GENERAL NOTES

- THE CONTRACTOR SHALL VISIT THE SITE INCLUDING ALL AREAS INDICATED ON THE DRAWINGS. HE SHALL THOROUGHLY FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS AND BY SUBMITTING A BID. ACCEPTS THE CONDITIONS UNDER WHICH HE SHALL BE REQUIRED TO PERFORM HIS WORK.
- 2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN A COMPLETE SET OF CONTRACT DOCUMENTS AND ADDENDA (DRAWINGS AND SPECIFICATIONS.) HE SHALL CHECK THE CONTRACT DOCUMENTS OF THE OTHER TRADES AND DETERMINE HIS RESPONSIBILITIES. FAILURE TO DO SO SHALL NOT RELEASE THE CONTRACTOR FROM COMPLETING ALL RESPONSIBLE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
- 3. SECURE AND PAY FOR ALL PERMITS, FEES, CHARGES, AND INCIDENTAL COSTS NECESSARY FOR EXECUTION AND COMPLETION OF ELECTRICAL WORK, INCLUDING ALL CHARGES BY STATE, COUNTY AND LOCAL GOVERNMENTAL AGENCIES.
- 4. .ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BE LISTED BY UNDERWRITER'S LABORATIES (UL) AND BEAR THEIR LABEL OR LISTED AND CERTIFIED BY A NATIONALLY RECOGNIZED TESTING AUTHORITY. WHERE UL DOES NOT HAVE A LISTING. CUSTOM MADE EQUIPMENT SHALL HAVE COMPLETE TEST DATA SUBMITTED BY THE MANUFACTURER ATTESTING TO ITS SAFETY. IN ADDITION, THE MATERIALS, EQUIPMENT, AND INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF THE FOLLOWING:

AMERICAN SOCIETY OF TESTING MATERIALS (ASTM)
INSULATED POWER CABLE ENGINEERS ASSOCIATION (IPCEA)
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
AMERICAN STANDARD ASSOCIATION (ASA)
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)
CALIFORNIA ELECTRICAL CODE (CEC) — LATEST EDITION
CALIFORNIA CODE OF REGULATIONS TITLE 24 (CCR)
INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)
ALL LOCAL CODES HAVING JURISDICTION.

- 5. ALL ELECTRICAL WORK REFERENCED HEREIN SHALL BE COORDINATED WITH OTHER TRADES AND SITE CONDITIONS. ANY COSTS TO INSTALL WORK TO ACCOMPLISH SAID COORDINATION WHICH DIFFERS FROM THE WORK AS SHOWN ON THE CONTRACT DOCUMENTS SHALL BE INCURRED BY THE CONTRACTOR ANY DISCREPANCIES, AMBIGUITIES OR CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT DURING BID TIME FOR CLARIFICATION. ANY SUCH CONFLICTS NOT CLARIFIED PRIOR TO BID SHALL BE SUBJECT TO THE INTERPRETATION OF THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
- 6. PROVIDE TEMPORARY POWER FACILITIES AND CONNECTIONS FOR ALL FEEDERS, BRANCH CIRCUITS OR SIGNAL AND COMMUNICATIONS SYSTEMS BEING DISCONNECTED IN ORDER TO MAINTAIN SYSTEMS IN OPERATION.
- 7. ALL INTERRUPTION OF ELECTRICAL POWER SHALL BE KEPT TO A MINIMUM. HOWEVER WHEN AN INTERRUPTION IS NECESSARY, THE SHUTDOWN MUST BE COORDINATED WITH THE OWNER AND ENGINEER 14 DAYS PRIOR TO THE OUTAGE AND OVERTIME PAY SHALL BE INCLUDED IN THE CONTRACTOR'S BID. WORK IN EXISTING SWITCHBOARDS OR PANEL BOARDS SHALL BE COORDINATED WITH THE OWNER PRIOR TO REMOVING ACCESS PANELS OR DOORS.
- 8. AFTER ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS HAVE BEEN FULLY COMPLETED. REPRESENTATIVES OF THE OWNERS WILL INSPECT THE WORK. THE CONTRACTOR SHALL PROVIDE COMPETENT PERSONNEL TO DEMONSTRATE THE OPERATION OF ANY ITEM OR SYSTEM TO THE FULL SATISFACTION OF EACH REPRESENTATIVE. FINAL ACCEPTANCE OF THE WORK WILL BE MADE BY THE OWNER AFTER RECEIPT OF APPROVAL AND RECOMMENDATION OF ACCETANCE FROM EACH REPRESENTATIVE.
- 9. FURNISH A ONE YEAR WRITTEN GUARANTEE OF MATERIALS AND WORKMANSHIP FROM THE DATE OF SUBSTANTIAL COMPLETION.
- 10. ALL FINAL CONNECTIONS TO OWNER FURNISHED EQUIPMENT SHALL BE MADE BY THE CONTRACTOR.
- 11. COORDINATE WITH OTHER TRADES AS TO THE EXACT LOCATION OF THEIR RESPECTIVE EQUIPMENT SUPPLY POWER AND MAKE CONNECTION TO MOTORS AND EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS AS INDICATED ON THE SINGLE LINE DIAGRAM, ELECTRICAL DRAWINGS, AND DRAWINGS OF OTHER TRADES. REVIEW THE DRAWINGS OF OTHER TRADES FOR CONTROL DIAGRAMS, SIZE AND LOCATION OF EQUIPMENT. DISCONNECT SWITCHES, STARTERS, WIRING, CONTROLS, AND CONDUIT FOR MECHANICAL AND PLUMBING OPERATIONS SHALL BE PROVIDED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING MANUFACTURER'S SHOP DRAWINGS PRIOR TO ROUGHING IN ALL CONDUIT TO THIS EQUIPMENT.
- 12. EXACT METHOD AND LOCATION OF CONDUIT PENETRATION AND OPENINGS IN CONCRETE OR MASONARY WALLS, GRADEBEAMS, FLOORS OR STRUCTURAL STEEL MEMBER SHALL BE AS DIRECTED BY THE STRUCTURAL ENGINEER. PERFORM CORING, SAWCUTTING, PATCHING, AND REFINISHING OF WALLS AND SURFACES WHEREVER IT IS NECESSARY TO PENETRATE. OPENINGS SHALL BE SEALED IN AN APPROVED METHOD TO MEET THE FIRE RATING OF THE PARTICULAR WALL. FLOOR OR CEILING EXACT METHOD AND LOCATION OF CONDUIT PENETRATIONS AND OPENINGS IN CONCRETE WALLS OR FLOORS SHALL BE UL APPROVED.
- 13. CONNECTIONS TO MECHANICAL, PLUMBING AND VIBRATING EQUIPMENT AND SEISMIC SEPARATIONS SHALL BE, LIQUID—TIGHT FLEXIBLE STEEL CONDUIT IN DRY INTERIOR LOCATIONS, AND LIQUID—TIGHT FLEXIBLE STEEL CONDUIT IN AREAS EXPOSED TO WEATHER. DAMP LOCATIONS, CONNECTIONS TO TRANSFORMER ENCLOSURES, AND FINAL CONNECTIONS TO MOTORS.
- 14. EQUIPMENT OUTLETS, LIGHTING FIXTURES, CONDUIT, WIRE AND CONNECTION METHODS IN HVAC AIR—PLENUMS SHALL BE APPROVED FOR USE IN PLENUMS AND SHALL CONFORM TO THE CALIFORNIA ELECTRICAL CODE.
- 15. ROUTE EXPOSED CONDUIT AND CONDUIT ABOVE ACCESSIBLE CEILING SPACES PARALLEL AND PERPENDICULAR TO WALLS AND ADJACENT PIPING, ARRANGE CONDUIT TO MAINTAIN HEADROOM AND TO PRESENT A NEAT APPEARANCE.
- 16. CONDUIT SHALL NOT BE INSTALLED IN ANY FLOOR SLAB. CONDUIT SHALL BE INSTALLED CONCEALED IN THE CEILING SPACE, CONCEALED WALLS, OR 24" MINIMUM BELOW SLAB ON GRADE UNLESS NOTED OTHERWISE.
- 17. LOCATE ELECTRICAL EQUIPMENT AND BOXES IN ACCESSIBLE CEILING SPACE OR PROVIDE AN ACCESS PANEL FOR INACCESSIBLE CEILING SYSTEMS. ACCESS DOORS SHALL BE A MINIMUM DIMENSION OF 24" x 24" ACCESS DOOR LOCATIONS SHALL SUIT ACCESSIBILITY AND CONSTRUCTION CONDITIONS. ACCESS DOORS SHALL HAVE A FIRE RATING EQUAL TO THE CEILING ASSEMBLY IN WHICH THEY ARE INSTALLED.

- 18. COORDINATE REQUIRED ACCESS DOORS IN NON-ACCESSIBLE CEILING TO SUIT FIELD CONDITIONS. THE EXACT SIZES AND PHYSICAL LOCATIONS SHALL SUIT ACCESSIBILITY AND CONSTRUCTION CONDITIONS. ACCESS DOORS SHALL BE PROVIDED IN OTHER SECTIONS OF THE SPECIFICATIONS. ACCESS DOORS SHALL HAVE A FIRE RATING EQUAL TO THE CEILING ASSEMBLY IN WHICH THEY ARE INSTALLED.
- 19. PROVIDE SAWCUTTING, TRENCHING, BACKFILLING, COMPACTION AND PATCHING OF CONCRETE, ASHPHALT AND LANDSCAPING AS REQUIRED TO PERFORM THIS WORK. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN TRENCHING FOR HIS WORK AND SHALL BE RESPONSIBLE FOR DETERMINING AND/OR VERIFIYING ALL EXISTING UNDERGROUND SYSTEMS PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER AND APPROVED REPAIR OF ANY AND ALL DAMAGES CAUSED BY HIM OR HIS WORK.
- 20. WHENEVER A DISCREPANCY OF ANY SYSTEM AND/OR EQUIPMENT ARISES ON THE CONTRACT DOCUMENTS OR SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIAL AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS NOTED ON THE DRAWINGS OR SPECIFICATIONS TO ENSURE COMPLETE AND OPERABLE SYSTEMS AS REQUIRED BY THE OWNER AND ARCHITECT/ENGINEER.
- 21. VERIFY TYPE OF CEILING SYSTEMS AND FURNISH APPROVED LIGHTING FIXTURES OF THE TYPE REQUIRED FOR MOUNTING IN THE SPECIFIC CEILING WHERE FIXTURES ARE RECESSED IN PLASTER OR DRYWALL CEILING. THEY SHALL BE COMPLETE WITH NECESSARY MOUNTING HARDWARE AND PLASTER FRAMES.
- 22. ALL EQUIPMENT/DEVICES INSTALLED RECESSED IN FIRE RATED CEILINGS OR WALLS SHALL BE ENCLOSED WITH AN APPROVED UL LISTED ENCLOSURE CARRYING THE SAME FIRE RATING AS THE CEILING OR WALL.
- 23. UTILITY PENETRATIONS OF ANY KIND IN FIRE AND SMOKE PARTITIONS AND CEILING ASSEMBLIES SHALL BE FIRESTOPPED AND SEALED WITH AN APPROVED UL LISTED SYSTEM OR MATERIAL.

STEEL ELECTRICAL OUTLET BOXES WHICH DO NOT EXCEED 16 SQUARE INCHES IN AREA, NEED NOT BE PROTECTED IN ONE HOUR OR TWO HOUR FIRE RATED WALLS, PARTITIONS, CEILING, OR AREA SEPARATION UNLESS THEY:

OCCUR ON OPPOSITE SIDES OF THE WALL WITHIN 24 INCH HORIZONTAL DISTANCE OF ONE ANOTHER IN THIS CASE, ONLY ONE OUTLET BOX NEED TO PROTECTED BY AN APPROVED FIRESTOP MATERIAL OR DETAIL TO CORRECT THIS CONDITION.

OCCUR IN COMBINATION WITH OUTLET BOXES OF ANY SIZE SUCH THAT THE AGGREGATE AREA OF UNPROTECTED OUTLET BOXES EXCEEDS 100 SQUARE INCHES IN ANY 100 SQUARE FEET OF WALL AREA IN THIS CASE, ONLY A SUFFICIENT NUMBER OF OUTLET BOXES NEED BE PROTECTED BY AN APPROVED MATERIAL OR DETAIL TO DECREASE THE AGGREGATE AREA OF UNPROTECTED UTILITY BOXES TO LESS THAN 100 SQUARE FEET OF WALL.

STEEL ELECTRICAL OUTLET BOXES WHICH EXCEED 16 SQUARE INCHES IN AREA, AND ALL OTHER STEEL UTILITY OUTLET BOXES REGARDLESS OF SIZE, SHALL BE PROTECTED BY AN APPROVED FIRESTOP MATERIAL AS LISTED OR EQUAL.

FIRESTOPPING MATERIAL: MPP-1 MOLDABLE PUTTY PADS

3M CONTRACTOR PRODUCTS
MINNEAPOLIS, MN
3M TEST REPORT NO. 1167
DATED AUGUST 21, 1987

FSP FIRESTOP PUTTY PADS HEVI-DUTY NELSON PRODUCTS TULSA, OK

FLAMESAFE FSP 1077 FIRESTOP PADS INTERNATIONAL PROTECTIVE COATINGS OAKHURST, NJ

STEEL UTILITY BOXES WHICH EXCEED 100 SQUARE INCHES IN AREA SHALL BE PROTECTED BY ENCASEMENT.

UTILITY AND ELECTRICAL OUTLETS OR BOXES SHALL BE SECURELY FASTENED TO THE STUD FRAMING OF THE WALL, PARTITION OR CEILING ASSEMBLY. THE OPENING IN THE GYPSUM BOARD FACING SHALL BE CUT SO THAT THE CLEARANCE BETWEEN THE BOX AND THE GYPSUM BOARD DOES NOT EXCEED 1/8 INCH IN SMOKE WALLS OR PARTITIONS, THE 1/8 INCH CLEARANCE SHALL BE FILLED WITH AN APPROVED FIRE—RATED SEALANT.

- 24. STRAIGHT FEEDER BRANCH CIRCUIT, AND CONDUIT RUNS SHALL BE PROVIDED WITH SUFFICIENT PULL BOXES OR JUNCTION BOXES TO LIMIT THE MAXIMUM LENGTH OF ANY SINGLE CABLE PULL TO 100 FEET. PULL BOXES SHALL BE SIZED PER CODE OR AS INDICATED ON DRAWINGS.
- 25. MAXIMUM QUALITY OF CONDUCTORS IN AN OUTLET OR JUNCTION BOX SHALL CONFORM TO THE CALIFORNIA ELECTRICAL CODE. ARTICLE 314.16 IN NO CASE SHALL OUTLET OR JUNCTION BOXES CONTAIN MORE THAN THE FOLLOWING QUANTITY OF #12 AWG CONDUCTORS FOR THE SIZE OF BOX INDICATED. THE MINIMUM SIZE OUTLET OR JUNCTION BOX PERMITTED IN A WALL IS FOUR INCHES SQUARE BY 1-1/2 INCHES DEEP.

4" SQ BY 1-1/2" D = 9 CONDUCTORS 4" SQ BY 2-1/8" D = 13 CONDUCTORS 4-11/16" SQ BY 1-1/2" D = 11 CONDUCTORS 4-11/16" SQ BY 2-1/8" D = 18 CONDUCTORS

ALL OUTLET BOXES CONTAINING MORE THAN ONE DEVICE SHALL BE GANGED. TWO DEVICES DOUBLE GANGED, MINIMUM.

- 26. WHERE MULTIPLE HOMERUNS ARE INDICATED ON DRAWINGS
 REFERENCING THE SAME PANELBOARD CIRCUIT NUMBER. PROVIDE
 JUNCTION BOX ABOVE ACCESSIBLE CEILING AND ROUTE ONE SET OF
 WIRES TO CIRCUIT BREAKERS.
- 27. THE LOCATION OF ALL ELECTRICAL DEVICES AND EQUIPMENT SHALL BE COORDINATED WITH THE ARCHITECTURAL ELEVATIONS, DETAILS, OR SECTIONS PRIOR TO INSTALLATIONS. ALL ELECTRICAL DEVICES AND EQUIPMENT SHALL BE RECESSED IN WALLS UNLESS OTHERWISE NOTED. OUTLETS NOT INDICATED ON ARCHITECTURAL ELEVATIONS SHALL BE COORDINATED WITH THE ARCHITECT PRIOR TO ROUGH—IN, UNLESS OTHERWISE NOTED. ELECTRICAL DEVICES SHALL BE MOUNTED PER "ACCESSIBLE DEVICE MOUNTING HEIGHT" DETAIL.

REVIEW ARCHITECTURAL ELEVATIONS OF CASEWORK—OUTLETS MOUNTED ABOVE OR BELOW, OR ADJACENT TO CASEWORK SHALL BE COORDINATED WITH THE ARCHITECTURAL DRAWINGS. PRIOR TO FINAL ROUGH—IN. ELECTRICAL DRAWINGS SHALL GOVERN NUMBER AND TYPE

OF OUTLETS. HOWEVER, LOCATIONS SHALL BE AS INDICATED ON ARCHITECTURAL ELEVATIONS. PROVIDE CONDUIT WIRES, AND OUTLETS FOR WORK REQUIRED IN CASEWORK INSTALLATIONS, REFERENCE ARCHITECTURAL DETAILS FOR METHOD OF ROUTING CONDUIT WITHIN CASEWORK CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CUT—OUTS IN TILE OR COUNTER SPLASHES WHERE RECEPTACLES, OUTLETS, ETC. OCCUR. PROVIDE BOX EXTENSIONS THROUGH ALL CASEWORK TO ENSURE FINISHED INSTALLATION IS FLUSH WITH FACE OF SPLASH, CABINETS, ETC.

MOUNTING HEIGHTS OF ALL DEVICES AND EQUIPMENT ARE FROM FINISHED FLOOR TO CENTER OF DEVICES AND EQUIPMENT UNLESS OTHERWISE NOTED. BOXES INSTALLED IN LOCATIONS NOT APPROVED BY THE ARCHITECT SHALL BE RELOCATED AS DIRECTED BY THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.

- 28. DRAWINGS ARE DIAGRAMMATIC AND DO NOT INDICATE DETAILED CONDUIT ROUTING OR LENGTHS REQUIRED FOR COMPLETE INSTALLATION. ROUTING OF RACEWAYS SHALL BE AT THE OPTION OF THE CONTRACTOR BUT SHALL BE IN STRICT COMPLIANCE WITH STRUCTURAL REQUIREMENTS, CONTRACT DOCUMENTS AND SPECS UNLESS OTHERWISE NOTED. ALL WORK SHALL BE COORDINATED WITH OTHER TRADES. DO NOT SCALE THE ELECTRICAL DRAWINGS FOR LOCATIONS ANY ELECTRICAL AARCHITECTURAL, STRUCTURAL AND/OR MECHANICAL ITEMS OR FEATURES, REFER TO ARCHITECTURAL AND STRUCTURAL CONTRACT DOCUMENTS FOR DIMENSIONS.
- 29. A PROPERLY SIZED EQUIPMENT GROUNDING CONDUCTOR, ALTHOUGH NOT SHOWN ON CONDUIT RUNS SHALL BE INSTALLED AND RUN CONTINUOUS FROM PANEL TO THE LAST DEVICE. THIS WIRE SHALL BE PIGTAILED IN EACH OUTLET FOR CONNECTION TO BOX AND DEVICE SUCH THAT IF DEVICE IS REMOVED THE CONTINUITY OF THE GROUND WILL NOT BE COMPREMISED/INTERRUPTED. ALL EQUIPMENT GROUNDING CONDUCTORS SHALL BE INSULATED GREEN CONDUCTORS ALTERNATE METHODS OF IDENTIFICATION SHALL NOT BE USED. CONTRACTOR SHALL NOTIFY ELECTRICAL ENGINEER TO EXAMINE CONDUCTOR INSULATION PRIOR TO INSTALLATION OF DEVICES.
- 30. ALL CONDUCTORS SHALL BE UL LISTED COPPER #12 AWG MINIMUM SIZE, TYPE THHN/THWN THERMOPLASTIC, 600 VOLT, 75 DEGREES CELSUS WET AND 90 DEGREES CELSUS DRY AND UL LISTED UNLESS NOTED OTHERWISE. CONDUCTORS #10 AWG AND SMALLER SHALL BE SOLID. CONDUCTORS #8 AWG AND LARGER SHALL BE STRANDED.
- 31. PANEL SCHEDULES SHALL BE REVISED TO REFLECT FINAL ROOM NAMES AND NUMBERS USING OWNERS ROOM ROOM NAMES AND NUMBERS DESIGNATIONS.
- 32. WHERE OUTLETS OCCUR AT TACKABLE WALL PANELS OR OTHER WALL FINISHES. PROVIDE EXTENSION RINGS AS REQUIRED SO THAT NO SPACE WILL EXIST BETWEEN DEVICE PLATE AND BACKBOX PER CALIFORNIA ELECTRICAL CODE 314.20 SEE ARCHITECTURAL ELEVATIONS FOR WALL FINISHES AND LOCATIONS.
- 33. COORDINATE LOCATIONS OF ALL SEISMIC SEPARATIONS.

DRAWING INDEX

E0.0 ELECTRICAL GENERAL NOTES
E0.1 ELECTRICAL SYMBOLS AND SINGLE LINE DIAGRAM
E0.2 ELECTRICAL GENERAL SPECIFICATIONS
E0.2A ELECTRICAL GENERAL SPECIFICATIONS (CONTINUED)
E0.2B TECHNOLOGY GENERAL SPECIFICATIONS
E1.0 ELECTRICAL & TECHNOLOGY SITE PLAN
E2.0 ELECTRICAL & TECHNOLOGY FLOOR PLAN
E3.0 ELECTRICAL DETAILS

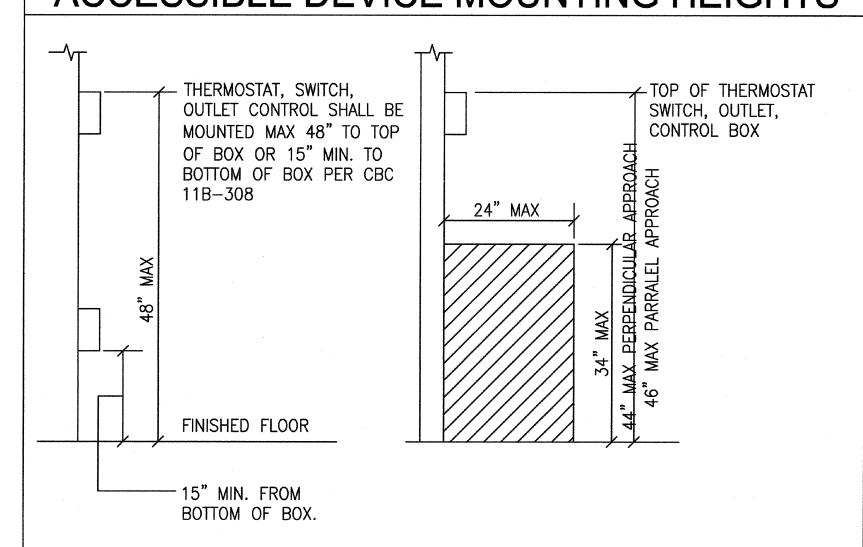
FA0.1 FIRE ALARM NOTES, SYMBOLS & LEGENDS

FA1.0 FIRE ALARM NOTES, SYMBOLS & LEGENDS

FA1.0 FIRE ALARM SITE PLAN

FA2.0 FIRE ALARM FLOOR PLAN, RISER DIAGRAM & CALCULATIONS

ACCESSIBLE DEVICE MOUNTING HEIGHTS



STRUCTURAL NOTE

UNLESS SPECIFICALLY SHOWN ON THESE PLANS.
STRUCTURAL MEMBERS SHALL NOT BE CUT.
DRILLED, OR NOTCHED WITHOUT PRIOR WRITTEN
AUTHORIZATION FROM THE STRUCTURAL ENGINEER
AND THE DIVISION OF THE STATE ARCHITECT.

EQUIPMENT ANCHORAGE NOTES

MEP COMPONENT ANCHORAGE NOTE

ALL MECHANICAL, PLUMBING AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS WHERE NO DETAIL IS INDICATED. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2016 CBC, SECTIONS 1616A.1.8 THROUGH 1616A.1.26 AND ASCE 7–10 CHAPTER 13, 26 AND 30.

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.

TEMPORARY OR MOVABLE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARD WIRED)
 TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER.
 MOVABLE EQUIPMENT WHICH IS STATIONED IN ONE PLACE FOR MORE THAN 8 HOURS AND HEAVIER THAN 400 POUNDS ARE REQUIRED TO BE ANCHORED WITH TEMPORARY

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT THE ATTACHMENT NEED NOT BE DETAILED ON THE PLANS. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT.

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.

B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 20 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

FOR THOSE ELEMENTS THAT DO NOT REQUIRE DETAILS ON THE APPROVED DRAWINGS, THE INSTALLATION SHALL BE SUBJECT TO THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH ABOVE REQUIREMENTS.

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEM BRACING NOTE

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7–10 SECTION 13.3 AS DEFINED IN ASCE 7–10 SECTION 13.6.5.6, 13.6.7, 13.6.8, AND 2016 CBC, SECTIONS 1616A.1.23, 1616A.1.24, 1616A.1.25 AND 1616A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON A PRE—APPROVED INSTALLATION GUIDE (E.G. SMACNA OR OSHPD OPM). COPIES OF THE BRACING SYSTEM INSTALLATION GUIDE OR MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF AND DURING THE HANGING AND BRACING OF THE DISTRIBUTION SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.

MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP), ELECTRICAL DISTRIBUTION SYSTEMS (E):

ATTACHMENTS.

E OPTION 1: DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS.

OPTION 2: SHALL COMPLY WITH THE APPLICABLE OSHPD PRE-APPROVAL. (OPM#) #0043-13.

APPLICABLE SEISMIC HAZARD LEVEL _____ FOR THE

E OPTION 3: SHALL COMPLY WITH THE SMACNA SEISMIC RESTRAINT MANUAL. OSHPD EDITION (2009), INCLUDING ANY ADDENDIA, FASTENERS AND OTHER ATTACHMENTS NOT SPECIFICALLY IDENTIFIED IN THE SMACNA RESTRAINT MANUAL, OSHPD EDITION ARE DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS. THE DETAILS SHALL ACCOUNT FOR THE

PROJECT AND CONDITIONS.

PBK

ARCHITECTURE

COSTA MESA
234 EAST 17TH STREET, SUITE 200
COSTA MESA, CA 92627

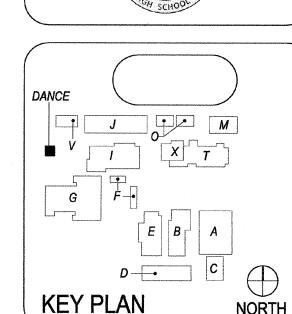
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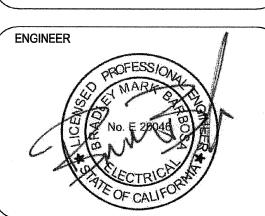


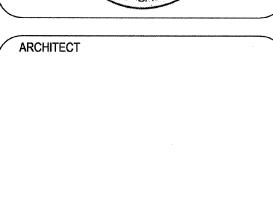
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Construction Documents

ELECTRICAL
GENERAL NOTES

E0.0

APPLICABLE CODES

THE CONSTRUCTION OF THIS PRODUCT SHALL CONFORM TO THE REQUIREMENTS OF:

CALIFORNIA CODE OF REGULATIONS (CCR), TITLE 24, PART 2

 CALIFORNIA BUILDING CODE (CBC) - 2016 EDITION.

CALIFORNIA CODE OF REGULATIONS (CCR), TITLE 24, PART 3

-CALIFORNIA ELECTRICAL CODE (CEC) - 2016 EDITION.

3. CALIFORNIA CODE OF REGULATIONS (CCR). TITLE 24, PART 9

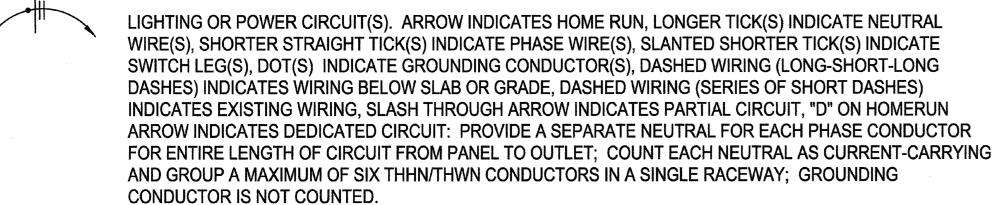
-CALIFORNIA FIRE CODE (CFC) - 2016 EDITION.

4. NATIONAL FIRE PROTECTION ASSOCIATION, NFPA 72
-NATIONAL FIRE ALARM AND SIGNALING CODE (CA AMENDED) - 2016 EDITION

ELECTRICAL SYMBOL LEGEND

- 1. EVERY SYMBOL SHOWN ON LEGEND MAY NOT APPEAR ON DRAWINGS.
- DASHED ELECTRICAL EQUIPMENT GENERALLY INDICATES EXISTING EQUIPMENT.
 LONG-SHORT-SHORT-LONG DASHING GENERALLY INDICATES MATCH LINE OR DEFINES AREA FOR SPECIAL NOTE.

CIRCUIT RELATED



TELEPHONE CONDUIT SYSTEM. DASHED WIRING (LONG-SHORT-LONG DASHES) INDICATES WIRING IN OR BELOW SLAB OR GRADE, DASHED WIRING (SERIES OF SHORT DASHES) INDICATES EXISTING WIRING.

JUNCTION BOX. "J" MAY BE OMITTED IF BOX IS WITHIN OR ATTACHED TO FLUORESCENT LIGHT FIXTURE SYMBOL ON PLANS.

