKED-UP PRINTS INDICATING ALL ELECTRICAL ITEMS WHICH AFFECT THE LOCATION OF HEATING, VENTILATING, AIR CONDITIONING, PLUMBING, PIPING, AND DUCTWORK. THESE SHALL INCLUDE BUT NOT BE LIMITED TO PULL BOXES, CONDITION FOR

.9 <u>EQUIPMENT AND MATERIALS</u>

A. ALL EQUIPMENT, DEVICES, AND MATERIALS USED ON THIS PROJECT SHALL BE NEW AND U.L. LISTED AND LABELED FOR THE APPLICATION. B. PROVIDE MATERIAL AND LABOR WHICH IS NEITHER DRAWN NOR SPECIFIED, BUT WHICH IS OBVIOUSLY A COMPONENT PART OF, AND NECESSARY TO COMPLETE WORK AND WHICH IS CUSTOMARILY A PART OF WORK OF SIMILAR CHARACTER.

C. EQUIPMENT AND MATERIALS FOR THE CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE PROTECTED BY SAME UNTIL FORMALLY ACCEPTED BY THE ALL MANUFACTURERS OF ELECTRICAL EQUIPMENT SHALL VERIFY TO THE SATISFACTION OF THE CONTRACTOR AND ENGINEER THAT THEIR EQUIPMENT WILL FUNCTION PROPERLY UNDER THE CONDITIONS OF USE, AS SHOWN ON THE DRAWINGS AND AS SPECIFIED HEREIN. DIMENSIONS, WEIGHTS, OPERATING CHARACTERISTICS AND ALL OTHER RELATED APPURTENANCES SHALL BE VERIFIED BEFORE SUBMITTAL OF SHOP DRAWINGS.

.10 QUALITY ASSURANCE A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: UNDERWRITER LABORATORIES, INC. (UL) LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY O AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

.11 <u>SUBMITTALS</u>

 THE DESIGN DRAWINGS, AS SUBMITTED, ARE DIAGRAMMATIC AND ARE NOT INTENDED TO SHOW EXACT LOCATION OF EQUIPMENT, CONDUITS, ETC. UNLESS DIMENSIONS ARE GIVEN. DRAWINGS ARE NOT TO BE SCALED. EQUIPMENT, CONDUIT, ETC. TO BE INSTALLED ALONG THE GENERAL PLANS SHOWN ON THE DRAWINGS, BUT KEEPING IN MIND ACTUAL BUILDING CONDITIONS WHICH MUST BE CONFIRMED WITHIN THE ACTUAL

IF THIS CONTRACTOR PROPOSES TO INSTALL EQUIPMENT REQUIRING SPACE CONDITIONS OTHER THAN THOSE AS SPECIFIED AND/OR SHOWN ON THE DESIGN DRAWINGS, OR TO REARRANGE THE EQUIPMENT, HE SHALL ASSUME FULL RESPONSIBILITY FOR THE REARRANGEMENT OF THE SPACE AND SHALL OBTAIN THE FULL APPROVAL OF THE ARCHITECT BEFORE PROCEEDING WITH THE WORK. B. RECORD DRAWINGS

1. EACH CONTRACTOR OR SUBCONTRACTOR FOR ELECTRICAL WORK SHALL KEEP ONE COMPLETE SET OF THE CONTRACT WORKING DRAWINGS ON THE PROJECT SITE ON WHICH THEY SHALL RECORD ANY DEVIATIONS OR CHANGES FROM SUCH CONTRACT DRAWINGS MADE DURING CONSTRUCTION. THESE CHANGES SHALL BE ACCURATELY RECORDED IN RED INK ON THE PRINTS. RECORD DRAWINGS SHALL SHOW CHANGES IN:

a. LOCATION OF ANY DEVICE OR PIECE OF EQUIPMENT. b. LOCATION OF ANY OUTLET OR DEVICE AND ASSOCIATED WIRING.

2. RECORD DRAWINGS SHALL BE KEPT CLEAN AND UNDAMAGED, AND SHALL NOT BE USED FOR ANY PURPOSE OTHER THAN RECORDING DEVIATIONS FROM WORKING DRAWINGS. 3. AFTER THE PROJECT IS COMPLETED, RECORD SETS OF DRAWINGS SHALL BE DELIVERED TO THE TENANT AND BUILDING MANAGEMENT IN GOOD CONDITION, AS A PERMANENT RECORD OF THE INSTALLATION AS CONSTRUCTED. ALL COSTS FOR PRODUCTION, PRINTING, ETC. SHALL BE BORNE BY THE CONTRACTOR AND SHALL BE INCLUDED IN

4. REFER TO DIVISION 1 SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS RELATED TO

5. THIS CONTRACTOR SHALL RECORD ALL CHANGES FROM ORIGINAL DESIGN DRAWINGS WHICH WERE THE INSTALLATION OF THE WORK. THESE CHANGES SHALL BE RECORDED IN RED INK ON THE PRINTS. CHANGES SHALL BE ACCURATELY DIMENSIONED. THIS CONTRACTOR SHALL KEEP AN UPDATED SET OF PRINTS, INCLUDING CHANGES, ON THE JOB SITE AT ALL TIMES AND SHALL SUBMIT ONE (1) SET OF UPDATED AND LEGIBLE "AS-BUILT" PRINTS TO THE ARCHITECT WHEN THE WORK IS COMPLETE. 7. PREPARE RECORD DOCUMENTS IN ACCORDANCE WITH THE REQUIREMENTS IN DIVISION SECTION "PROJECT CLOSEOUT."

D. IN GENERAL, DO NOT DELIVER ITEMS OF ELECTRICAL EQUIPMENT TO THE PROJECT SUBSTANTIALLY BEFORE THE TIME OF INSTALLATION. LIMIT EACH SHIPMENT OF BULK AND MULTIPLE-USE MATERIALS TO THE QUANTITIES NEEDED FOR INSTALLATION WITHIN 3-WEEKS OF RECEIPT.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAFEGUARDING WORK, PROPERTY, AND FACILITIES AGAINST DAMAGE, BOTH HIS OWN AS WELL AS OTHERS, WITH WHICH HE MAY COME INTO CONTACT IN THE PERFORMANCE OF HIS WORK.

. STORED MATERIALS SHALL BE PROTECTED AGAINST DAMAGE FROM WEATHER. PIPE AND DUCT OPENINGS SHALL BE CLOSED WITH CAPS OR PLUGS DURING INSTALLATION. ALL FIXTURES AND EQUIPMENT SHALL BE COVERED AND PROTECTED AGAINST DAMAGE. ANY MATERIALS OR EQUIPMENT DAMAGED AT ANY STAGE IN THE CONSTRUCTION SHALL BE REPLACED OR REPAIRED AND AT THE FINAL COMPLETION, ALL WORK SHALL BE IN A CLEAN, UNDELEMBER CONDITION.