POINT OF BRANCH CIRCUIT TAP FOR SEPARATELY SWITCHED FIXTURE GROUP. REFERENCE CATEGORY "B" LIGHTING SYMBOLS FOR FURTHER INFORMATION.

GROUNDING ELECTRODE.

POWER OUTLETS

- 20A-125V DUPLEX RECEPTACLE.
 "GF" INDICATES GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE.
- LC1-X CIRCUIT DESIGNATION NEXT TO RECEPTACLE DEVICES INDICATES BRANCH CIRCUIT NUMBER. RE: PANEL SCHEDULES FOR INFORMATION.
- WP "WP" INDICATES WEATHER PROOF DEVICE.

EQUIPMENT

A NOTATION INDICATING THE MOUNTING HEIGHT OF A DEVICE AS MEASURED FROM FINISHED FLOOR OR GRADE TO CENTER LINE OF DEVICE.

PANELBOARD

SWITCHBOARD/DP

TRANSFORMER

GROUNDING CONNECTION TO GROUNDING ELECTRODE AS DEFINED IN NEC ARTICLE 250.

TECHNOLOGY

- INDICATES THE LOCATION OF A NEW TECHNOLOGY OUTLET. CABLING CONTRACTOR TO PROVIDE FACEPLATE WITH A MINIMUM OF 4-PORTS AT EACH LOCATION UNLESS OTHERWISE NOTED. ALL OUTLET CABLING IS TO BE DROPPED DOWN THE INSIDE OF THE WALL INDICATED. ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL RING IN WALL.
- #' DESIGNATES NUMBER OF NEW DATA AND VOICE CIRCUITS THAT ARE TO BE INSTALLED AT FACEPLATE LOCATION. CABLING CONTRACTOR TO PROVIDE AND INSTALL CATEGORY 6 UTP CABLING FOR EACH CIRCUIT FROM THE DESIGNATED MDF OR IDF TO THE OUTLET LOCATION. PROVIDE AND INSTALL BLANKS FOR ALL UNUSED DATA PORTS.
- WIRELESS ACCESS POINTS OUTLET. CONTRACTOR SHALL PROVIDE AND INSTALL A 2-PORT STAINLESS STEEL FACEPLATE AND (2) CATEGORY 6 UTP CABLES FROM DESIGNATED MDF OR IDF AND TO THIS LOCATION WITH A 20' SERVICE LOOP AT THE OUTLET END OF THE CABLE. CONTRACTOR SHALL PROVIDE A SINGLE GANG BACK BOX. BACK BOX SHALL BE SECURELY MOUNTED TO BUILDING STRUCTURE, AT A SERVICEABLE HEIGHT, AND HAVE A ENTRY POINT WITH A PROTECTIVE CAP TO PREVENT CABLE DAMAGE. CONTRACTOR TO LABEL CEILING GRID AT ALL "AP" LOCATIONS.
- SPEAKER/ CLOCK, PoE+ INDOOR WALL MOUNT IP & 25V/70V SPEAKER WITH LCD DISPLAY AND TALKBACK MICROPHONE. PROVIDE ATLAS SOUND #IP-SDM-72 WITH WALL/SURFACE ENCLOSURE #IP-SEST-SD. CABLING CONTRACTOR SHALL PROVIDE AND INSTALL (1) (WHITE IN COLOR) CATEGORY 6 NETWORK CABLE FROM THIS LOCATION ROUTED TO IDF FOR TERMINATION.
- WPS

 EXTERIOR SPEAKER, PoE+ VANDAL AND WEATHER RESISTANT WALL MOUNT IP SPEAKER. PROVIDE ATLAS SOUND #IP-HVP WITH WALL/SURFACE ENCLOSURE #IP-SEST-HVP. CABLING CONTRACTOR SHALL PROVIDE AND INSTALL (1) (WHITE IN COLOR) CATEGORY 6 NETWORK CABLE FROM THIS LOCATION ROUTED TO IDF FOR TERMINATION.

PARTIAL SINGLE LINE DIAGRAM

#. INDICATES GENERAL NOTE.

INDICATES KEYED PLAN NOTE.

1 PANELBOARD BY BUILDING MANUFACTURE.

PROVIDE 1#4 COPPER EQUIPMENT GROUND IN 1" CONDUIT.

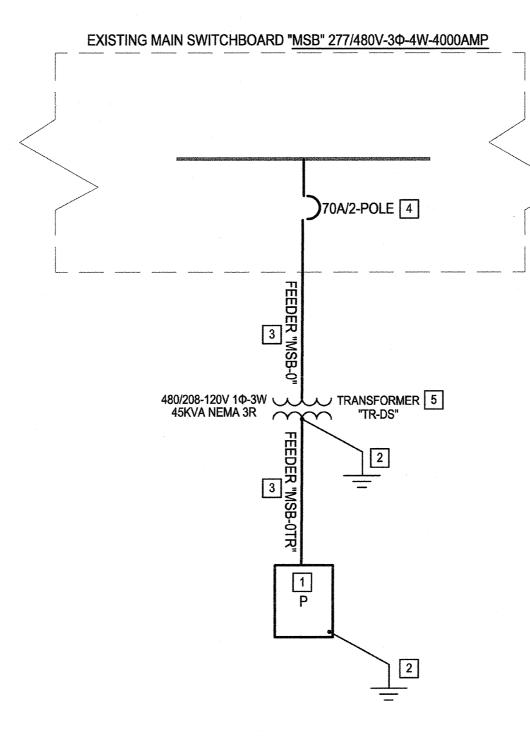
3 PROVIDE UNDERGROUND FEEDER AS INDICATED.

PROVIDE CIRCUIT BREAKER TO MATCH EXISTING TYPE AND A.I.C. RATING.

PROVIDE TRANSFORMER AS INDICATED. TRANSFORMER SHALL BE UL LISTED AND DESIGNED IN ACCORDANCE WITH C89.2 AND NEMA ST-20 STANDARDS & SHALL USE UL RECOGNIZED 220C INSULATION SYSTEM, SHALL BE DRY TYPE,

PART 431, WITH 150C TEMPERATURE RISE, AND COPPER WINDINGS.

CLASS AA, VENTILATED ENCLOSURE, MEETS DOE-2016 EFFICIENCY 10 CFR



	FEEI	DER SCHEDU	JLE	
TAG NUMBER	CONDUCTOR QUANT. & SIZE	CONDUIT SIZE	SETS	COMMENTS
MSB-0	2#4, 1#8G	1-1/2"	1	_
MSB-0TR	3#1/0, 1#6G	2"	1	_
	_	– .	_	_



ARCHITECTURE

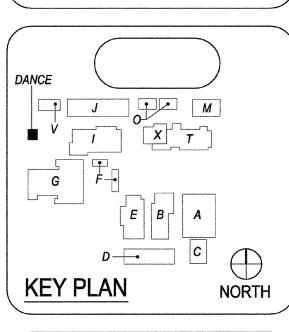
COSTA MESA
234 EAST 17TH STREET, SUITE 200
COSTA MESA, CA 92627
949-548-5000 P

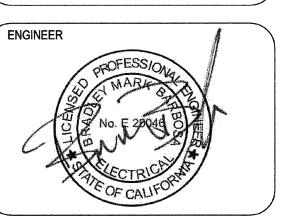
These drawings have been prepared as one coordinated set of drawings and are complimentary. What is required by one drawing is required by all of the drawings, even if a detail or component part is not identified on every sheet. Any user's reliance on a single or select few sheet(s) of the drawings without consideration for the information included in the entire set of drawings will be at the user's sole risk and shall not form the basis for a request for additional compensation or time.

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HUNTINGTON BEACH HIGH SCHOOL DANCE STUDIO 1905 MAIN ST HUNTINGTON BEACH, CA 92648







ARCHITECT	

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Construction Documents

ELECTRICAL SYMBOLS AND SINGLE LINE DIAGRAM

E0.1

1.0 WORK INCLUDED:

- A. THIS SPECIFICATION SHALL APPLY TO ALL PHASES OF WORK HEREIN AFTER SPECIFIED, SHOWN ON DRAWINGS, OR AS REQUIRED TO PROVIDE A COMPLETE INSTALLATION OF ELECTRICAL SYSTEMS FOR THIS PROJECT. WORK REQUIRED UNDER THIS SPECIFICATION, IS NOT LIMITED TO JUST THE ELECTRICAL DRAWINGS - REFER TO ARCHITECTURAL, STRUCTURAL, LANDSCAPE, AND MECHANICAL/PLUMBING DRAWINGS, AS WELL AS ALL OTHER DRAWINGS APPLICABLE TO THIS PROJECT. WHICH DESIGNATE THE SCOPE OF WORK TO BE ACCOMPLISHED. THE INTENT OF THE DRAWINGS AND SPECIFICATIONS IS TO PROVIDE A COMPLETE AND OPERABLE ELECTRICAL SYSTEM THAT INCLUDES ALL DOCUMENTS THAT ARE A PART OF THE CONTRACT.
- 1. WORK INCLUDED. FURNISH LABOR, MATERIAL, SERVICES AND SKILLED SUPERVISION NECESSARY FOR THE CONSTRUCTION, ERECTION, INSTALLATION, CONNECTIONS, TESTING, AND ADJUSTMENT OF ALL CIRCUITS AND ELECTRICAL EQUIPMENT SPECIFIED HEREIN, OR SHOWN OR NOTED ON DRAWINGS, AND ITS DELIVERY TO THE OWNER COMPLETE IN ALL RESPECTS READY FOR USE.
- 2. THE ELECTRICAL WORK INCLUDES INSTALLATION OR CONNECTION OF CERTAIN MATERIALS AND EQUIPMENT FURNISHED BY OTHERS. VERIFY INSTALLATION DETAILS, INSTALLATION AND ROUGH-IN LOCATIONS FROM THE ACTUAL EQUIPMENT OR FROM THE EQUIPMENT SHOP DRAWINGS.
- B. ELECTRICAL DRAWINGS. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC, AND ARE INTENDED TO CONVEY THE SCOPE OF WORK. INDICATING INTENDED GENERAL ARRANGEMENT OF EQUIPMENT, CONDUIT AND OUTLETS, FOLLOW DRAWINGS IN LAYING OUT WORK AND VERIFY SPACES FOR INSTALLATION OF MATERIALS AND EQUIPMENT BASED ON ACTUAL DIMENSIONS OF EQUIPMENT FURNISHED.

1.1 QUALITY ASSURANCE

- A. DESIGN, MANUFACTURE, TESTING AND METHOD OF INSTALLATION OF ALL APPARATUS AND MATERIALS FURNISHED UNDER REQUIREMENTS OF THESE SPECIFICATIONS SHALL CONFORM TO LATEST PUBLICATIONS OR STANDARD RULES OF THE FOLLOWING.
- INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS IEEE - NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION - NEMA
- UNDERWRITERS' LABORATORIES, INC. UL
- NATIONAL FIRE PROTECTION ASSOCIATION NFPA - FEDERAL SPECIFICATIONS - FED. SPEC.
- AMERICAN SOCIETY FOR TESTING AND MATERIALS ASTM
- AMERICAN NATIONAL STANDARDS INSTITUTE ANSI
- NATIONAL ELECTRICAL CODE NEC - NATIONAL ELECTRICAL SAFETY CODE - NESC
- INSULATED CABLE ENGINEERS ASSOCIATION ICEA - AMERICAN INSTITUTE OF STEEL CONSTRUCTION - AISC
- STATE AND MUNICIPAL CODES IN FORCE IN THE SPECIFIC PROJECT AREA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) - ELECTRONICS INDUSTRIES ASSOCIATION/TELECOMMUNICATIONS INDUSTRY
- ASSOCIATION (EIA/TIA) - CALIFORNIA ELECTRICAL CODE
- LOCAL AUTHORITY HAVING JURISDICTION PUBLISHED ELECTRICAL STANDARDS & CODES (AS APPLICABLE)
- B. PERFORM WORK IN ACCORDANCE WITH THE CALIFORNIA ELECTRICAL CODE. APPLICABLE BUILDING ORDINANCES, AND OTHER APPLICABLE CODES, HEREINAFTER REFERRED TO AS THE "CODE." THE CONTRACTOR SHALL COMPLY WITH THE CODE INCLUDING LOCAL AMENDMENTS AND INTERPRETATIONS WITHOUT ADDED COST TO THE OWNER. WHERE CONTRACT DOCUMENTS EXCEED MINIMUM REQUIREMENTS. THE CONTRACT DOCUMENTS TAKE PRECEDENCE, WHERE CONFLICTS OCCUR, THE MOST STRINGENT SHALL APPLY AND SHALL BE PART OF THE BASE BID.
- . COMPLY WITH ALL REQUIREMENTS FOR PERMITS, LICENSES, FEES AND ALL CODES. THE CONTRACTOR, AT CONTRACTOR'S EXPENSE, SHALL OBTAIN ALL PERMITS, LICENSES, FEES, SPECIAL SERVICE COSTS, INSPECTIONS AND ARRANGEMENTS REQUIRED FOR WORK UNDER THIS CONTRACT, UNLESS OTHERWISE SPECIFIED.
- 2. COMPLY WITH REQUIREMENTS OF THE APPLICABLE UTILITY COMPANIES SERVING THIS PROJECT. MAKE ALL ARRANGEMENTS WITH UTILITY COMPANIES FOR PROPER COORDINATION OF WORK.

1.2 GENERAL REQUIREMENTS

- A. GUARANTEE: FURNISH A WRITTEN GUARANTEE FOR A PERIOD OF ONE—YEAR FROM DATE OF ACCEPTANCE.
- B. WHEREVER A DISCREPANCY IN QUANTITY OR SIZE OF CONDUIT, WIRE, EQUIPMENT, DEVICES, CIRCUIT BREAKERS, ETC., (ALL MATERIALS), ARISES ON THE DRAWINGS AND/OR IN THE SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIAL AND SERVICES REQUIRED BY THE STRICTEST CONDITION NOTED ON DRAWINGS AND/OR IN SPECIFICATIONS TO ENSURE COMPLETE AND OPERABLE SYSTEMS AS REQUIRED BY THE OWNER AND ENGINEER.
- C. ALL CORE CUTTING, DRILLING, AND PATCHING:
- 1. FOR THE INSTALLATION OF WORK UNDER THIS SECTION, THE AFOREMENTIONED SHALL BE PERFORMED UNDER THIS SECTION OF THE SPECIFICATIONS AND THE CONCRETE SECTION OF THE SPECIFICATIONS.
- 2. NO HOLES WILL BE ALLOWED IN ANY STRUCTURAL MEMBERS WITHOUT THE WRITTEN APPROVAL OF THE PROJECT'S STRUCTURAL ENGINEER.
- 3. FOR PENETRATIONS OF CONCRETE SLABS OR CONCRETE FOOTINGS, THE WORK SHALL BE AS DIRECTED IN THE CONCRETE SECTION OF SPECIFICATIONS.
- 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING AND REPAIRING SURFACES WHERE HE IS REQUIRED TO PENETRATE FOR WORK UNDER THIS
- 5. PENETRATIONS SHALL BE SEALED TO MEET THE RATED INTEGRITY OF THE SURFACE REQUIRED TO BE PATCHED AND REPAIRED. THE PATCHED SURFACE SHALL BE PAINTED OR FINISHED TO MATCH THE EXISTING
- D. VERIFYING DRAWINGS AND JOB CONDITIONS:
- 1. THIS CONTRACTOR SHALL EXAMINE ALL DRAWINGS AND SPECIFICATIONS IN A MANNER TO BE FULLY COGNIZANT OF ALL WORK REQUIRED UNDER THIS
- 2. THIS CONTRACTOR SHALL VISIT THE SITE AND VERIFY EXISTING CONDITIONS. WHERE EXISTING CONDITIONS DIFFER FROM DRAWINGS, ADJUSTMENT(S) SHALL BE MADE AND ALLOWANCES INCLUDED FOR ALL NECESSARY EQUIPMENT TO COMPLETE ALL PARTS OF THE DRAWINGS AND

1.3 WORK IN COOPERATION WITH OTHER TRADES

- A. EXAMINE THE DRAWINGS AND SPECIFICATIONS AND DETERMINE THE WORK TO BE PERFORMED BY THE ELECTRICAL, MECHANICAL AND OTHER TRADES. PROVIDE THE TYPE AND AMOUNT OF ELECTRICAL MATERIALS AND EQUIPMENT NECESSARY TO PLACE THIS WORK IN PROPER OPERATION, COMPLETELY WIRED, TESTED AND READY FOR USE. THIS SHALL INCLUDE ALL CONDUIT. WIRE, DISCONNECTS. RELAYS. AND OTHER DEVICES FOR THE REQUIRED OPERATION SEQUENCE OF ALL ELECTRICAL, MECHANICAL AND OTHER SYSTEMS OR EQUIPMENT.
- B. PROVIDE CONDUIT ONLY FOR LOW VOLTAGE WIRING REQUIRED FOR CONTROL OF MECHANICAL AND PLUMBING EQUIPMENT DESCRIBED IN THIS OR OTHER PARTS OF THE CONTRACT DOCUMENTS. INSTALL ALL CONTROL HOUSINGS AND BACKBOXES REQUIRED FOR INSTALLING CONDUIT AND WIRE TO THE CONTROLS.
- C. INSTALL SEPARATE CONDUITS BETWEEN EACH HEATING, VENTILATING AND AIR CONDITIONING SENSING DEVICE AND ITS CONTROL PANEL AND/OR CONTROL MOTOR. BEFORE INSTALLING ANY CONDUIT FOR HEATING, VENTILATING AND AIR CONDITIONING CONTROL WIRING, VERIFY THE EXACT REQUIREMENTS FROM THE CONTROL DIAGRAMS PROVIDED WITH THE EQUIPMENT MANUFACTURER'S SHOP

1.4 TESTING AND ADJUSTMENT

- A. UPON COMPLETION OF ALL ELECTRICAL WORK, THIS CONTRACTOR SHALL TEST ALL CIRCUITS, SWITCHES, LIGHT FIXTURES, LIGHTING CONTROL & DIMMING SYSTEMS INCLUDING DISTRIBUTED SYSTEMS, UPSS, GENERATORS, TVSSS, LIGHTING INVERTERS, TRANSFER SWITCHES, MOTORS, CIRCUIT BREAKERS, MOTOR STARTER(S) AND THEIR AUXILIARY CIRCUITS AND ANY OTHER ELECTRICAL ITEMS TO ENSURÉ PERFECT OPERATION OF ALL ELECTRICAL EQUIPMENT.
- B. EQUIPMENT AND PARTS IN NEED OF CORRECTION, AND DISCOVERED DURING SUCH TESTING, SHALL BE IMMEDIATELY REPAIRED OR REPLACED WITH ALL NEW EQUIPMENT AND THAT PART OF THE SYSTEM SHALL THEN BE RETESTED. ALL SUCH REPLACEMENT OR REPAIR SHALL BE DONE AT NO ADDITIONAL COST TO THE OWNER.
- C. ALL CIRCUIT(S) SHALL BE TESTED FOR CONTINUITY AND CIRCUIT INTEGRITY. ADJUSTMENT'S SHALL BE MADE FOR CIRCUITS NOT COMPLYING WITH TESTING

D. ALL TEST REPORTS, INCLUDING COPIES OF ANY REQUIRED ENERGY CODE ACCEPTANCE FORMS (E.G. CA TITLE 24 ACCEPTANCE FOR CODE COMPLIANCE FORMS) SHOULD BE SUBMITTED TO THE ENGINEER AT COMPLETION OF **PROJEĆT**

1.5 IDENTIFICATION

- A. NAMEPLATES SHALL BE PROVIDED FOR UNIT SUBSTATIONS, SWITCHGEAR, SWITCHBOARDS, DISTRIBUTION BOARDS, DISTRIBUTION PANELS, PANEL BOARDS, MOTOR CONTROL CENTERS, TRANSFORMERS, TRANSFER SWITCHES, CONTACTORS, STARTERS, DISCONNECT SWITCHES, ENCLOSED CIRCUIT BREAKERS/SWITCHES, INVERTERS, UPSS, PDUS, RDCS, LIGHTING CONTROL PANELS, DIMMING PANELS, DOOR RELEASING SYSTEM PANELS, FIRE ALARM/CENTRAL MONITORING TERMINAL CABINETS/POWER SUPPLIES/CONTROL PANELS. AND ALL LOW VOLTAGE SYSTEM TERMINAL & CONTROL CABINETS. NAMEPLATE INSCRIPTIONS SHALL BE IDENTICAL TO THE EQUIPMENT DESIGNATIONS INDICATED IN PLANS AND SPECIFICATIONS.
- ALL CIRCUIT BREAKERS/FUSES IN SWITCHGEAR, SWITCHBOARDS, DISTRIBUTION BOARDS, DISTRIBUTION PANELS, UPS OUTPUT CIRCUIT BREAKERS, PDU OUTPUT CIRCUIT BREAKERS AND MOTOR CONTROL CENTERS SHALL HAVE INDIVIDUAL NAMEPLATES LOCATED IMMEDIATELY ADJACENT TO THE RESPECTIVE DEVICE. NAMEPLATE INSCRIPTION SHALL IDENTIFY THE DOWNSTREAM EQUIPMENT OR DEVICE SERVED BY THE CIRCUIT BREAKER OR FUSE.
- NAMEPLATES FOR CONTACTORS, STARTERS, DISCONNECT SWITCHES, AND ENCLOSED CIRCUIT BREAKERS SHALL BE ENGRAVED WITH THE DEVICE DESIGNATION/IDENTIFICATION ON THE TOP LINE, SOURCE IDENTIFICATION FOR THE DEVICE ON THE 2ND LINE AND LOAD DESIGNATION FOR THE DEVICE ON THE BOTTOM LINE. WHERE DEVICE DESIGNATION IS NOT INDICATED ON PLANS/SPECIFICATIONS, CONTRACTOR SHALL SUBMIT A WRITTEN CLARIFICATION REQUEST TO THE ENGINEER.
- B. IDENTIFICATION NAMEPLATES, U.N.O, SHALL BE LAMINATED 1/8" THICK MICARTA WITH BEVELED EDGES AND ENGRAVED WHITE LETTERS 3/8" HIGH, MINIMUM, ON 1-1/2" HIGH BLACK BACKGROUND FOR SINGLE LINE OF TEXT. WHERE TWO LINES OF TEXT ARE REQUIRED, PROVIDE MIN. 2" HIGH NAMEPLATE. WHERE THREE LINES OF TEXT ARE REQUIRED, PROVIDE MIN. 2.5" HIGH NAMEPLATE. LABELS SHALL BE BLACK FOR NORMAL POWER SYSTEMS AND RED FOR SYSTEMS CONNECTED TO EMERGENCY POWER.
- C. IDENTIFICATION NAMEPLATES FOR NEW SWITCHGEAR, SWITCHBOARDS, DISTRIBUTION BOARDS, DISTRIBUTION PANELS, PANEL BOARDS & MOTOR CONTROL CENTERS SHALL BE ATTACHED WITH SWITCHGEAR MANUFACTURER -PROVIDED SCREWS VIA SWITCHGEAR MANUFACTURER FACTORY PRE-DRILLED HOLES. A FACTORY OPTION TO RIVET IDENTIFICATION NAMEPLATES TO THE EQUIPMENT IS ONLY ACCEPTABLE IF SCREW-FASTENED NAMEPLATES ARE NOT AN AVAILABLE OPTION FROM THE SWITCHGEAR MANUFACTURER. FIELD DRILLING OR OTHER MECHANICAL ATTACHMENT METHODS THAT CHANGE/VOID THE NEMA OR NRTL RATING OF THE ENCLOSURE ARE STRICTLY FORBIDDEN.
- D. RECEPTACLES THAT ARE PART OF A UL—LISTED UNDER FLOOR COMPUTER ROOM WHIP ASSEMBLY. CEILING AND/OR CABLE/LADDER TRAY-MOUNTED RECEPTACLES USED IN LAB, MANUFACTURING, COMMERCIAL KITCHEN ENVIRONMENTS OR THAT ARE SERVING TELCOM/DATA/AV RACKS & CABINETS SHALL HAVE IDENTIFICATION NAMEPLATES LOCATED ON THE WIRING DEVICE PLATE COVER. NAMEPLATES SHALL BE SELF-ADHESIVE, 1/8" THICK MICARTA WITH BEVELED EDGES. ENGRAVED 1/4" HIGH WHITE LETTERING ON BLACK BACKGROUND WITH SERVING POWER SOURCE, CIRCUIT IDENTIFICATION AND NEMA/IEC RECEPTACLE TYPE. USE OF TWO (2) SEPARATE NAMEPLATES PER DEVICE PLATE COVER IS ACCEPTABLE. AFFIX NAMEPLATES TO BE VISIBLE WHEN PLUGS ARE OCCUPYING RECEPTACLES.
- E. SEE WIRING DEVICE SECTION OF THIS SPECIFICATION FOR ADDITIONAL WIRING DEVICE PLATE COVER LABELING REQUIREMENTS.

1.6 FINAL INSPECTION AND ACCEPTANCE

- A. AFTER ALL REQUIREMENTS OF THE SPECIFICATIONS AND/OR THE DRAWINGS HAVE BEEN FULLY COMPLETED, REPRESENTATIVES OF THE OWNER WILL INSPECT THE WORK. CONTRACTOR SHALL PROVIDE COMPETENT PERSONNEL TO DEMONSTRATE THE OPERATION OF ANY ITEM OR SYSTEM TO THE FULL SATISFACTION OF EACH REPRESENTATIVE.
- B. FINAL ACCEPTANCE OF THE WORK WILL BE MADE BY THE OWNER AFTER RECEIPT OF APPROVAL AND RECOMMENDATION OF ACCEPTANCE FROM EACH

1.7 RECORD DRAWINGS

- A. DRAWINGS OF RECORD: THE CONTRACTOR SHALL PROVIDE AND KEEP UP-TO-DATE, A COMPLETE RECORD SET OF DRAWINGS. THESE SHALL BE CORRECTED DAILY AND SHOW EVERY CHANGE FROM THE ORIGINAL DRAWINGS. THIS SET OF PRINTS SHALL BE KEPT ON THE JOB SITE AND SHALL BE USED ONLY AS A RECORD SET. THIS SHALL NOT BE CONSTRUED AS AUTHORIZATION FOR THE CONTRACTOR TO MAKE CHANGES IN THE LAYOUT WITHOUT DEFINITE INSTRUCTION IN EACH CASE. UPON COMPLETION OF THE WORK, A SET OF REPRODUCIBLE CONTRACT DRAWINGS SHALL BE OBTAINED FROM THE GENERAL CONTRACTOR AND ALL CHANGES AS NOTED ON THE RECORD SET OF PRINTS SHALL BE INCORPORATED THEREON WITH BLACK INK IN A NEAT, LEGIBLE, UNDERSTANDABLE AND PROFESSIONAL MANNER. REFER TO THE SUPPLEMENTARY GENERAL CONDITIONS FOR COMPLETE REQUIREMENTS. AT COMPLETION OF PROJECT. THE CONTRACTOR SHALL TRANSFER ALL FIELD AS-BUILT INFORMATION TO AUTOCAD ELECTRONIC DRAWINGS IN DWG FORMAT OR EQUAL.
- 1.8 APPROVALS, EQUALS, SUBSTITUTIONS, ALTERNATIVES, NO KNOWN EQUAL
- A. APPROVALS: WHERE THE WORDS (OR SIMILAR TERMS) "APPROVED", "APPROVAL" "ACCEPTABLE", AND "ACCEPTANCE" ARE USED, IT SHALL BE UNDERSTOOD THAT ACCEPTANCE BY THE OWNER, ARCHITECT AND ENGINEER ARE REQUIRED.
- B. EQUAL: WHERE THE WORDS (OR SIMILAR TERMS) "EQUAL", "APPROVED EQUAL". "EQUAL TO", "OR EQUAL BY", "OR EQUAL" AND "EQUIVALENT" ARE USED, IT SHALL BE UNDERSTOOD THAT THESE WORDS ARE FOLLOWED BY THE EXPRESSION "IN THE OPINION OF THE OWNER, ARCHITECT, AND ENGINEER" FOR THE PURPOSES OF SPECIFYING PRODUCTS, THE ABOVE WORDS SHALL INDICATE THE SAME SIZE, MADE OF THE SAME CONSTRUCTION MATERIALS. MANUFACTURED WITH EQUIVALENT LIFE EXPECTANCY, HAVING THE SAME AESTHETIC APPEARANCE/STYLE (INCLUDES CRAFTSMANSHIP, PHYSICAL ATTRIBUTES, COLOR AND FINISH), AND THE SAME PERFORMANCE".
- C. SUBSTITUTION: FOR THE PURPOSES OF SPECIFYING PRODUCTS "SUBSTITUTION" SHALL REFER TO THE SUBMITTAL OF A PRODUCT NOT EXPLICITLY APPROVED BY THE CONSTRUCTION DOCUMENTS/SPECIFICATIONS.
- 1. SUBSTITUTIONS OF SPECIFIED EQUIPMENT SHALL BE SUBMITTED AND RECEIVED BY THE ENGINEER TEN (10) DAYS PRIOR TO THE BID DATE FOR REVIEW AND WRITTEN APPROVAL. REGULATORY AGENCY APPROVAL FOR ALL SUBSTITUTIONS WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. TO RECEIVE CONSIDERATION, REQUESTS FOR SUBSTITUTIONS MUST BE ACCOMPANIED BY DOCUMENTARY PROOF OF ITS EQUALITY WITH THE SPECIFIED MATERIAL. DOCUMENTARY PROOF SHALL BE IN LETTER FORM AND IDENTIFY THE SPECIFIED VALUES/MATERIALS ALONGSIDE PROPOSED EQUAL VALUES/MATERIALS. IN ADDITION, CATALOG BROCHURES AND SAMPLES. IF REQUESTED. MUST BE INCLUDED IN THE SUBMITTAL. ONLY PRE-BID APPROVED PRODUCTS, ISSUED VIA A FORMAL BID ADDENDUM TO ALL BIDDERS, WILL BE ALLOWED ON THE PROJECT, REGARDLESS OF THE APPROVAL ON ANY SUBSTITUTION, ALL BIDS SHALL BE BASED ON THE PRODUCTS EXACTLY AS SPECIFIED. PRICING FOR EACH APPROVED SUBSTITUTION SHALL BE INCLUDED IN THE BID SUBMITTAL AS A SEPARATE LINE ITEM.
- 2. IN THE EVENT THAT WRITTEN AUTHORIZATION IS GIVEN FOR A SUBSTITUTION, AFTER AWARD OF CONTRACT, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER QUOTATIONS FROM SUPPLIERS/DISTRIBUTORS OF BOTH THE SPECIFIED AND PROPOSED EQUAL MATERIAL FOR PRICE COMPARISON, AS WELL AS A VERIFICATION OF DELIVERY DATES THAT CONFORM TO THE PROJECT SCHEDULE.
- 3. IN THE EVENT OF COST REDUCTION, THE OWNER WILL BE CREDITED WITH 100 PERCENT OF THE REDUCTION, ARRANGED BY CHANGE ORDER.
- 4. THE CONTRACTOR WARRANTS THAT SUBSTITUTIONS PROPOSED FOR SPECIFIED ITEMS WILL FULLY PERFORM THE FUNCTIONS REQUIRED.
- D. ALTERNATES\ALTERNATIVES: FOR THE PURPOSES OF SPECIFYING PRODUCTS, "ALTERNATIVES/ALTERNATES" MAY BE ESTABLISHED TO ENABLE THE OWNER/ ARCHITECT/ENGINEER TO COMPARE COSTS WHERE ALTERNATIVE MATERIALS OR METHODS MIGHT BE USED. AN ALTERNATE PRICE SHALL BE SUBMITTED IN ADDITION TO THE BASE BID FOR CONSIDERATION, IF THE ALTERNATE IS DEEMED ACCEPTABLE, WRITTEN AUTHORIZATION WILL BE ISSUED.
- E. NO KNOWN EQUAL: FOR THE PURPOSES OF SPECIFYING PRODUCTS, "NO KNOWN EQUAL" SHALL MEAN THAT THE OWNER/ARCHITECT/ENGINEER IS NOT AWARE OF AN EQUIVALENT PRODUCT. THE CONTRACTOR WILL NEED TO SUBMIT A "SUBSTITUTION" ITEM. PER THE REQUIREMENTS LISTED ABOVE. IF A DIFFERENT PRODUCT IS PROPOSED TO BE UTILIZED.

1.9 SHOP DRAWINGS/SUBMITTALS

- A. SHOP DRAWINGS/SUBMITTALS SHALL BE SUBMITTED IN SIX (6) BOUND SETS ACCOMPANIED BY LETTER OF TRANSMITTAL, WHICH SHALL GIVE A LIST OF THE NUMBER AND DATES OF THE DRAWINGS SUBMITTED. DRAWINGS SHALL BE COMPLETE IN EVERY RESPECT AND BOUND IN SETS.
- B. THE SHOP DRAWINGS/SUBMITTALS SUBMITTED SHALL BE MARKED WITH THE NAME OF THE PROJECT. NUMBERED CONSECUTIVELY AND BEAR THE APPROVAL OF THE CONTRACTOR AS EVIDENCE THAT THE CONTRACTOR HAS CHECKED THE DRAWINGS. ANY DRAWINGS SUBMITTED WITHOUT THIS APPROVAL WILL BE RETURNED TO THE CONTRACTOR FOR RESUBMISSION.

ELECTRICAL GENERAL SPECIFICATIONS

- :. IF THE SHOP DRAWINGS SHOW VARIATIONS FROM THE REQUIREMENTS OF THE CONTRACT BECAUSE OF STANDARD SHOP PRACTICE OR OTHER REASONS, THE CONTRACTOR SHALL MAKE SPECIFIC MENTION OF SUCH VARIATIONS IN THE CONTRACTOR'S LETTER OF TRANSMITTAL. IF THE SUBSTITUTION IS ACCEPTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER ADJUSTMENT THAT MAY BE CAUSED BY THE SUBSTITUTION. SAMPLES SHALL BE SUBMITTED WHEN REQUESTED.
- D. ONLY PRODUCTS LISTED AS "EQUAL" WITHIN THE CONTRACT DOCUMENTS, ALONG WITH FORMALLY APPROVED "SUBSTITUTIONS" WILL BE REVIEWED. PRODUCTS NOT CONFORMING TO THESE ITEMS WILL NOT BE REVIEWED AND WILL BE RETURNED TO THE CONTRACTOR FOR RE-SUBMITTAL.
- E. SHOP DRAWINGS SHALL BE SUBMITTED ON THE FOLLOWING BUT NOT LIMITED
- SWITCHGEAR, SWITCHBOARDS, DISTRIBUTION BOARDS, MOTOR CONTROL CENTERS, PANELBOARDS, AND BUS DUCTS; COMPLETE WITH OVERCURRENT DEVICE INFORMATION. - TRANSFORMERS
- FIRE ALARM SYSTEM/CENTRAL MONITORING SYSTEM
- WIRING DEVICES.
- PULLBOXES AND UNDERGROUND VAULTS
- TERMINAL CABINETS
- POWER POLES AND FLOOR BOXES
- ARC FLASH, SHORT-CIRCUIT & COORDINATION STUDIES
- ALL OTHER PRODUCTS CALLED OUT ON DRAWINGS THAT CALL FOR SHOP DRAWING SUBMITTAL.
- I.10 MAINTENANCE. SERVICING. INSTRUCTION MANUALS AND WIRING DIAGRAMS
- A. PRIOR TO FINAL ACCEPTANCE OF THE JOB, THE ELECTRICAL CONTRACTOR SHALL FURNISH TO THE OWNER AT LEAST FOUR (4) COPIES OF OPERATING AND MAINTENANCE AND SERVICING INSTRUCTIONS, AS WELL AS FOUR (4) COMPLETE WIRING DIAGRAMS FOR THE FOLLOWING ITEMS OR EQUIPMENT:
- FIRE ALARM SYSTEM
- TRANSFORMERS
- SWITCHGEAR, SWITCHBOARDS, DISTRIBUTION BOARDS, MOTOR CONTROL CENTERS, PANELBOARDS, AND BUS DUCTS; COMPLETE WITH OVERCURRENT DEVICE INFORMATION.
- B. ALL WIRING DIAGRAMS SHALL SPECIFICALLY COVER THE SYSTEM SUPPLIED. TYPICAL DRAWINGS WILL NOT BE ACCEPTED. FOUR (4) COPIES SHALL BE PRESENTED TO THE OWNER.

.11 INTERRUPTION OF SERVICES/SERVICE SHUTDOWN

- A. ANY INTERRUPTION OF ELECTRICAL SERVICES, ELECTRICAL CIRCUITS, ELECTRICAL FEEDERS, SIGNAL SYSTEMS, COMMUNICATION SYSTEMS, FIRE ALARM SYSTEMS, ETC. REQUIRED TO PERFORM WORK SHALL MEET THE SPECIFIC PRIOR-APPROVAL REQUIREMENTS OF THE OWNER. SUCH WORK SHALL BE SCHEDULED WITH THE OWNER TO BE PERFORMED AT THE OWNER'S CONVENIENCE.
- B. INTERRUPTIONS/OUTAGES OF ANY OF THE OWNER'S SYSTEMS AND SERVICES MENTIONED ABOVE SHALL BE SCHEDULED TO OCCUR DURING OTHER THAN THE OWNER'S NORMAL BUSINESS HOURS. ANY OVERTIME COSTS SHALL BE BORNE BY THE CONTRACTOR.
- C. SEE DRAWINGS FOR ANY ADDITIONAL REQUIREMENTS REGARDING OUTAGES, INTERRUPTION AND ANY TEMPORARY SERVICES REQUIRED. PART 2 - PRODUCTS

2.1 MATERIALS

- A. MATERIALS AND EQUIPMENT: ALL ELECTRICAL MATERIALS AND EQUIPMENT. INCLUDING CUSTOM-MADE EQUIPMENT, SHALL BE NEW AND SHALL BE LISTED BY UNDERWRITER'S LABORATORIES (UL) AND BEAR THEIR LABEL OR BE LISTED AND CERTIFIED BY A NATIONALLY RECOGNIZED TESTING LAB (NRTL) THAT IS ALSO RECOGNIZED BY THE LOCAL AUTHORITY—HAVING—JURISDICTION (AHJ).
- B. SWITCHGEAR/SWITCHBOARDS/DISTRIBUTION BOARDS/MOTOR CONTROL CENTERS: SEE GENERAL SINGLE LINE DIAGRAM NOTES ON DRAWINGS FOR ADDITIONAL INFORMATION.
- C. PANELBOARDS BRANCH CIRCUIT: 1. SEE DRAWINGS FOR PANELBOARD SCHEDULES AND SPECIFICATIONS.
- D. TRANSFORMERS: 1. SEE DRAWINGS FOR TRANSFORMER SCHEDULES AND SPECIFICATIONS.
- E. WIRING DEVICES:
- PROVIDE WIRING DEVICES INDICATED PER PLAN. DEVICES SHALL BE SPECIFICATION GRADE. ACCEPTABLE MANUFACTURES ARE LEVITON. PASS & SEYMOUR AND HUBBELL. PROVIDE ALL SIMILAR DEVICES OF SAME MANUFACTURER, UNLESS INDICATED OTHERWISE. ALL DEVICE COLORS SHALL BE SELECTED FROM THE FULL RANGE OF MANUFACTURER STANDARD COLOR OPTIONS AS SELECTED BY THE ARCHITECT. THIS DIRECTION WILL BE PROVIDED IN THE SHOP DRAWING REVIEW PROCESS.
- 2. I.G. (ISOLATED GROUND) RECEPTACLE BODIES SHALL BE OF A BASIC COLOR SPECIFIED ABOVE WITH AN ORANGE TRIANGLE TO SYMBOLIZE ISOLATED GROUND.
- WHEN SHOWN CIRCUITED WITH AN I.G. CONDUCTOR, ALL RECEPTACLES SHALL BE OF THE I.G. TYPE.
- 4. WIRING DEVICE COVER PLATES LOCATED ON RECESSED BOXES SHALL BE COMMERCIAL GRADE STAINLESS STEEL. COVER PLATES UTILIZED ON SURFACE MOUNTED BOXES SHALL BE STAINLESS STEEL. PLASTIC COVER PLATES ARE UNACCEPTABLE.
- ALL WIRING DEVICE PLATES ON THE PROJECT SHALL BE LABELED WITH PANEL AND CIRCUIT NUMBER(S) UTILIZING A BROTHER P-TOUCH LABELING SYSTEM UTILIZING 1/2" TAPE (YELLOW ON BLACK) OR EQUAL BY HERMAN-TELLERMAN OR PANDUIT. LOCATE LABEL ON THE CONCEALED SIDE OF THE WIRING DEVICE PLATE. HANDWRITTEN LABELS ARE UNACCEPTABLE.
- 6. THE FOLLOWING WIRING DEVICE PLATES SHALL BE ENGRAVED:
- a. KEY OPERATED SWITCHES, SWITCHES WITH PILOT LIGHTS AND SWITCHES FOR THE CONTROL OF MOTORS, HEATERS AND VENTILATORS. ENGRAVING SHALL BE BLACK AND OCCUR ON THE EXPOSED SIDE OF THE PLATE AND INDICATE THE MOTOR, HEATER, OR VENTILATOR CONTROLLED.
- RECEPTACLES ON GENERATOR AND/OR UPS POWER SHALL HAVE CUSTOM HOT STAMPED PLATES WITH THE WORDS "GENERATOR" OR "UPS" IN BLACK LETTERS.
- WEATHERPROOF OUTLET COVERS/ASSEMBLIES. ALL RECEPTACLES IDENTIFIED AS WEATHERPROOF ON THE DRAWINGS SHALL BE GFCI TYPE AND EQUIPPED WITH CAST WEATHERPROOF OUTLET BOXES WITH METAL COVERS. PROVIDE LOCKING TYPE WHERE NOTED ON DRAWINGS.
- G. MOTOR CONTROLLERS/STARTERS: SEE DRAWINGS FOR MOTORIZED EQUIPMENT SCHEDULES AND SPECIFICATIONS. H. CIRCUIT BREAKERS.
 - SERVICE ENTRANCE CIRCUIT BREAKERS SMALLER THAN 400 AMP FRAME SHALL BE THERMAL-MAGNETIC TRIP WITH INVERSE TIME CURRENT CHARACTERISTICS UNLESS OTHERWISE INDICATED BELOW. SERVICE ENTRANCE RATED, SOLID-STATE TYPE AS OUTLINED IN THIS SPECIFICATION. ALL OTHER SERVICE ENTRANCE CIRCUIT BREAKERS, 400 AMP FRAME AND LARGER, SHALL BE 100% RATED. SOLID-STATE TYPE AS OUTLINED IN THIS SPECIFICATION.
- ALL NON-SERVICE ENTRANCE CIRCUIT BREAKERS 225 AMP AND LARGER SHALL BE THERMAL MAGNETIC TYPE AND HAVE CONTINUOUSLY ADJUSTABLE MAGNETIC PICK-UPS OF APPROXIMATELY 5 TO 10 TIMES TRIP RATING. BREAKERS SHALL HAVE EASILY CHANGED TRIP RATING PLUGS WITH TRIP RATINGS AS INDICATED ON THE DRAWINGS. RATING PLUGS SHALL BE INTERLOCKED SO THEY ARE NOT INTERCHANGEABLE BETWEEN FRAMES. ADDITIONALLY, ALL NON-SERVICE ENTRANCE CIRCUIT BREAKERS, 600 AMP FRAME AND LARGER, LOCATED IN 480V 3 PHASE, 3-WIRE OR 277/480V, 3 PHASE 4-WIRE SWITCHGEAR, DISTRIBUTION BOARDS OR PANEL BOARDS, SHALL BE SOLID STATE. 100% RATED. BREAKER SHALL HAVE BUILT-IN TEST POINTS FOR TESTING LONG DELAY AND INSTANTANEOUS, AND GROUND FAULT FUNCTIONS OF THE BREAKER BY MEANS OF A 120-VOLT OPERATED TEST KIT. CONTRACTOR SHALL UTILIZE A TEST KIT CAPABLE OF TESTING ALL BREAKERS 400 AMP AND ABOVE - AT THE ENGINEER'S REQUEST AT NO ADDITIONAL COST TO THE OWNER.

- 3. ALL NON-SERVICE ENTRANCE CIRCUIT BREAKERS LESS THAN 225 AMP SHALL BE MOLDED PLASTIC CASE. AIR CIRCUIT BREAKERS CONFORMING TO UL 489. PROVIDE BREAKERS WITH THERMAL MAGNETIC TRIP UNITS. AND A COMMON TRIP BAR FOR TWO-OR THREE-POLE BREAKERS, CONNECTED INTERNALLY TO EACH POLE SO TRIPPING OF ONE POLE WILL AUTOMATICALLY TRIP ALL POLES OF EACH BREAKER. PROVIDE BREAKERS OF TRIP-FREE AND TRIP-INDICATING BOLT-ON TYPE, WITH QUICK-MAKE, QUICK-BREAK CONTACTS. PROVIDE SINGLE TWO-OR THREE-POLE BREAKER INTERCHANGEABILITY. PROVIDE PADLOCKING DEVICE FOR CIRCUIT BREAKERS AS SHOWN ON THE DRAWINGS.
- GROUND FAULT INTERRUPTING BREAKERS. PROVIDE WITH MOLDED PLASTIC CASE, AIR CIRCUIT BREAKERS, SIMILAR TO ABOVE WITH GROUND FAULT
- CIRCUIT INTERRUPT CAPABILITY, CONFORMING TO UL CLASS A, GROUP 1.
- 6. SERIES RATED BREAKERS SHALL NOT BE USED.
- 7. CIRCUIT BREAKER HANDLE ACCESSORIES SHALL PROVIDE PROVISIONS FOR LOCKING HANDLE IN THE ON OR OFF POSITION.

5. TANDEM OR HALF-SIZED CIRCUIT BREAKERS ARE NOT PERMITTED.

- 8. TEMPERATURE COMPENSATING CIRCUIT BREAKER(S) SHALL BE PROVIDED WHEN LOCATED IN OUTDOOR ENCLOSURE(S) OR WHEN LOCATED IN AN ENCLOSURE SUBJECT TO HIGH AMBIENT HEAT, ETC.
- 9. PROVIDE 75 DEGREE CELSIUS-RATED CONDUCTOR LUGS/LUG KITS AS REQUIRED ON ALL CIRCUIT BREAKERS TO ACCEPT CONDUCTOR QUANTITIES AND SIZES SHOWN ON DRAWINGS.
- 10. ALL CIRCUIT BREAKER TERMINATIONS SHALL BE SUITABLE FOR USE WITH 75 DEGREE CELSIUS AMPACITY CONDUCTORS.
- 1. NON-FUSIBLE OR FUSIBLE, SHALL BE HEAVY-DUTY, EXTERNALLY OPERATED HORSEPOWER-RATED, 600V.A.C. PROVIDE NEMA 3R, LOCKABLE ENCLOSURES

I. DISCONNECT SWITCHES:

- FOR ALL SWITCHES LOCATED ON ROOF TOPS, IN WET OR DAMP AREAS AND IN ANY AREA EXPOSED TO THE ELEMENTS.
- 2. FUSIBLE SWITCHES SHALL BE CLASS "R".
- AMPERAGE, HORSEPOWER, VOLTAGE AND NUMBER OF POLES PER DRAWINGS ALL OF WHICH SHALL BE CLEARLY MARKED ON THE SWITCH NAMEPLATE.
- 4. PROVIDE THE OWNER'S PROJECT MANAGER WITH ONE (1) SPARE SET OF FUSES AND TWO (2) SETS OF FUSE CLIPS/FUSES FOR EVERY SET OF FUSES ON THE PROJECT.
- PROVIDE FUSES AT ALL LOCATIONS SHOWN ON THE DRAWINGS AND AS REQUIRED FOR SUPPLEMENTAL PROTECTION.
- a. FUSES SHALL BE MANUFACTURED BY BUSSMAN, SHAWMUT OR EQUAL.

b. ALL FUSES SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER.

- 2. MAIN AND FEEDER PROTECTION. a. WHERE RATING OF PROTECTIVE DEVICE IS GREATER THAN 600A,
- PROVIDE BUSSMAN HI-CAP FUSES, CLASS L, CURRENT LIMITING, HAVING AN INTERRUPTING RATING OF 200,000A RMS. b. WHERE RATING OF PROTECTIVE DEVICE IS 600A OR LESS. PROVIDE BUSSMAN CLASS R FUSES. CLASS RK SERIES CURRENT LIMITING
- FUSES, HAVING AN INTERRUPTING RATING OF 200,000A RMS. 3. MOTOR PROTECTION.
- a. WHERE RATING OF PROTECTIVE DEVICE IS GREATER THAN 600A. PROVIDE BUSSMAN HI-CAP FUSES, CLASS L, CURRENT LIMITING, HAVING AN INTERRUPTING RATING OF 200,000A RMS.
- b. WHERE RATING OF PROTECTIVE DEVICE IS 600A OR LESS, PROVIDE BUSSMAN CLASS RK SERIES CURRENT LIMITING FUSES, HAVING AN INTERRUPTING RATING OF 200,000A RMS.
- c. WHERE FUSES FEEDING MOTORS ARE INDICATED BUT NOT SIZED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE FUSE SIZE WITH THE MOTOR TO PROVIDE PROPER MOTOR RUNNING PROTECTION.
- d. WHEN REJECTION TYPE FUSES ARE SPECIFIED (CLASS RK SERIES) THE FUSE HOLDER OF ALL SWITCHES (SPECIFIED IN OTHER SECTIONS)
- SHALL BE SUITABLE FOR THE FUSES PROVIDED. K. FIRE ALARM SYSTEM/CENTRAL MONITORING SYSTEM:
- SEE DRAWINGS FOR FIRE ALARM SYSTEM OR CENTRAL MONITORING SYSTEM
- L. TRANSIENT VOLTAGE SUPPRESSION (TVSS):
- 1. SEE DRAWINGS FOR TVSS SPECIFICATIONS.
- M. CONDUIT: 1. GALVANIZED RIGID CONDUIT (GRC) SHALL BE FULL WEIGHT THREADED TYPE STEEL. STEEL CONDUIT SHALL BE PROTECTED BY OVERALL ZINC COATING

TO INSIDE AND OUTSIDE SURFACES, APPLIED BY THE HOT DIP,

- METALLIZING, OR SHERARDIZING PROCESS. INTERMEDIATE METAL CONDUIT (IMC), SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH UL 1242 AND MEETING FEDERAL SPECIFICATION WWC-581 (LATEST REVISION).
- 3. ELECTRICAL METALLIC TUBING (EMT) SHALL BE ZINC-COATED STEEL WITH BAKED ENAMEL OR PLASTIC FINISH ON INSIDE SURFACES EXCEPT AS NOTED BELOW. EMT SHALL BE DIPPED IN A CHROMIC ACID BATH TO CHEMICALLY FORM A CORROSION-RESISTANT PROTECTIVE COATING OF ZINC CHROMATE OVER GALVANIZED SURFACE. 4. FLEXIBLE METAL CONDUIT SHALL BE CONSTRUCTED OF HOT-DIPPED

GALVANIZED STEEL STRIPS WOUND SPIRALLY WITH INTERLOCKING EDGES TO

SURFACES SHALL BE SMOOTH AND OFFER MINIMUM DRAG TO PULLING IN

CONDUCTORS. USED ONLY AS DIRECTED IN WRITING BY THE ENGINEER WITH THE EXCEPTION OF 400 HZ FEEDERS AND 400 HZ BRANCH CIRCUITS WHICH SHALL BE RUN IN FLEXIBLE ALUMINUM CONDUIT. 5. LIQUID-TIGHT CONDUIT (SEAL-TITE) SHALL BE GALVANIZED STEEL FLEXIBLE CONDUIT AS ABOVE EXCEPT WITH MOISTURE AND OIL-PROOF JACKET,

PROVIDE GREATEST FLEXIBILITY WITH MAXIMUM STRENGTH. INTERIOR

ON DRAWINGS. 6. FACTORY ASSEMBLED, OR OFF-SITE ASSEMBLED WIRING SYSTEMS (SUCH AS METAL CLAD (MC) CABLE, TYPE AC CABLE, TYPE NM CABLE, TYPE BX

PRE-CUT LENGTHS AND FACTORY-INSTALLED FITTINGS. FOR OUTDOOR

INSTALLATIONS AND MOTOR CONNECTIONS ONLY UNLESS OTHERWISE NOTED

- CABLE, ETC) SHALL NOT BE USED. MINIMUM SIZE CONDUIT ABOVE GRADE SHALL BE 3/4" MINIMUM AND 1"
- MINIMUM FOR BELOW GRADE.
- 8. NONMETALLIC FLEXIBLE TUBING (ENT) SHALL NOT BE USED.
- 9. NON-METALLIC CONDUIT: a. POLYVINYL CHLORIDE (PVC) RIGID CONDUIT, SCHEDULE 40, TYPE II FOR UNDERGROUND INSTALLATION ONLY WITH SOLVENT WELDED JOINTS.

CONFORMING TO UNDERWRITERS LABORATORIES, INC. (U.L.)

- REQUIREMENTS, LISTED FOR EXPOSED AND DIRECT BURIAL APPLICATION. b. CONDUIT AND FITTINGS SHALL BE PRODUCED BY THE SAME
- MANUFACTURER.
- 1. CONDULET TYPE FITTINGS SHALL BE SMOOTH INSIDE AND OUT, TAPER THREADED WITH INTEGRAL INSULATING BUSHING AND OF THE SHAPES. SIZES AND TYPES REQUIRED TO FACILITATE INSTALLATION OR REMOVAL OF WIRES AND CABLES FROM THE CONDUIT AND TUBING SYSTEM. THESE FITTINGS SHALL BE OF METAL, SMOOTH INSIDE AND OUT, THOROUGHLY GALVANIZED, AND SHERARDIZED CADMIUM PLATED.
- 2. METALLIC CONDULET COVERS SHALL HAVE THE SAME FINISH AS THE FITTING AND SHALL BE PROVIDED FOR THE OPENING OF EACH FITTING WHERE CONDUCTORS DO NOT PASS THROUGH THE COVER.
- 3. CONNECTOR, COUPLING, LOCKNUT, BUSHINGS AND CAPS USED WITH RIGID CONDUIT SHALL BE STEEL, THREADED AND THOROUGHLY GALVANIZED. BUSHINGS SHALL BE INSULATED.
- 4. U.N.O. ALL INTERIOR EMT FITTINGS. CONNECTORS AND COUPLINGS INSTALLED IN CONCEALED LOCATIONS, AREAS NOT CONSIDERED TO BE WET OR DAMP LOCATIONS BY THE AHJ, OR AREAS NOT SUBJECT TO PHYSICAL DAMAGE, SHALL BE STEEL, ZINC OR CADMIUM PLATED, THREADLESS, COMPRESSION, STEEL LOCKING RING TYPE WITH INSULATED THROAT.

- 5. ALL INTERIOR AND EXTERIOR EMT FITTINGS, CONNECTORS AND COUPLINGS, SHALL BE RAINTITE-LISTED, STEEL, ZINC OR CADMIUM PLATED, THREADLESS, COMPRESSION, STEEL LOCKING RING TYPE WITH INSULATED THROAT. IF RAINTITE-LISTED, EMT FITTINGS, CONNECTORS AND COUPLINGS ARE UNAVAILABLE FOR A GIVEN TRADE SIZE OR IF CONDUIT IS INSTALLED IN AN AREA SUBJECT TO DAMAGE - PROVIDE RIGID METALLIC OR INTERMEDIATE METALLIC CONDUITS, FITTINGS, CONNECTORS AND COUPLINGS AS REQUIRED.
- 6. FLEXIBLE STEEL CONDUIT CONNECTORS SHALL BE A MALLEABLE IRON CLAMP OR SQUEEZE TYPE OR STEEL TWIST-IN TYPE WITH INSULATED THROAT. THE FINISH SHALL BE ZINC OR CADMIUM PLATING.
- 1. ALL CONDUCTORS SHALL BE COPPER. PROVIDE STRANDED CONDUCTOR FOR #10 AWG AND LARGER OR WHEN MAKING FLEXIBLE CONNECTIONS TO VIBRATING MACHINERY. USE COMPRESSION "FORK" TYPE CONNECTORS OR TRANSITION TO SOLID CONDUCTORS WHEN CONNECTING TO SWITCHES, RECEPTACLES, ETC.
- WET LOCATIONS RATED AT 90 DEGREES CELSIUS, FOR CONDUCTORS OF INSULATION IS ALLOWED ONLY TO PROVIDE AN ELECTRICAL CIRCUIT PROTECTIVE SYSTEM TO COMPLY WITH CEC, ARTICLES 695 AND 700.
- 3. WIRE AND CABLE SHALL BE NEW. MANUFACTURED NOT MORE THAN SIX (6) OUTER COVERING AT REGULAR INTERVALS.

5. SYSTEMS CONDUCTOR COLOR CODING:

- (1) PHASE A = BLACK
- (3) PHASE C = BLUE
- IDENTIFIED SEPARATELY BY NUMERICAL TAGS)
- (1) PHASE A = BROWN
- (2) PHASE B = ORANGE
- (4) NEUTRAL = GRAY
- (5) SWITCHLEGS = PURPLE (SWITCHLEGS SHALL ALSO BE IDENTIFIED SEPARATELY BY NUMERICAL TAGS)
- c. GROUND CONDUCTORS: GREEN

(6) TRAVELERS = PURPLE WITH BLACK STRIPE.

- IDENTIFIED ABOVE. CONDUCTORS #4 AWG AND LARGER SHALL BE IDENTIFIED WITH UTILIZING PHASE TAPE AT EACH TERMINATION.

AND TACKLE TO INSTALL CONDUCTORS ARE NOT ACCEPTABLE.

- #12 AWG.
- CONDUCTORS IN RACEWAYS SHALL ONLY BE "POLYWATER J". NO OIL, GREASE, GRAPHITE, OR SIMILAR SUBSTANCES MAY BE USED. PULLING OF #1/0 OR LARGER CONDUCTORS SHALL BE DONE WITH AN APPROVED CABLE PULL MACHINE. OTHER METHODS; E.G. USING VEHICLES, AND BLOCK

- 7. CONDUIT UNIONS SHALL BE "ERICKSON" COUPLINGS, OR APPROVED EQUAL. THE USE OF RUNNING THREADS WILL NOT BE PERMITTED.
- O. 600 VOLT CONDUCTORS WIRE AND CABLE:
- 2. TYPE THHN/THWN-2 THERMOPLASTIC, 600 VOLT, UL APPROVED, DRY AND ALL SIZES FROM #12 AWG UP TO AND INCLUDING 1000 KCMIL. RHH/RHW
- MONTHS PRIOR TO INSTALLATION, SHALL HAVE SIZE, TYPE OF INSULATION, VOLTAGE RATING AND MANUFACTURER'S NAME PERMANENTLY MARKED ON

PIGMENTATION WITH A SEPARATE COLOR FOR EACH PHASE AND NEUTRAL.