C. FURNISH INFORMATION TO GENERAL CONTRACTOR AS TO SIZE AND LOCATION OF ALL BUILT-IN OPENINGS REQUIRED. DO NOT CUT, REMOVE OR PIERCE: GENERAL OR MECHANICAL INSULATION; FIRE RATED WALLS OR CEILINGS; OR STEEL WORK; WITHOUT PRIOR

A. GENERAL: ALL CUTTING AND PATCHING FOR THE INSTALLATION OF THIS BRANCH OF THE WORK SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR.

B. PERFORM CUTTING AND PATCHING IN ACCORDANCE WITH DIVISION 1 SECTION "PROCEDURES, SEPARATE PRIMES." IN ADDITION TO THE REQUIREMENTS SPECIFIED IN DIVISION 1, PERFORM CUTTING, FITTING AND PATCHING OF MECHANICAL EQUIPMENT AND MATERIALS REQUIRED TO:

REMOVE AND REPLACE WORK NOT CONFORMING TO REQUIREMENTS OF THE CONTRACT

DOCUMENTS.

INSTALL EQUIPMENT AND MATERIALS IN EXISTING STRUCTURE.

UPON WRITTEN INSTRUCTIONS FROM THE ENGINEER, UNCOVER AND RESTORE WORK TO PROVIDE FOR ENGINEER OBSERVATION OF CONCEALED WORK.

CUT, REMOVE AND LEGALLY DISPOSE OF SELECTED ELECTRICAL EQUIPMENT, COMPONENTS AND MATERIALS AS INDICATED, INCLUDING BUT NOT LIMITED TO REMOVAL OF CONDUITS AND CONDUCTORS, JUNCTION BOXES, LUMINAIRES AND TRIM, AND OTHER ELECTRICAL ITEMS MADE OBSOLETE BY THE NEW WORK.

. PROTECTION OF INSTALLED WORK: DURING CUTTING AND PATCHING OPERATIONS, PROTECT ADJACENT INSTALLATIONS.

. PROVIDE AND MAINTAIN TEMPORARY PARTITIONS OR DUST BARRIERS ADEQUATE TO PREVENT THE SPREAD OF DUST AND DIRT TO ADJACENT AREAS.

E. ALL OPENINGS REQUIRED FOR THIS BRANCH OF WORK SHALL BE ACCOMPLISHED IN TIME TO BE INCORPORATED IN, AND BE COMPATIBLE WITH THE CONSTRUCTION PROGRAM, OTHERWISE THIS CONTRACTOR SHALL BE RESPONSIBLE AND PAY FOR ALL CHANGES MADE NECESSARY FOR HES FAILURE TO DO SO. PIPE HOLES IN FLOORS AND WALLS SHALL BE CORE

. PATCH EXISTING FINISHED SURFACES AND BUILDING COMPONENTS USING NEW MATERIALS MATCHING EXISTING MATERIALS AND EXPERIENCED INSTALLERS. FOR INSTALLERS' QUALIFICATIONS, REFER TO THE MATERIALS AND METHODS REQUIRED FOR THE SURFACE AND

FIRE STOPPED PRIOR TO FINISH PATCHING. ALL FIRE STOPPING MATERIALS SHALL BE U.L. "CLASSIFIED", INTUMESCING COMPOUND, DEVICE, OR SHEET RATED TO FUNCTION FOR THIS PURPOSE. ACCORDING TO INSTRUCTIONS PROVIDED, ALL PENETRATIONS IN 1—HOUR, 2—HOUR, AND 3—HOUR FIRE RATED WALLS, FLOORS OR PARTITION ASSEMBLIES SHALL BE SEALED WITH 3M BRAND FIRE BARRIER CAULK, CP—25, OR COMPOSITE SHEET CS—195, OR EQUIVALENT. ALL PENETRATIONS SHALL BE SEALED IN ACCORDANCE WITH UL FIRE

I. CAULK P-25 FILL MATERIAL TO COMPLETELY FILL THE ANNULAR SPACE BETWEEN THE INDIVIDUAL CONDUIT AND GYPSUM WALLBOARD WITH A MINIMUM ¼" DIAMETER BEAD OF CAULK APPLIED TO THE PERIMETER OF CONDUIT (UL SYSTEM WL1001).

MULTIPLE CONDUITS SHALL BE CONTAINED WITHIN A 28 GAUGE STEEL SLEEVE. CAULK CP-25 FILL MATERIAL TO A DEPTH OF 1" COMPLETELY AROUND THE STEEL SLEEVE. A NOMINAL 14" DIAMETER BEAD SHALL BE APPLIED ON BOTH SIDES OF WALL ASSEMBLE. A MINIMUM 1" THICKNESS OF MINERAL WOOL BATT INSULATION SHALL BE PACKED FIRMLY INTO THE STEEL SLEEVE ON BOTH SIDES OF WALL ASSEMBLY AS A PERMANENT FORM. PACKING MATERIAL SHALL BE RECESSED 5/8" FROM SURFACE OF WALL ON BOTH SIDES OF WALL ASSEMBLY. FILL RECESSED CAVITY WITH 1" OF CP-25 CAULK (UL SYSTEMS WI 1016)

3. A MINIMUM 1" THICKNESS OF MINERAL WOOL BATT INSULATION SHALL BE PACKED FIRMLY INTO THE MAXIMUM 2" ANNULAR SPACE AS A PERMANENT FORM. A MINIMUM OF 1" OF CP-25 CAULK SHALL FILL THE RECESSED CAVITY, (FOR WALLS, THIS SHALL BE APPLIED ON BOTH SIDES OF THE WALL) (UL SYSTEM CAJ1044).

COORDINATE WITH THE ARCHITECT FOR ALL EXACT MATERIAL AND RATINGS AND EXACT DETAILS FOR FIRE STOPPING MATERIALS AND INSTALLATIONS PER ALL NFPA AND UL

WITH CLEARANCE REQUIRED FOR LIGHTS, CONDUIT, AND CEILINGS AND FOR FINISH ON BEAMS, COLUMNS, PILASTERS, WALLS OR OTHER STRUCTURAL OR ARCHITECTURAL MEMBERS, AS SHOWN ON CONTRACT DRAWINGS. IF ANY WORK IS SO INSTALLED AND IT LATER DEVELOPS THAT ORIGINAL DESIGN CANNOT BE FOLLOWED, THIS CONTRACTOR SHALL, AT HIS OWN EXPENSE, MAKE SUCH CHANGES IN HIS WORK AS ARCHITECT MAY DIRECT TO PERMIT COMPLETION OF WORK IN ACCORDANCE WITH PLANS AND SPECIFICATIONS.

WHEN WORK PROGRESS MAKES TEMPORARY SHUTDOWN OF SERVICES UNAVOIDABLE, SHUTDOWN SHALL BE COORDINATED WITH AND APPROVED BY OWNER SO AS TO CAUSE MINIMUM DISRUPTION TO ESTABLISHED OPERATING ROUTINE. ARRANGE TO WORK AS NECESSARY TO RE-ESTABLISH SERVICE WITHIN SHORTEST POSSIBLE DOWNTIME. IN THOSE INSTANCES WHERE THE LENGTH OF TIME REQUIRED FOR THE SERVICE INTERRUPTION IS NOT ACCEPTABLE TO THE OWNER, UNLESS OTHERWISE INDICATED, FURNISH AND INSTALL TEMPORARY CONNECTIONS AS REQUIRED TO REDUCE THE LENGTH OF TIME OF SERVICE INTERRUPTION TO AN ACCEPTABLE LEVEL.

A. WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE BEST PRACTICES OF THE TRADE. AND IN A WORK LIKE MANNER AND SHALL NEAT AND RECTILINEAR TO FINISHES.

B. INSTRUCT THE OWNER'S MAINTENANCE PERSONNEL IN THE OPERATION AND MAINTENANCE OF

A. GENERAL: FOLLOW THE REQUIREMENTS SPECIFIED IN DIVISION 1 SECTION "PROJECT CLOSEOUT."

B. IN SO FAR AS THIS DIVISION IS CONCERNED, AT ALL TIMES KEEP PREMISES AND BUILDING IN A NEAT AND ORDERLY CONDITION, FOLLOW EXPLICITLY ANY INSTRUCTIONS OF ARCHITECT AND OWNER IN REGARD TO STORING OF MATERIALS, PROTECTIVE MEASURES, CLEANING-UP OF DEBRIS, ETC.

C. UPON COMPLETION OF WORK, THIS CONTRACTOR SHALL THOROUGHLY CLEAN ALL EQUIPMENT LEAVING EVERYTHING IN WORKING ORDER AT THE COMPLETION OF THIS COMPLETED THEIR WORK. CLEAN LUMINAIRES, OUTLET BOX PLATES, PANEL AND CABINET INTERIORS AND EXTERIORS, ETC., OF DIRT, DUST, DEBRIS, PAINT, ETC.

A. WARRANT THAT EQUIPMENT AND ALL WORK IS INSTALLED IN ACCORDANCE WITH GOOD ENGINEERING PRACTICE AND THAT ALL EQUIPMENT WILL MEET REQUIREMENTS SPECIFIED. ANY EQUIPMENT FAILING TO PERFORM OR FUNCTION AS SPECIFIED SHALL BE REPLACED

BUILDING COMPONENTS BEING PATCHED.

1.16 <u>Interferences</u>

1.18 WORKMANSHIP

1.20 <u>CLEANING AND FINISHING</u>

1.21 <u>GUARANTEE AND WARRANTIES</u>

1.19 <u>DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEM</u>

ALL ELECTRICAL EQUIPMENT AND CONTROLS.

. UNCOVER WORK TO PROVIDE FOR INSTALLATION OF ILL—TIMED WORK. REMOVE AND REPLACE DEFECTIVE WORK.

ELECTRICAL METALLIC TUBING (EMT) SHALL BE ELECTRO—GALVANIZED AND MANUFACTURED IN ACCORDANCE WITH ANSI C80.3. B. FLEXIBLE METAL CONDUIT (FMC) SHALL CONSIST OF CONTINUOUS LENGTHS OF SPIRALLY WOUND AND INTERLOCKED GALVANIZED STEEL, MANUFACTURED IN ACCORDANCE WITH UL 1. LIQUID TIGHT FLEXIBLE METAL CONDUIT (LFMC) SHALL BE USED IN WET LOCATIONS. 8. IN ADDITION TO THE REQUIREMENTS SPECIFIED IN DIVISION 1, INDICATE THE FOLLOWING INSTALLED CONDITIONS (ACCURATELY DIMENSIONED): a. CONCEALED EQUIPMENT, UNITS, DEVICES, ETC., REQUIRING PERIODIC MAINTENANCE OR REPAIR.

CONDUIT EXPANSION FITTINGS SHALL BE THREADED HOT-DIPPED GALVANIZED MALLEABLE IRON WITH INTERNAL BONDING ASSEMBLY. . APPROVED SUBSTITUTIONS, CONTRACT MODIFICATIONS AND ACTUAL EQUIPMENT AND MATERIALS INSTALLED. EQUIPMENT LOCATIONS (EXPOSED AND CONCEALED), DIMENSIONED FROM PROMINENT BUILDING LINES. . PROVIDE THREADED MALLEABLE IRON OR STEEL CONNECTORS AND COUPLINGS WITH INSULATED THROATS; MANUFACTURED ELBOWS; LOCKNUTS; AND PLASTIC OR BAKELITE BUSHINGS AT TERMINATIONS, AS NECESSARY. COUPLINGS AND CONNECTORS SHALL BE GLAND AND RING COMPRESSION OR STAINLESS STEEL MULTIPLE POINT LOCKING OR STEEL CONCRETE—TIGHT SET SCREW. COMPRESSION COUPLINGS AND CONNECTORS SHALL FORM POSITIVE GROUND. SET—SCREW CONNECTORS AND COUPLINGS SHALL HAVE WALL THICKNESS EQUAL TO CONDUIT, CASE—HARDENED, HEX—HEAD SCREWS AND SEPARATE GROUND WIRE. BUSHINGS FOR RIGID STEEL AND CONNECTORS FOR EMT SHALL HAVE INSULATING INSERTS THAT MEET REQUIREMENTS OF UL 514 FLAME TEST. DELIVER PRODUCTS TO THE PROJECT PROPERLY IDENTIFIED WITH NAMES, MODEL NUMBERS, TYPES, COMPLIANCE LABELS AND SIMILAR INFORMATION NEEDED FOR IDENTIFICATION. MATERIALS MUST BE ADEQUATELY PACKAGED OR PROTECTED TO PREVENT DETERIORATION DURING SHIPMENT, STORAGE AND HANDLING.

E. ACCEPTABLE MANUFACTURER FOR METALLIC RACEWAY SHALL BE AS FOLLOWS: ALFLEX 2. ELECTRI-FLEX 3. GRINNEL CO. 4. O-Z GEDNEY

3. THE CONTRACTOR SHALL MAKE PROVISIONS FOR THE DELIVERY AND SAFE STORAGE OF HIS MATERIALS AND EQUIPMENT IN COORDINATION WITH THE WORK OF OTHERS. MATERIALS AND EQUIPMENT SHALL BE DELIVERED AT SUCH STAGES OF THE WORK AS WILL EXPEDITE THE WORK AS A WHOLE AND SHALL BE MARKED AND STORED IN SUCH A WAY AS TO BE EASILY CHECKED AND INSPECTED. THE ARRIVAL AND PLACING OF LARGE EQUIPMENT ITEMS SHALL BE SCHEDULED EARLY ENOUGH TO PERMIT ENTRY AND SETTING WHEN THERE IS NO RESTRICTION OR PROBLEM DUE TO SIZE AND WEIGHT. . MATERIALS SHALL BE STORED TO PROTECT THEM FROM INJURY PRIOR TO INSTALLATION. MATERIAL SHOULD NOT BE STORED DIRECTLY ON THE GROUND OR FLOOR AND SHALL BE KEPT AS CLEAN AND DRY AS POSSIBLE AND FREE FROM DAMAGE OR DETERIORATING

OUTLET BOXES ON CONCEALED WORK SHALL BE AT LEAST 4 11/16" SQUARE OR OCTAGONAL, GALVANIZED PRESSED STEEL WITH PLASTER RINGS AS REQUIRED. OUTLET BOXES FOR EXPOSED CONDUIT WORK SHALL BE CAST ALUMINUM ALLOY WITH CAST

D. OUTLET BOXES FOR VARIOUS SYSTEMS AND COMPONENTS SHALL BE AS REQUIRED BY EQUIPMENT MANUFACTURER. PROVIDE ONLY ENOUGH CONDUIT OPENINGS TO ACCOMMODATE CONDUITS AT INDIVIDUAL LOCATION. EACH BOX SHALL BE LARGE ENOUGH TO ACCOMMODATE NUMBER AND SIZES OF CONDUITS, WIRES AND SPLICES TO MEET NEC REQUIREMENTS, BUT SHALL BE AT LEAST SIZE SHOWN OR SPECIFIED. NECESSARY VOLUME SHALL BE OBTAINED BY USING BOXES OF PROPER DIMENSIONS.