4. WIRE AND CABLE SHALL BE FACTORY COLOR-CODED BY INTEGRAL

- EACH SYSTEM SHALL BE COLOR-CODED AND IT SHALL BE MAINTAINED
- a. Power 208/120V, 3PH, 4W:
- (2) PHASE B = RED
- (4) NEUTRAL = WHITE
- (5) SWITCHLEGS = PURPLE (SWITCHLEGS SHALL ALSO BE
- (6) TRAVELERS = PURPLE WITH BLACK STRIPE.
- b. Power 480/277V, 3PH, 4W:
- (3) PHASE C = YELLOW
- d. ISOLATED GROUND CONDUCTORS: GREEN WITH CONTINUOUS YELLOW
- e. FIRE ALARM SYSTEM: AS RECOMMENDED BY THE MANUFACTURER. 6. ALL COLOR-CODING FOR #12 THRU #6 AWG CONDUCTOR SHALL BE AS
- 7. NO CONDUCTORS CARRYING 120 VOLT OR MORE SHALL BE SMALLER THAN
- 8. ALUMINUM CONDUCTORS SHALL NOT BE USED. 9. WIRE-PULLING COMPOUNDS USED AS LUBRICANTS IN INSTALLING

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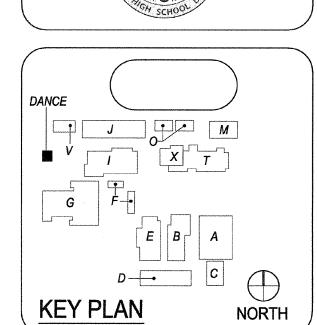
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ARCHITECT

ENGINEER

HUNTINGTON BEACH UNION HIGH

SCHOOL DISTRICT

PROJECT NUMBER

18296 05/09/19 DATE: DRAWN BY: Author CHECKED BY: Checker **REVISIONS** Description

Construction Documents

ELECTRICAL GENERAL SPECIFICATIONS

JUNCTION AND PULLBOXES:

- FOR INTERIOR DRY LOCATIONS, BOXES SHALL BE GALVANIZED ONE-PIECE DRAWN STEEL, KNOCKOUT TYPE, WITH REMOVABLE, MACHINE SCREW SECURED COVERS.
- 2. FOR OUTSIDE, DAMP OR SURFACE LOCATIONS, BOXES SHALL BE HEAVY CAST ALUMINUM OR CAST IRON WITH REMOVABLE, GASKETED. NON-FERROUS MACHINE SCREW SECURED COVERS.
- 3. FOR IN-GRADE APPLICATIONS, JUNCTION AND PULL BOXES SHALL BE PRE-CAST CONCRETE MANUFACTURED BY BROOKS-JENSEN, OR UTILITY
- 4. ALL BOXES SHALL BE SIZED FOR THE NUMBER AND SIZES OF CONDUCTORS AND CONDUITS ENTERING THE BOX AND EQUIPPED WITH PLASTER RINGS WHERE REQUIRED.
- 5. ALL BOXES LOCATED IN TRAFFIC AREAS SHALL BE TRAFFIC RATED.
- Q. OUTLET BOXES: 1. FOR FIXTURES, BOXES SHALL BE GALVANIZED. ONE-PIECE DRAWN STEEL. KNOCKOUT TYPE EQUIPPED WITH 3/8" FIXTURE STUDS AND PLASTER RINGS
 - WHERE REQUIRED. 2. FOR CONVENIENCE OUTLETS, WALL SWITCHES, OR OTHER DEVICES, OUTLET BOXES SHALL BE GALVANIZED ONE-PIECE DRAWN STEEL, KNOCKOUT TYPE 4" X 4" X 2-1/8" MINIMUM SIZE WITH PLASTER RINGS AS REQUIRED.
- 3. FOR LOCATIONS WHERE STANDARD BOXES ARE NOT SUITABLE DUE TO NUMBER AND SIZE OF CONDUIT TO BE TERMINATED, SPECIAL BOXES SHALL BE DESIGNED TO FIT SPACE OR MEET OTHER REQUIREMENTS AND SUBMITTED FOR APPROVAL.
- 4. FOR EXPOSURE TO WEATHER, DAMP LOCATIONS, OR SURFACE MOUNTING, OUTLET BOXES SHALL BE HEAVY CAST ALUMINUM OR CAST IRON WITH THREADED HUBS; COVERS SHALL BE WATERTIGHT WITH GASKETS AND NON-FERROUS SCREWS.
- 5. OUTLET BOXES USED FOR SUPPORT OF CEILING FANS SHALL BE GALVANIZED. ONE-PIECE DRAWN STEEL, KNOCKOUT TYPE EQUIPPED WITH BRACING BARS & PLASTER RINGS WHERE REQUIRED AND LISTED FOR CEILING FAN SUPPORT USE. SUCH BOXES SHALL BE LABELED AND CAPABLE OF SUPPORTING CEILING FAN WEIGHTS UP TO 70 POUNDS.
- SEE DRAWINGS FOR FLOOR BOX INSTALLATION NOTES AND SPECIFICATIONS.
- PLYWOOD BACKBOARDS: WHERE INDICATED FOR TELEPHONE OR COMMUNICATIONS SYSTEM TERMINALS OR OTHER EQUIPMENT ASSEMBLIES, PROVIDE BACKBOARDS OF SIZE INDICATED. USE 3/4" THICK X 8' TALL (LENGTH PER PLANS), DOUGLAS FIR, VOID-FREE, KILN-DRIED, FIRE-RATED PLYWOOD FINISHED ON ONE SIDE AND PRIME COAT PAINTED ON ALL SURFACES WITH FINISH COAT OF ENAMEL PAINT, COLOR BY ARCHITECT. LEAVE ONE (1) FIRE-RATING STAMP/SHEET EXPOSED FOR INSPECTION.
- TERMINAL CABINETS:
- TERMINAL CABINETS SHALL BE FABRICATED OF HOT DIPPED GALVANIZED CODE GAUGE SHEET METAL FOR FLUSH OR SURFACE MOUNTING, COMPLETE WITH BARRIERED SECTIONS, A DOOR FOR EACH VERTICALLY BARRIERED SECTION AND SIZES AS INDICATED ON PLAN. DOORS SHALL BE HINGED AND LOCKABLE. LOCKS SHALL BE KEYED TO MATCH THE BRANCH CIRCUIT PANELBOARDS. TERMINAL CABINET TRIMS SHALL MATCH THE BRANCH CIRCUIT PANELS.
- 2. PROVIDE EACH TERMINAL CABINET WITH A FULL SIZE PLYWOOD BACKBOARD. 3. TERMINAL CABINETS SHALL BE INSTALLED COMPLETE WITH FULL-LENGTH SKIRTS OF THE SAME CONSTRUCTION AND FINISH AS THE TERMINAL
- 4. WHERE MOUNTED OUTDOORS, TERMINAL CABINETS SHALL BE NEMA 3R, WEATHERPROOF COMPLETE WITH GASKETS AND REQUIRED SEALANT TO PREVENT MOISTURE FROM ENTERING THE TERMINAL CABINET.
- 5. ALL TERMINAL CABINETS AND TERMINAL CABINET BARRIERED SECTIONS SHALL BE LABELED BY THE CABINET OR CABINET SECTION USE (I.E. CATV, SECURITY, ETC). LABELS SHALL BE MICARTA TYPE AS SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS. UNLESS OTHERWISE NOTED, ALL TERMINATION BLOCKS AND CABLES SHALL BE LABELED PER ANSI/EIA 606
- PAINTING: TERMINAL CABINETS, PANELS, JUNCTION BOXES, PULL BOXES, ETC., AND CONDUIT INSTALLED IN PUBLIC VIEW SHALL BE PAINTED WITH COLORS SELECTED BY THE ARCHITECT TO MATCH THE SUBJECT SURFACE. REFER TO PAINTING SECTION OF THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- TRENCHING AND BACKFILLING: CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCHING AND BACKFILLING. REFER TO APPLICABLE TRENCHING AND BACKFILLING SPECIFICATIONS FOR COMPLETE REQUIREMENTS.

PART 3 - EXECUTION

- 3.1 PREPARATION AND INSTALLATION
- INSTALLATION OF CONDUIT AND OUTLET BOXES:
 - 1. ALL CONDUIT INSTALLED IN THE DRY WALLS OR CEILINGS OF A BUILDING SHALL BE STEEL TUBE (EMT), ALUMINUM TUBE (EMT), OR INTERMEDIATE METAL CONDUIT (IMC). FLEXIBLE CONDUIT SHALL NOT BE USED IN LIEU OF EMT, IMC OR RIGID CONDUIT EXCEPT AS NOTED HEREIN.
 - 2. GALVANIZED RIGID CONDUIT (GRC) OR INTERMEDIATE METAL CONDUIT (IMC) SHALL BE USED AS FOLLOWS:
 - WHEN NOTED ON THE DRAWINGS
 - WHEN CONSIDERED EXPOSED TO DAMAGE BY THE LOCAL AHJ - WHEN INSTALLED IN WET OR DAMP LOCATIONS AND OF A TRADE SIZE WHERE LISTED-RAINTITE FITTINGS, CONNECTORS, COUPLINGS ETC ARE
 - WHEN REQUIRED BY CEC ARTICLE 517.13
- WHEN INSTALLED IN CONCRETE AND MASONRY. THE USE OF ENT IN CMU WALLS AND PARKING STRUCTURES MAY BE ALLOWED ONLY AS DIRECTED IN WRITING BY THE ENGINEER. REQUEST FOR ENT SUBSTITUTION MUST BE MADE PRIOR TO BID AND IN ACCORDANCE WITH PRE-BID SUBSTITUTION REQUEST REQUIREMENTS OF THESE SPECIFICATIONS.
- 3. INTERMEDIATE METAL CONDUIT (IMC), IS APPROVED FOR USE IN ALL LOCATIONS AS APPROVED FOR GRC OR EMT AND IN ACCORDANCE WITH NEC, OR CEC WHERE ADOPTED, ARTICLE 342.
- 4. FLEXIBLE STEEL CONDUIT SHALL ONLY BE PERMITTED TO BE USED AT LIGHT FIXTURE OUTLETS AND CONNECTIONS TO VIBRATING ELECTRICAL EQUIPMENT. ALL FLEXIBLE STEEL CONDUIT RUNS SHALL BE LESS THAN 6'-0". ALL OUTDOOR INSTALLATION SHALL BE MADE USING LIQUID-TIGHT FLEX WITH APPROVED FITTINGS. INCLUDE A SEPARATE INSULATED GREEN GROUND CONDUCTOR SIZED PER CEC IN EACH CONDUIT, OTHER USES OF FLEXIBLE CONDUIT SHALL BE ALLOWED ONLY AS APPROVED IN WRITING BY THE ENGINEER.
- 5. FLEXIBLE LIQUIDTIGHT CONDUIT SHALL BE INSTALLED IN LIEU OF THE FLEXIBLE STEEL; WHERE REQUIRED BY CEC, IN DAMP AND WET LOCATION, WHERE EXPOSED TO WEATHER, IN REFRIGERATED AREA (65 DEG. F OR LESS), AND/OR BETWEEN SEISMIC JOINTS. ALL ROTATING ELECTRICAL EQUIPMENT SHALL BE SUPPLIED WITH FLEXIBLE. LIQUID-TIGHT CONDUIT WITH APPROPRIATE SLACK AND SHALL NOT EXCEED THIRTY-SIX (36) INCHES, INCLUDE A SEPARATE INSULATED GREEN GROUND CONDUCTOR SIZED PER CEC IN EACH CONDUIT. OTHER USES OF LIQUIDTIGHT FLEXIBLE CONDUIT SHALL BE ALLOWED AS APPROVED IN WRITING BY THE ENGINEER ON A CASE BY CASE BASIS.
- 6. RIGID METALLIC CONDUIT INSTALLED UNDERGROUND OR EMBEDDED IN CONCRETE SHALL BE 1" TRADE SIZE MINIMUM AND SHALL BE WRAPPED WITH 20 MIL POLYVINYL CHLORIDE PLASTIC TAPE. PVC CONDUIT INSTALLED UNDERGROUND OR EMBEDDED IN CONCRETE SHALL BE 1" MINIMUM TRADE
- WHERE REQUIRED FOR PROVIDING AN ELECTRICAL CIRCUIT PROTECTIVE SYSTEM TO COMPLY WITH CEC, ARTICLES 695 AND 700, UTILIZE UL LISTED 2-HOUR FIRE-RATED RHH/RHW CONDUCTORS IN CONDUIT.
- 8. CONDUIT SHALL BE RUN SO AS NOT TO INTERFERE WITH OTHER PIPING, FIXTURES OR EQUIPMENT.
- 9. THE ENDS OF ALL CONDUITS SHALL BE CUT SQUARE, CAREFULLY REAMED OUT TO FULL SIZE AND SHALL BE SHOULDERED IN FITTING.
- 10. NO RUNNING THREADS WILL BE PERMITTED IN LOCATIONS EXPOSED TO THE WEATHER, IN CONCRETE OR UNDERGROUND. SPECIAL UNION FITTINGS SHALL BE USED IN THESE LOCATIONS.
- 11. WHERE CONDUIT IS UNDERGROUND, UNDER SLABS OR GRADE, EXPOSED TO THE WEATHER, OR IN WET LOCATIONS, MAKE JOINTS LIQUID TIGHT AND GAS
- 12. ALL METAL CONDUIT IN MASONRY AND CONCRETE AND WHERE CONCEALED UNDER FLOOR SLABS SHALL HAVE JOINTS PAINTED WITH THREAD COMPOUND PRIOR TO MAKEUP.

- 13. PVC CONDUIT SHALL NOT BE USED ABOVE GRADE.
- WHERE CONDUCTORS ENTER A RACEWAY OR A RACEWAY IN A CABINET, PULL BOX, JUNCTION BOX, OR AUXILIARY GUTTER, THE CONDUCTORS SHALL BE PROTECTED BY A PLASTIC BUSHING TYPE FITTING PROVIDING A SMOOTHLY ROUNDED INSULATING SURFACE.
- 15. WHERE CONDUIT EXTENDS THROUGH ROOF TO EQUIPMENT ON ROOF AREA, THIS CONTRACTOR SHALL PROVIDE FLASHING MATERIAL COMPATIBLE WITH THE ROOFING SYSTEM AS REQUIRED BY THE ROOFING SPECIFICATIONS OR AS REQUIRED BY THE OWNER'S ROOF WARRANTY. THIS FLASHING SHALL BE DELIVERED TO THE ROOFING CONTRACTOR FOR INSTALLATION. THE ACTUAL LOCATION OF ALL SUCH ROOF PENETRATIONS AND OUTLETS SHALL BE VERIFIED WITH ARCHITECT/OWNER, CONTRACTOR SHALL VERIFY TYPE OF FLASHING PRIOR TO BID AND INCLUDE ALL COSTS.
- 16. ALL CONDUIT SHALL BE SUPPORTED AT INTERVALS NOT LESS THAN 6'-0" AND WITHIN 12" FROM ANY OUTLET AND AT EACH SIDE OF BENDS AND ELBOWS. CONDUIT SUPPORTS SHALL BE GALVANIZED, HEAVY STAMPED, TWO-HOLE CONDUIT CLAMP PROPERLY SECURED. FLEXIBLE CONDUIT SUPPORTS SHALL NOT EXCEED 4'-6" ON CENTER.
- 17. WHERE CONDUIT RACKS ARE USED THE RACK SHALL CONSIST OF TWO PIECE CONDUIT CLAMPS ATTACHED TO GALVANIZED STEEL SLOTTED CHANNELS, PROPERLY SECURED VIA THREADED RODS ATTACHED DIRECTLY TO THE BUILDING STRUCTURE.
- 18. NAIL-IN CONDUIT SUPPORTS, ONE-PIECE SET SCREW TYPE CONDUIT CLAMPS OR PERFORATED IRON FOR SUPPORTING CONDUIT SHALL NOT BE
- 19. SEISMIC CONDUIT SUPPORT:
- a. ALL CONDUIT SHALL BE SUPPORTED IN SUCH A MANNER THAT IT IS SECURELY ATTACHED TO THE STRUCTURE OF THE BUILDING. ATTACHMENT IS TO BE CAPABLE OF SUPPORTING THE TRIBUTARY WEIGHT OF CONDUIT AND CONTENTS IN ANY DIRECTION. MAXIMUM SPACING OF SUPPORT AND BRACES ARE TO BE AS FOLLOWS:

MAXIMUM SPACING 6'-0" 8'-0"

- 20. ALL CONDUIT RUNS SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO WALLS, STRUCTURAL MEMBERS, OR INTERSECTION OF VERTICAL PLANES AND CEILINGS. FIELD MADE BENDS AND OFFSET SHALL BE AVOIDED WHERE POSSIBLE. CRUSHED OR DEFORMED RACEWAY SHALL NOT BE INSTALLED.
- 21. OPEN KNOCKOUTS IN OUTLET BOXES ONLY WHERE REQUIRED FOR INSERTING CONDUIT.
- 22. LOCATE WALL OUTLET OF THE SAME TYPE AT SAME LEVEL IN ALL ROOMS, EXCEPT WHERE OTHERWISE NOTED.
- 23. OUTLET BOXES ON METAL STUDS SHALL BE ATTACHED TO METAL HANGERS, TACK WELDED OR BOLTED TO STUDS; ON WOOD STUDS ATTACHMENT SHALL BE WITH WOOD SCREWS, NAILS NOT ACCEPTABLE.
- 24. RECESSED BOXES SHALL NOT BE MOUNTED BACK-TO-BACK IN ANY WALL; MINIMUM OFFSET SHALL BE 24 INCHES.
- 25. JUNCTION BOXES THAT DO NOT CONTAIN ANY DEVICE(S) SHALL BE LOCATED IN STORAGE ROOMS, ELECTRICAL CLOSETS, OR ABOVE ACCESSIBLE CEILINGS. NOT IN HARD LID CEILINGS OR OTHER FORMS OF INACCESSIBLE CEILINGS. PLACE BOXES WHICH MUST BE EXPOSED TO PUBLIC VIEW IN A LOCATION APPROVED BY THE OWNER'S PROJECT MANAGER. PROVIDE COVERS OR PLATES TO MATCH ADJACENT SURFACES AS APPROVED BY THE OWNER'S PROJECT MANAGER.
- 26. SURFACE MOUNTED PULL BOXES, TERMINAL CABINETS, JUNCTION BOXES, PANEL BOARDS ETC., SHALL BE ATTACHED TO WALLS USING APPROPRIATE SCREWS, FASTENERS, BACKING PLATES, STUD BLOCKING ETC., AS DETAILED ON ARCHITECTURAL AND/OR STRUCTURAL DRAWINGS. IF ARCHITECTURAL AND/OR STRUCTURAL DRAWINGS ARE NOT PROVIDED ON THE PROJECT. CONTRACTOR SHALL PROVIDE ALL NECESSARY MOUNTING HARDWARE AND BACKING SUPPORT TO COMPLY WITH LOCAL BUILDING CODE REQUIREMENTS AND ANY ADDITIONAL REQUIREMENTS IMPOSED BY THE LOCAL AUTHORITY-HAVING-JURISDICTION.
- 27. EXCEPT WHERE BELOW GRADE, SLEEVES SHALL BE INSTALLED WHERE CONDUIT PASSES THROUGH MASONRY OR CONCRETE WALLS AND SHALL BE 24 GAUGE GALVANIZED STEEL NO MORE THAN 1/2" GREATER IN DIAMETER THAN THE OUTSIDE DIAMETER OF THE CONDUIT. WHEN LOCATED IN NON-RATED STRUCTURES. CAULK CONDUIT SLEEVE WITH STONE WOOL. WHEN LOCATED IN FIRE RATED STRUCTURES, PROVIDE U.L. LISTED FIRE STOPPING SYSTEM. SEE FIRE STOPPING SECTION OF THIS SPECIFICATION FOR ADDITIONAL REQUIREMENTS.
- 28. ALL BOXES SHALL BE COVERED WITH OUTLET BOX PROTECTOR, OR SIMILAR DEVICE/METHOD TO KEEP DIRT/DEBRIS FROM ENTERING BOX, CONDUIT OR PANELS. IF DIRT/DEBRIS DOES GET IN, IT SHALL BE REMOVED PRIOR TO PULLING WIRES.
- 29. ALL BOXES INSTALLED OUTDOORS SHALL BE SUITABLE FOR OUTDOOR INSTALLATIONS, GASKETED, SCREW COVER AND PAINTED AS DIRECTED BY THE ARCHITECT WITH WEATHERPROOF PAINT TO MATCH BUILDING.
- 30. ALL CONDUIT ENTRIES TO OUTDOOR MOUNTED PANELS, CABINETS, BOXES, ETC., SHALL BE MADE USING MYERS "SCRU-TITE" HUBS SERIES ST.
- 31. PROVIDE NYLON OR A 1/8-INCH O.D. POLYETHYLENE ROPE, RATED AT 250 POUNDS TENSILE STRENGTH, IN ALL CONDUITS MORE THAN 5 FEET IN LENGTH LEFT EMPTY FOR FUTURE USE. NOT LESS THAN 5 FEET OF ROPE SHALL BE LEFT AT EACH END OF THE CONDUIT. TAG ALL LINES WITH A PLASTIC TAG AT EACH END INDICATING THE TERMINATION/STUB LOCATION OF THE OPPOSITE END OF THE CONDUIT.
- 32. ALL MULTIPLE CONDUIT RUNS WITHIN SUSPENDED CEILINGS SHALL BE SUSPENDED FROM BUILDING STRUCTURE BY MEANS OF UNISTRUT HANGERS/RACK, CONDUIT SHALL NOT BE ALLOWED TO LAY ON CEILING OR BE SUPPORTED FROM CEILING SUSPENSION WIRES OR OTHER SUSPENSION SYSTEM. SUPPORT CONDUIT TO STRUCTURE ABOVE SUSPENDED CEILINGS 8" MINIMUM ABOVE CEILING TO ALLOW REMOVAL OF CEILING TILE. MAINTAIN TWO INCH CLEARANCE ABOVE RECESSED LIGHT FIXTURES.
- 33. ALL EXPOSED CONDUITS AND SUPPORT HARDWARE SHALL BE PAINTED TO MATCH THE FINISH OF THE WALL OR CEILING TO WHICH IT IS SUPPORTED.
- 34. WHERE CONDUITS OR WIREWAYS CROSS SEISMIC JOINTS, PROVIDE APPROVED FLEXIBLE CONDUIT CONNECTION OR APPROVED EXPANSION/DEFLECTION FITTING TO ALLOW FOR DISPLACEMENT OF CONDUIT IN ALL THREE AXES. CONNECTION SHALL ALLOW FOR MOVEMENT IN ACCORDANCE WITH DESIGN OF SEISMIC JOINT. NON-FLEXIBLE RACEWAYS CROSSING EXPANSION JOINTS OR OTHER AREAS OF POSSIBLE STRUCTURAL MOVEMENT SHALL MAKE PROVISION FOR 3-WAY MOVEMENT AT SUCH POINTS BY MEANS OF EXPANSION/DEFLECTION FITTINGS. FITTINGS SHALL BI INSTALLED IN THE CENTER OF THEIR AXES OF MOVEMENT AND SHALL NOT BE DEFLECTED TO MAKE PART OF A CONDUIT BEND, OR COMPRESSED OR EXTENDED TO COMPENSATE FOR INCORRECT CONDUIT LENGTH. INSTALL FLEXIBLE CONDUIT CONNECTION(S) OR APPROVED EXPANSION/DEFLECTION FITTING(S) COMPLETE WITH GROUND JUMPERS. WHERE NECESSARY. PROVIDE APPROVED EXPANSION JOINTS TO ALLOW FOR THERMAL EXPANSION AND CONTRACTION OF CONDUIT(S). INSTALL EXPANSION JOINTS COMPLETE WITH GROUND JUMPERS.
- 35. SEAL ALL CONDUITS WHERE TERMINATION IS SUBJECT TO MOISTURE OR WHERE CONDUIT PENETRATES EXTERIOR WALL, FLOOR OR ROOF, IN REFRIGERATED AREAS, CLASSIFIED (HAZARDOUS AREAS) AND AS INDICATED ON THE DRAWINGS.
- 36. EXCEPT AS OTHERWISE INDICATED ON THE DRAWINGS OR ELSEWHERE IN THESE SPECIFICATIONS, BENDS IN FEEDER AND BRANCH CIRCUIT CONDUIT 2 INCHES OR LARGER SHALL HAVE A RADIUS OR CURVATURE OF THE INNER EDGE. EQUAL TO NOT LESS THAN TEN (10) TIMES THE INTERNAL DIAMETER OF THE CONDUIT. EXCEPT WHERE SWEEPING VERTICALLY INTO A BUILDING WHERE SWEEP RADIUS EQUALS TEN (10) TIMES CONDUIT DIAMETER, UNDERGROUND COMMUNICATIONS AND BUILDING INTERCONNECT CONDUITS 3 INCHES OR LARGER SHALL HAVE A MINIMUM 12'-6" RADIUS OR CURVATURE OF THE INNER EDGE. FOR THE SERVING UTILITIES, RADIUS BENDS SHALL BE MADE PER THEIR RESPECTIVE SPECIFICATIONS.
- 37. TAG ALL EMPTY CONDUITS AT EACH ACCESSIBLE END WITH A PERMANENT TAG IDENTIFYING THE PURPOSE OF THE CONDUIT, FOOTAGE END-TO-END, AND THE LOCATION OF THE OTHER END. IN WET, CORROSIVE OUTDOOR OR UNDERGROUND LOCATIONS, USE BRASS, BRONZE, OR COPPER 16 GAUGE TAGS SECURED TO CONDUIT ENDS WITH #16 OR LARGER GALVANIZED WIRE. INSCRIBE ON THE TAGS, WITH STEEL PUNCH DIES, CLEAR AND COMPLETE IDENTIFYING INFORMATION.
- 38. THE FOLLOWING ADDITIONAL REQUIREMENTS SHALL APPLY TO UNDERGROUND
- a. UNDERGROUND CONDUIT SHALL BE SCHEDULE 40 PVC (POLYVINYL CHLORIDE) UNLESS OTHERWISE INDICATED ELSEWHERE IN THESE SPECIFICATIONS OR AS REQUIRED PER CEC, ARTICLE 517.13.