2.3 JUNCTION BOXES

PROVIDE CODE GAUGE GALVANIZED STEEL JUNCTION AND PULL BOXES FOR CONDUIT 1-1/4" TRADE SIZE AND LARGER, WHERE NECESSARY TO FACILITATE INSTALLATION, OF REQUIRED DIMENSIONS, WITH ACCESSIBLE, REMOVABLE SCREW-ON COVERS. PROVIDE JUNCTION AND PULL BOXES IN SPECIAL SIZES AND SHAPES DETERMINED IN FIELD WHERE NECESSARY. JUNCTION BOX COVERS SHALL BE ACCESSIBLE. DO NOT INSTALL JUNCTION BOXES ABOVE SUSPENDED CEILINGS EXCEPT WHERE CEILING IS REMOVABLE OR WHERE ACCESS PANEL IS PROVIDED.

PROVIDE SINGLE—CONDUCTOR, ANNEALED COPPER WIRE AND CABLE WITH INSULATION RATED 600 V, OF SIZES SPECIFIED AND SCHEDULED ON DRAWINGS, FOR SECONDARY SERVICE, FEEDERS, BRANCH AND SYSTEM WIRING.

METAL CLAD CABLE SHALL BE 600 V COPPER WITH FULL-SIZED INSULATED GROUND CONDUCTOR. USE IS RESTRICTED BY REQUIREMENTS OF PARAGRAPH ENTITLED WIRING METHODS IN PART 3 OF THIS SECTION. MINIMUM SIZE SHALL BE 12-AWG UNLESS

C. WIRE 10-AWG AND LARGER SHALL BE STRANDED; 12-AWG AND SMALLER SHALL BE SOLID. WIRE AND CABLE SHALL HAVE THWN-THHN OR XHHW INSULATION. D. MOTOR CONTROL CIRCUITS AND SIGNAL WIRING MAY BE 14-AWG IF NEC REQUIREMENTS ARE MET. BRANCH CIRCUITS LONGER THAN 75' FOR 120 V AND 175' FOR 277 V SHALL BE AT LEAST 10-AWG FROM PANEL TO LAST OUTLET

WIRING WITHIN LUMINAIRES AND OTHER HIGH-TEMPERATURE EQUIPMENT SHALL HAVE 150°C INSULATION AS REQUIRED BY NEC. MAKE SPLICES IN BRANCH CIRCUIT WIRING WITH UL-LISTED, SOLDERLESS CONNECTORS RATED 600 V, OF SIZES AND TYPES REQUIRED BY MANUFACTURER'S RECOMMENDATIONS WITH TEMPERATURE RATINGS EQUAL TO THOSE OF WIRES. SPLICE CONNECTORS SHALL BE SCREW-ON. INSULATE SPLICES WITH INTEGRAL COVERS OR WITH PLASTIC OR RUBBER

FRICTION TAPE TO PRESERVE CHARACTERISTICS OF WIRE AND CABLE INSULATION.

G. MAKE TERMINATIONS AND SPLICES FOR CONDUCTORS 6-AWG AND LARGER WITH CORROSION-RESISTANT, HIGH-CONDUCTIVITY PRESSURE INDENT, HEX SCREW OR BOLT-CLAMP CONNECTORS, WITH OR WITHOUT TONGUES, DESIGNED SPECIFICALLY FOR INTENDED SERVICE. CONNECTORS FOR CABLES 250 KCMIL AND LARGER SHALL HAVE TWO CLAMPING ELEMENTS OR COMPRESSION INDENTS. TERMINALS FOR BUS CONNECTIONS SHALL HAVE TWO BOLT HOLES. H. AMPACITY OF SPLICES AND CONNECTORS SHALL BE EQUAL TO THOSE OF ASSOCIATED WIRES

A. COLOR CODE SECONDARY SERVICE, FEEDERS AND BRANCH CIRCUIT CONDUCTORS AS FOLLOWS:

208Y/120 VOLT: 480Y/277 VOLT: PHASE A: BLACK PHASE A: BROWN PHASE B: RED PHASE B: ORANGE PHASE C: BLUE PHASE C: YELLOW NEUTRAL: WHITE NEUTRAL: GRAY GROUND: GREEN GROUND: GREEN ISO GROUND:GREEN W/ YELLOW STRIPE

BRANCH CIRCUIT CONDUCTORS 12-AWG AND 10-AWG SHALL HAVE SOLID COLOR COMPOUND, SOLID COLOR COATING. NEUTRALS AND EQUIPMENT GROUNDS SHALL HAVE SOLID COMPOUND OR SOLID COLOR COATING (WHITE, GRAY AND GREEN).

C. ACCEPTABLE MANUFACTURER FOR WIRE AND CABLE SHALL BE AS FOLLOWS: 1. AMERICAN INSULATED WIRE CORP.; A LEVITON COMPANY 2. SENATOR WIRE & CABLE COMPANY 3. SOUTHWIRE COMPANY

. INSTALL ADDITIONAL OFFSETS ON PIPING OR DUCTWORK WHERE REQUIRED TO OBTAIN MAXIMUM HEADROOM OR TO AVOID CONFLICT WITH OTHER WORK WITHOUT ADDITIONAL COST 2.6 <u>WIRE PULLING EQUIPMENT</u>

A. PROVIDE POLYETHYLENE ROPES FOR PULLING WIRE.

B. PROVIDE FISH WIRES IN TELEPHONE CONDUITS AND OTHER EMPTY CONDUIT SYSTEMS REQUIRED, WITHOUT SPLICES AND WITH AMPLE EXPOSED LENGTHS AT EACH END. C. PROVIDE WIRE PULLING LUBRICANTS THAT MEET APPLICABLE UL REQUIREMENTS AS

B. REPORT ANY INTERFERENCE BETWEEN WORK UNDER THIS DIVISION AND THAT OF ANY OTHER CONTRACTORS TO ARCHITECT AS SOON AS THEY ARE DISCOVERED. ARCHITECT WILL DETERMINE WHICH EQUIPMENT SHALL BE RELOCATED, REGARDLESS OF WHICH WAS FIRST

MATCH EXISTING MANUFACTURER AND TYPE

B. ELECTRICAL WORK SHALL BE INSTALLED BY JOURNEYMEN ELECTRICIANS UNDER THE SUPERVISION OF A COMPETENT FOREMAN.

A. BEFORE FINAL PAYMENT, DEMONSTRATE TO THE OWNER'S SATISFACTION THE PROPER OPERATION OF EACH OF THE SYSTEMS COMPRISING THIS CONTRACT. A. AC TOGGLE SWITCHES MATCH EXISTING MANUFACTURER AND TYPE

C. DELIVER TO THE OWNER ALL SPECIAL TOOLS AND APPURTENANCES FOR PROPER OPERATION AND MAINTENANCE OF THE EQUIPMENT PROVIDED AND REQUEST RECEIPT FOR SAME. ATTACH TO THE CONTRACTOR'S REQUEST FOR FINAL PAYMENT. A. WIRING DEVICES AND WALL PLATES

> 1. SINGLE AND COMBINATION TYPES TO MATCH CORRESPONDING WIRING DEVICES. a. SMOOTH HIGH-IMPACT THERMOPLASTIC MATERIAL FOR FINISHED SPACES: b GALVANIZED STEEL MATERIAL FOR UNFINISHED SPACES: c. VOICE/DATA JACKS SHALL UTILIZE THE SAME TYPE OF PLATE USED FOR RECEPTACLES d. DEVICES PLATES SHALL BE BY THE SAME MANUFACTURER AS THE WIRING DEVICE. e. DEVICE/PLATE COLOR SELECTED BY ARCHITECT.

B. RECEPTACLE ORIENTATION: . INSTALL GROUND PIN OF VERTICALLY MOUNTED RECEPTACLES UP AND ON HORIZONTALLY MOUNTED RECEPTACLES TO THE RIGHT.

D. OUTLETS SHALL BE FLUSH TO SURFACE.

C. DO NOT USE OVERSIZED OR EXTRA—DEEP PLATES. REPAIR WALL FINISHES AND REMOUNT OUTLET BOXES WHEN STANDARD DEVICE PLATES DO NOT FIT FLUSH OR DO NOT COVER ROUGH WALL OPENING. D. ARRANGEMENT OF DEVICES: UNLESS OTHERWISE INDICATED, MOUNT FLUSH, WITH LONG DIMENSION VERTICAL GROUP ADJACENT SWITCHES UNDER A SINGLE, MULTI-GANG WALL PLATE.

B. THIS CONTRACTOR SHALL GUARANTEE AGAINST DEFECTS OF ALL MATERIALS, WORKMANSHIP AND THE COMPLETE OPERATION OF ALL EQUIPMENT AND APPARATUS INSTALLED BY HIM FOR A PERIOD OF ONE YEAR FROM THE DATE OF THE FINAL ACCEPTANCE OF THE ENTIRE WORK AND SHALL GUARANTEE TO REPAIR OR REPLACE AT HIS OWN EXPENSE ANY PART OF THE APPARATUS WHICH MAY SHOW DEFECT DURING THAT TIME PROVIDED SUCH DEFECT IS, IN THE OPINION OF THE ARCHITECT, DUE TO IMPERFECT MATERIAL OR WORKMANSHIP AND NOT TO CARELESSNESS OR IMPROPER USE.

A. PROVIDE TYPE AND COLOR AS DIRECTED BY ARCHITECT. B. VOICE/DATA OUTLET PLATES SHALL BE SAME AS USED FOR RECEPTACLES C. DEVICE PLATES SHALL BE BY MANUFACTURER OF WIRING DEVICES

PART 3 - EXECUTION

3.1 TESTING, INSPECTION, AND CLEANING

TEST WIRING AND CONNECTIONS FOR CONTINUITY AND GROUNDS BEFORE EQUIPMENT IS CONNECTED; DEMONSTRATE INSULATION RESISTANCE BY MEGGER TEST AS REQUIRED. INSULATION RESISTANCE BETWEEN CONDUCTORS AND GROUNDS FOR SECONDARY DISTRIBUTIONS SYSTEMS SHALL MEET NEC REQUIREMENTS.

B. VERIFY AND CORRECT AS NECESSARY: VOLTAGES, TAP SETTINGS, TRIP SETTINGS AND PHASING ON EQUIPMENT FROM SECONDARY DISTRIBUTION SYSTEM TO POINTS OF USE. TEST SECONDARY VOLTAGES AT BUS IN MAIN SWITCHBOARD, AT PANELBOARDS, AND AT OTHER LOCATIONS ON DISTRIBUTION SYSTEMS AS NECESSARY. TEST SECONDARY VOLTAGES UNDER

. TEST LUMINAIRES WITH SPECIFIED LAMPS IN PLACE FOR 10 HOURS. DO NOT OPERATE LAMPS OTHER THAN FOR TESTING BEFORE FINAL INSPECTION BY ARCHITECT. REPLACE LAMPS THAT FAIL WITHIN 90 DAYS AFTER ACCEPTANCE BY ARCHITECT.

D. PROVIDE NECESSARY TESTING EQUIPMENT AND TESTING.

E. FAILURE OR DEFECTS IN WORKMANSHIP OR MATERIALS REVEALED BY TESTS OR INSPECTION SHALL BE CORRECTED PROMPTLY AND RETESTED. REPLACE DEFECTIVE MATERIAL. F. CLEAN PANELS AND OTHER EQUIPMENT. PANELBOARD INTERIORS SHALL BE CLEANED AND VACUUMED, EQUIPMENT WITH DAMAGE TO PAINTED FINISH SHALL BE REPAIRED TO ARCHITECT'S SATISFACTION.

G. EQUIPMENT: AFTER COMPLETION OF PROJECT, CLEAN THE EXTERIOR SURFACE OF EQUIPMENT INCLUDED IN THIS SECTION, INCLUDING CONCRETE RESIDUE 3.2 <u>NAMEPLATES</u>

A. PROVIDE NAMEPLATES ON SWITCHBOARDS, PANELBOARDS, JUNCTION BOXES AND CABINETS, AND FOR SPECIAL PURPOSE SWITCHES, MOTOR DISCONNECT SWITCHES, REMOTE CONTROL STATIONS, STARTERS OR OTHER CONTROLS FURNISHED OR INSTALLED UNDER THIS SECTION. NAMEPLATES SHALL DESIGNATE EQUIPMENT CONTROLLED AND FUNCTION.

B. NAMEPLATES SHALL BE LAMINATED WHITE BAKELITE WITH 1/4" HIGH BLACK RECESSED LETTERS. NAMEPLATES SHALL BE SECURELY ATTACHED TO THE EQUIPMENT WITH GALVANIZED SCREWS. ADHESIVES OR CEMENTS SHALL NOT BE USED.