- b. FOR ALL COMMUNICATIONS CONDUITS 2" AND LARGER AND FEEDERS 100 AMPS OR GREATER, PROVIDE WITH A MINIMUM 3" INCH, (2,000 LB) CONCRETE ENVELOPE, 2" INCH MINIMUM SEPARATION BETWEEN CONDUITS, INSTALLED AT DEPTH OF NOT LESS THAN 24" BELOW GRADE. (PROVIDE CONCRETE ENCASEMENT AND/OR GREATER MINIMUM CONDUIT DEPTH AS REQUIRED BY THE UTILITY COMPANIES.) CONDUIT SEPARATION WITHIN A DUCT BANK SHALL BE MAINTAINED USING PLASTIC SPACERS LOCATED AT 5'-0" INTERVALS. WHERE POWER AND COMMUNICATION CONDUITS ARE RUN IN A COMMON TRENCH. A 12" INCH MINIMUM SEPARATION SHALL BE MAINTAINED BETWEEN POWER AND COMMUNICATION CONDUITS OR AS REQUIRED BY UTILITY
- c. IN ALL CASES, WHERE ANY CONDUIT(S) PASS UNDER A BUILDING SLAB OR FOOTING, THE ELECTRICAL CONTRACTOR WILL PROVIDE A BENTONITE CLAY OR CONCRETE BARRIER THAT CONFORMS TO THE HEIGHT AND WIDTH OF THE TRENCH EXCAVATION AND IS A MINIMUM OF 18" THICK. IN ALL CASES, WHERE CONDUIT(S) PASS THRU A SLEEVE IN A FOOTING OR OTHER FOUNDATION ELEMENT, THE ELECTRICAL CONTRACTOR WILL PROVIDE A BENTONITE CLAY OR CONCRETE BARRIER BETWEEN THE SLEEVE AND THE CONDUIT(S) SURROUNDING THE CONDUIT(S) FOR THE ENTIRE DEPTH OF THE SLEEVE. THE BARRIER IS REQUIRED TO PREVENT PASSAGE OF MOISTURE UNDER OR THRU THE SLAB OR FOOTING VIA THE TRENCH OR SLEEVE.
- d. WHERE UNDERGROUND CONDUIT PASSES UNDER A BUILDING SLAB, CONCRETE ENCASEMENT MAY NOT BE REQUIRED. EXCEPT AS REQUIRED ABOVE, CONTACT THE ENGINEER FOR WRITTEN DIRECTION PRIOR TO OMITTING ANY ENCASEMENT.
- e. UNDERGROUND CONDUITS, WHICH TERMINATE INSIDE BUILDING(S) BELOW GRADE, SUCH AS IN A BASEMENT LEVEL, OR WHICH SLOPE SO THAT WATER MIGHT FLOW INTO INTERIOR BUILDING SPACES, SHALL BE SEALED AT THE POINT OF PENETRATION WITH A MODULAR CONDUIT SEAL (LINK-SEAL OR EQUAL BY ROX SYSTEMS). CONDUIT/CONDUIT SEALING SYSTEM PENETRATIONS OF WATERPROOFING MEMBRANES/SYSTEMS ON EXISTING STRUCTURES SHALL BE COMPLETELY RESTORED AS REQUIRED TO MAINTAIN MEMBRANE/SYSTEM MANUFACTURER AND INSTALLER WARRANTEE FOR THE INSTALLATION. ALL CONDUITS SHALL BE PROVIDED WITH A 4% SLOPE AWAY FROM BUILDINGS. ALL CONDUITS SHALL BE INSTALLED SUCH THAT THE WATER CANNOT ACCUMULATE IN THE CONDUIT AND SUCH THAT WATER DRAINS INTO THE NEAREST MANHOLE, PULL BOX OR VAULT AND NOT INTO THE FACILITY. IN INSTANCES WHERE GRADE CHANGES OR ELEVATION DIFFERENCES PREVENT SLOPING OF CONDUIT AWAY FROM A BUILDING INTO THE NEAREST MANHOLE, PULL BOX OR VAULT OR WHERE ACCUMULATION OF WATER IN A MANHOLE, PULL BOX OR VAULT MAY RESULT IN WATER TRAVELING INTO THE FACILITY, CONDUITS SHALL BE SEALED INTERNALLY AT EACH END OF EACH CONDUIT USING CONDUIT SEALING BUSHING, SIZED AS REQUIRED FOR THE CONDUCTORS CONTAINED WITHIN THE CONDUIT (O-Z GEDNEY #CSBG 100PSIG WITHSTAND OR EQUAL). IN ALL CASES, INSTALL PLUGS OR CAPS IN SPARE (EMPTY) CONDUITS AT BOTH ENDS OF EACH CONDUIT (JACKMOON OR EQUAL) PREVENTING BOTH WATER AND GAS FROM ENTERING THE FACILITY VIA THE CONDUITS.
- f. INCLUDE A SEPARATE INSULATED GREEN GROUND CONDUCTOR SIZED PER CEC, IN EACH UNDERGROUND ELECTRICAL FEEDER/BRANCH
- q. ALL UNDERGROUND CONDUITS WITH CIRCUITS RATED AT 40 AMPS OR GREATER AND ALL UNDERGROUND COMMUNICATIONS CONDUITS SHALL BE PROVIDED WITH A METALLIC MARKER TAPE LOCATED 12 INCHES BELOW THE FINISHED GRADE.
- h. WHERE UNDERGROUND CONDUITS SWEEP INTO/THRU SLABS, UTILIZE PVC 90 DEGREE SWEEPS THAT TRANSITION. VIA FEMALE PVC ADAPTER TO GRC COUPLING MOUNTED FLUSH IN SLAB. GRC COUPLINGS SHALL BE 1/2 LAP TAPED WITH 20 MIL TAPE. IF THE DISTANCE OF THE CONDUIT RUN BETWEEN A SWEEP AND THE NEXT CONNECTING SWEEP. PULLBOX, VAULT OR MANHOLE EXCEEDS 150 FT THEN THE SWEEP SHALL BE CONCRETE ENCASED. EXCEPTIONS:
- h.a. COMMUNICATIONS CONDUITS SHOWN TERMINATING AT A FINISHED FLOOR SHALL HAVE AN ADDITIONAL 4" HIGH GRC NIPPLE EQUIPPED WITH A BUSHING, REMOVABLE CONDUIT PLUG, LABELING TAG AND PULL ROPE. TIE OFF PULL ROPE TO CONDUIT PLUG.
- h.b. UTILITY CONDUIT SWEEPS SHALL BE INSTALLED PER THE REQUIREMENTS OF THE RESPECTIVE UTILITY COMPANY.
- i. ALL PVC CONDUIT SHALL BE GLUED FOR A WATER AND GAS TIGHT INSTALLATION. THE CONTRACTOR SHALL USE APPROPRIATE SOLVENT ON ALL JOINTS PRIOR TO GLUING CONDUIT AND FITTINGS TOGETHER.
- INSTALLATION OF 600-VOLT CONDUCTORS: 1. ALL ELECTRICAL WIRE, INCLUDING SIGNAL CIRCUITS, SHALL BE INSTALLED IN
- 2. ALL CIRCUITS AND FEEDER WIRES FOR ALL SYSTEMS SHALL BE CONTINUOUS FROM OVERCURRENT PROTECTIVE DEVICE OR SWITCH TO TERMINAL OR FARTHEST OUTLET. NO JOINTS SHALL BE MADE EXCEPT IN PULL, JUNCTION OR OUTLET BOXES, OR IN PANEL OR SWITCHBOARD
- a. UTILIZE PREINSULATED "WINGED" SPRING TYPE CONNECTORS, 3M COMPANY AS REQUIRED FOR SPLICES AND TAPS IN CONDUCTORS #6 AWG AND SMALLER. WHEN A SPRING CONNECTOR IS USED IN AN UNDERGROUND ENVIRONMENT OR WHEN SUBJECT TO MOISTURE, UTILIZE A 3M COMPANY EPOXY RESIN CONNECTOR SEALING PACK TO SEAL THE SPRING CONNECTOR.
- b. WIRES #4 AWG AND LARGER AWG SHALL BE JOINED TOGETHER AS
- b.a. WHEN LOCATED IN AN UNDERGROUND ENVIRONMENT OR WHEN SUBJECT TO MOISTURE. THE SPLICE SHALL BE MADE WITH COMPRESSION CONNECTOR AND SEALED BY A 3M, OR EQUAL, PST COLD SHRINK CONNECTOR INSULATOR.
- b.b. WHEN LOCATED IN AN INTERIOR ENVIRONMENT, THE SPLICE SHALL BE MADE WITH AN ILSCO OR EQUAL DUAL RATED, INSULATED SPLICER—REDUCER CONNECTOR OR MULTI—TAP CONNECTOR—LISTED FOR USE WITH 75/90 DEGREE CELSIUS RATED CONDUCTORS.
- c. CONNECTIONS TO BUSBAR SHALL BE MADE WITH DUAL-RATED COPPER/ALUMINUM ONE-PIECE COMPRESSION LUGS. PARALLELED CONDUCTOR CONNECTIONS SHALL BE BY MECHANICAL LUGS.
- 3. THOROUGHLY CLEAN ALL CONDUIT AND WIRE—WAYS AND SEE THAT ALL PARTS ARE PERFECTLY DRY BEFORE PULLING ANY WIRES.
- 4. INSTALL UL APPROVED FIXTURE WIRE FROM ALL LIGHTING FIXTURE LAMP SOCKETS INTO FIXTURE OUTLET OR JUNCTION BOX.
- 5. FOR 20 AMPERE BRANCH CIRCUIT WIRING, INCREASE #12 CONDUCTORS TO #10 FOR 120 VOLT CIRCUITS LONGER THAN 100 FEET AND FOR 277 VOLT

CIRCUITS LONGER THAN 150 FEET, MINIMUM. SEE DRAWING SCHEDULE FOR

- 6. CONDUCTOR SUPPORT. PROVIDE CONDUCTOR SUPPORTS AS REQUIRED BY CODES AND RECOMMENDED BY CABLE MANUFACTURER. WHERE REQUIRED, PROVIDE CABLE SUPPORTS IN VERTICAL CONDUITS AND PROVIDE LOWER END OF CONDUIT WITH A VENTILATOR.
- C. GROUNDING/BONDING:
 - PROVIDE GROUNDING AND BONDING FOR ENTIRE ELECTRIC INSTALLATION AS SHOWN ON PLANS, AS LISTED HEREIN AND AS REQUIRED BY APPLICABLE CODES. INCLUDED, BUT NOT LIMITED TO, ARE ITEMS THAT REQUIRE GROUNDING/BONDING:
 - a. CONDUIT, RACEWAYS AND CABLE TRAYS.

ADDITIONAL INFORMATION.

- b. NEUTRAL OR IDENTIFIED CONDUCTORS OF INTERIOR WIRING SYSTEM.
- c. PANELBOARDS, DISTRIBUTION BOARDS, SWITCHGEAR AND SWITCHBOARDS. d. NON-CURRENT CARRYING METAL PARTS OF FIXED EQUIPMENT.
- e. TELEPHONE DISTRIBUTION EQUIPMENT.
- f. METAL PIPING INSTALLED IN OR ATTACHED TO A BUILDING/STRUCTURE.

2. IN MULTI-OCCUPANCY BUILDINGS, CONTRACTOR SHALL BOND METAL WATER

- g. METALLICALLY ISOLATED STRUCTURAL STEEL.
- PIPING SYSTEMS INSTALLED IN, UNDER OR ATTACHED TO A BUILDING AND/OR STRUCTURE SERVING INDIVIDUAL OCCUPANCIES WHERE THE PIPING SYSTEM(S) ARE METALLICALLY ISOLATED FROM EACH OTHER. PER CEC. ART. 250.104(A)(2) & (4). THE BONDING CONDUCTOR SHALL BE SIZED PER TABLE 250.122 AND CONNECTED TO THE SWITCHBOARD/PANELBOARD SERVING THAT SUITE/OCCUPANCY.

- 3. USE OF GROUND RODS: FURNISH AND INSTALL REQUIRED NUMBER OF 3/4" X 10' COPPER CLAD GROUND RODS TO MEET SPECIFIED RESISTANCE ALL REQUIRED GROUNDING WIRES, CONDUIT AND CLAMPS. THE SIZE OF THE GROUNDING CONDUCTORS SHALL BE NOT LESS THAN THAT SET FORTH IN THE LATEST EDITION OF THE CALIFORNIA CODE OF REGULATIONS, TITLE 24, STATE OF CALIFORNIA AND NEC (OR CEC WHERE ADOPTED), UNLESS OTHERWISE INDICATED. RODS SHALL BE INSTALLED SUCH THAT AT LEAST 10 FEET OF LENGTH IS IN CONTACT WITH THE SOIL. WHERE ROCK BOTTOM IS ENCOUNTERED. THE ELECTRODE SHALL BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM VERTICAL OR SHALL BE BURIED IN A TRENCH THAT IS AT LEAST 30 INCHES DEEP. THE UPPER END OF THE ELECTRODE SHALL BE FLUSH WITH OR BELOW GROUND LEVEL UNLESS THE ABOVE GROUND END AND THE GROUNDING ELECTRODE CONDUCTOR ATTACHMENTS ARE PROTECTED AGAINST PHYSICAL DAMAGE. UNLESS OTHERWISE NOTED, CONNECTION TO THE GROUNDING ELECTRODE CONDUCTOR MAY BE BY COMPRESSION TYPE OR EXOTHERMIC PROCESS CONNECTOR. MECHANICAL CONNECTORS SHALL NOT BE USED.
- 4. GROUNDING SYSTEM CONNECTION:
- a. COMPRESSION CONNECTORS SHALL BE UNPLATED COPPER, MANUFACTURED BY BURNDY, OR APPROVED EQUAL, DESIGNED SPECIFICALLY FOR THE INTENDED CONNECTION.
- b. EXOTHERMIC WELD-TYPE CONNECTORS SHALL BE 'CADWELD' MANUFACTURED BY ERICO PRODUCTS, OR APPROVED EQUAL, DESIGNED SPECIFICALLY FOR THE INTENDED CONNECTION.
- c. MECHANICAL CONNECTORS SHALL NOT BE USED.
- 5. ISOLATED GROUND RECEPTACLES SHALL HAVE AN INSULATED GROUND WIRE CONNECTED BETWEEN THE RECEPTACLE AND THE PANELBOARD ISOLATED GROUND BUS. UNLESS OTHERWISE NOTED, THIS GROUND WIRE SHALL NOT BE GROUNDED AT ANY OTHER POINT, AND SHALL BE DISTINGUISHED FROM OTHER GROUND WIRES BY A CONTINUOUS YELLOW STRIPE.
- 6. PROVIDE SEPARATE GREEN EQUIPMENT GROUND CONDUCTOR IN ALL ELECTRICAL RACEWAYS, TO EFFECTIVELY GROUND ALL FIXTURES, PANELS, CONTROLS. MOTORS. DISCONNECT SWITCHES, EXTERIOR LIGHTING STANDARDS. AND NON-CURRENT CARRYING METALLIC ENCLOSURES. USE BONDING JUMPERS, GROUNDING BUSHINGS, LUGS, BUSSES, ETC., FOR THIS PURPOSE. CONNECT THE EQUIPMENT GROUND TO THE BUILDING SYSTEM GROUND. USE THE SAME SIZE EQUIPMENT GROUND CONDUCTORS AS PHASE CONDUCTORS, UP THROUGH #10 AWG. USE CEC TABLE 250.122 FOR CONDUCTOR SIZE WITH PHASE CONDUCTORS #8 AND LARGER, IF NOT SHOWN ON THE DRAWINGS.
- 7. CLEAN THE CONTACT SURFACES OF ALL GROUND CONNECTIONS PRIOR TO MAKING CONNECTIONS.
- 8. DUCTWORK. PROVIDE A FLEXIBLE GROUND STRAP, NO. 6 AWG EQUIVALENT, AT EACH FLEXIBLE DUCT CONNECTION AT EACH AIR HANDLER, EXHAUST FAN, AND SUPPLY FAN, AND INSTALL TO PRECLUDE VIBRATION.
- 9. MOTORS. CONNECT THE GROUND CONDUCTOR TO THE CONDUIT WITH AN APPROVED GROUNDING BUSHING, AND TO THE METAL FRAME WITH A BOLTED SOLDERLESS LUG. BOLTS, SCREWS AND WASHERS SHALL BE BRONZE OR CADMIUM PLATED STEEL.
- 10. BUILDING GROUNDING SYSTEM RESISTANCE TO GROUND SHALL NOT EXCEED 25 OHMS.
- LINE VOLTAGE AND LOW VOLTAGE POWER SUPPLIES TO ALL MECHANICAL EQUIPMENT INCLUDING PLUMBING, HEATING AND AIR CONDITIONING UNITS;
 - 1. AN ELECTRIC POWER SUPPLY, INCLUDING CONDUIT, ANY NECESSARY JUNCTION AND/OR OUTLET BOXES AND CONDUCTORS AND CONNECTION SHALL BE FURNISHED AND INSTALLED BY THIS CONTRACTOR FOR EACH ITEM OR MECHANICAL EQUIPMENT.
 - 2. POWER SUPPLIES TO INDIVIDUAL ITEMS OF EQUIPMENT SHALL BE TERMINATED IN A SUITABLE OUTLET OR JUNCTION BOX ADJACENT TO THE RESPECTIVE ITEM OF EQUIPMENT, OR A JUNCTION BOX PROVIDED BY THE MANUFACTURER OR THE EQUIPMENT AND DIRECTED BY THE MECHANICAL CONTRACTOR. ALLOW SUFFICIENT LENGTHS OF CONDUCTOR AT EACH LOCATION TO PERMIT CONNECTION TO THE INDIVIDUAL EQUIPMENT WITHOUT BREAKING THE WIRE RUN.
 - 3. THE LOCATION OF ALL CONDUIT TERMINATIONS TO THE EQUIPMENT IS APPROXIMATE. THE EXACT LOCATION OF THESE CONDUIT TERMINATIONS SHALL BE LOCATED AND INSTALLED AS DIRECTED BY THE MECHANICAL OR PLUMBING CONTRACTOR.
- 4. PROVIDE POWER SUPPLIES TO ALL PLUMBING AND MECHANICAL EQUIPMENT. INCLUDING BUT NOT LIMITED TO, EQUIPMENT FURNISHED AND INSTALLED BY OWNER OR CONTRACTOR SUCH AS HEATING AND AIR CONDITIONING EQUIPMENT, PUMPS, BOILERS, AUTO VALVES AND WATER COOLERS, ETC. THE INSTALLATION SHALL PRODUCE A COMPLETE AND OPERABLE SYSTEM.
- 5. UNLESS OTHERWISE NOTED. THIS CONTRACTOR SHALL FURNISH AND INSTALL ALL CONDUIT, BOXES, WIRES, ETC., FOR LINE VOLTAGE WIRING AND
- 6. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY WITH THE DRAWINGS OF OTHER TRADES REGARDING THE EXTENT OF HIS RESPONSIBILITY FOR MECHANICAL EQUIPMENT. THE BID MUST INCLUDE A SUM SUFFICIENT TO COVER THE COST OF THE INSTALLATION.
- 7. THE LOCATION OF ALL POWER SUPPLY CONNECTION AND/OR TERMINATIONS TO THE MECHANICAL EQUIPMENT IS APPROXIMATE. THE EXACT LOCATIONS OF THESE TERMINATIONS SHALL BE VERIFIED WITH OTHER TRADES DURING
- PREFABRICATED EQUIPMENT: INSTALLATION OF ALL PREFABRICATED ITEMS AND EQUIPMENT SHALL CONFORM TO THE REQUIREMENTS OF THE MANUFACTURER'S SPECIFICATIONS AND INSTALLATION INSTRUCTION PAMPHLETS, WHERE CODE REQUIREMENTS AFFECT INSTALLATION OF MATERIALS AND EQUIPMENT, THE MORE STRINGENT REQUIREMENTS, CODE OR MANUFACTURER'S INSTRUCTIONS AND/OR SPECIFICATIONS, SHALL GOVERN THE WORK.
- F. FIRESTOPPING:

LOW VOLTAGE WIRING.

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL MATERIAL LABOR, EQUIPMENT, AND SERVICES, IN CONJUNCTION WITH THE SELECTION AND INSTALLATION OF A COMPLETE AND FULLY FUNCTIONING AND CODE COMPLIANT UL-LISTED FIRE STOP ASSEMBLY/SYSTEM(S) AS REQUIRED BY PROJECT CONDITIONS.
- 2. EACH FIRE STOP ASSEMBLY/SYSTEM SHALL HAVE AN "F" AND/OR "T" RATING AS REQUIRED BY EACH CONDITION REQUIRING FIRE STOPPING. EACH FIRE STOP ASSEMBLY/SYSTEM SHALL HAVE A CURRENT U.L. LISTING, AS INDICATED IN THE LATEST EDITION OF THE U.L. FIRE RESISTANCE DIRECTORY. CONTRACTOR SHALL VERIFY ACCEPTABILITY OF ALL FIRE STOPPING METHODS AND SYSTEM SELECTIONS WITH THE AUTHORITY HAVING JURISDICTION PRIOR TO INSTALLATION. THE CONTRACTOR SHALL INSTALL EACH FIRESTOP ASSEMBLY/SYSTEM IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS.
- 3. EACH FIRE STOP ASSEMBLY/SYSTEM SHALL BE LABELED WITH FIRE STOP MANUFACTURER - FURNISHED LABEL ON EACH SIDE OF THE FIRE STOPPING SYSTEMS DEPICTING UL NUMBER, ETC.
- G. HOUSE KEEPING PADS
 - 1. PROVIDE A MINIMUM 4" HIGH HOUSEKEEPING PAD ABOVE FINISHED FLOOR/FINISHED GRADE FOR ALL EXTERIOR FLOOR MOUNTED SWITCHGEAR. DISTRIBUTION BOARDS, TRANSFORMERS, MOTOR CONTROL CENTERS ETC. FLUSH WITH THE FACE OF THE EQUIPMENT, PROVIDE A MINIMUM 4" HIGH HOUSEKEEPING PAD FOR ALL FLOOR MOUNTED SWITCHGEAR, DISTRIBUTION BOARDS, TRANSFORMERS, MOTOR CONTROL CENTERS, TRANSFER SWITCHES ETC. LOCATED IN MECHANICAL CENTRAL PLANT(S) AND OTHER MECHANICAL SPACES FLUSH WITH THE FACE OF THE EQUIPMENT. CONFIRM PAD DIMENSIONS WITH AHJ PRIOR TO FORMING PAD TO ENSURE ANY LOCAL CODE INTERPRETATIONS/CONDITIONS REGARDING HOUSEKEEPING PADS ARE
 - 2. ALL HOUSEKEEPING PADS LOCATED IN, ON OR ATTACHED TO A BUILDING SHALL BE SEISMICALLY BRACED/CONNECTED TO THE BUILDING STRUCTURE. END OF SECTION



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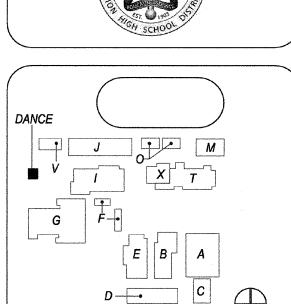
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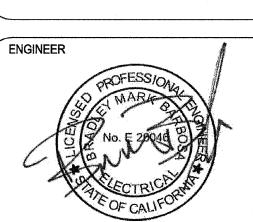
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ARCHITECT

HUNTINGTON BEACH UNION HIGH SCHOOL DISTRICT PROJECT NUMBER 18296 05/09/19 DRAWN BY: Author CHECKED BY: Checker REVISIONS Description

Construction Documents

ELECTRICAL GENERAL SPECIFICATIONS (CONTINUED

PART 1 - GENERAL

1.1 GENERAL INTRODUCTION

A. THE WORK SHALL CONSIST OF THE DESIGN, PROVISION, TERMINATION, TESTING AND DOCUMENTATION OF A COMPLETE AND FULLY FUNCTIONAL STRUCTURED HIGH PERFORMANCE COPPER AND OPTICAL FIBER CONNECTION COMMUNICATIONS CABLING SYSTEM. THE INSTRUCTIONS IN THIS SECTION ARE SPECIFIC TO COMMUNICATIONS INSTALLATIONS AND SHOULD BE READ IN CONJUNCTION WITH OTHER CONTRACT DOCUMENTS AS APPLICABLE. WORK SHALL PROVIDE DATA SYSTEMS COMPLETE TO INCLUDE, BUT NOT BE LIMITED TO, JACKS, CABLING, PATHWAYS, EQUIPMENT, WIRELESS ACCESS POINTS (WAP), LABOR, ETC. AS NOTED ON THE DRAWINGS AND INDICATED IN THE BID DOCUMENTS. THE PROJECT REQUIRES THE REWORK OF AN EXISTING IDF TO INSTALL NEW CATEGORY 6 CABLING AND FROM A NEW CATEGORY 6 RATED PATCH PANEL TO EACH WORKSTATION OUTLET INDICATED ON THE PLANS. FIBER OPTIC CABLING INTO THE IDF IS EXISTING AND NO ADDITIONAL FIBER OPTIC EQUIPMENT IS REQUIRED.

1.2 QUALIFICATIONS

- A. THE DATA CABLING SYSTEM INSTALLATION WORK DETAILED IN THIS SECTION SHALL BE CARRIED OUT BY A SPECIALIST INSTALLER COMPANY. THE INSTALLER SHALL BE CERTIFIED BY THE SYSTEM MANUFACTURER (OR MANUFACTURERS) IN THE INSTALLATION AND TESTING OF THE CABLING
- B. THE INSTALLER SHALL HAVE A PROVEN TRACK RECORD IN THE FIELD OF TELEPHONE AND DATA (HIGH PERFORMANCE "CATEGORY 6" COPPER) CABLING SYSTEM INSTALLATION. THE INSTALLER SHALL HAVE COMPLETED AT LEAST THREE PREVIOUS INSTALLATIONS OF COMPARABLE SIZE, COMPLEXITY AND MANPOWER WITHIN THE LAST THREE YEARS. EACH INSTALLATION SHALL UTILIZE COMPONENTS, INSTALLATION PRACTICES AND TESTING PROCEDURES EQUIVALENT TO THOSE SPECIFIED IN THIS DOCUMENT.
- C. THE INSTALLER SHALL HOLD A VALID STATE CONTRACTORS LICENSE FOR THE DURATION OF THE PROJECT. THE INSTALLER SHALL BE RESPONSIBLE FOR OBTAINING PERMITS AND OTHER REQUIREMENTS FOR PERFORMING WORK ON THIS PROJECT. ALL COSTS ASSOCIATED WITH OBTAINING PERMITS AND OTHER DOCUMENTATION SHALL BE INCLUDED IN THE BID SUM FOR THE PROJECT.

1.3 MANUFACTURER'S COMPLETE SYSTEMS

A. THE CABLING SYSTEM SPECIFIED IN THIS DOCUMENT SHALL BE A 'PANDUIT' SYSTEMS HARDWARE AND BELDEN UTP COPPER CABLE END-TO-END SOLUTION EXCEPT WHERE STATED OTHERWISE COMPLYING WITH THE DISTRICT STANDARDS FOR VOICE AND DATA CABLING SYSTEM.

1.4 JOB CONDITIONS

- A. PRIOR TO BIDDING, VISIT THE SITE AND DETERMINE ALL EXISTING CONDITIONS AFFECTING WORK. THE BIDDER SHALL EXAMINE ALL DRAWINGS AND SPECIFICATIONS TO FAMILIARIZE THEMSELVES WITH THE TYPE OF CONSTRUCTION TO BE USED, AND THE NATURE AND EXTENT OF WORK PROVIDED BY OTHER TRADES.
- B. VERIFY DIMENSIONS AND THE CORRECT LOCATION OF HARDWARE BEFORE PROCEEDING WITH THE INSTALLATION OF HARDWARE, CABLING AND/OR CONNECTIONS.
- C. NOTIFY THE OWNERS' REPRESENTATIVE IN WRITING IMMEDIATELY ON DISCOVERY OF DIMENSIONAL DISCREPANCIES AND OTHER CONDITIONS DETRIMENTAL TO PROPER PERFORMANCE OF THE WORK.
- D. THE CONTRACTOR SHALL NOTE THAT THE SITE IDF IS AN EXISTING CONDITION AND WILL REQUIRE COMPLETE REWORK TO ALLOW ALL NEW EQUIPMENT AND CABLING TO BE INSTALLED ALONG WITH EXISTING EQUIPMENT. ALL WORK, MATERIALS AND LABOR SHALL BE PART OF THE CONTRACTORS BASE BID.

1.5 LABELING AND NUMBERING SCHEME

A. LABELING OF THE CABLING SYSTEMS SHALL BE IN ACCORDANCE WITH DISTRICT STANDARDS AS NOTED WITHIN THE CABLING AND PATHWAY PORTION OF THESE SPECIFICATIONS.

1.6 WARRANTY

- A. INSTALLER TO PROVIDE A WARRANTY FOR ONE YEAR FROM NOTICE OF COMPLETION ON ALL MATERIALS AND WORKMANSHIP INSTALLED OR SUPPLIED AS PART OF THE CABLING SYSTEM.
- B. THE INSTALLER SHALL ALSO SUPPLY AN EXTENDED PERFORMANCE WARRANTY, AS OFFERED BY THE COMPONENTS' MANUFACTURER(S).

1.7 QUALITY

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLETE PROVISION AND INSTALLATION OF ALL COMPONENTS AS SPECIFIED HEREIN. THE CONTRACTOR SHALL PROVIDE ALL TOOLS, EQUIPMENT, FIXTURES, APPLIANCES, ANCILLARY PIECE PARTS AND HARDWARE AS NECESSARY TO COMPLETE THE ASSEMBLY AND INSTALLATION AS REQUIRED. THE OWNER'S REPRESENTATIVE MAY CONDUCT SCHEDULED OR UNSCHEDULED INSPECTIONS OF THE CONTRACTOR'S WORK AT ANYTIME DURING CONSTRUCTION. ALL WORK INCLUDED IN THE SCOPE ASSIGNED TO THE CONTRACTOR THAT IS ASSOCIATED WITH THIS PROJECT SHALL BE ACCOMPLISHED IN A WORKMANLIKE MANNER, INSTALLED AND ASSEMBLED PLUMB, LEVEL AND SQUARE. THE PRODUCT SHALL BE DELIVERED TO THE OWNER FINISHED, COMPLETE, AND READY TO OPERATE ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.
- B. ALL INSTALLATION WORK SHALL BE COMPLETED TO THE STANDARD OF THE SAMPLES APPROVED BY THE OWNERS REPRESENTATIVE DURING THE SUBMITTAL PROCESS. ANY PRODUCTS NOT INSTALLED TO THE QUALITY DETAILED IN THESE SPECIFICATIONS AND APPROVED IN THE SUBMITTAL PROCESS SHALL BE REWORKED BY THE INSTALLER TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AT NO ADDITIONAL COST TO THE OWNER.

1.8 STANDARDS

- A. ALL MATERIALS PROVIDED BY THE INSTALLER SHALL MEET THE REQUIREMENTS OF THE FOLLOWING WHERE APPLICABLE:
- 1. NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)
- 2. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
- 3. UNDERWRITERS LABORATORIES, INC. (UL)
- 4. ETL
- B. ALL PRODUCTS, SERVICES AND DOCUMENTATION PROVIDED BY THE INSTALLER SHALL MEET THE REQUIREMENTS OF THE FOLLOWING WHERE APPLICABLE:
- 1. CALIFORNIA ELECTRIC CODE (CEC)
- 2. RELEVANT STATE ELECTRIC AND FIRE CODES
- 3. ANSI/EIA/TIA 568-B COMMERCIAL BUILDING TELECOMMUNICATIONS WIRING
- 4. ANSI/EIA/TIA 569-A COMMERCIAL BUILDING STANDARD FOR TELECOMMUNICATIONS PATHWAYS AND SPACES
- 5. ANSI/EIA/TIA 606 THE ADMINISTRATION STANDARD FOR THE TELECOMMUNICATIONS INFRASTRUCTURE OF COMMERCIAL BUILDINGS
- 6. ANSI/EIA/TIA 607 COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS AUGUST 1994
- 7. BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL (BICSI)
- a. TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL
- b. NETWORK DESIGN REFERENCE MANUAL
- c. TELECOMMUNICATIONS CABLING INSTALLATION MANUAL (TDDM)
- 8. MANUFACTURER'S RECOMMENDATIONS AND INSTALLATION GUIDELINES
- 9. ISO/IEC 11801: GENERIC CABLING FOR CUSTOMER PREMISESC. ALL PUBLICATIONS REFERRED TO IN THIS DOCUMENT SHALL BE THE LATEST
- EDITION

 1.9 SUBMITTALS
 - A. ALL SUBMITTALS SHALL BE SENT PER DIVISION 01 REQUIREMENTS. EACH SUBMITTAL SHOULD BE PROVIDED NO LATER THAN SIX WEEKS PRIOR TO THE WORK ASSOCIATED WITH THAT SUBMITTAL TO ALLOW TIME FOR SUBMITTAL REVIEW.
 - B. PROJECT REFERENCES:
 - 1. SUBMIT FOR APPROVAL, REFERENCES FOR A MINIMUM OF THREE SIMILAR PROJECTS SUCCESSFULLY UNDERTAKEN AND COMPLETED WITHIN THE LAST THREE YEARS. THESE PROJECTS SHOULD BE A SIMILAR SCALE, COMPLEXITY AND HAVE SIMILAR TIME SCALES AS THIS PROJECT.