A. INSTALL WIRE AND CABLE AS SPECIFIED AND AS APPROVED BY AUTHORITIES HAVING JURISDICTION. ALL CONDUITS OR RACEWAYS SHALL BE CONCEALED WHERE POSSIBLE, EXCEPT FOR UNFINISHED AREAS, SUCH AS EQUIPMENT ROOMS. PROVIDE STAND-OFF CLIPS WHERE FOR A PROVIDE STAND OFF CLIPS

B. RUN CONCEALED CONDUIT IN AS DIRECT LINES AS POSSIBLE WITH MINIMUM NUMBER OF BENDS OF LONGEST POSSIBLE RADIUS. RUN CONDUIT PARALLEL TO OR AT RIGHT ANGLES TO BUILDING LINES TIGHT TO BUILDING STRUCTURE. CONDUIT RUNS SHALL BE MECHANICALLY AND ELECTRICALLY CONTINUOUS FROM SERVICE ENTRANCE TO OUTLETS. CONDUIT SHALL ENTER AND BE SECURED TO CABINET, JUNCTION BOX, PULL BOX OR OUTLET BOX WITH LOCKNUT OUTSIDE AND BUSHING INSIDE.

ALL RACEWAY SHALL BE 3/4" TRADE SIZE MINIMUM, AS INDICATED ON THE DRAWINGS OR AS REQUIRED BY THE NEC AND SHALL CONTAIN AN EQUIPMENT GROUNDING CONDUCTOR. PROVIDE INSERTS, HANGERS, ANCHORS AND STEEL SUPPORTS AS NECESSARY.

E. INSTALL CONDUIT SYSTEMS COMPLETE BEFORE DRAWING IN CONDUCTORS. BLOW THROUGH AND SWAB AFTER PLASTER IS FINISHED AND DRY, AND BEFORE CONDUCTORS ARE INSTALLED.

CONDUCTORS 10-AWG AND SMALLER IN BRANCH CIRCUIT PANELBOARDS, SIGNAL CABINETS, SIGNAL CONTROL BOARDS, SWITCHBOARDS AND MOTOR CONTROL CENTERS SHALL BE BUNDLED. CONDUCTORS LARGER THAN 10-AWG IN SWITCHBOARDS, MOTOR CONTROL CENTERS, AND PULL BOXES SHALL BE CABLED IN INDIVIDUAL CIRCUITS.

. FOLLOW HOMERUN CIRCUIT NUMBERS SHOWN ON DRAWINGS TO CONNECT CIRCUITS TO PANELBOARDS. CONNECT EACH BRANCH CIRCUIT HOMERUN WITH TWO OR MORE CIRCUITS AND COMMON NEUTRAL TO CIRCUIT BREAKER OR SWITCH IN THREE—WIRE OR FOUR—WIRE BRANCH CIRCUIT PANELBOARD SO THAT NO TWO CIRCUITS ARE FED FROM SAME BUS. WHERE PANELBOARD CABINETS ARE RECESSED, PROVIDE CONDUITS WITH SUFFICIENT CAPACITY FOR FUTURE CONDUCTORS FOR SPACES IN PANELBOARD. STUR LIP CONCEALED TO LINCTION BOX PROVIDE EXTENSIONS SPACES IN PANELBOARD; STUB UP CONCEALED TO JUNCTION BOX. PROVIDE EXTENSIONS

ELECTRICAL METALLIC TUBING (EMT) MAY BE USED FOR INTERIOR APPLICATIONS ABOVE GRADE, WHERE PERMITTED BY CODES, FOR LUMINAIRE AND RECEPTACLE CIRCUITS, TELEPHONE, INTER—COMMUNICATIONS, SIGNAL AND INSTRUMENTATION CIRCUITS, AND FOR CONTROL CIRCUITS. EMT MAY BE USED ABOVE HUNG CEILINGS, IN EQUIPMENT ROOMS, IN MECHANICAL AND ELECTRICAL CHASES AND CLOSETS, IN EXPOSED LOCATIONS ALONG CEILINGS OR WALLS ABOVE NORMAL TRAFFIC LEVEL AND WHERE NOT SUBJECT TO ACCIDENTAL DAMAGE OR ABUSE.

. INSTALL CONNECTORS AND COUPLINGS AS RECOMMENDED BY MANUFACTURERS. COMPRESSION FITTINGS SHALL BE USED IN AREAS SUBJECT TO MOISTURE.

K. METAL CLAD CABLE (MC) AS APPROVED BY LOCAL CODE FOR RECEPTACLE CIRCUITS IN SUSPENDED CEILINGS AND STUD—WALL PARTITIONS. N. FLEXIBLE METAL CONDUIT (FMC) SHALL BE USED FOR CONNECTIONS TO ELECTRICAL EQUIPMENT AND TO EQUIPMENT FURNISHED UNDER DIVISIONS 14 AND 15 THAT ARI SUBJECT TO MOVEMENT AND VIBRATION. FMC SHALL BE LIMITED TO LENGTHS OF 6 FEE

AND SHALL CONTAIN GROUNDING CONDUCTOR. O. ALL LOW VOLTAGE CABLE NOT IN CONDUIT AND INSTALLED IN RETURN AIR PLENUM SHALL BE U.L. LISTED PLENUM TYPE CABLE.

P. OPENINGS AROUND ELECTRICAL PENETRATIONS THROUGH FIRE RESISTANT RATED WALLS, PARTITIONS, FLOORS, OR CEILINGS SHALL BE FIRESTOPPED USING U.L. APPROVED METHODS PER MANUFACTURES GUIDELINES (HILTI FIRE STOP SYSTEMS OR 3M FIRE PROTECTION PRODUCTS) TO MAINTAIN THE FIRE RESISTANCE RATING OF STRUCTURE. REFER TO ARCHITECTURAL DRAWINGS FOR FIRE RATINGS REQUIREMENTS TO BE MAINTAINED.

3.4 GROUNDING

A. PROVIDE EQUIPMENT GROUNDING SYSTEM AS SHOWN ON DRAWINGS. EQUIPMENT GROUNDING SYSTEM SHALL BE DESIGNED SO METALLIC STRUCTURES, ENCLOSURES, RACEWAYS, JUNCTION BOXES, OUTLET BOXES, CABINETS, MACHINE FRAMES, PORTABLE EQUIPMENT AND OTHER CONDUCTIVE ITEMS IN CLOSE PROXIMITY WITH ELECTRICAL CIRCUITS OPERATE CONTINUOUSLY AT GROUND POTENTIAL AND PROVIDE LOW IMPEDANCE PATH FOR POSSIBLE GROUND FAULT

B. SYSTEM SHALL MEET NEC REQUIREMENTS, MODIFIED AS SHOWN ON DRAWINGS AND AS SPECIFIED. PROVIDE SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR EACH BRANCH CIRCUIT. INSTALL GROUNDING CONDUCTOR IN COMMON CONDUIT WITH RELATED PHASE OR NEUTRAL CONDUCTORS, OR BOTH. PARALLEL FEEDERS INSTALLED IN MORE THAN ONE RACEBRY SHALL HAVE INDIVIDUAL FULL SIZE GREEN INSULATED EQUIPMENT GROUND

. DETERMINE NUMBERS AND SIZES OF SCREW TERMINALS FOR EQUIPMENT GROUNDING BARS IN PANELBOARDS AND OTHER ELECTRICAL EQUIPMENT. PROVIDE SCREW TERMINALS FOR ACTIVE CIRCUITS, SPARES AND SPACES.