- 2. PROVIDE PROJECT NAME AND ADDRESS, CLIENT CONTACT NAME AND TELEPHONE NUMBER AND CONSTRUCTION MANAGER NAME AND TELEPHONE NUMBER. PROVIDE A BRIEF DESCRIPTION OF EACH PROJECT INDICATING TYPES OF SYSTEM INSTALLED, QUANTITIES AND CONFIGURATIONS OF OUTLETS AND PROJECT TIME SCALES.
- 3. AT LEAST TWO OF THE REFERENCES SHALL BE LOCATED IN SOUTHERN CALIFORNIA AND SHALL BE AVAILABLE FOR THE OWNERS REPRESENTATIVE AND OTHER MEMBERS OF THE DESIGN TEAM TO VISIT AND INSPECT THE INSTALLATION, SHOULD, IN THE OPINION OF THE OWNERS REPRESENTATIVE, THIS BE NECESSARY.
- 4. THESE REFERENCES ARE INTENDED TO SHOW THAT THE INSTALLER HAS SUCCESSFULLY COMPLETED SIMILAR PROJECTS. FAILURE TO PRODUCE SATISFACTORY REFERENCES MAY RESULT IN THE BID BEING DEEMED NON-COMPLIANT.

C. PERSONNEL TRAINING:

- 1. SUBMIT FOR APPROVAL RECORDS REGARDING THE MANAGEMENT, INSTALLATION AND TESTING PERSONNEL. THESE RECORDS SHALL INCLUDE RESUMES, TRAINING CERTIFICATES, PREVIOUS WORK EXPERIENCE DETAILS (ESPECIALLY ON REFERENCE PROJECTS) AND OTHER RELEVANT INFORMATION
- 2. SUBMIT RECORDS TO CONFIRM THAT THE PERSONNEL WHO WILL BE EMPLOYED IN AN INSTALLATION CAPACITY ARE SUITABLY TRAINED IN THE INSTALLATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS OF THE TYPE BEING PROVIDED.
- 3. SUBMIT RECORDS TO CONFIRM THAT THE PERSONNEL THAT WILL BE RESPONSIBLE FOR TESTING THE SYSTEM ARE SUITABLY TRAINED IN THE OPERATION OF THE TEST EQUIPMENT BEING USED IN THIS PROJECT.
- 4. THESE RECORDS ARE REQUIRED TO ENSURE THAT THE INSTALLER IS ABLE TO CARRY OUT ALL WORK IN A COMPETENT MANNER. FAILURE TO PRODUCE SATISFACTORY TRAINING DOCUMENTATION MAY RESULT IN THE BID BEING DEEMED NON—COMPLIANT.

D. CABLING DIAGRAM

1. SUBMIT, FOR APPROVAL, A COMPLETE CABLING DIAGRAM. THE DIAGRAM SHALL BE BASED ON THE SINGLE LINE DRAWING INCLUDED IN THE CONSTRUCTION DOCUMENTS. IT SHALL BE UPDATED TO SHOW QUANTITIES AND PART NUMBERS FOR ALL COMPONENTS INCLUDING PATCH PANELS, CABLE, CONDUIT, ETC. AND ALL OTHER ASSOCIATED COMPONENTS.

E. TEST EQUIPMENT

STANDARD

REQUIREMENTS

- SUBMIT, FOR APPROVAL, DETAILS OF EACH ITEM OF TEST EQUIPMENT TO BE USED TO TEST THE OPTICAL FIBER AND COPPER COMPONENTS. INCLUDE PATCH CORDS AND OTHER SPECIALIZED COMPONENTS.
- F. PRODUCT LITERATURE/DATA SHEETS:
- SUBMIT FOR APPROVAL MANUFACTURER'S PRODUCT DATA SHEETS FOR EACH COMPONENT OF THE TELEPHONE AND DATA CABLING SYSTEMS. CERTIFY THAT THE DATA SHEETS DEPICT THE COMPONENTS TO BE PROVIDED BY THE INSTALLER TO MAKE UP THE COMPLETE SYSTEM AS DESCRIBED IN THIS SPECIFICATION.

PART 2 - PRODUCTS AND RELATED REQUIREMENTS

2.1 HORIZONTAL AND LINK COPPER CABLING

- SUPPORTING CODES AND STANDARDS DOCUMENTS
- A NON-INCLUSIVE LIST OF KEY DOCUMENTS IS PRESENTED BELOW AS A MINIMUM:
 ANSI/EIA/TIA-568-B: COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING
- ANSI/EIA/TIA-569-A: COMMERCIAL BUILDING STANDARD FOR TELECOM PATHWAYS AND SPACES

TELECOMMUNICATIONS INFRASTRUCTURE OF COMMERCIAL BUILDINGS

- ANSI/EIA/TIA-606: ADMINISTRATION STANDARD FOR THE
- ANSI/EIA/TIA-607: COMMERCIAL BUILDING GROUNDING/BONDING
- NFPA 70: NATIONAL ELECTRICAL CODE
- ISO/IEC 11801: GENERIC CABLING FOR CUSTOMER PREMISES

THE APPLICABLE DOCUMENTS IN CONTENT AND INTENT AS WELL.

- BICSI: TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL (TDDM)

 THE LATEST REVISION OF EACH DOCUMENT, AND OTHER RELATED DOCUMENTS, IS
 TO BE CONSIDERED THE ONE IN FORCE AT THE TIME OF SYSTEM CONSTRUCTION
 AND DELIVERY TO THE DISTRICT. THE CONTRACTOR IS REQUIRED TO COMPLY WITH
- A. IF ANY APPLICABLE DOCUMENTS ARE IN CONFLICT, THEN THE MORE STRINGENT REQUIREMENT SHALL APPLY. THE CONTRACTOR IS REQUIRED TO ADVISE THE DISTRICT INFORMATION TECHNOLOGY (IT) REPRESENTATIVE OF ANY CONFLICT THAT COULD RESULT IN WORK DEFICIENCIES.
- B. CONTRACTOR REQUIREMENTS (MINIMUM)

CONTRACTORS BIDDING ON DISTRICT WORK PROJECTS SHALL POSSESS AS A MINIMUM THE FOLLOWING QUALIFICATIONS:

- A MANUFACTURER'S CERTIFIED INSTALLER/CONTRACTOR AGREEMENT IN FORCE AT THE TIME OF BID SUBMITTAL AND THROUGHOUT THE ENTIRE CONSTRUCTION PROCESS. A CURRENT SUPPORT DOCUMENT SHALL BE INCLUDED IN THE CONTRACTOR'S BID RESPONSE.
- 2. AUTHORIZATION TO FACILITATE THE APPLICABLE MANUFACTURER'S SYSTEM WARRANTY.
- 3. THE CONTRACTOR SHALL ENSURE THAT AT LEAST 50% OF ALL TECHNICIANS INSTALLING A COPPER SYSTEM HAVE RECEIVED A
- MANUFACTURER'S TRAINING CERTIFICATE FOR COPPER SYSTEMS.

 4. THE CONTRACTOR SHALL ENSURE THAT 100% OF THE TECHNICIANS INSTALLING A FIBER OPTIC SYSTEM HAVE RECEIVED A MANUFACTURER'S
- TRAINING CERTIFICATE FOR FIBER OPTIC SYSTEMS.

 5. THE CONTRACTOR SHALL HAVE COPIES OF THE TECHNICIANS' CERTIFICATES AVAILABLE FOR INSPECTION BY THE DISTRICT IT REPRESENTATIVE UPON
- 6. CONTRACTOR SHALL HOLD IN GOOD STANDING A CALIFORNIA C-7 LICENSE.
 A COPY OF THE LICENSES TO BE INCLUDED IN THE CONTRACTOR'S BID
 RESPONSE.
- . THE CONTRACTOR MUST HAVE COMPLETED A MINIMUM OF THREE PROJECTS OF SIMILAR SIZE AND SCOPE FOR PUBLIC ENTITIES WITHIN THE PAST FIVE YEARS.

C. CABLING SYSTEM

1. ALL COPPER COMPONENTS OF THE CABLING SYSTEM ARE EITHER TO BE OF A SINGLE MANUFACTURER, OR OF A MANUFACTURER PARTNERSHIP UNDER A SYSTEM TRADE NAME OFFERING A SINGLE POINT OF CONTACT FOR THE DISTRICT IN THE EVENT OF A WARRANTY CLAIM. THE DISTRICT HAS CHOSEN THE BELDEN 10 GIG UTP COPPER CABLING SOLUTION AS THE BASELINE FOR ALL EQUIVALENTS TO BE MEASURED. CONTRACTORS SUBMITTING OTHER MANUFACTURER SYSTEMS FOR CONSIDERATION MUST MEET THIS SYSTEM IN PHYSICAL AND ELECTRONIC PERFORMANCE AS WELL AS UTILITY AT A MINIMUM.

D. CABL

- INSTALLATION OF CABLING SHALL BE OF CONTINUOUS LENGTH FROM EACH TERMINATION POINT.
- 2. NO LENGTH OF CABLE SHALL EXCEED 285 FEET (TESTED LENGTH).
- 3. THE BEND RADIUS OF ANY CABLE SHALL NOT EXCEED 4 TIMES THE DIAMETER OF THE CABLE.
- 4. SHOULD THE CABLE BECOME KINKED WHILE BEING INSTALLED, THE CONTRACTOR SHALL <u>NOT</u> ATTEMPT TO REPAIR THE CABLE, BUT SHALL REMOVE AND REPLACE THE ENTIRE RUN. ALL CABLE RUNS ARE POTENTIAL INSPECTION ITEMS FOR THE DISTRICT IT REPRESENTATIVE.
- 5. THE CABLE JACKET SHALL BE MAINTAINED AS CLOSE TO THE POINT OF TERMINATION AS POSSIBLE.
- 6. CABLE COLOR PER DISTRICT STANDARDS.
- 7. THE CABLE PAIRS SHALL NOT BE UNTWISTED MORE THAN 1/2" FROM THE TERMINATION POINT.
- 8. ALL CABLING IS TO BE INSTALLED IN ITS OWN PATHWAY AND FULLY SUPPORTED.

- 9. CABLING SHALL BE INSTALLED WITH NO MORE THAN A 4-FOOT SPACE BETWEEN SUPPORTS.
- 10. CABLING CAN BE INSTALLED IN PATHWAYS USING J-HOOKS OR CONDUIT, AS LONG AS THE PATHWAY IS LOW-VOLTAGE CABLING ONLY, THE PATHWAY IS APPROPRIATELY BONDED TO THE BUILDING GROUNDING SYSTEM, AND THE DATA SYSTEM CABLES ARE BUNDLED SEPARATELY FROM OTHER LOW VOLTAGE CABLING.

E. TERMINATIONS

- 1. JACK MODULE COLORS PER DISTRICT STANDARDS. JACK MODULES SHALL BE OF INSULATION—DISPLACEMENT TERMINATION CONSTRUCTION, AND MAY OFFER MASS TERMINATION OF ALL FOUR PAIRS SIMULTANEOUSLY. IN ADDITION, A JACK MODULE MUST BE AVAILABLE AS PART OF THE CABLING SYSTEM, AND FACILITATE THE SAME SYSTEM PERFORMANCE AND WARRANTIES, THAT CAN BE UTILIZED IN EXISTING WORKSTATION OUTLET FACEPLATES FROM OTHER MANUFACTURERS.
- 2. CABLING SHALL BE DRESSED CLEANLY AND FULLY SUPPORTED VIA VELCRO STRAPS AND CABINET/RACK SUPPORTS. CABLE TIES ARE NOT TO BE
- 3. CABLING SLACK CAN BE PLACED IN THE CABINET/RACK AREA AS WELL AS THE CEILING AREAS IF FULLY SUPPORTED BY THE PROPER PATHWAY DEVICE. NO MORE THAN 4 FEET PER HORIZONTAL RUN SHALL BE STORED.
- 4. THE PORTS ARE TO BE POPULATED BEGINNING WITH PORT ONE IN SEQUENCE, LEAVING NO OPEN PORTS.
- 5. UNUSED PORTS ARE TO BE FILLED WITH A BLANK MODULE INSERT.
- FACEPLATES ARE TO BE IN TWO-PORT AND FOUR-PORT SINGLE GANG CONFIGURATIONS. THE FACEPLATES MUST INCLUDE LABELS AND LABEL
- COVERS. THE DISTRICT HAS STANDARDIZED ON WHITE COLOR FACEPLATES.

 2. THE OUTLET FACEPLATE SHALL BE AFFIXED TO THE WALL OR SURFACE
- MOUNT TERMINATION BOX WITH TWO COLOR MATCHING SCREWS.

 3. ALL EMPTY PORTS SHALL BE FILLED WITH A COLOR MATCHING BLANK
- MODULE.

 4. CABLING SHALL BE COILED IN THE WALL OR SURFACE MOUNT BOXES WITH
- NO LESS THAN 6" AND NO MORE THAN 12" OF SLACK CABLE.

 G. ACCESS POINT CABLING
- A SINGLE-PORT SURFACE MOUNT TERMINATION BOX SHALL BE UTILIZED TO HOUSE A SINGLE JACK MODULE FOR ACCESS POINT CONNECTIVITY. THE TERMINATION BOX SHALL BE WHITE.

H. PATCH CORDS

F. WORKSTATION OUTLETS

- 1. SMALL DIAMETER CATEGORY 6 PATCH CORDS, AS MANUFACTURED BY SYSTIMAX (OR APPROVED EQUIVALENT) SHALL BE PROVIDED BY THE CONTRACTOR FOR THE OUTLET OR ACCESS POINT TERMINATION END AS WELL AS THE PATCH PANEL TERMINATION END. THE CONTRACTOR SHALL PROVIDE PATCH CORDS AT THE IDF. THESE PATCH CORDS FOR THE MOST PART SHALL BE 24" IN LENGTH OR AS REQUIRED.
- 2. SMALL DIAMETER CATEGORY 6 PATCH CORDS, AS MANUFACTURED BY SYSTIMAX (OR APPROVED EQUIVALENT) UTILIZED FOR ACCESS POINT PATCH SHALL BE 12" IN LENGTH AND ENGAGED INTO THE ASSOCIATED TERMINATED JACK, THEN COILED AND LEFT TO BE ENGAGED INTO THE ACCESS POINT.
- 3. THE PATCH CORDS SHALL BE THE SAME IN COLOR AND BE OF THE SAME MANUFACTURER AS THE CABLING SYSTEM.
- 4. THE CONNECTOR END OF THE PATCH CORD SHALL PROVIDE A TANGLE-FREE LATCH DESIGN.
- 5. A CATEGORY 6 SMALL DIAMETER, TANGLE—FREE LATCH DESIGN PATCH CORD FOR WORKSTATIONS IN 5 METER LENGTHS APPROPRIATE FOR THE SPECIFIC WORKSTATION SHALL BE DELIVERED TO THE DISTRICT.

I. CABLE MANAGEMENT

- SEE CABINETS/RACKS REDRESSING REQUIREMENTS.
- REAR CABLE MANAGEMENT DEVICES TO SUPPORT CABLES TO THE POINT OF TERMINATION ARE TO BE UTILIZED. A TOWEL BAR STYLE BRACKET IS ACCEPTABLE AS LONG AS THE CABLES ARE NEATLY AND SECURELY ATTACHED VIA VELCRO STRAPS.

J. LABELING

1. ALL WORKSTATION OUTLETS, ACCESS POINTS, AND PATCH PANEL TERMINATION PORTS ARE TO BE LABELED WITH THE DISTRICT STANDARD LABELING SYSTEM.

K. LABELING

- A WRAP-AROUND LABEL SHALL BE INSTALLED ON THE JACKET OF THE CABLE NO LESS THAN 4" AND NO MORE THAN 6" OUTSIDE THE ENCLOSURE AT EACH END OF THE CABLES. THE CABLES MUST BE EASILY IDENTIFIABLE BY VISUAL MEAN THE SPECIFIC IDF CABINET.
- L. SYSTEM TESTING AND CERTIFICATION
- ALL COMPONENTS SHALL BE INSPECTED BEFORE INSTALLATION TO ENSURE THE CORRECT ITEM IS BEING INSTALLED AND THE COMPONENT APPEARS
- TO BE WITHOUT FLAWS.

 2. ANY DEFECT OR SYSTEM FAILURE SHALL BE CORRECTED BY THE
- CONTRACTOR PRIOR TO REQUEST FOR FINAL INSPECTION.

 3. TESTING EQUIPMENT SHALL BE CALIBRATED NO LESS THAN TWELVE MONTHS PRIOR TO THE DATE OF TESTING. PROOF OF CERTIFICATION IS TO

BE AVAILABLE TO THE DISTRICT IT REPRESENTATIVE UPON REQUEST.

4. TEST RESULTS SHALL AUTOMATICALLY BE CALCULATED AND EVALUATED BY THE TESTING EQUIPMENT, UTILIZING THE MOST CURRENT PERFORMANCE AND TESTING STANDARDS AND THE MANUFACTURER'S SYSTEM PERFORMANCE PUBLISHED STATISTICS. TEST RESULTS SHALL BE PROVIDED WITHIN THREE CALENDAR WEEKS OF FINAL INSPECTION COMPLETION IN AN ELECTRONIC FORMAT THAT DOES NOT REQUIRE SPECIAL SOFTWARE TO REVIEW.

5. COPPER SYSTEM

- a. TESTING SHALL BE COMPLIANT WITH THE MOST RECENT LEVEL III REQUIREMENT FOR CATEGORY 6 TESTING.
- b. TESTING SHALL BE DIRECTIONAL, SWEPT-FREQUENCY FOR THE
 - FOLLOWING: b1. ATTENUATION
- b2. WIRE MAP
- b3. ATTENTION TO CROSSTALK RADIO
- b4. PAIR-TO-PAIR NEXT LOSS
- b5. PSNEXT LOSS
- b6. RETURN LOSS
- b7. PAIR-TO-PAIR ELFEXT
- b8. PSELFEXTb9. PROPAGATION DELAY
- b10. DELAY SKEW
- c. CONTRACTOR SHALL PROVIDE DOCUMENTATION TO THE DISTRICT REPRESENTATIVE IDENTIFYING THE CABLE MANUFACTURER'S PUBLISHED NOMINAL VELOCITY OF PROPAGATION (NVP).

M. WARRANTY

- CONTRACTOR SHALL WARRANT ALL COMPONENTS AND SYSTEMS FOR A MINIMUM OF ONE YEAR AFTER DATE OF FINAL INSPECTION.
- 2. CONTRACTOR SHALL ALSO FACILITATE A MANUFACTURER'S SYSTEM WARRANTY CERTIFICATE FOR THE COPPER CABLING SYSTEM AND FIBER OPTIC CABLING SYSTEM FOR A MINIMUM OF 25 YEARS AND PROVIDE DOCUMENTATION IN SUPPORT THEREOF.
- 3. THE WARRANTY SHALL APPLY TO ALL CURRENT AND FUTURE APPLICATIONS DESIGNED TO RUN ON THE DESIGNATED LINK OR CHANNEL CLASSIFICATION AS DEFINED IN THE COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING STANDARDS.

- 4. THE WARRANTY SHALL INCLUDE ALL INDIVIDUAL COMPONENTS AND THE PERFORMANCE THEREOF TO MEET THE MANUFACTURER'S REQUIREMENTS AS
- 5. THE WARRANTY SHALL GUARANTEE 10GIG ETHERNET SYSTEM PERFORMANCE, PLUS PREVIOUSLY IDENTIFIED HEADROOM.

A COMPONENT OF THE WARRANTED SYSTEM.

PRK

ARCHITECTURE

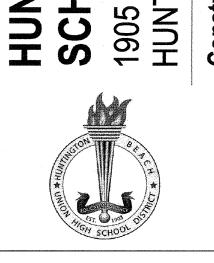
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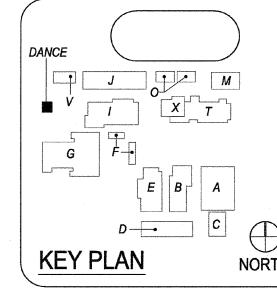
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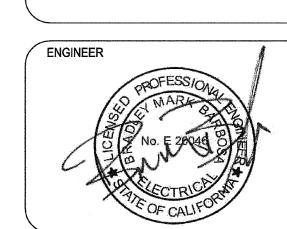


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ARCHITECT

CLIENT
HUNTINGTON BEACH UNION HIGH
SCHOOL DISTRICT
PROJECT NUMBER
18296

DATE: 05/09/19

DRAWN BY: Author
CHECKED BY: Checker
REVISIONS

No. Description Date

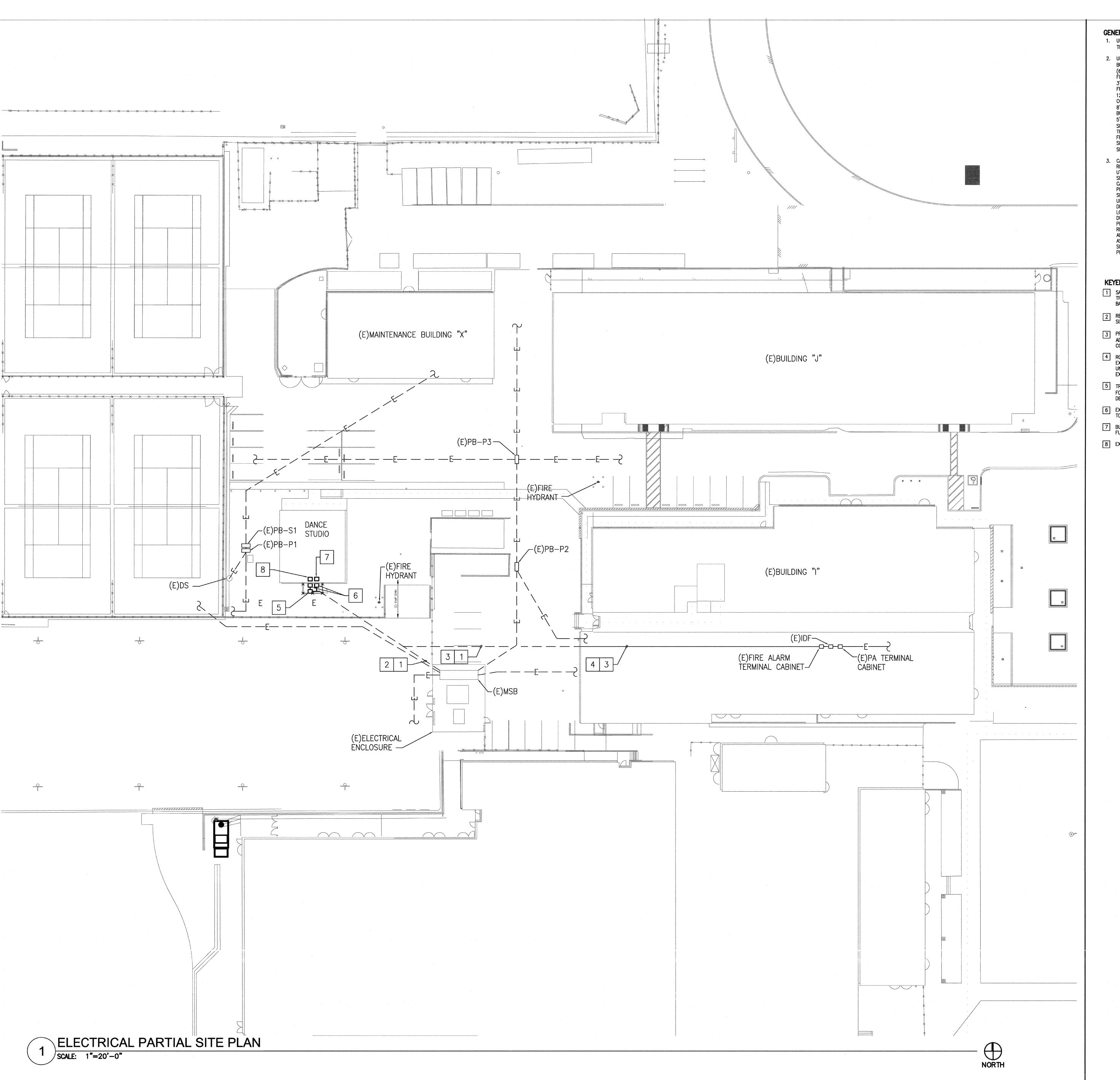
Construction Documents

TECHNOLOGY

GENERAL

SPECIFICATIONS

E0.2B



GENERAL NOTES

1. UNLESS NOTED OTHERWISE ALL UNDERGROUND CONDUIT SHOWN ON THIS PLAN TO BE MINIMUM 1" IN SIZE, TYPICAL.

2. UNDERGROUND CONDUITS: COMMUNICATION CONDUIT SHALL BE BURIED A MINIMUM 24" BELOW FINISHED GRADE POWER CONDUITS (600 VOLT OR LESS) SHALL BE BURIED A MINIMUM 36" BELOW FINISHED GRADE. CONDUITS SHALL BE CONCRETE ENCASED MINIMUM 3" AROUND EACH CONDUIT. CONDUITS SHALL BE SPACED 3" APART FROM OUTSIDE EDGE OF CONDUIT. SPACING SHALL BE INCREASED TO 12" MINIMUM BETWEEN POWER AND COMMUNICATION CONDUITS. CONDUITS SHALL BE ARRANGED WITH INTERLOCKING PLASTIC SPACERS 8'-0" ON CENTER. WHERE CONDUIT TRENCH RUNS PARALLEL WITH BUILDING AND SIMILAR STRUCTURES. TRENCH SHALL BE A MINIMUM 5'-0" FROM BUILDINGS AND STRUCTURES. YELLOW WARNING TAPE SHALL BE PLACED 12" ABOVE CONCRETE ENCASEMENT. BACKFILL OF TRENCH SHALL BE COMPACTED TO 90% RELATIVE DENSITY. FREE FROM LARGE ROCKS AND DEBRIS, CONDUIT RISER ABOVE GRADE SHALL BE OVC COATED GALVANIZED RIGID STEEL. CONDUIT RISERS SHALL BE STUBBED UP TO A MINIMUM 6" ABOVE FINISHED GRADE.

3. CAUTION - EXISTING UTILITIES: THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITY LINES INCLUDING ELECTRICAL, COMMUNICATIONS, FIRE ALARM, SEWER, WATER, GAS, ETC. IN ADDITION THE CONTRACTOR SHALL CAUTION ALL SUBCONTRACTORS THAT THE SITE AND PUBLIC PROPERTY CONTAINS UNDERGROUND UTILITY LINES. THE DRAWINGS SHOW DIAGRAMMATICALLY THE APPROXIMATE LOCATION OF UNDERGROUND UTILITIES WHERE INFORMATION IS AVAILABLE, BUT THE DRAWINGS ARE NOT EXACT AS TO THE QUANTITY, EXTENT, OR LOCATION. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION DURING ALL PHASES OF THE WORK TO LOCATE, IDENTIFY, AND PROTECT EXISTING UNDERGROUND UTILITIES. THE CONTRACTOR SHALL RECORD THE LOCATION OF, DISCONNECT, AND CAP AS REQUIRED, AND REPAIR DAMAGE TO EXISTING UTILITIES WHICH ARE ENCOUNTERED AS A RESULT OF WORK UNDER THIS CONTRACT. THE CONTRACTOR SHALL MAINTAIN UTILITIES TO EXISTING ADJACENT BUILDINGS OR PROVIDE TEMPORARY SERVICE CONNECTIONS.

KEYED NOTES

- SAWCUT, TRENCH, EXCAVATE, HAND DIG, & PROVIDE SHORING AT DEEP TRENCHES AS REQUIRED TO INSTALL CONDUIT AND FEEDERS AS INDICATED. BACKFILL, TAMP AND RESURFACE TO ORIGINAL CONDITION.
- REFER TO THE ELECTRICAL SINGLE-LINE DIAGRAM FOR CONDUIT/FEEDER SIZES AND QUANTITIES.
- 3 PROVIDE 1-1/2" CONDUIT FOR DATA, 1-1/2" CONDUIT FOR PUBLIC ADDRESS, AND 1-1/2" CONDUIT SPARE WITH PULL ROPE. REFER TO THE COMMUNICATIONS RISER DIAGRAMS FOR FURTHER INFORMATION.
- 4 ROUTE CONDUITS CONCEALED IN CEILING SPACE, STUB OUT TO BUILDING EXTERIOR, RUN DOWN EXTERIOR BUILDING WALL, AND TRANSITION TO UNDERGROUND. PAINT ALL EXTERIOR EXPOSED CONDUITS TO MATCH EXISTING ADJACENT SURFACE.
- 5 TRANSFORMER "TR-DS". REFER TO THE ELECTRICAL SINGLE-LINE DIAGRAM FOR FURTHER INFORMATION. REFER TO 6&7&8/E3.0 FOR ANCHORAGE
- 6 EXPOSED PULLBOXES AT REAR OF BUILDING. EXTEND CONDUIT & WIRING TO ROOM ELECTRICAL PANEL & IDF AS REQUIRED.
- 7 BUILDING IDF. REFER TO THE COMMUNICATIONS RISER DIAGRAM FOR FURTHER INFORMATION.
- 8 EXISTING PANELBOARD BY BUILDING MANUFACTURER.