E. PROVIDE GREEN INSULATED GROUNDING CONDUCTOR IN NONMETALLIC CONDUITS OR DUCTS UNLESS SPECIFIED OTHERWISE. 3.5 <u>TELECOMMUNICATIONS CONDUIT SYSTEM</u>

A. PROVIDE SYSTEM OF EMPTY CONDUIT, OUTLETS AND MOUNTING BOARDS, AS SPECIFIED AND AS SHOWN ON DRAWINGS.

B. NYLON PULL-IN WIRE SHALL BE INSTALLED IN TELECOMMUNICATIONS CONDUITS FOR USE BY OWNER

SYMBOL LEGEND SYMBOL **DESCRIPTION** USED LUMINAIRE. "A" INDICATES TYPE LUMINAIRE WITH INTEGRAL EMERGENCY BATTERY PACK OR WIRED TO EMERGENCY CIRCUIT. "NL" DENOTES NIGHT LIGHT. REFER TO LUMINAIRE SCHEDULE FOR DESCRIPTION RECESSED DOWN LIGHT EXISTING EXIT SIGN EXISTING CEILING MOUNTED EMERGENCY LIGHTING BATTERY UNIT LIGHT SWITCH - SINGLE POLE, 20 AMPERE, 120/277V, 1HP LIGHT SWITCH - 3-WAY TYPE HOME RUN TO PANEL "LP2", CIRCUIT #1,3,5 (VIA THREE 20A/1P C.B.). HASH MARKS INDICATE QUANTITY OF CONDUCTORS. PROVIDE EQUIPMENT GROUNDING CONDUCTOR AS INDICATED AND IN ACCORDANCE WITH SPECIFICATIONS CIRCUITING TO BE DISCONNECTED AND REMOVED ____ EXISTING CIRCUITING TO REMAIN 208Y/120 VOLT, 3ø, 4 WIRE PANEL 480Y/277 VOLT, 3ø, 4 WIRE PANEL JUNCTION BOX - SIZE PER N.E.C. REQUIREMENTS DUPLEX RECEPTACLE - 125 VOLT, 2 POLE, 3 WIRE, GROUNDING TYPE 20 AMPERE, MOUNTED AT 18" AFF UNLESS NOTED OTHERWISE DOUBLE DUPLEX RECEPTACLE - 125 VOLT, 2 POLE, 3 WIRE, GROUNDING TYPE 20 AMPERE, MOUNTED AT 18" AFF UNLESS NOTED OTHERWISE RECEPTACLE SYMBOL WITH THE ADDITIONAL SUBSCRIPT DESIGNATES TYPE OR SPECIFIC REQUIREMENTS AS FOLLOWS: INDICATES MOUNTED 8" ABOVE COUNTER UNLESS NOTED OTHERWISE RECEPTACLE MOUNTED AT HEIGHT INDICATED POWER OUTLET (4 11/16" SQUARE X 2 1/8" DEEP J-BOX) COMPLETE WITH SINGLE GANG DEVICE RING AND COVER PLATE (COLOR SELECTION BY ARCHITECT) TO ACCEPT FURNITURE WHIP. PROVIDE ALL NECESSARY APPURTENANCES INCLUDING WHIP IF REQUIRED AND MAKE FINAL CONNECTIONS TO SYSTEMS FURNITURE. MOUNTED AT 8" AFF. TELECOMMUNICATIONS JUNCTION BOX FOR CONNECTION TO SYSTEMS FURNITURE. BOX SHALL BE 4 11/16" SQUARE x 2 1/8" DEEP WITH SINGLE GANG DEVICE RING AND 1 1/4" CONDUIT WITH INSULATING BUSHING AND PULLSTRING STUBBED 12" INTO ACCESSIBLE CEILING SPACE. MOUNTED AT 8" A.F.F. COMBINATION VOICE/DATA OUTLET (4 11/16" X 2 1/8" J-BOX) COMPLETE WITH SINGLE GANG DEVICE RING AND COVER PLATE (COLOR SELECTION BY ARCHITECT) MOUNTED AT 18" AFF. PROVIDE 3/4" (VERIFY DRYWALL THICKNESS) CONDUIT WITH INSULATING BUSHING AND PULL WIRE STUBBED UP 12" INTO ACCESSIBLE CEILING SPACE "AC" – INDICATES 8" ABOVE COUNTER. MANUAL PULL STATION COMBINATION AUDIBLE/VISUAL (SPEAKER/STROBE) SIGNALING DEVICE VISUAL (STROBE) ONLY SIGNALING DEVICE

DEMOLITION LEGEND

DENOTES EXISTING DEVICE/EQUIPMENT TO BE REMOVED IN ITS ENTIRETY INCLUDING JUNCTION BOXES, CONDUITS AND CIRCUITRY, ETC. COMPLETE BACK TO SOURCE. DENOTES EXISTING DEVICE/EQUIPMENT TO BE RELOCATED IN ITS ENTIRETY. EXTEND ALL BRANCH CIRCUIT WIRING, CONDUIT, ETC. TO NEW LOCATION INDICATED ON DRAWING. DENOTES NEW LOCATION OF EXISTING DEVICE/EQUIPMENT, RECONNECT AS REQUIRED DENOTES EXISTING DEVICE/EQUIPMENT TO BE MAINTAINED

GENERAL NOTES

ANY AND ALL "BUILDING STANDARDS" AND/OR "BUILDING SPECIFICATIONS" SHALL BE CONSIDERED AN INTEGRA PART OF THESE DOCUMENTS AND THE CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN A COPY OF THESE REQUIREMENTS/THIS DOCUMENT AND COMPLY WITH ALL REQUIREMENTS AND STANDARDS CONTAINED WITHIN.

ALL CIRCUITING SHALL BE RUN CONCEALED UNLESS SPECIFIED OTHERWISE.

ALL EQUIPMENT SHALL BE INSTALLED IN A NEAT, PROFESSIONAL AND WORKMANLIKE MANNER, RECTILINEAR BUILDING STRUCTURE. ALL COMPONENTS SHOWN ON THE RISER/ONE-LINE DIAGRAMS, BUT NOT ON THE PLAN OR VICE VERSA, SHALL

BE INCLUDED AS IF SHOWN ON BOTH. EXACT LOCATION OF MECHANICAL EQUIPMENT THAT REQUIRE ELECTRICAL CONNECTION ARE SHOWN ON THE

MECHANICAL DRAWINGS. FIELD VERIFY EXACT LOCATIONS WITH MECHANICAL CONTRACTOR PRIOR TO ANY ALL RACEWAYS RUNNING THROUGH BUILDING EXPANSION JOINTS SHALL BE EQUIPPED WITH EXPANSION FITTINGS.