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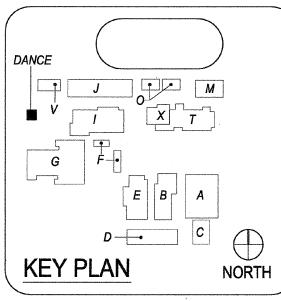
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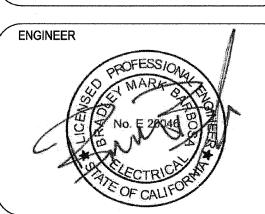
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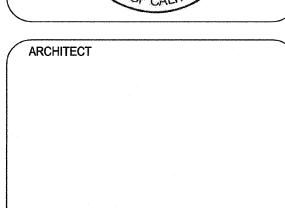
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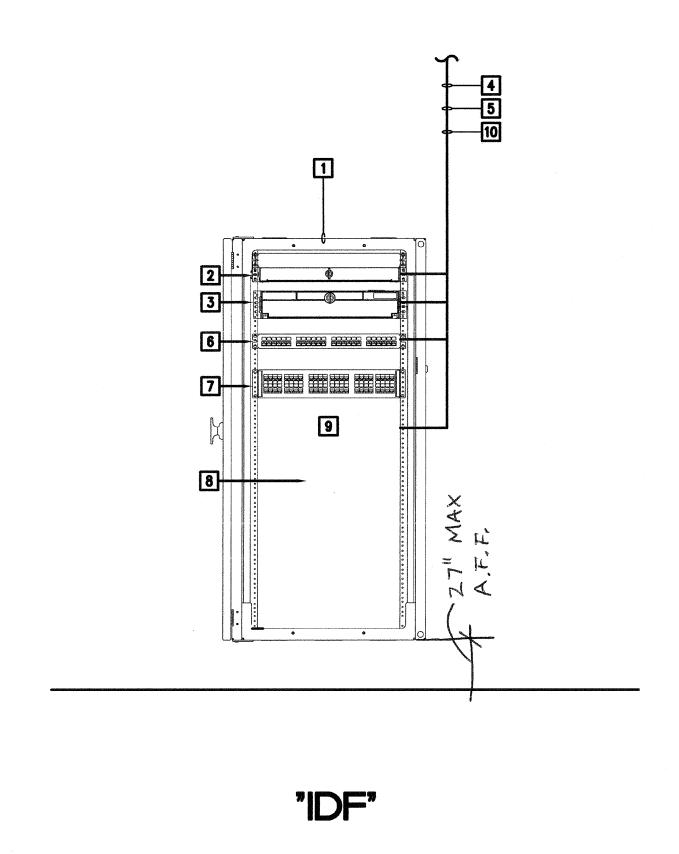




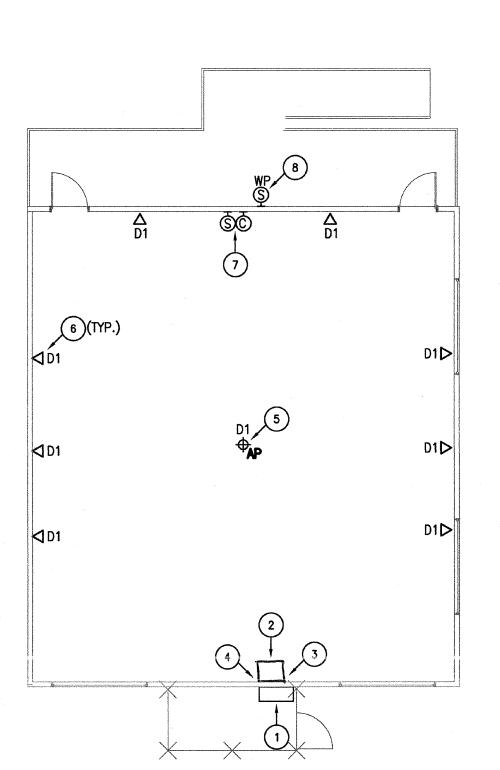
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Construction Documents

ELECTRICAL PARTIAL SITE PLAN



IDF RISER DIAGRAM



TECHNOLOGY FLOOR PLAN SCALE: 1/8"=1'-0"

NORTH

NORTH

IDF RISER KEYED NOTES

- 1 CONTRACTOR TO PROVIDE AND INSTALL A NEW WALL MOUNTED RACK WITH ALL REQUIRED MOUNTING HARDWARE. REFER TO 9/E3.0 FOR MOUNTING DETAIL.
- 2 INDICATES A LOCATION TO BE DESIGNATED FOR THE INCOMING SERVICE FIBER.
- 3 CONTRACTOR TO PROVIDE AND INSTALL A RACK MOUNTED, 2RU FIBER OPTIC ENCLOSURE, ALL FIBER OPTIC TIE CABLE TO IDFS ARE TO BE TERMINATED IN THIS ENCLOSURE. PROVIDE AND INSTALL THE FIBER OPTIC ADAPTER PLATES REQUIRED TO ACCOMMODATE 110% OF THE INSTALLED FIBER OPTICS.
- 4 CONTRACTOR TO PROVIDE AND INSTALL A 12-STRAND 50/125UM, INTERLOCKING ARMORED FIBER OPTIC CABLE FROM THE (E)IDF BLDG.I TO THE DANCE STUDIO IDF. CABLE SHALL BE RATED FOR PLENUM SPACE.
- 5 CONTRACTOR TO PROVIDE AND INSTALL A 25-PAIR, CATEGORY 3 UTP COPPER TIE CABLE FROM THE (E)IDF BLDG.I TO THE DANCE STUDIO IDF. TERMINÀTE TIE CABLE ONTO DESIGNATED 24-PORT PATCH PANEL, 1-PAIR PER PORT. CABLE SHALL BE RATED FOR PLENUM SPACE.
- 6 CONTRACTOR TO PROVIDE AND INSTALL A 24-PORT PATCH PANEL WITH ALL REQUIRED MOUNTING HARDWARE AND TERMINATION COMPONENTS, FOR THE TERMINATION OF 25-PAIR IDF TO IDF TIE CABLES.
- 7 CONTRACTOR TO PROVIDE AND INSTALL A 48-PORT PATCH PANEL WITH ALL REQUIRED MOUNTING HARDWARE AND TERMINATION COMPONENTS, FOR THE TERMINATION OF ALL DATA CABLES IN THIS COMMUNICATIONS CLOSET. PANELS SHOWN ARE AN ESTIMATE. CONTRACTOR TO PROVIDE THE REQUIRED AMOUNT TO TERMINATE 110% OF THE TOTAL NUMBER OF CABLES TERMINATING IN EACH CLOSET.
- 8 THIS PORTION OF RACK IS RESERVED FOR OWNER PROVIDED SWITCHES.
- 9 CONTRACTOR TO PROVIDE AND INSTALL IP GATEWAY ZONE AMPLIFIERS FOR INTERIOR & EXTERIOR PA SPEAKERS.
- 10 CONTRACTOR TO PROVIDE AND INSTALL INTERIOR & EXTERIOR ZONE SPEAKER WIRES FROM EXISTING PA TERMINAL CABINET IN BUILDING "I".

TECHNOLOGY KEYED NOTES

- (1) EXPOSED PULLBOX AT REAR OF BUILDING.
- 2) INDICATES THE LOCATION OF A NEW WALL MOUNTED SWINGING NETWORK RACK. CONTRACTOR TO PROVIDE AND INSTALL RACK AND ALL REQUIRED MATERIALS TO MOUNT THIS RACK AT THE DESIGNATED LOCATION.
- (3) INDICATES THE LOCATION OF A 3/4" FIRE RATED PLYWOOD. CONTRACTOR TO PROVIDE AND INSTALL PLYWOOD AND ALL REQUIRED MOUNTING HARDWARE. PLYWOOD SHALL BE PAINTED WHITE WITH FIRE RATED PAINT. TYPICAL FOR ALL
- (4) INDICATES THE LOCATION OF A NEW WALL MOUNTED GROUND BUS BAR. CONTRACTOR TO PROVIDE BUS BAR AND ALL REQUIRED MATERIAL TO MOUNT AT THE LOCATION SHOWN.
- (5) OWNER PROVIDED CONTRACTOR INSTALLED WIRELESS ACCESS POINT. PROVIDE QUANTITY OF CAT-6 CABLES & CONNECTORS AS INDICATED. ALL CABLES SHALL BE ROUTED IN CONDUIT.
- (6) DATA OUTLET. PROVIDE QUANTITY OF CAT-6 CABLES & JACKS AS INDICATED. ALL CABLES SHALL BE ROUTED IN CONDUIT.
- (7) COMBINATION CLOCK AND PUBLIC ADDRESS SPEAKER WITH CONDUIT & WIRING TO SOURCE.
- (8) EXTERIOR PUBLIC ADDRESS SPEAKER WITH VANDAL GUARD AND CONDUIT & WIRING TO SOURCE.

ELECTRICAL KEYED NOTES

- 1 ROUTE CONDUIT AND WIRINGS TO ELECTRICAL --- PANEL. TYPICAL FOR HOME RUNS UNLESS NOTED OTHERWISE.
- 2 EXTEND CONDUIT AND WIRINGS TO DEVICES WHERE CIRCUITS ARE INDICATED. TYPICAL.
- 3 RECEPTACLE FOR IDF.
- 4 EXTERIOR SURFACE MOUNTED ARCHITECTURAL WALL SCONCE, 25 WATTS, 3000 LUMENS, FORWARD THROW, WITH INTEGRAL OCCUPANCY SENSOR, STEP DIMMING DRIVER, AND 90 MINUTE EMERGENCY BATTERY PACK. LITHONIA #WST-LED-P2-40K-VF-MVOLT-PIR-E20WH.
 ARCHITECT TO VERIFY FINISH PRIOR TO ORDERING.
- 5 TIME CLOCK AND EXTERIOR ROOF MOUNTED NORTH FACING PHOTO—CELL FOR CONTROL OF EXTERIOR LIGHTING FIXTURES.
- 6 EXPOSED PULLBOX AT REAR OF BUILDING.
- 7 TRANSFORMER "TP". REFER TO SINGLE LINE DIAGRAM E0.1 FOR FURTHER INFORMATION. SEE 6/E3.0 FOR ANCHORAGE DETAIL

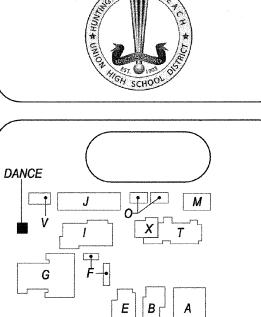


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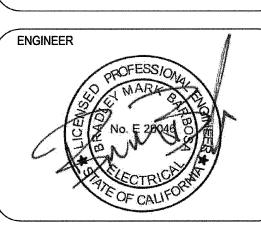
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> HIGH UDIO 92648 JNTINGTON BEACH BEACH,

1905 MAIN ST HUNTINGTON F HOSC



KEY PLAN FILE NO. 30-H5 **IDENTIFICATION STAMP** DIV. OF THE STATE ARCHITECT APPL. 04-118263 ACS FLS 14 SS /



ARCHITECT

CLIENT HUNTINGTON BEACH UNION HIGH SCHOOL DISTRICT PROJECT NUMBER 18296 05/09/19

DRAWN BY: Author Checker CHECKED BY: REVISIONS

Description

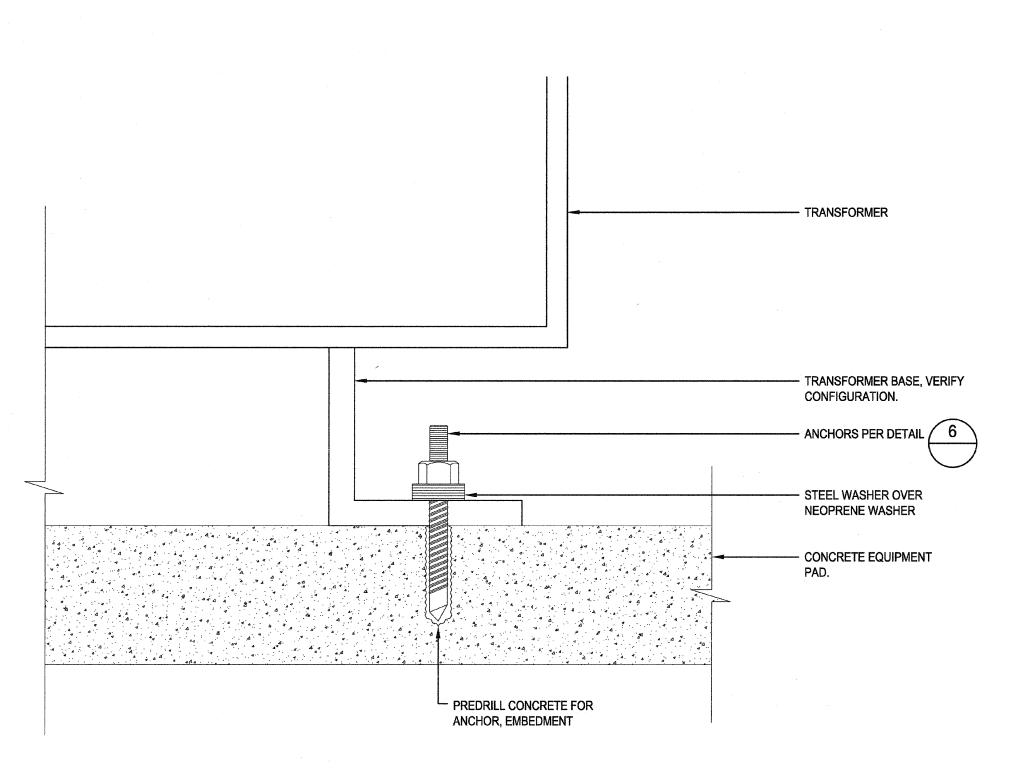
Construction Documents

ELECTRICAL & TECHNOLOGY FLOOR PLAN

E2.0



_P-10



TRANSFORMER MOUNTING DETAIL

- #4 @ 12"O.C. EACH WAY,

3" CLR. TYP.

FASTEN UNISTRUT TO BUILDING WALL STUD 4 PLACES (1 EACH

4"x4" BLOCKING BETWEEN STUDS. SECURE 3/8"Ø x 4" LAG BOLT AT EACH STUD TOP AND BOTTOM.

- A34 CLIPS TOP AND BOTTOM, (TYP.)

- 4"x4" BLOCKING BETWEEN STUDS.

AT EACH STUD TOP AND BOTTOM.

SECURE 3/8"Ø x 4" LAG BOLT

PREDRILL HOLE

PREDRILL HOLE

BUILDING WALL

TOP AND BOTTOM

HOUSE KEEPING PAD DETAIL

1/4"Ø x 3" LONG LAG BOLT (4 TOTAL). PREDRILL BACKING

(200 LBS MAX.)

3/8" BOLT, SPRING NUT

AND WASHERS (TYPICAL

FOR EACH CORNER)

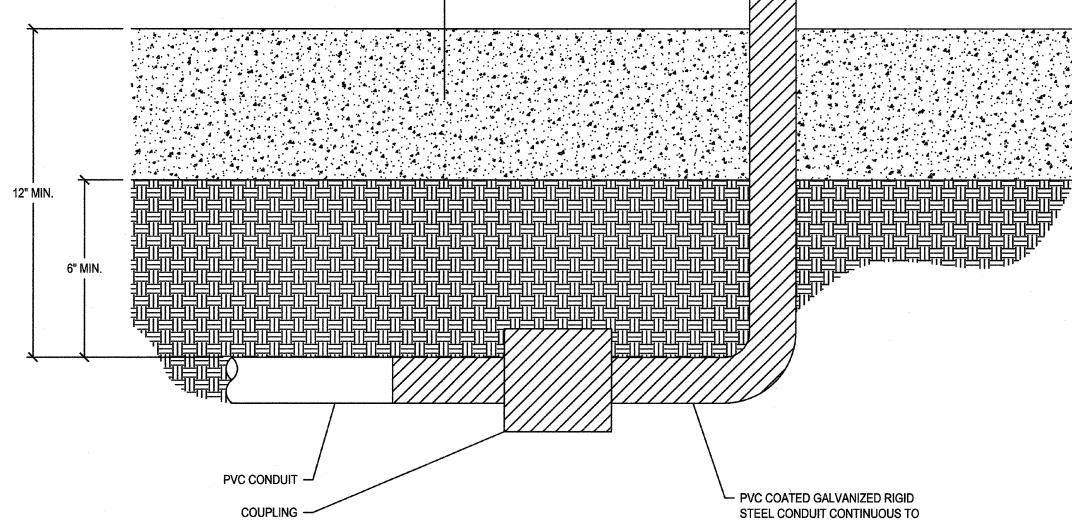
LENGTH AS REQUIRED

P-1000 UNISTRUT.

ANCHOR SWITCHBOARD SECTIONS

WITH WEDGE ANCHORS PER DETAIL

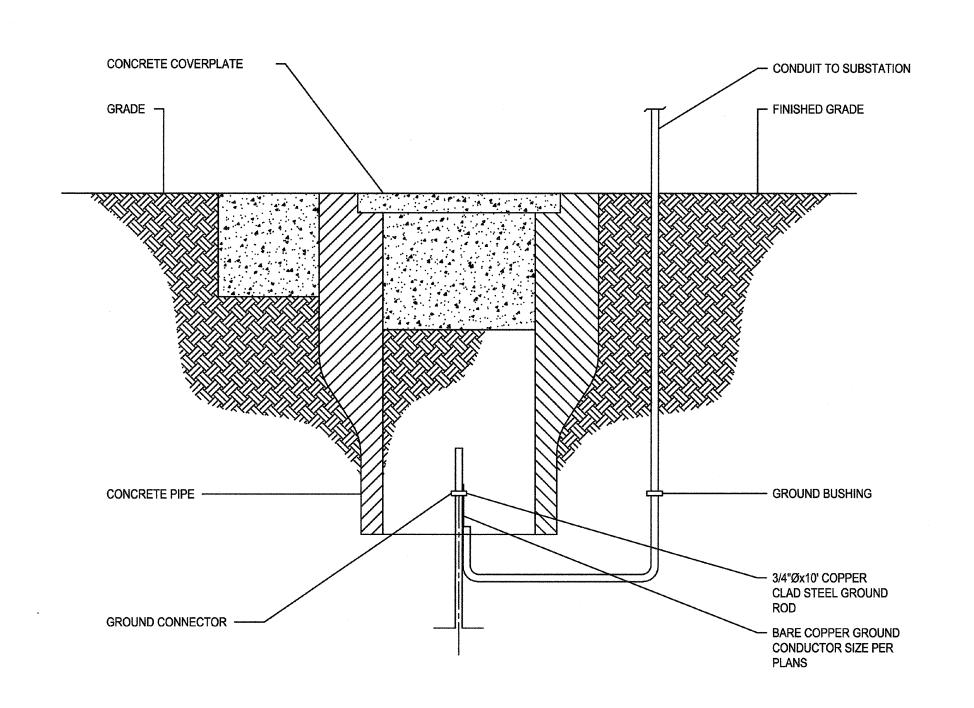
FINISH GRADE



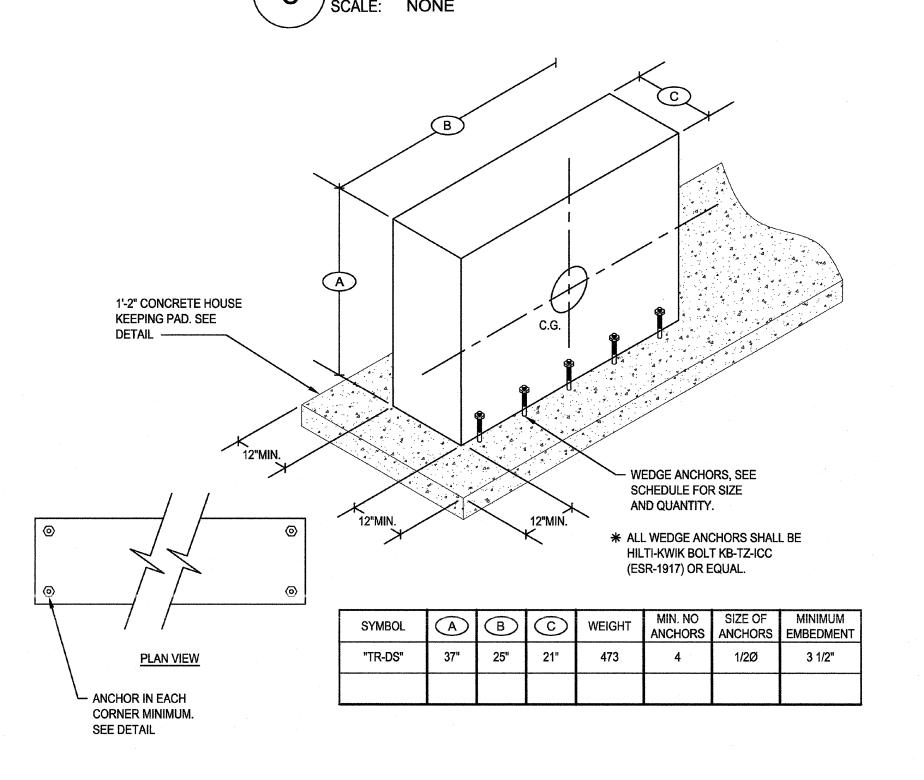
CONCRETE FLOOR

CONDUIT INSTALLED BELOW GRADE TO ABOVE GRADE DETAIL

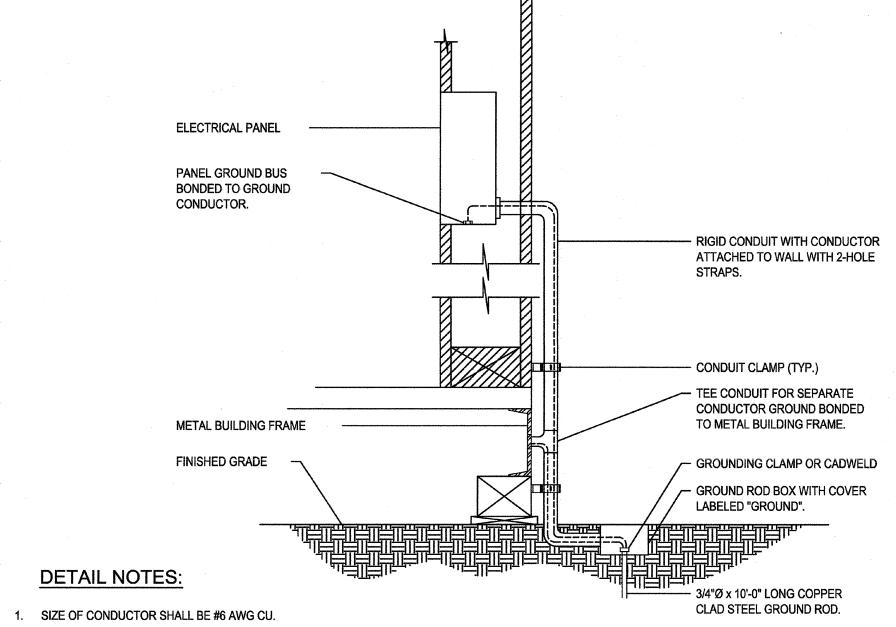
6" ABOVE FINISHED GRADE



GROUND ROD DETAIL



SWITCHBOARD & TRANSFORMER MOUNTING DETAIL

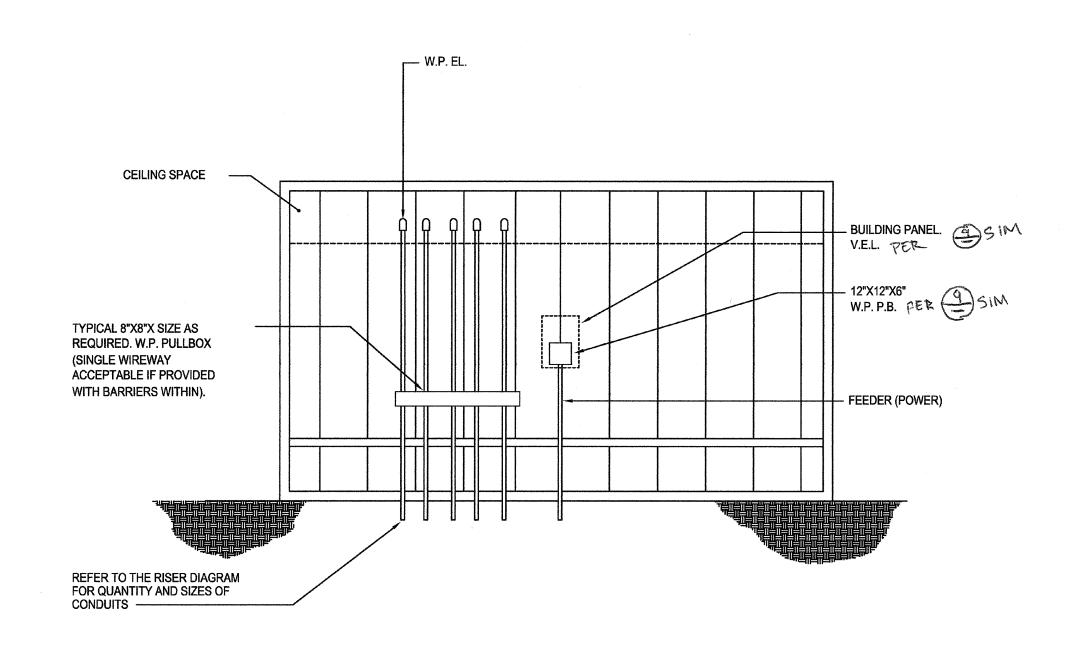


2. BOND SEPARATE CONDUCTORS FROM GROUND ROD TO ELECTRICAL PANEL AND TO METAL BUILDING FRAME (CEC. 250-81). IN ADDITION TO THE DETAIL SHOWN ABOVE, BOND THE ELECTRICAL GROUND TO METAL WATER PIPE EMBEDDED AT LEAST 10 FT. INTO THE SOIL IF AVAILABLE

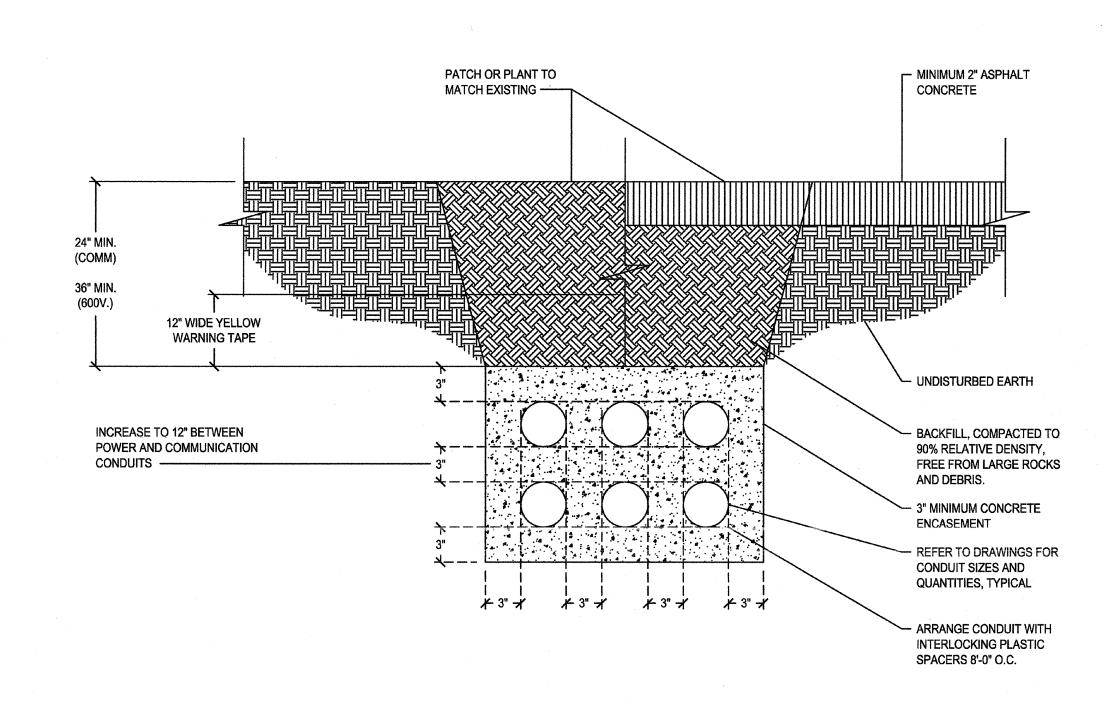
4. CHECK RESISTANCE TO GROUND. IF RESISTANCE EXCEEDS 25 OHMS, INSTALL ADDITIONAL GROUND RODS WITH CONDUCTORS AS SHOWN, SEPARATED AT LEAST 6'-0" UNTIL RESISTANCE IS REDUCED TO 25 OHMS OR LESS. (CEC. 250-84).

5. GROUND TEST SHALL BE WITNESSED BY PROJECT INSPECTOR, AND RECORDED FOR OWNER MANUAL.

PORTABLE BUILDING GROUNDING DETAIL



PORTABLE BUILDING ELEVATION DETAIL



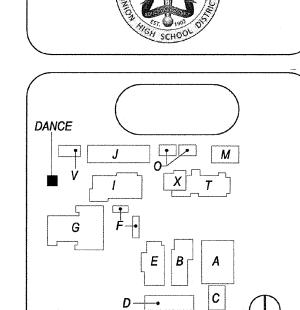
TYPICAL MULTI-CONDUIT PLACEMENT DETAIL



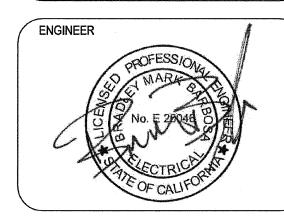
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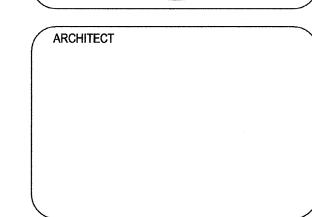
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FILE NO. 30-H5 **IDENTIFICATION STAMP** DIV. OF THE STATE ARCHITECT APPL. 04-118263





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18296	
05/09/19	
Author	
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Description	D
struction Docume	ents
	05/09/19 Author Y: Checker

ELECTRICAL DETAILS

SURFACE MOUNTED PANEL/CABINET AT WOOD FRAMING (9) SCALE: NONE

00

SCALE: NONE

		DE	VICE SCHE	EDULE		
YMBOL	DESCRIPTION	MODEL	MANUFACTURER	BACKBOX	MOUNTING HEIGHT	C.S.F.M. NUMBER
FACP	EXISTING FIRE ALARM CONTROL PANEL (A# 04-102053)	IFP-1000	SILENT KNIGHT			7170-0559:0135
FAPS	EXISTING FIRE ALARM POWER SUPPLY PANEL (A# 04-102053)	RPS-1000	SILENT KNIGHT			7170-0559:0135
ANN	EXISTING FIRE ALARM ANNUNCIATOR (A# 04-102053)	RA-1000	SILENT KNIGHT			7170-0559:0135
S _P	AREA SMOKE DETECTOR (ADDRESSABLE - PHOTOELECTRIC)	SD505-ADHR	SILENT KNIGHT	4S DEEP BOX W/ 3-0 RING	CEILING	7300-0900:0138
	HEAT DETECTOR (ATTIC)	SD505-AHS	SILENT KNIGHT	4S DEEP BOX W/ 3-0 RING	ATTIC SPACE	7300-0900:0138
Ž 4	FIRE ALARM CEILING MOUNTED HORN/STROBE	PC2WL	SYSTEM SENSOR	4S DEEP BOX W/ 4S EXTENSION		7125-1653:0188
™ WP	FIRE ALARM EXTERIOR WEATHERPROOF HORN	HRK	SYSTEM SENSOR	EWR		7135-1653:0189
- ∤ EOL	END OF LINE RESISTOR	N/A	N/A	N/A	N/A	N/A

ELEVATION MOUNTING DETAIL

---- 4-S BOX WITH 3" RING

SMOKE DETECTOR

* PULL STATION

48"A.F.F.

TO TOP OF DEVICE

SMOKE DETECTOR NOT -

TO BE INSTALLED IN

SPEAKER/STROBE

AND STROBE

80" A.F.F.

FINISHED CEILING

SPEAKER ONLY

A.F.F.

90" A.F.F. OR 6"

BELOW CEILING

WHICHEVER IS

LOWER

SOUND CONTROL PANEL TROUBLE BUZZER

ANNUNCIATE AT

FIRE CONTROL PANEL (ALARM OR TROUBLE)

REMOTE FIRE ALARM ANNUNCIATOR

(ALARM OR TROUBLE)

VISUAL ALARM SIGNAL THROUGHOUT BUILDING

4" OCTAGON BACK BOX

• THE ENTIRE LENS OF STROBE LIGHTS MUST BE BETWEEN 80"

• IF CEILING HEIGHTS EXCEED 30 FEET, STROBE LIGHTS MUST BE SUSPENDED AT OR BELOW 30 FEET

* MANUAL FIRE ALARM BOXES SHALL BE INSTALLED IN

THAN 5 FEET FROM THE ENTRANCE TO EACH EXIT.

ACCORDANCE WITH SECTIONS 907.3.1 THROUGH 907.3.5

MANUAL FIRE ALARM BOXES SHALL BE LOCATED NOT MORE

ADDITIONAL MANUAL FIRE ALARM BOXES SHALL BE LOCATED

SO THAT THE TRAVEL DISTANCE TO THE NEAREST BOX DOES

MINIMUM OF 42 INCHES AND A MAXIMUM OF 48 INCHES,

MEASURED VERTICALLY, FROM THE FLOOR LEVEL TO THE

BOX. MANUAL FIRE ALARM BOXES SHALL ALSO COMPLEY

EXCEPTIONS: [DSA-AC] IN EXISTING BUILDINGS THERE IS NO

REQUIREMENTS TO RETROACTIVELY RELOCATE EXISTING

MANUAL FIRE ALARM BOXES TO A MINIMUM OF 42 INCHES

THE ACTIVATING HANDLE OR LEVER OF THE BOX

AND A MAXIMUM OF 48 INCHES FROM THE FLOOR LEVEL TO

HIGHES POINT OF THE ACTIVATING HANDLE OR LEVER OF THE

AND 96" ABOVE FLOOR FINISH (AFF)

NOT EXCEED 200 FEET.

WITH SECTION 1117B.6 ITEM 4.

- 4-S BOX WITH NO

---- 4-S BOX

FINISHED FLOOR

SEQUENCE OF OPERATION

WITH SINGLE GANG RING

RING FLUSH TO WALL

FOR STROBE ONLY

OF SINGLE GANG RING

DESCRIPTION **ABBREVIATION ABBREVIATION DESCRIPTION NOT IN CONTRACT** A OR AMP **AMPERES** NO. NUMBER ABOVE FINISHED FLOOR PHASE AMPERES INTERRUPTING CAPACITY **PANEL** PNL ARCH. ARCHITECT; ARCHITECTURAL **POWER** AWG AMERICAN WIRE GAUGE REC/RECEPT RECEPTACLE CONDUIT REQUIRED CIRCUIT CKT CEILING MOUNTED DEVICE ROOM **SQUARE FEET** C.O. CONDUIT ONLY WITH PULL WIRE SHEET COPPER SINGLE POLE DWG **DRAWING** SPECS **SPECIFICATIONS EACH ELECTRICAL METALLIC TUBING** SWITCH **EMT TYPICAL EQUIP EQUIPMENT** UG UNDERGROUND EXIST / (E) **EXISTING** UNLESS OTHERWISE NOTED **FINISH FLOOR VOLTS** FEET **VOLT-AMPERES** WATTS GROUND FAULT INTERRUPTER WITH GND GROUND LTG. W/O WITHOUT LIGHTING WP **WEATHERPROOF** MOUNTING NORTH NEC NATIONAL ELECTRICAL CODE

LEGENDS

GENERAL NOTES

- ALL WALL-MOUNTED AUDIBLE & VISUAL SIGNALING APPLIANCES SHALL HAVE THEIR HEIGHTS ABOVE THE FINISHED FLOOR AT 90" TO BOTTOM. NFPA 72, 1999 EDITION, ALLOWS 80"-96" FOR VISUAL DEVICES (CH. 6-4.4) AND REQUIRES A MINIMUM OF 90" TO TOP FOR AUDIBLE DEVICES (CH. 6-3.7)
- 2. ALL EQUIPMENT SHALL BE U.L. AND C.S.F.M. LISTED.
- ALL WIRING SHALL BE IN ACCORDANCE WITH THE C.E.C. AND AUTHORITIES HAVING
- 4. ALL JUNCTION BOXES SHALL BE SIZED IN ACCORDANCE WITH THE C.E.C.
- ELECTRICAL CONTRACTOR SHALL FURNISH ACCESS PANELS TO AREAS THAT REQUIRE SERVICING, TROUBLE SHOOTING, ETC.
- DO NOT DEVIATE FROM CONDUIT RUNS AS SHOWN ON FLOOR PLANS WITHOUT PRIOR APPROVAL FROM SYSTEM SUPPLIER. FACTORS SUCH AS EXCESSIVE VOLTAGE DROP, ADDITIONAL PARTS, ENGINEERING, ETC., THAT ARE A RESULT OF CONDUIT RUN DEVIATIONS SHALL BE THE SOLE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
- DETECTORS SHALL NOT BE LOCATED IN A DIRECT AIR-FLOW, NOR CLOSER THAN 3 FEET (900mm) FROM AN AIR SUPPLY DIFFUSER.
- ALL FAN SHUTDOWN FUNCTIONS, DAMPER CLOSURES, AND ASSOCIATED MECHANICAL SYSTEM FIRE ALARM INTERFACE SHALL BE BY MECHANICAL CONTRACTOR.
- ALL DUCT SMOKE DETECTORS SHALL BE MOUNTED BY THE MECHANICAL CONTRACTOR. DUCT SMOKE DETECTORS EXPOSED TO THE WEATHER SHALL BE WEATHER PROTECTED BY THE MECHANICAL CONTRACTOR. ALL AIR VELOCITY TESTING SHALL BE PERFORMED BY THE
- ALL 120VAC POWER REQUIREMENTS FOR THE FIRE ALARM SYSTEM SHALL BE FURNISHED BY THE ELECTRICAL CONTRACTOR AND SHALL MEET ALL REQUIREMENTS OF THE AUTHORITIES
- ALL FIRE ALARM DEVICE BACKBOXES, FIRE ALARM TERMINAL CABINETS, GUTTERS, JUNCTION BOXES, AND ASSOCIATED CONDUITS SHALL BE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR UNLESS OTHERWISE NOTED. REFER TO FIRE ALARM SYMBOL LIST AND/OR MOUNTING DETAILS FOR ADDITIONAL INFORMATION, SYSTEM SUPPLIER PROVIDED BACKBOXES SHALL BE INSTALLED BY ELECTRICAL CONTRACTOR UNLESS OTHERWISE NOTED.
- SMOKE DETECTOR TESTING SHALL BE ACCOMPLISHED PER THE MANUFACTURER'S INSTRUCTIONS.

ANNUNCIATOR PANEL, ALL INITIATING AND INDICATING DEVICE CIRCUITS.

- ALL WIRING, INITIATING DEVICES AND ANNUNCIATOR PANEL SHALL BE SUPERVISED TO THE PRINCIPAL POINT OF ANNUNCIATION. THE FIRE ALARM CONTROL PANEL TO SUPERVISE THE
- 14. ALL WIRING SHALL BE CUT FOR IN AND OUT. WIRING SHALL NOT BE LOOPED THROUGH
- POINT AND COMMON ANNUNCIATION AND T-TAPPING ARE PROHIBITED.
- PROVIDE 3/4" CONDUIT FROM FIRE ALARM CONTROL PANEL TO TELEPHONE BACKBOARD FOR OWNER PROVIDED CENTRAL STATION MONITORING.
- THE ALARM SYSTEM SHALL HAVE AN AUDIBILITY OF NOT LESS THAN 15dB ABOVE AMBIENT NOISE LEVELS. TESTING SHALL BE ACCOMPLISHED WITH A dB.METER. WHERE APPLICABLE,
- 18. ALL CONDUIT SHALL BE 3/4" UNLESS OTHERWISE NOTED.

AUDIBLE TONE SHALL BE TEMPORAL PATTERN.

ALL FLOW SWITCHES SHALL BE 2 WIRE WITH NON-ELECTRONIC RETARD TYPE SIMILAR TO THE SYSTEM SENSOR MODEL "WFD SERIES" ONLY.

SYSTEM SHALL BE FURNISHED AND INSTALLED BY A NESCO AFFILIATE AND AUTHORIZED

- ALL DEVICES IN THE ALARM SYSTEM SHALL BE COMPATIBLE AND INSTALLED PER
- MANUFACTURER'S SPECIFICATIONS.
- NOTIFIER DISTRIBUTOR.

22. FIRE ALARM SYSTEM INSTALLATION COMPANY SHALL BE UL LISTED (UUJS).

FIRE ALARM REQUIREMENTS

- THE CONTRACTOR SHALL PROVIDE AND SUBMIT THE FIRE ALARM SHOP DRAWINGS TO THE ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION OF THE FIRE ALARM SYSTEM. THE SUBMITTAL SHALL CONTAIN THE FOLLOWING:
- A. SHOP DRAWINGS: COMPLETE 1/8" SCALE FLOOR PLANS SHOWING ALL DEVICES, COMPONENTS, CONDUIT AND WIRING INDICATING A COMPLETE AND OPERABLE SYSTEM AS DESIGNED AND SPECIFIED. REPRODUCED COPIES OF BID SET FIRE ALARM PLANS ARE NOT ACCEPTABLE AS SHOP DRAWINGS. SHOP DRAWINGS MUST ALSO INDICATE DEVICE MOUNTING HEIGHTS, ROOM NAMES AND NUMBERS AND THE LOCATION OF ALL FIRE RATED WALLS.
- B. ELECTRICAL CONTRACTOR'S AND FIRE ALARM SYSTEM INSTALLER'S NAME, ADDRESS, PHONE NUMBER AND C-10 LICENSE NUMBER.
- C. LIST OF SYSTEM COMPONENTS, EQUIPMENT AND DEVICES, INCLUDING MANUFACTURERS' MODEL NUMBER(S) AND CALIFORNIA STATE FIRE MARSHALL LISTING NUMBERS.
- E. VOLTAGE DROP CALCULATIONS -- INCLUDE THE FOLLOWING INFORMATION FOR THE WORST

D. ORIGINAL COPIERS OF MANUFACTURERS' SPECIFICATION SHEETS FOR ALL EQUIPMENT AND

- POINT-TO-POINT OR OHMS LAW CALCULATIONS. IDENTIFICATION OF ZONE USED IN CALCULATIONS.
- VOLTAGE DROP PERCENT (NOT TO EXCEED MANUFACTURERS' REQUIREMENTS). NOTE: IF VOLTAGE DROP EXCEEDS 10% INDICATE MANUFACTURERS' LISTED OPERATING RANGE(S) OR EQUIPMENT AND DEVICES.
- 4. NOTE CIRCUIT NUMBER FOR WORST CASE CALCULATION. F. BATTERY TYPE(S), AMPS HOURS AND LOAD CALCULATIONS -- INCLUDE THE FOLLOWING
- NORMAL OPERATION: 100% OF APPLICABLE DEVICES FOR 24 HOURS = CONTROL PANEL PLUS LIST OF AMPS PER DEVICE WHICH DRAW POWER FROM THE PANEL DURING
- STANDBY POWER -- I.E.:
 - ZONE MODULES DETECTORS

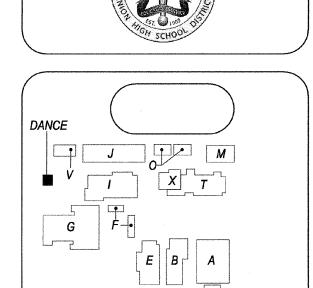
STANDBY

- OTHER DEVICES (IDENTIFY) ALARM CONDITION: 100% OF APPLICABLE DEVICES FOR 15 MINUTES = CONTROL PANEL PLUS LIST OF AMPS PER DEVICE WHICH DRAW POWER FROM THE PANEL DURING
- POWER -- I.E.:
- ZONE MODULES SIGNAL MODULES
- DETECTORS SIGNAL DEVICES
- ANNUNCIATOR OTHER DEVICES (IDENTIFY)
- NORMAL OPERATION + ALARM OPERATION TOTAL AMP HOURS REQUIRED.
- B. TOTAL AMP HOURS PROVIDED

WIRE SCHEDULE

			•
WIRE DESIGNATION	WIRE IN CONDUIT	WIRE IN CONDUIT UNDERGROUND/WET LOC.	UNDERGROUND/WET WIRE DESIGNATION
INIT. LOOP	2 CONDUCTOR #16 FPL TWISTED/	2 CONDUCTOR #16 FPLP SHIELDED	INIT. LOOP
Z	SHIELDED WEST PENN #D991	WEST PENN WEST PENN #AQ-294	UM
SPEAKER CKT.	2 CONDUCTOR #14 THHN/THWN	2 CONDUCTOR #14 THHN/THWN	AUDIBLE CKT.
S	STRANDED	STRANDED	S
VISUAL CKT.	2 CONDUCTOR #12 THHN/THWN	2 CONDUCTOR #12 THHN/THWN	AUDIBLE CKT.
V	STRANDED	STRANDED	V

ALL WIRE MODEL NUMBERS ARE WEST PENN. **EQUIVALENT BY OTHER MANUFACTURER IS ACCEPTABLE**



ARCHITECTURE

COSTA MESA

234 EAST 17TH STREET, SUITE 200

COSTA MESA, CA 92627 949-548-5000 P

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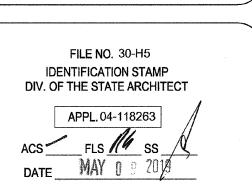
the user's sole risk and shall not form the basis for a

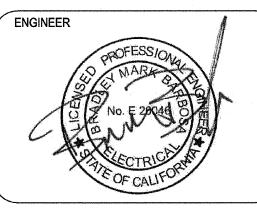
request for additional compensation or time.

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information included in the entire set of drawings will be at





ARCHITECT

CLIENT HUNTINGTON BEACH UNION HIGH

SCHOOL DISTRICT PROJECT NUMBER 18296

05/09/19 DRAWN BY: **Author** Checker CHECKED BY:

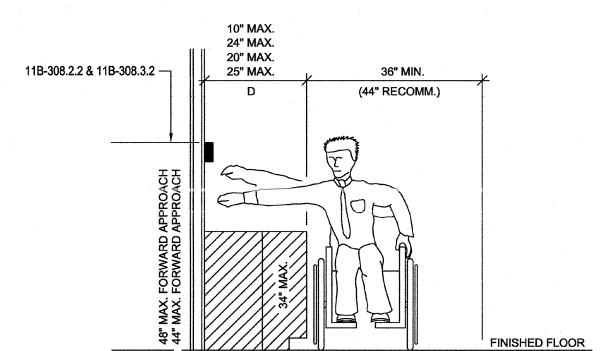
REVISIONS Description

Construction Documents

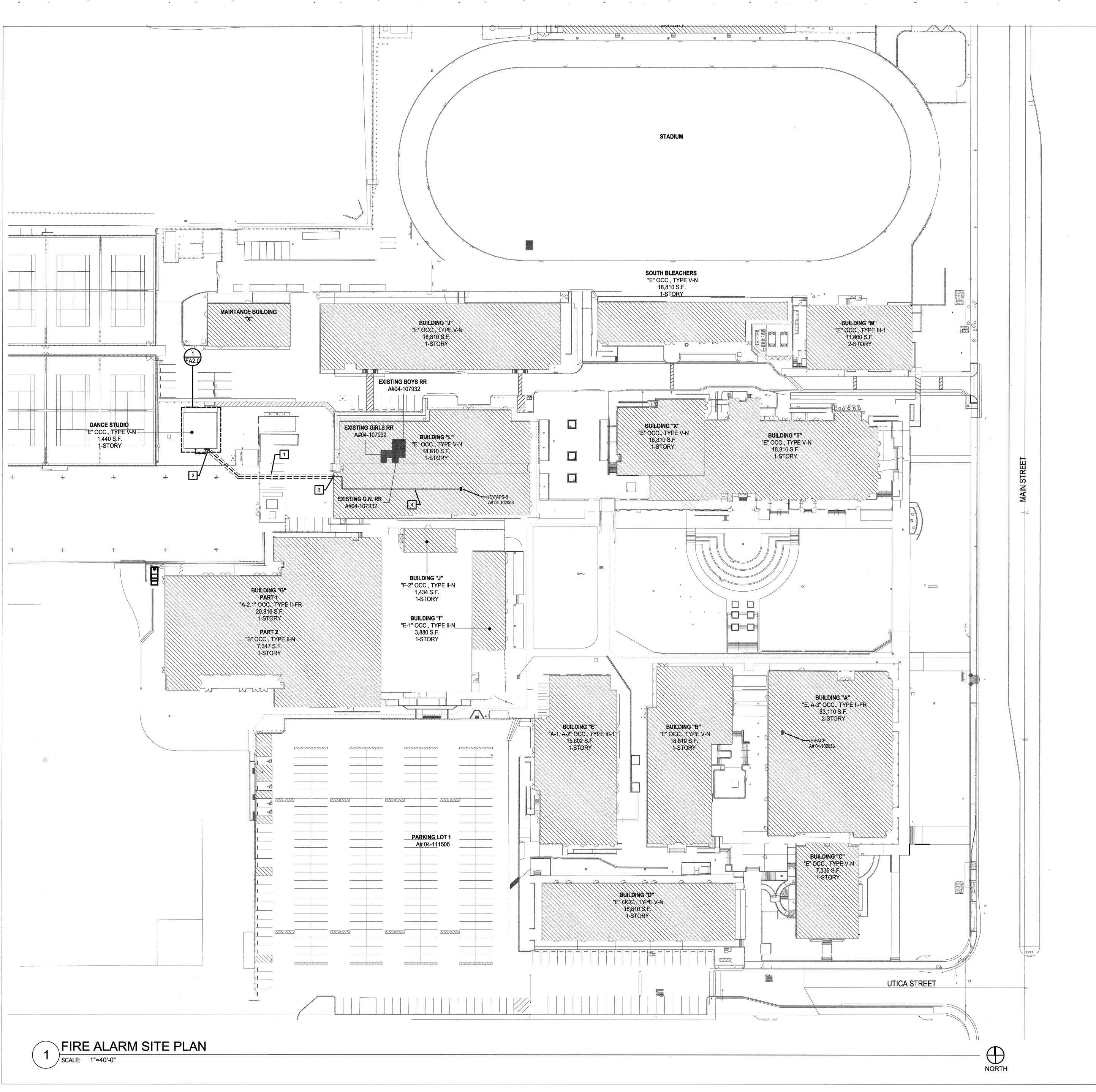
FIRE ALARM NOTES, SYMBOLS,

& LEGENDS

AREA
SMOKE
DETECTOR
HEAT
DETECTOR
HEAT
FAILURE YES|YES|YES|YES



MOUNTING OVER OBSTRUCTION DETAIL



KEYED NOTES

- SAW, CUT, & EXCAVATE EXISTING ASPHALT. PROVIDE 1"C (PVC, SCHEDULE 40) AND FIRE ALARM CABLES, 24" BELOW GRADE. PATCH AND COMPACT SURFACES TO MATCH EXISTING.
- PROVIDE 12"x12"x6"D NEMA-3R PULL BOX. MOUNT ON BACK OF PORTABLE BUILDING.
- PROVIDE 12"x12"x6"D NEMA-3R PULL BOX. PAINT TO MATCH EXISTING BUILDING.
- 4 RUN CONDUIT IN ATTIC SPACE TO EXISTING EXTENDER PANEL 'FAPS-8'



ARCHITECTURE

COSTA MESA
234 EAST 17TH STREET, SUITE 200
COSTA MESA, CA 92627
949-548-5000 P

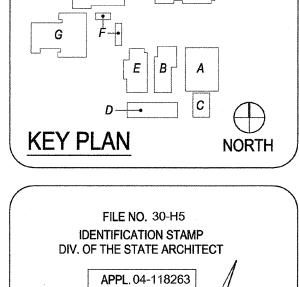
COSTA MESA, CA 92627
949-548-5000 P
949-548-5001 F
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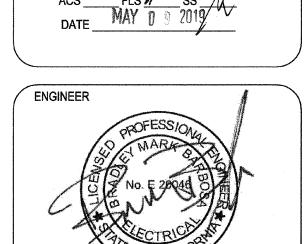
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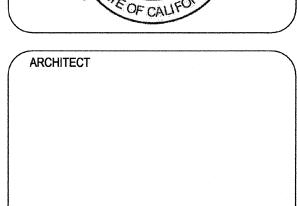
the user's sole risk and shall not form the basis for a request for additional compensation or time.

HUNTINGTON BEACH HIGH SCHOOL DANCE STUDIO 1905 MAIN ST HUNTINGTON BEACH, CA 92648









SCHOOL DISTRICT PROJECT NUMBER 18296 DATE: 05/09/19 DRAWN BY: Author CHECKED BY: Checker REVISIONS No. Description	HUN	CLIENT TINGTON BEACH U	NION HI
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DATE: 05/09/19 DRAWN BY: Author CHECKED BY: Checker REVISIONS			R
DRAWN BY: Author CHECKED BY: Checker REVISIONS		18296	
CHECKED BY: Checker REVISIONS	DATE:	05/09/19	
REVISIONS	DRAWN	BY: Author	
	CHECK	ED BY: Checker	
No. Description	REVISIO	DNS	
	No.	Description	

Construction Documents

FIRE ALARM SITE PLAN

FA1.0

FIRE ALARM CONTROL PANEL 'FACP'

(E) DEVICES (A# 04-102053)	STAND-BY CURRENT	ALARM CURRENT
CONTROL	0.140	0.260
REMOTE ANNUNCIATOR	0.020	0.025
SLC DEVICES	0.048	0.480
SLC LOOP EXPANDER	0.440	0.440
SERIAL/ PARALLEL MODULE	0.045	0.045
POWER EXPANDER	0.080	0.080
LED ANNUNCIATOR (4G)	0.035	0.145
LED ANNUNCIATOR (3G)	0.035	0.145
LED DRIVER MODULE	0.035	0.200
SOUNDER BASE	0.001	0.032
RELAY BASE	0.001	0.001
DUCT DETECTOR RELAY	0.070	0.150
	0.950	2.002

(4)	SMOKE DETECTOR	0.0003	0.0003
(3)	HEAT DETECTOR	0.0003	0.0003

TOTAL STANDBY CURRENT x 60 HOURS = 0.951A x 60 HOURS = 57.06 AMP-HOUR TOTAL ALARM CURRENT x 5 MINUTES = 2.002A x 0.0833 HOURS = 0.167 AMP-HOUR TOTAL MINIMUM AMPERE - HOUR RATING OF BATTERIES = 57.223 AMP-HOUR

FIRE ALARM EXPANDER PANEL 'FAPS-8'

0.060 	0.06 1.449
	1.449
Magazine Magazine	
	0.266
Marine Marine	0.583
	0.17
WARMS .	0.32
0.060	2.848
	0.143
	0.01
***	0.04
	3.041
	 0.060

TOTAL STANDBY CURRENT x 24 HOURS = 0.06A x 60 HOURS = 3.60 AMP-HOUR TOTAL ALARM CURRENT x 10 MINUTES = 3.041A x 0.167 HOURS = 0.508 AMP-HOUR TOTAL MINIMUM AMPERE - HOUR RATING OF BATTERIES = 4.108 AMP-HOUR EXISTING BATTERY = 7.0 AMP-HOUR

FIRE ALARM VOLTAGE DROP & BATTERY CALCULATIONS SCALE: NONE

VOLTAGE DROP FORMULA AMPS = TOTAL CURRENT OF INDICATING DEVICES IN ALARM CIRCUITS. DISTANCE = LENGTH OF CIRCUIT FROM SUPPLY TO LAST DEVICE (IN FEET). CIRCULAR MILS FOR #12 AWG = 6530 RESISTIVITY OF COPPER CONDUCTOR = 21.6 SUPPLY VOLTAGE = 24 V AMPS x DISTANCE x 21.6 x 100% PERCENTAGE OF VOLTAGE DROP = ---CIRCULAR MILS x 24Volt

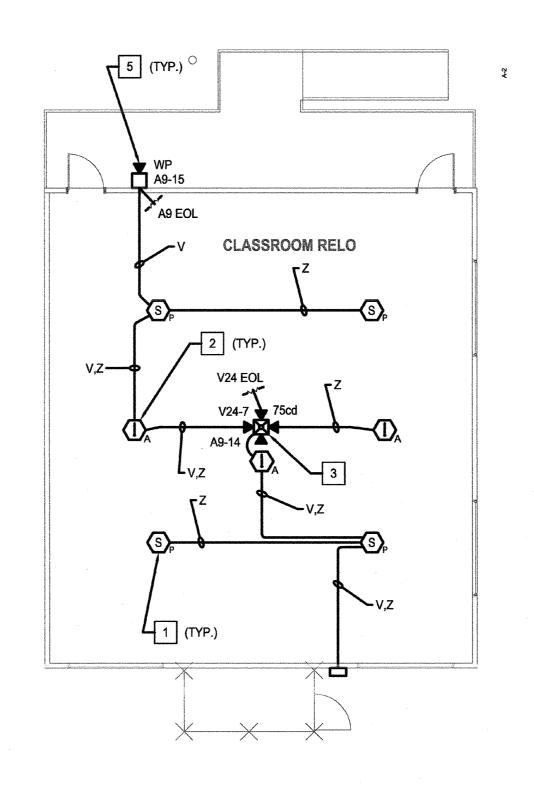
FIR	E ALAR	M VOLTAC	SE DROP (CALCU	JLATIO	ONS
CIRCUIT#	SERVICE TO	CONTROL PANEL TO BUILDING LENGTH FEET	CONTROL PANEL TO BUILDING CONDUCTOR SIZE (AWG)	DEVICE LOAD AMPS	LOAD CURRENT AMPS	VOLTS DROPPED PERCENT
V24	VISUAL DEVICE	740	12	2 @ 0.065 1 @ 0.133 3 @ 0.161 1 @ 0.143	0.889	9.07%
A9	AUDIBLE DEVICE	1100	12	6 @ 0.04 9 @ 0.01	0.330	5.00%

FIRE ALARM RISER DIAGRAM

(E)FACP (A #04-102053)

(E)FAPS-8 (RPS-1000) (A #04-102053)

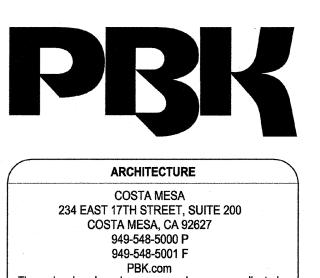
V23



KEYED NOTES

NORTH

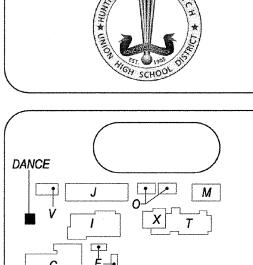
- 1 PROVIDE ADDRESSABLE SMOKE DETECTOR AS SHOWN.
- 2 PROVIDE ADDRESSABLE HEAT DETECTOR AS SHOWN. 3 PROVIDE CEILING MOUNTED HORN/ STROBE AS SHOWN.
- 4 PROVIDE EXTERIOR HORN AS SHOWN.



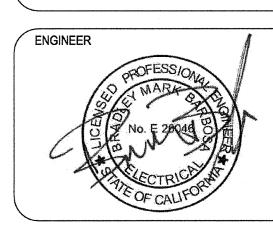
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the user's sole risk and shall not form the basis for a request for additional compensation or time.

BEACH HIGH ICE STUDIO 92648 HUNTINGTON BEACH, (HUNTINGTON BEACH, (



IDENTIFICATION STAMP DIV. OF THE STATE ARCHITECT



CLIENT HUNTINGTON BEACH UNION HIGH SCHOOL DISTRICT 18296 **Author** Checker

Construction Documents

FIRE ALARM **FLOOR PLAN**

FA2.0

FIRE ALARM FLOOR PLAN