CONDUIT HOME RUNS SHOWN ON THE DRAWING WITH MORE THAN (3) CURRENT CARRYING CONDUCTORS ARI SHOWN DIAGRAMATICALLY. THIS CONTRACTOR SHALL NOT INSTALL MORE THAN (3) CURRENT CARRYING CONDUCTORS IN A RACEWAY UNLESS NATIONAL ELECTRIC CODE (N.E.C), ARTICLE 310 DERATING FACTORS ARE

REVIEW ALL TRADES' CONTRACT DOCUMENTS TO DETERMINE SPECIFIC MOUNTING LOCATIONS FOR ELECTRICAL EQUIPMENT. COORDINATE EXACT MOUNTING LOCATIONS WITH THE ARCHITECT.

REFER TO ARCHITECTURAL ELEVATIONS TO DERIVE EXACT LOCATIONS OF ALL RECEPTACLES, OUTLETS/JACKS, SWITCHES, ETC. LUMINAIRES AND CEILING MOUNTED EQUIPMENT SHALL BE COORDINATED WITH THE ARCHITECTURAL REFLECTED CEILING PLANS. THE ELECTRICAL CONTRACTOR SHALL REFER TO THE ELECTRICAL SPECIFICATIONS FOR ACCEPTABLE CONDUIT

TYPES/LOCATIONS. ALL CONDUIT SIZES ON THE DRAWINGS $\,$ ARE BASED ON THE LATEST EDITION OF THE N.E.C. CONDUIT FILL TABLES FOR ELECTRICAL METALLIC TUBING (E.M.T). CONDUIT SIZES SHALL BE REVISED TO THE SIZE REQUIRED, RELATIVE TO THE ACTUAL CONDUIT TYPE TO BE INSTALLED.

EACH LIGHTING AND GENERAL POWER BRANCH CIRCUIT SHALL INCLUDE A SEPARATE NEUTRAL CONDUCTOR, UNLESS SPECIFICALLY NOTED OTHERWISE. THE ELECTRICAL CONTRACTOR SHALL VERIFY EXISTING CONDITIONS TO INSURE THAT ALL NEW WORK WILL F

INTO THE EXISTING CONDITIONS IN THE MANNER INTENDED AND AS SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/OWNER REPRESENTATIVE PRIOR TO ANY ROUGH-INS, FABRICATIONS, OR PERFORMING ANY WORK IN THE AREA INVOLVING DIFFERENCES. NOTIFICATION SHALL BE IN THE FORM OF A DRAWING OR SKETCH INDICATING FIELD MEASUREMENTS AND NOTES RELATED TO THE AREA.

13. ALL FLUSH MOUNTED PANELS SHALL HAVE (3), 3/4" CONDUITS STUBBED ABOVE ACCESSIBLE CEILINGS FOR FUTURE CIRCUITS.

CKT	DESCRIPTION	LTG	REC	HVAC	MISC	C/B		C/B	MISC	HVAC	REC	LTG	DESCRIPTION		CKT	
1	EXISTING RECEPTACLES		0.72			20/1	Α	20/1			0.54		EXISTING RECEPTACLES		2	
3	EXISTING RECEPTACLES		0.72			20/1	В	20/1			0.72		EXISTING RECEPTACLES		4	
5	EXISTING RECEPTACLES		1.44			20/1	С	20/1			0.36		EXISTING RECEPTACLES		6	
7	EXISTING RECEPTACLES		1.44			20/1	Α	20/1			0.72		EXISTING RECEPTACLES		8	
9	EXISTING RECEPTACLES		1.26			20/1	В	20/1			1.08		EXISTING RECEPTACLES		10	
11	EXISTING RECEPTACLES		0.54			20/1	С	20/1			0.72		EXISTING RECEPTACLES		12	
13	EXISTING RECEPTACLES		1.26			20/1	Α	20/1			1.00		EXISTING COPIER		14	
15	EXISTING RECEPTACLES		1.44			20/1	В	20/1			0.54		EXISTING RECEPTACLES		16	
17	EXISTING RECEPTACLES		1.26			20/1	С	20/1			0.54		EXISTING RECEPTACLES		18	
19	EXISTING RECEPTACLES		0.54			20/1	Α	20/1			0.72		EXISTING RECEPTACLES		20	
21	EXISTING RECEPTACLES		0.36			20/1	В	20/1			1.08		EXISTING RECEPTACLES		22	
23	NEW FURNITURE SYS.		0.54			20/1	С	20/1			1.08		EXISTING RECEPTACLES		24	
25	NEW FURNITURE SYS.		0.54			20/1	Α	20/1					SPARE	*	26	
27	NEW FURNITURE SYS.		0.54			20/1	В	20/1			1.00		NEW COPIER	*	28	
29	NEW FURNITURE SYS.		0.54			20/1	С	20/1			0.36		EXISTING RECEPTACLES	*	30	→ MOVE EXISTING LOAD FROM CIRC
REMARKS:			PHASE TOTALS:				LOAD SUMMARY:			KWC	X	D.F.	=	KWD		BREAKER #23 AND RECONNECT TO CIRCUIT BREAKER #30
ALL CB'S SHALL BE SWD/HID & HACR RATED			PHASE A PHASE B			7.48		Total KVA-LTG		0.00	V	1.00		0.00		
"G" = GFCI CB			PHASE B							0.00		1.00	=	0.00		
"H" = CB CLIP			PHASE C		<u>7.58</u> 23.60 KWC		Total KVA-HVAC Total KVA-MISC			0.00		1.00 1.00	=	0.00		
"A" = ARC FAULT CB					23.60	KWC .		A-MISC AC - RE	-0	0.00	^	1.00		0.00		
	SHUNT TRIP CB						1st 10K			23.60	V	10.00	_	10.00		
5 - 5/10/41 HVII CD							BALANCE			13.60		0.50		6.80		
							DALANCE	. OF REC	,	13.00	^	0.50	= TOTAL KWD:			
										FEEDER DEMAND:				TAL KWD: 16.80 KWD 46.54 A		
											FEEDER	DEMAND:		40.54	A	

200% NEUTRAL

DOUBLE LUGS

FEED THRU LUGS

NP4 PROVIDE 3-POLE HANDLE TIES FOR COMMON DISCONNECTING MEANS OF MULTI-WIRE BRANCH CIRCUITS. CONFIRM AVAILABILITY OF HANDLE TIES WITH MANUFACTURER. PROVIDE 20A/3P CIRCUIT BREAKERS AS - REQUIRED IF HANDLE TIES CANNOT BE FITTED TO EXISTING CIRCUIT BREAKERS, TYPE AND AIC RATING TO

RECESSED MOUNTED

MAIN LUGS ONLY XX SURFACE MOUNTED XX

* INDICATES NEW CIRCUIT BREAKER. TYPE AND AIC RATING TO MATCH EXISTING.

AMPS: 100

EXISTING

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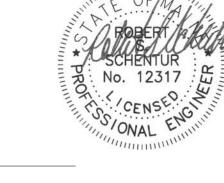
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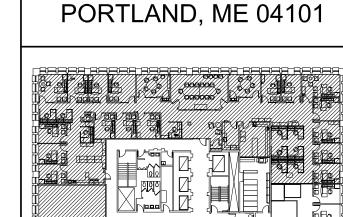
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Registration No:

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SHEET TITLE:

ELECTRICAL LEGENDS & **SPECIFICATIONS**

SHEET NUMBER: