VENTURA UNIFIED SCHOOL DISTICT

VENTURA HIGH SCHOOL SOFTBALL SITE IMPROVEMENTS

BID # E4-23

October 1st, 2024

ADDENDUM #02

NOTICE TO BIDDERS:

The following revisions and/or clarifications shall be made to the bidding requirements and contract documents. Revise and amend the documents for the above-named project in accordance with this addendum. The bid shall reflect these addendum changes and each bidder shall refer in their bid to this addendum.

All bidding requirements and contract documents shall apply to this addendum as originally indicated in the applicable portions of the contract documents, unless otherwise modified by this addendum.

Contractors shall acknowledge this addendum at the space provided on the Bid Proposal.

REVISIONS, CLARIFICATIONS, & RESPONSES TO PRE-BID RFI'S: See attached document for Pre-Bid RFIs questions and responses.

REVISIONS TO THE PLANS: C-1, A-100, E1.0, E1.1, E2.0, E3.0

REVISIONS TO THE SPECIFICATIONS: 32 92 00 – Turf Renovation and Div 26 – Electrical Specifications

REVISED DOCUMENTS ATTACHED AT END OF ADDENDUM #02

Addendum: 1 Page

ENCLOSURES: 52 Pages

Total Number of Pages: 53 Pages

ADDENDUM NUMBER TWO

01 October 2024



E4-23 VENTURA HS SOFTBALL SITE IMPROVEMENTS
2 N Catalina St
Ventura, CA 93001

Issued By:
KRUGER BENSEN ZIEMER ARCHITECTS, INC.
199 Figueroa St, Ste 100A
Ventura, CA 93001

To all bidders submitting proposal(s) for the captioned project: this Addendum is hereby made part of the Contract Documents to the same extent as though it was originally included therein and takes precedence over the original documents and any previous addenda.

Acknowledge receipt of the Addendum on Form of Proposal

A. PRE-BID RFI'S

Q1: Will electrical sheets be issued for this project?

A1: See (4) attached electrical sheets E1.0, E1.1, E2.0, and E3.0, and related electrical specifications.

Q2: Keynote 8 on C-1: Existing chain link fencing fabric at locations identified to be "temporarily removed and replaced to construct other improvements" were observed to have either existing damage (adjacent to the bullpen) and/or be overgrown with existing turf grass, specifically at the approximately 144 linear feet of the backstop area (not receiving a curb). The damage will be futile to attempt to restore and most visible when placed above concrete. This area has chain link fabric attached to the twenty (20) foot tall posts that are part of the Backstop assembly. Will the Owner and Design Professional consider an Additive Alternate for replacement of the lower ten (10) foot tall segment of chain link fencing fabric at the Backstop assembly?

A2: Bidders shall include replacement of the chain link fabric at areas described above as part of the Base Bid in lieu of as a bid alternate.

B. PROJECT MANUAL

ITEM NO. 1: SECTION 32 9200 – TURF RENOVATION

Part 2 – Products, 2.3 Hydroseed Mix – Turf Renovation: Change seed mix from Stover Pro Sports Field seed mix at the rate of 8 pound per 1,000 square feet to Stover Seed Grand Slam FS seed mix at the rate of 10 pounds per 1,000 square feet. Fertilizer, soil stabilizer and fiber shall remain the same.

(continues next page)

C. DRAWINGS

ITEM NO. 2: SHEET C-1, CLARIFICATION OF OVER-EXCAVATION

On Sheet C-1, Keynote 19 refers to over-excavation and scarification below the finished subgrade. Clarifying that this is below the finished grade, NOT below the bottom of footings.

ITEM NO. 3: SHEET A-100, CLARIFICATION OF OFCI SCOREBOARD

On Sheet A-100, Keynote 13 refers to "Nevco scoreboard – owner furnished, contractor installed." Clarification: Owner will turn over the scoreboard "box" only, as it is being uninstalled from the stadium location. The bidding contactor is responsible for all materials, connectors, framing, foundations, etc. to complete the installation.

D. ATTACHMENTS

1. Div. 26 Electrical Specifications (8.5x11, 46 pages) ..... New
2. Sheet E1.0 General Notes, Abbreviations and Symbols, Etc. (30x42) ..... New
3. Sheet E1.1 General Electrical Specifications (30x42) ..... New
4. Sheet E2.0 Site Power Plan (30x42) ..... New
5. Sheet E3.0 Electrical Details (30x42) ..... New

END OF ADDENDUM NUMBER TWO

SECTION 260000 - GENERAL ELECTRICAL PROVISIONS

1.00 - GENERAL

A. The general contract provisions of the contract, including General and Supplementary conditions and Division 01 specification section apply to this section and take precedent over this section in case of conflict.

1.01 GENERAL PROVISIONS

A. This division supplements the applicable requirements of other divisions.

1.02 DEFINITIONS

A. For the purposes of Division 260000, the following definitions apply:

1. Provide: Furnish and install.

2. Indicated: As shown on the drawings or specified herein.

3. Circuit Designation: Panel designation and circuit number, i.e., CHA-13.

1.03 SCOPE OF WORK

A. The Specifications for Work of Division 260000 include, but are not limited to the following sections:

260000 - General Electrical Provisions
260050 - Basic Electrical Materials and Methods
260051 - Common Work Results for Electrical
260073 - Hangers and Supports for Electrical Systems
260111 - Conduits
260118 - Duct Bank
260120 - Conductors
260130 - Electrical Boxes
260170 - Disconnects

B. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this division, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to the following:

1. Examine all divisions for related work required to be included as work under this division.

2. General provisions for electrical work.

3. Branch circuit panelboards connections and circuit breakers.

4. Feeders, disconnects, and connection to scoreboard equipment.

5. Branch circuit wiring, connections and devices for all equipment, outlets, circuit breakers, etc.

6. Removal of existing electrical systems and equipment which will be affected by the work of this Contract and reinstallation of same as shown or as is required.

7. Work in existing facility and shut down of existing services shall be performed only at times approved.

8. All cutting and patching required for the electrical system installation.

C. Related Work Specified Elsewhere:

1. Motors and their installation.

2. Control wiring and conduit for heating, ventilating and air conditioning.

D. Work Not In Contract (N.I.C.):

1. Telephone instruments.

E. Coordination

1. The following supplements are additional General Requirements pertaining to work of this Division. Provisions of Division 01 - General Requirements shall remain in effect.
   a) Coordinate work of various sections of Division 26.
   b) Coordinate work of this Division 26 with work of Divisions 02 through 25.

1.04 REFERENCE STANDARDS

A. American National Standards Institute (ANSI).

B. Association of Edison Illuminating Companies (AEIC).

C. Electrical Testing Laboratories (ETL).

D. Illuminating Engineering Society (IES).

E. Institute of Electrical and Electronic Engineers (IEEE).

F. Insulated Cable Engineers Association (ICEA).

G. National Electrical Manufacturers Association (NEMA).

H. National Fire Protection Association (NFPA).

I. Underwriters Laboratories, Inc. (UL).

J. California State Fire Marshal (CSFM).

1.05 QUALITY ASSURANCE

A. Regulations: All the electrical equipment and materials, including their installations, shall conform to the following applicable latest codes and standards:

1. National Electric Code, Latest Adopted Edition (NEC), 2023 unless a more current version has been adopted.

2. California Electric Code, Latest Adopted Edition (CEC), 2023

3. Local and State Fire Marshal.

4. Occupational Safety and Health Act (OSHA).

5. Requirements of the Serving Utility Company.

6. Local Codes and Ordinances.

7. Requirements of the Office of the California State Architect (OSA).

8. California Administrative Code, Title 8, Chapter 4, Industrial Safety Orders.

9. California Administrative Code, Title 24.

10. County of Ventura Codes and Regulations.

B. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply. In instances where plans and specifications are at variance or conflict the most restrictive requirement shall apply. Contractor shall be responsible for all his associated work and materials and also the work and materials of related or affected trades.

C. Contractor's Expense: Obtain and pay for all required bonds, insurance, licenses, and pay for all taxes, fees and utility charges required for the electrical work.

D. Testing and Adjustment:

1. Perform all necessary tests required to ascertain that the electrical system has been properly installed, that the power supply to each item of equipment is correct, and that the system is free of grounds, ground faults, and open circuits, that all motors are rotating in the proper directions, and such other tests and adjustments as may be required for the proper completion and operation of the electrical system.

2. If, during the course of testing, it is found that system imbalance is in excess of 20%, rearrange single-pole branch circuit in lighting and receptacle panels to bring system balance to within 20% on all phases. Record all such changes on the panelboard schedule and submit a summary of changes to the Engineer on the record drawings.

1.06 SUBMITTALS

A. Procedure:

B. Show drawings: Detailed shop drawings for the following equipment:
(1) Branch circuit panelboards.
(2) Circuit breakers.
(3) Motor control.
(4) Contactors and cabinet.

C. Product data: Detailed manufacturer’s data for:
(1) Cable.
(2) Cabinets.
(3) Pull boxes.
(4) Disconnects.
(5) Wire connectors.

D. Test results for the following:
(1) Circuit breakers.
(2) Grounding systems.
(3) Cables.

E. Include sufficient information to indicate complete compliance with Contract Documents. Include illustrations, catalog cuts, installation instructions, drawings, and certifications. On each sheet show manufacturer's name or trademark.

F. Instruction materials:

(1) Provide at the time of personnel instruction period three bound copies of instruction manuals for the systems used on this project.
(2) Include the following (minimum) information in each copy of instruction manual:
(a) Manufacturers' names and addresses.

(b) Serial numbers of items furnished.
(c) Catalog cuts, exploded views and brochures, complete with technical and performance data for all equipment, marked to indicate actual items furnished and intended use.

1.07 OWNER'S PERSONNEL INSTRUCTIONS

A. Prior to completion of the contract, and at the Owner's convenience, instruct verbally and demonstrate to the Owner's personnel, the operation of the systems as listed under operating, maintenance, and instructional data and/or emergency generator, automatic transfer switch and fire alarm annunciator panel.

1.08 CLEANING

A. Clean exterior surfaces of equipment and remove all dirt, cement, plaster and other debris. Protect interior of equipment from dirt during construction and clean thoroughly before energizing.

B. Clean out cracks, corners and surfaces on equipment to be painted. Remove grease and oil spots so that paint may be applied without further preparation.

1.09 PROJECT RECORD DOCUMENTS - Prepare the following and submit to the engineer before final acceptance:

A. Mark Project Record Documents daily to indicate all changes made in the field.

1. In addition to general requirements of Project Record Drawings, indicate on drawings, changes of equipment locations and ratings, trip sizes, and settings on circuit breakers, alterations in raceway runs and sizes, changes in wire sizes, circuit designations, installation details, one-line diagrams, control diagrams and schedules.

B. Use green to indicate deletions and red to indicate additions.

1. Use the same symbols and follow the same drafting procedures used on the Contract Drawings.

C. Locate underground conduit stubbed-out for future use, underground feeder conduits, and feeder pull box locations using building lines by indicating on the Project Record Drawings.

D. At the completion of underground conduit installation provide underground conduit record documents to owner’s representative.

E. Two copies, in binder form, of all test results as required by these specifications.

F. Two copies of local and/or state code enforcing authorities’ final inspection certificates.

G. Two copies, in binder form, of electrical equipment cut sheets, manufacturer's installation instructions, warranty certificates, and product literature for all products utilized on project.

1.10 SERVICE INTERRUPTIONS AND UTILITY

A. Coordinate with the Owner the interruption of services necessary to accomplish the work.

B. Coordinate with the utility company all work associated with power and communications distribution systems and service entrance equipment.

C. Electrical contractor shall supply temporary power for all trades.

1.11 MINIMUM SPECIFICATION REQUIREMENTS (ALL WORK OF DIVISION 260000)

A. As a minimum Specification requirement, all materials and methods shall comply with applicable governing codes.

1.12 PENETRATION SEALING

A. Seal penetration through exterior walls and fire rated walls, floors, ceilings, and roofs with 3M Firestopping materials of fire rating capacity per architectural plans and Building Code requirements.

1.13 PLACING EQUIPMENT IN SERVICE

A. Do not energize or place electrical equipment in service until all interested parties have been duly notified and are present or have waived their rights to be present. Where equipment to be placed in service involves service or connection from another contractor of the Owner, notify the Owner in writing when the equipment will be ready. Notify the Owner two weeks in advance of the date the various items of equipment will be complete.

1.14 OWNER-FURNISHED ITEMS

A. Pick up Owner-furnished items and handle, deliver, install, and make all final connections.

1. Assume responsibility for the items when consigned at the storage facility in accord with requirements of the Contract Documents.

1.15 ELECTRIC ITEM LOCATION

A. Electrical drawings are generally diagrammatic. Verify equipment sizes with shop drawings and manufacturers' data and coordinate location layout with other trades. Notify Owner of any changes of location requirements prior to installation.

1.16 DEMOLITION

A. Scope: Provide and perform demolition, preparatory and miscellaneous work as indicated and specified, complete.

B. Principle Items of Work:

1. Demolition and removal of existing electrical conduit, wiring and equipment required to complete the project.

2. Preparation of the existing building to receive or connect the new work.

3. Miscellaneous demolition, cutting, alteration, and repair work in the existing building necessary for the completion of the entire project.

4. Disconnecting and reconnection of electrical equipment as required by the construction modifications.

C. Existing Conditions: Make a detailed survey of the existing conditions pertaining to the work. Check the locations of all existing structures, equipment and wiring (branch circuiting and controls).

D. Salvage and Disposal: All removed material other than items to be reused shall be returned to the Owner or disposed of in accordance with instructions from the Owner's representative. Disposal shall be done in accordance with EPA and governing body requirements and regulations. Contractor shall pay all fees and charges for disposal.

1.17 ELECTRICAL WORKMANSHIP REQUIREMENTS

A. It is required that all electrical construction of this Contract be performed by State of California licensed journeyman electricians.

1. Before each journeyman electrician commences work, deliver to Owner at project site a photocopy of journeyman’s valid State of California license.

B. All electrical systems shall be installed in a neat and workmanlike manner per National Electrical Code requirements and ANSI approved NEIS National Electrical Installation Standards.

1.18 DESIGN CHANGES AFTER AWARD OF BID

A. When a change in the quantity or size of conductors is made, the conduit size will remain in accordance with that indicated in the original contract drawings rather than the drawing symbol conduit table. When code permits, provide conductor insulation 'THWN’ where required to maintain conduit fill conformance with the NEC.

1.19 CREDITS AND EXTRAS (in case of conflict the provisions of section 01000 shall govern)

A. Material prices shall be in accordance with the 2023 edition of Means Electrical Cost Data, or submitted manufacturer's or supplier's quotes, plus tax and 1% cartage.

B. Labor rates shall be based on local union scale and shall include only benefits required by the union.

C. The maximum charged for the Foreman or General Foreman shall be the minimum required by the local union.

D. The maximum amount of labor charged to accomplish the required work shall be based on 2023 edition of Means Electrical Cost Data.

E. The amount of added direct labor cost shall not exceed 30% of the actual labor cost and shall include insurance, taxes, small tools, payroll expenses, office supervision, management development, training, and etc.

F. Rental cost or rates shall be based on the American Equipment Dealers rated manual, less Contractor's discount. Copies of the Equipment Rental Invoices shall be submitted to the Architect.

G. The Contractor and the Architect shall negotiate any cost item where it can be shown that the job conditions are beyond the scope of the above listed manuals. In this case, the burden of proof shall be the responsibility of the Contractor. He shall provide invoices, detailed breakdowns, confirmation by the resident inspector of existing conditions and etc., as may be required to justify his claim.

H. The fee for the prime electrical sub-contractor shall be in accordance with the general and supplemental conditions of the specification, but shall not exceed 5% overhead and 5% profit. No additional overhead and profit shall be allowed for sub-contractors to the prime sub-contractor.

I. The Contractor shall submit detailed material and labor cost breakdown on all cost changes to the contract in the form directed by the Architect.

J. For credit changes to the contract, the fee shall not be included, except where additions and deductions are made by a single change order. The cost shall be based on the net change in material and labor prior to determining the fee.

1.20 MATERIAL AND EQUIPMENT SUBSTITUTION

A. Where two or more trade names or manufacturers are mentioned, selection shall be made from the group listed for use in the base bid. The order in which names are listed is not intended to be any indication of preference.

B. Where a single manufacturer, product or trade name is stated, that manufacturer, product or trade name shall be used in the base bid. The use of other manufacturers, products or trade names will be considered (unless that product is indicated for no substitution) only if submitted as alternate items at the time of bidding, with evidence of equality and a statement of net price difference as compared to the specified item. The Architect and Owner reserve the right to review such submittals and to determine the acceptability for use.

C. Equipment other than that specified will be accepted only when written approval is given by the Architect, in accordance with Division 01.

D. The Contractor shall be held responsible for all physical changes in piping, equipment, etc. resulting from equipment substitution and likewise bear any increased cost of other trades in making said substitution. Approval by the Architect of equipment other than that specified does not relieve this Contractor of this responsibility.

1.21 REQUESTS FOR INFORMATION

A. The contractor shall submit all requests for information (RFI's) on the attached form.

END OF SECTION 260000

REQUEST FOR INFORMATION

To: _____ RFI # _____

Attention _____ Date Sent _____

Project: _____ Project # _____

Sheet Number:_____ Bulletin or Delta Number:_____

Spec. Section _____ _____ _____ Sheet Details: _____ _____ _____

_____ _____ _____ _____ _____ _____

REQUEST FOR INFORMATION:

_____
_____
_____
_____

CONTRACTOR'S RECOMMENDATION:

_____
_____
_____
_____

Requested by: _____

The above information is requested on or before: _____

Cost Impact:___ Yes ___ No ___ Possible Time Impact: ___ Yes ___ No ___ Possible

Response: _____
_____
_____
_____
_____
_____

Response by:

Name: _____ Signature: _____

Date:_____

SECTION 260050 - BASIC ELECTRICAL MATERIALS AND METHODS

1.00 - GENERAL

1.01 DESCRIPTION: This Section contains general requirements for the Sections in Division 26.

A. Related Work Not in Division 26: Refer to individual Division 26 Sections.

1.02 QUALITY ASSURANCE:

A. Codes: Entire installation shall comply with requirements of authorities having jurisdiction.

B. Permits: Contractor shall pay for all permits required by work under this Division.

C. Inspections: Contractor shall arrange for all inspections and correct non-complying installations.

1.03 SUBMITTALS: Refer to Division 01 for procedures.

A. Material and Equipment: Prior to start of work, 6 copies of a list of all materials and equipment covered by Division 26 shall be submitted for approval. Contractor shall allow ample time for checking and processing and shall assume responsibility for delays incurred due to rejected items. No installation of material concerned shall be made until such written approval has been obtained. Approval of materials and equipment shall in no way obviate compliance with the Contract Documents. Each item proposed shall be referenced to the applicable Section, Page, and Paragraph of Division 26. For each item proposed, give name of manufacturer, trade name, catalog data, and performance data.

B. Routing of Conduit and Piping: The drawings indicate required size and termination of conduits and raceways. It is not the intent to indicate all necessary supports, bends, boxes, or offsets and it shall be the responsibility under this Division to install conduit in such a manner as to conform to structure, avoid obstructions, comply with the 2023 CEC, preserve headroom, keep openings and passageways clear, and make all equipment requiring inspection, maintenance and repair accessible without extra cost to the Owner.

C. Service Manuals: Indexed Service Manuals shall be submitted which shall include test reports, service instructions, and renewal parts lists of all equipment.

1. Submission and Information: Service Manuals shall be submitted for approval at least 30 days before final inspection. The following information together with any pertinent data, shall be included in Service Manual:
   a. Renewal part numbers of all replaceable items.
   b. Manufacturer's cuts and rating data.
   c. Serial numbers of all principal pieces of equipment.
   d. Supplier's name, address, and phone number.
   e. Final settings for all breakers, relays, and control devices.

2. Copies: Four (4) copies of approved Service Manual shall be delivered on or before date required.

D. Record Drawings: Prepare and submit in accordance with requirements of Section 705. Contractor shall make notations, neat and legible, daily as the work proceeds. Drawings shall be available for inspection at all times and kept at the job site. All buried conduit and/or indicated future connections outside any building shall be located both by depth and by accurate measurement from a permanently established landmark such as a building or structure.

E. Seismic Calculation: Refer to Article 3.01 herein.

F. Spare Parts: Deliver following spare parts to Owner and obtain receipts. Submit at same time as Operating Instructions:

1. Spare fuses; 1 set for each combination fuse breaker.

2. Spare pilot light lamps of each type used on project, in quantity of 10%, but not less than 2%.

3. Overload heater elements; 2 sets for each size used on project.

G. Special Tools: If any part of the equipment furnished under Division 26 requires a special tool for assembly, adjustment, resetting, or maintenance thereof and such tool is not readily available on the commercial tool market, it shall be furnished with the equipment as a standard accessory and delivered to the Owner.

H. Maintenance Paint: One (1) can of touch-up paint shall be delivered to Owner for each different color factory finish which is to be the final finished surfaces of the product.

1.04 DRAWINGS:

A. Diagrammatic Drawings: For purposes of clarity and legibility, drawings are diagrammatic although size and location of equipment may be drawn to scale.

B. Routing of Conduit and Piping: The drawings indicate required size and termination of conduits and raceways. It is not the intent to indicate all necessary supports, bends, boxes, or offsets and it shall be the responsibility under this Division to install conduit in such a manner as to conform to structure, avoid obstructions, comply with the 2023 CEC, preserve headroom, keep openings and passageways clear, and make all equipment requiring inspection, maintenance and repair accessible without extra cost to the Owner.

C. Coordination with Other Trades: Check with other Divisions of the Specifications so that no interference shall occur and in order that elevations may be established for the work. Installed work which interferes with the work of other trades shall be removed and rerouted at the discretion of the Architect.

1.05 DAMAGE AND REPAIRS:

A. Emergency Repairs: Owner reserves the right to make temporary repairs as necessary to keep equipment in operating condition without voiding Contractor's warranty or relieving Contractor of his responsibility during warranty period.

B. Responsibility for Damage: Contractor shall be responsible for damage to grounds, buildings, or equipment due to work furnished or installed under this Division 26.

1.06 PROTECTION, CARE, AND CLEANING:

A. Protection: Provide adequate protection for finished parts of materials and equipment against physical damage from any cause during progress of work and until final completion. Sensitive electrical equipment shall not be installed until major construction is completed.

B. Care: During entire construction, properly cap all lines and equipment to prevent entrance of sand and dirt. Protect equipment against moisture, plaster, cement, paint or work of other trades by covering with polyethylene sheets.

C. Cleaning: After installation is completed, clean all systems as follows:

1. Field Painted Items: Clean exterior of conduits, raceways, piping and equipment exposed in completed structure; removing all rust, plaster, cement and dirt by wire brushing. Remove grease oil and similar materials by wiping with clean rags and suitable solvents.

2. Factory Finished Items: Remove grease and oil on all factory finished items such as cabinets and controllers, and leave surfaces clean and polished.

D. Connection: Prior to energizing, check all electrical connection hardware and torque where necessary.

2.00 - PRODUCTS

2.01 PRODUCTS: Products and materials shall be as specified in the pertinent Sections of Division 26.

2.02 MATERIALS AND EQUIPMENT: Wherever possible, all materials and equipment used in installation of this work shall be of same manufacturer throughout for each class of material or equipment. Materials shall be new and bear UL label, wherever subject to such approval. Comply with ANSI, IEEE and NEMA standards, where applicable.

3.00 - EXECUTION

3.01 GENERAL LATERAL BRACING REQUIREMENTS: Bracing requirements shall conform to specific requirements of the latest edition of SMACNA. Anchorages for equipment subject to thermal expansion and movement shall conform to manufacturer's recommendation and intent of general

bracing requirements. When general and specific bracing requirements enumerated above are in conflict with referenced standards, the most stringent requirements shall govern.

3.02 CUTTING AND PATCHING:

A. Cutting of Existing Structural Work: Holes in existing foundations, slabs and concrete walls shall be cored to the minimum size required. The Contractor shall submit Drawings showing dimensioned sizes and locations for all such holes to Architect for approval before cutting. Where required for conduit installation, slabs on grade shall be saw-cut to minimum required width; submit cutting Drawings to the Architect for approval before cutting.

B. Patching: Paved or concrete surfaces, landscaping, holes or chases shall be patched to match adjacent surfaces.

3.03 CONCRETE WORK: Concrete construction required for the Work of Division 26 shall be provided under the Work of Division 26.

3.04 PAINTING: Finish painting of electrical equipment will be as specified in Division 09, unless equipment is herein specified to be furnished with factory applied finish coats. Equipment to be field painted shall be furnished with a factory applied prime coat.

A. Touch-Up: If factory finish on any equipment furnished under Division 26 is damaged in shipment or during construction of building, the equipment shall be refinished by Contractor to satisfaction of Architect.

B. Concealed Equipment: Uncoated cast-iron or steel that will be concealed, or will not be accessible when installations are completed, shall be given one heavy coat of black asphaltum before installation.

3.05 OPERATING INSTRUCTIONS: Contractor to provide services of an experienced Engineer to instruct Owner in operation of entire installation. Instructional period shall be during normal work day hours. This instruction period may be simultaneous with compliance tests.

3.06 COMPLIANCE TESTS: Conduct such tests of all portions of installation as may be necessary to ensure full compliance with the Drawings and Specifications. Tests shall be made in the presence of the Owner. Costs of test shall be borne by Contractor and Contractor shall provide all instruments, equipment, labor, temp power and materials to complete all the tests. Tests may be required on any item between installation of Work and the end of 1 year warranty period. Should these tests develop any defective materials, poor workmanship or variance with requirements of Specifications, Contractor shall make any changes necessary and remedy any defects at his expense.

A. All Feeders: Measure and record as follows:

1. 600 volt conductors shall be tested with 500 volt megger to ground on each phase. Megger to be on test for one minute before any readings are taken. The minimum values on all feeders shall be 100,000 ohms.

2. Copies of the certified test readings shall be transmitted to Owner.

3.07 SYSTEM ACCEPTANCE:

A. Final Review: The Contractor shall request a final review prior to system acceptance after:

1. Completion of installation of all systems required under the Contract Documents.

2. Submission and acceptance of operating and maintenance data.

3. Completion of identification program.

B. Acceptance: Is contingent on:

1. Completion of final review and correction of all deficiencies.

2. Satisfactory completion of acceptance tests demonstrating compliance with all performance and technical requirements of Contract Documents.

3. Satisfactory completion of training program and submission of manuals and Drawings required by Contract Documents.

3.08 PRELIMINARY OPERATION: The Owner reserves the right to operate portions of the electrical system on a preliminary basis without voiding the warranty or relieving the Contractor of his responsibilities.

3.09 CLEAN-UP: Upon completion and at other times during progress or Work, when required, remove all surplus materials, rubbish, and debris resulting from Work of Division 26.

END OF SECTION 260050

SECTION 260051 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electrical installation requirements.

1.03 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

A. Product Data: For sleeve seals.

1.05 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

2. To provide for ease of disconnecting the equipment with minimum interference to other installations.

3. To allow right of way for piping and conduit installed at required slope.

4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

D. Coordinate sleeve selection and application with selection and application of firestopping.

PART 2 - PRODUCTS

2.01 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

2.02 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.

3. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.

4. Pressure Plates: Plastic. Include two for each sealing element.

5. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.03 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.02 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide at least 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

3.03 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.04 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly.

END OF SECTION 260051

SECTION 260073 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.
2. Nonmetallic slotted support systems.

B. Shop Drawings: Signed shop drawings, and sealed by a qualified professional engineer for all equipment over 400 lbs. Show fabrication and installation details, and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Nonmetallic slotted channel systems. Include Product Data for components.
4. Equipment supports.

C. Welding certificates.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements as specified in Division 3.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. ERICO International Corporation.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut; Tyco International, Ltd.
g. Wesanco, Inc.

3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
6. Channel Dimensions: Selected for applicable load criteria.

B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch diameter holes at a maximum of 8 inches o.c., in at least 1 surface.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.; a division of Cooper Industries.
    c. Fabco Plastics Wholesale Limited.
    d. Seasafe, Inc.

3. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
4. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
5. Rated Strength: Selected to suit applicable load criteria.

C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Hilti Inc.
2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
3) MKT Fastening, LLC.
4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Cooper B-Line, Inc.; a division of Cooper Industries.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti Inc.
4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1, the latest version of SMACNA Seismic Restraint Manual, and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1, the latest version of SMACNA Seismic Restraint Manual, and NECA 101 for installation requirements.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts. Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03.

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260073

SECTION 260111 - CONDUITS

1.00 - GENERAL

A. The general provisions of the contract, including General and Supplementary conditions and Division 1 specification sections apply to this section.

1.01 WORK INCLUDED

A. Conduits; including:

1. Rigid steel conduit.
2. Intermediate metal conduit (IMC).
3. Electrical metallic tubing (EMT).
4. Rigid aluminum conduit.
5. Polyvinyl chloride conduit (PVC).
6. Flexible metal conduit.
7. Liquid-tight flexible metal conduit.

1.02 DEFINITION

A. Conduit: This term shall be construed to mean conduit and conduit fittings; and tubing and tubing fittings.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Support material: Section 260190.

2.00 - PRODUCTS

2.01 MATERIAL AND FABRICATION - ALL MATERIALS SHALL BE MANUFACTURED IN THE USA.

A. Rigid Steel Conduit: Hot-dipped galvanized or sherardized including the threads, manufactured in accordance with ANSI C80.1 and UL6.

1. Threaded, hot-dipped galvanized or sherardized fittings manufactured in accordance with ANSI C80.4.

B. Intermediate Metal Conduit: Hot-dipped galvanized including the threads, manufactured in accordance with UL 1242.

C. Electrical Metallic Tubing: Manufactured in accordance with ANSI C80.3 and UL 797.

1. Provide compression fittings in walls, ceiling spaces or exposed construction areas.

2. Provide compression (water tight) fittings in damp areas or areas exposed to weather.

D. Rigid Aluminum Conduit: Manufactured in accordance with ANSI C80.5.

1. Threaded fittings, manufactured in accordance with ANSI C80.4.

E. Polyvinyl Chloride Conduit: Schedule 40 and schedule 80, manufactured in accordance with ANSI C33.91, UL 651, and NEMA TC-2.

1. Cemented type fittings of the same manufacturer as the conduit.

F. Polyvinyl Chloride Conduit: Type EB, heavy wall, manufactured in accordance with ANSI C33.91, UL651, and NEMA TC-8.

1. Cemented fittings of the same manufacturer as the conduit.

G. Flexible Metal Conduit: Hot-dipped galvanized steel, manufacturer in accordance with UL 1.

1. Squeeze type, malleable iron, cadmium plated, straight and angle connectors for all sizes and twist-in connectors for ½" and ¾" flexible metal conduit.

H. Liquid-Tight Flexible Conduit: Hot-dipped galvanized with liquid-tight vinyl jacket.

1. Liquid-tight fittings.

3.00 - EXECUTION

3.01 USE

A. EMT for all exposed and concealed work except as indicated in Paragraphs B, C, D, E, F, and G.

B. Rigid steel, IMC, or rigid aluminum conduit in areas where exposed conduit could be subject to physical damage or where conduit is exposed and conductor phase to ground voltage exceeds 300 volts.

C. Rigid aluminum conduit may be used for all feeder runs exposed or concealed in stud walls and spaces above suspended ceilings.

D. PVC Conduit:

1. Schedule 40 for runs below grade in direct contact with earth.

2. Schedule 40 in concrete floors, walls or roofs.

E. Flexible Conduit (steel only permitted):

1. For connection to equipment subject to vibration, maximum length 18". In wet locations use liquid-tight flexible conduit.

2. For connection to lighting fixtures above suspended ceilings. Lengths limited to 72".

3. Install ground conductors in all flexible conduits.

F. Where ¾" conduit runs are concealed in walls or ceilings and these runs are through wood studs and wood joists, flexible steel conduit may be used up to a maximum length of 6'0".

G. All risers shall be PVC coated RGS with bushings.

H. In concrete or below grade use conduit not smaller than 1". Maximum size in concrete slab: 1". Run larger sizes under slab.

I. Use long sweep elbows with minimum radius 10 times nominal conduit diameter for all telephone runs.

3.02 INSTALLATION

A. Provide conduit support and bracing in accordance with the latest published SMACNA guidelines.

B. Perform excavating, trenching, backfilling, and compacting as specified in Division 2.

C. Minimum cover for runs below finished grade outside buildings: 24" except where noted or required by the serving utility. Minimum cover for conduit in concrete floors, walls or roof: 1/3 thickness of slab. Minimum cover under building slabs is 12".

D. Minimum separation from uninsulated hot water pipes, steam pipes, heater flues or vents: 6". Avoid running conduit directly under water lines.

E. Protect inside of conduit from dirt and rubbish during construction by capping all openings with plastic caps intended for the purpose.

F. Provide conduit bodies for exposed conduit runs at junctions, bends or offsets where required. Do not use elbows or bends around outside corners of beams, walls or equipment. Make conduit body covers accessible.

G. Make conduit field cuts square with saw and ream out to full size. Shoulder conduits in couplings.

H. Run a minimum of one ¾" empty conduit for every three single pole spare circuit breakers, spaces or fraction thereof and not less than two ¾" conduits from every flush mounted panel to an accessible space above the ceiling and below the floor.

I. Make conduit projections from covered areas to areas exposed to the weather watertight by proper flashing. Extend flashing a minimum of 6 inches in all directions from conduit.

J. Where conduit is to remain empty, install polypropylene or nylon pull-line 3/16" minimum diameter from end to end with tag at each end designating opposite terminations.

K. Run conduit parallel and at right angle to building lines, when visible in finished construction.

L. Cap conduits indicated to be stubbed-out underground using glued-on PVC caps intended for this purpose.

M. Install a coupling flush with the floor on all conduits stubbed up through floors on grade.

N. Make no bends with a radius less than 12 times the diameter of the cable it contains nor more than 90 degrees. Make field bends with tools designed for conduit bending. Heating of metallic conduit to facilitate bending is not permitted.

O. Where conduit installed in concrete or masonry extends across building construction joints, provide expansion fittings as manufactured by O.Z.; Crouse-Hinds; Appleton; or equal, with approved ground straps and clamps.

P. Concrete Wall or Slab Penetrations: All core drilling, sleeves, blockouts or other penetrations must be x-rayed, report provided, and approved by the Structural Engineer prior to installation.

1. Space sleeves and core drills to insure a minimum dimension of 3 times the nominal trade diameter of the largest adjacent conduit between sleeves or core drills.

2. Use blockouts for concentrations of conduits in a confined area.

Q. Do not penetrate walls with flexible conduit where subject to physical damage. Use recessed box with extension ring for transition from interior to exterior of wall.

R. All homeruns shown shall be run to the panel indicated independently of all other homeruns. Provide pull points so as not to exceed total bends of 360 degrees between them unless otherwise indicated.

S. At switchboards, manholes and floor standing distribution panelboards, provide insulated throat bushings or bell ends on all non-metallic conduit entries and bushings on all metallic conduit entries.

T. Provide bushings on all conduit terminations sized 1" and larger.

U. Provide weatherproof boxes and connectors for all exposed raceways and boxes.

V. Provide bell ends on all stubbed up conduits, seal all conduits after conductors are pulled.

W. Cap all unused conduits with end cap. Do not tape.

END OF SECTION 260111

SECTION 260118 - DUCT BANK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal conduit.

B. Duct.

C. Manholes.

1.02 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete.

1.03 REFERENCES

A. Quality Control: Requirements for references and standards.

B. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.

C. ASTM A48 - Gray Iron Castings.

D. ASTM C857 - Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

E. ASTM C858 - Underground Precast Concrete Utility Structures.

F. ASTM C891 - Installation of Underground Precast Utility Structures.

G. ASTM C1037 - Inspection of Underground Precast Utility Structures.

H. IEEE C2 - National Electrical Safety Code.

I. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

J. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

K. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

L. NEMA TC 6 - PVC and ABS Plastic Utilities Duct for Underground Installation.

M. NEMA TC 9 - Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.

N. NEMA TC 10 - PVC and ABS Plastic Communications Duct and Fittings for Underground Installation.

O. NEMA TC 14 - Filament-Wound Reinforced Thermosetting Resin Conduit and Fittings.

P. NFPA 70 - National Electrical Code.

Q. UL 651A - Type EB and A PVC Conduit and HDPE Conduit.

1.04 SUBMITTALS FOR REVIEW

A. Section 260000 - Submittals: Procedures for submittals.

B. Product Data: Provide for metallic conduit or nonmetallic conduit, all manhole accessories, fittings and supports.

C. Shop Drawings: Indicate dimensions, reinforcement, size and locations of openings, and accessory locations for precast manholes.

1.05 SUBMITTALS FOR INFORMATION

A. Section 260000 - Submittals: Submittals for information.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.06 SUBMITTALS FOR CLOSEOUT

A. Project Record Documents: Record actual routing and elevations of underground conduit and duct, and locations and sizes of manholes.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years' experience, and with service facilities within 100 miles of Project.

1.08 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70 and IEEE C2.

B. Products: Listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.09 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated.

B. Verify routing and termination locations of duct bank prior to excavation for rough-in.

C. Verify locations of pull boxes prior to excavating for installation.

D. Duct bank routing is shown in approximate locations unless dimensions are indicated. Route as required to complete duct system.

PART 2 - PRODUCTS

2.01 RIGID STEEL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Fittings: NEMA FB 1, steel.

2.02 PLASTIC CONDUIT

A. Rigid Plastic Conduit: NEMA TC 2, Schedule 40 and 80 PVC, with fittings and conduit bodies to NEMA TC 3.

B. Rigid Plastic Underground Conduit: UL 651A, Type A PVC, High-density polyethylene, Schedule 40.

2.03 PLASTIC DUCT

A. Plastic Utilities Duct: NEMA TC 6; ABS Type DB.

B. Plastic Utility Duct Fittings: NEMA TC 9.

C. Plastic Communications Duct and Fittings: NEMA TC 10, Type DB.

2.04 PRECAST CONCRETE PULLBOXES

A. Description: Precast pull box designed in accordance with ASTM C858, comprising modular, interlocking sections complete with accessories.

B. Loading: ASTM C857, Class A-16, A-12, A-8 or A-0.3 as required.

C. Shape: Square or Rectangular with truncated corners and as indicated.

D. Riser Casting: 12”, with cable supports cast into frame.

E. Frames and Covers: ASTM A48; Class 30B gray cast iron, 30” size, machine finished with flat bearing surfaces. Provide cover marked ELECTRIC or TELEPHONE as appropriate.

F. Duct Entry Provisions: Window knockouts.

G. Duct Entry Locations: As indicated.

H. Duct Entry Size: As indicated.

I. Cable Pulling Irons: Use galvanized rod and hardware. Locate opposite each duct entry. Provide watertight seal.

J. Cable Rack Inserts: Minimum load rating of 800 pounds (365 kg). Locate at 3 feet on center.

K. Cable Rack Mounting Channel: 1-1/2 x ¾” steel channel, 48” length. Provide cable rack arm mounting slots on 1-1/2 inch centers.

L. Cable Racks: Steel channel, 1-1/2 x 3/4 x 14”, with fastener to match mounting channel.

M. Cable Supports: Porcelain clamps and saddles.

N. Sump Covers: ASTM A48; Class 30B gray cast iron.

O. Source Quality Control: Inspect in accordance with ASTM C1037.

2.05 ACCESSORIES

A. Underground Warning Tape: 4” wide plastic tape, detectable type, colored yellow with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.01 DUCT BANK INSTALLATION

A. Quality Control: Manufacturer's instructions.

B. Install duct to locate top of duct bank at depths as indicated on drawings.

C. Install duct with minimum slope of 4” per 100 feet. Slope duct away from building entrances.

D. Cut duct square using saw or pipe cutter; de-burr cut ends.

E. Insert duct to shoulder of fittings; fasten securely.

F. Join nonmetallic duct using adhesive as recommended by manufacturer.

G. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

H. Install no more than equivalent of three 90-degree bends between pull points.

I. Provide suitable fittings to accommodate expansion and deflection where required.

J. Terminate duct at pull box entries using end bell.

K. Stagger duct joints vertically in concrete encasement 6” minimum.

L. Use suitable separators and chairs installed not greater than 4 feet on centers.

M. Band ducts together with standard commercial racking before backfilling with sand slurry.

N. Securely anchor duct to prevent movement during concrete placement.

O. Place concrete under provisions of Section 033000. Use mineral pigment to color concrete red.

P. Provide minimum 3” concrete cover at bottom, top, and sides of duct bank.

Q. Provide two No. 4 steel reinforcing bars in top of bank under paved areas.

R. Connect to existing concrete encasement using dowels.

S. Connect to pull box wall using dowels.

T. Provide suitable pull string in each empty duct except sleeves and nipples.

U. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.

V. Backfill trenches.

W. Interface installation of underground warning tape with backfilling. Install tape 6 inches below finished surface.

3.02 PRE-CAST MANHOLE INSTALLATION

A. Quality Control: Manufacturer's instructions.

B. Excavate for pull box installation.

C. Install and seal precast sections in accordance with ASTM C891.

D. Install pull boxes plumb.

E. Use precast neck and shaft sections to bring pull box cover to finished elevation.

F. Attach cable racks to inserts after pull box installation is complete.

G. Install drains in manholes and connect to site drainage system or if approved by engineer to 4 inch (DN100) pipe terminating in 1 cu yd crushed gravel bed.

H. Damp-proof exterior surfaces, joints, and interruptions of pull boxes after concrete has cured 28 days.

I. Backfill pull box excavation.

END OF SECTION 260118

SECTION 260120 - CONDUCTORS

1.00 - GENERAL

1.01 WORK INCLUDED

A. Conductors; for power, lighting, sound, communication and control, including conductors for general wiring, flexible cords and cables, and ground conductors.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Submittals: Section 260000.

2.00 - PRODUCTS

2.01 MATERIAL AND FABRICATION

A. Conductors for General Wiring: Thermoplastic insulated rated for 600V manufactured in accordance with UL 83.

1. Provide 3/4 hard drawn copper conductors. Provide solid conductor for #12 AWG and smaller. Provide stranded conductors for #10 AWG and larger.

B. Conductor Connectors for General Wiring:

1. Sizes No. 14 to No. 8: Splice with insulated spring wire connectors.
   a. Ideal No. 451, 455 and 453.
   b. Minnesota Mining: Types Y, R, G, and B.
   c. Buchanan No. B1, B2 and B4.

2. Size No. 6 or Larger, Copper: Splice and terminate with compression or pressure type connectors and terminal lugs.

C. Provide connector sealing packs for all area lighting and exterior box splices which require complete protection from dampness and water.

1. Scotchlok No.'s 3576, 3577 and 3578, by 3M Company.

3.00 - EXECUTION

3.01 USE

A. Conductors for General Wiring:

1. Minimum 75 degrees C temperature rated insulation on conductors, except use minimum 90 degrees C temperature rated insulation on conductors in conduits exposed on roof, or where required due to ambient temperature.

2. Stranded conductors at motors and other applications where subject to vibration.

3. Minimum size conductors for power and lighting #12 AWG, except where noted.

4. Minimum size conductors for control circuits #14 AWG stranded with THHN/THWN insulation.

B. Use flexible cords and cables for connection of special equipment as indicated. Length not to exceed 72".

C. Ground Conductors:

1. Provide an insulated green ground conductor for all branch circuit wiring where indicated.

2. Bare copper conductor may be used.
   a. Install ground conductors in all non-metallic conduits as required by code. Install ground conductors in all motor branch circuits and all feeders. Where ground conductor size is not indicated, provide size as required for an equipment ground conductor by the 2023 National Electrical Code.
   b. Install ground conductors in all flexible metal conduits.

3.02 INSPECTION

A. Check conduit system for damage and loose connections, replace damaged sections.

B. Check for caps at conduit openings. Make sure that inside of conduit is free of dirt and moisture.

C. Pull mandrel, one size smaller than the conduit, through entire length of all underground conduits prior to conductor installation.

3.03 INSTALLATION

A. Conductors for General Wiring:

1. Color code conductors insulation as follows:

	SYSTEM	VOLTAGE
CONDUCTOR	208Y/120	480Y/277
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	White with Gray Stripe

2. For conductors #6 AWG or larger, permanent plastic colored tape may be used to mark conductor in lieu of coded insulation. Tape shall cover not less than 2" of conductor insulation within enclosure.
   a. Provide color tape on each end and at all terminal points and splices on wire enclosed in conduit.
   b. Provide color tape every 3'-0" on wire not enclosed in a listed wireway.

3. When pulling conductors, do not exceed manufacturer's recommended values.

4. Use polypropylene or nylon ropes for pulling conductors.

B. Insulate splices with plastic heat shrinkable splice kit by Raychem or equal.

C. Terminate all control wires with terminal lugs on terminal boards not designed with pressure plates. If splices are needed, use same procedure, installing a terminal board in a junction box for protection.

D. All splices or connections shall be compression type Thomas & Betts or Burndy, no split bolt connections are allowed.

3.04 IDENTIFICATION

A. Feeders: Identify with the corresponding circuit designation at over-current device and load ends, at all splices and in pull boxes.

B. Branch Circuits: Identify with the corresponding circuit designation at the over-current device and at all splices and devices.

C. Control Wires: Identify with the indicated number and/or letter designation at all terminal points and connections.

D. Alarm and Detection Wires: Identify with the indicated wire and zone numbers at all connections, terminal points, and coiled conductors within cabinets.

E. Conductors Terminated By Others: Indicate location of opposite end of conductor, i.e., Pull Box-Room 101.

F. For identification of conductors, use heat shrinkable white marking sleeves such as Brady Permasleeve with type written identification.

G. Circuit designation is construed to mean panel designation and circuit number, i.e., CHA-13.

END OF SECTION 260120

SECTION 260130 - ELECTRICAL BOXES

1.00 - GENERAL

1.01 WORK INCLUDED

A. Boxes; including:

1. Outlet boxes.

2. Pull and junction boxes.

3. Cabinets.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Submittals: Section 260000.

2.00 - PRODUCTS

2.01 MATERIAL AND FABRICATION

A. Outlet Boxes:

1. Pressed Steel Boxes: Knockout type, hot-dipped or electro-plate galvanized.

2. Cast Iron Boxes: Hot-dipped or electro-plate galvanized with threaded hubs.

3. Cast Iron Conduit Bodies: Hot-dipped or electro-plate galvanized with threaded hubs.

4. Cast copper free aluminum conduit bodies with threaded hubs.

5. Covers for Pressed Steel Boxes: Hot dipped or electro-plate galvanized.

6. Outlet boxes manufactured in accordance with UL 514.

B. Pull and Junction Boxes:

1. Sheet steel, hot-dipped or electro-plate galvanized, or prime coated and a final coat of manufacturer's standard enamel or lacquer finish. Manufactured in accordance with UL 50.
   a. Where exposed to weather, provide raintight hubs for conduits entering the boxes, top and sides only.

2. Floor Boxes:
   a. Single gang, similar to Hubbell #B-2536.
   b. Covers:
      1) Combination, similar to Hubbell #S-2525.
      2) Duplex receptacle, similar to Hubbell #S-3925.
   c. Carpet flange, similar to Hubbell #S-3075 thru #S-3079.
   d. Hubs: Provide hubs as required to suit the conduit arrangement.

3. Pre-Cast Concrete Pull Boxes: In roadway traffic rated. As manufactured by Jensen Pre-Cast or Utility Vault and size shown on drawings.

4. High impact resistant PVC boxes: As manufactured by Carlon, Sedco, or R & G Sloan.

C. Cabinets: Sheet metal, prime coat and final coat of manufacturer's standard enamel or lacquer finish. Manufactured in accordance with UL 50.

1. Control Cabinet: NEMA 1 enclosure, door with butt hinges and flush handle latches.
   a. Provide with removable steel back panel.

2. Terminal Cabinets: NEMA 1 enclosure, door with concealed hinges and spring catch type flush cylinder locks. Key locks alike, provide two keys with each lock.

3. Provide engraved plastic nameplates with 1/2" minimum height letters indicating designation of control and terminal cabinets as shown on the drawings.
   a. Secure nameplates with at least two screws or rivets. Cementing and adhesive installation are not acceptable.

3.00 - EXECUTION

3.01 USE

A. Outlet Boxes:

1. Ceiling Outlet Boxes: Not less than 4" octagonal by 2" deep.

2. FDD cast iron or cast aluminum device boxes and conduit bodies with metal covers for exposed conduit installation. Provide gasket for covers in wet areas.

3. Intercom, Microphone and TV Outlet Boxes: Not less than 4-11/16" square x 2-1/8" deep.

4. Provide floor boxes with quantity of gangs as required for power, communication or control as indicated. Use boxes with barriers where required. Provide carpet flanges in carpeted areas and tile flanges in tiled areas.

B. Pull and Junction Boxes:

1. Use sheet steel boxes NEMA Type 1 for indoor and NEMA Type 3R for outdoor installation, except as follows.

2. Use pre-cast concrete boxes for boxes flush in finish grade where requiring a nominal capacity greater than 144 cubic inches, where located in vehicular traffic areas, or where indicated.

3. Use polyvinyl chloride (PVC) boxes flush in finish grade when the nominal internal volume is less than or equal to 144 cubic inches or where indicated.

4. Use cast iron boxes for boxes flush in slab on grade.

3.02 INSTALLATION

A. Provide 3/8" fixture studs in wall bracket and ceiling boxes.

B. Provide covers suitable for the fixtures or devices used.

C. Make outlet box covers flush with finished surfaces.

D. Close unused open knockouts with knockout seals.

E. Provide 1" deep plaster rings on recessed outlet boxes installed in areas where concrete will be exposed after construction is complete.

F. Where boxes are concealed in exposed concrete unit masonry, use square cornered types or boxes fitted with rings of sufficient depth for the box to be recessed completely within cavity of block or tile. Install box to ensure that ring fits an opening sawed out of the masonry, so that no mortar is required to fill between ring and construction.

G. Provide a 6" base of compacted crushed rock under pre-cast concrete pull boxes. All pre-cast concrete pull boxes shall be provided with a bottom section.

H. Adjust floor boxes so they are level with top of finished floors.

I. Provide pull boxes and junction boxes in all branch circuit and feeder runs as indicated. Do not provide pull boxes unless they are indicated or required by the Electrical Code.

3.03 IDENTIFICATION

A. Junction Boxes: Use permanent black marker, 2” high lettering, and on each cover plate indicate the power source and circuits contained within that junction box.

END OF SECTION 260130

SECTION 260170 - DISCONNECTS

1.00 - GENERAL

1.01 WORK INCLUDED

A. Disconnects: Switches, fused or unfused.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Submittals: Section 260000.

2.00 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Square D Company

2.02 MATERIAL AND FABRICATION

A. Provide heavy duty type, quick-make, quick-break disconnects with cover interlocks.

B. Provide NEMA Type 1 enclosure for dry locations, NEMA 3R outdoor. Provide the proper enclosure for other locations as indicated.

C. Provide motor rated toggle switches where indicated.

D. Provide fused disconnect for all HVAC equipment, all motors, and all elevator drive motors.

E. Provide rejection clips on disconnects where rejection type fuses are to be installed.

3.00 - EXECUTION

3.01 INSTALLATION

A. Securely fasten disconnects to structure to withstand wire pulling strains.

B. Where structure is not available, contractor shall construct unistrut channel support stand. Stand and disconnect shall be attached to structure to withstand wire pulling strains.

3.02 LABELING AND IDENTIFICATION

A. Provide engraved plastic nameplates on individually mounted disconnects with minimum 1/4" height letters indicating the load served and the source feed designation.

EXAMPLE: LOAD: Unit A/C-1, 208 volt, 3 phase
FED FROM: MSB-1

B. Secure nameplates with at least two screws or rivets. Cementing and adhesive installation are not acceptable.

END OF SECTION 260170

ABBREVIATIONS

A	AMPERES	IDF	INTERMEDIATE DISTRIBUTION FRAME
AC	ALTERNATING CURRENT	I.G.	ISOLATED GROUND
AF	AMP FRAME/AMP FUSE	JB	JUNCTION BOX
AFC	AVAILABLE FAULT CURRENT	KV	KILO VOLT
AFF	ABOVE FINISHED FLOOR	KVA	KILO VOLT AMPS=1000VA
AFG	ABOVE FINISHED GRADE	KW	KILOWATT
AIC	AMPERES INTERRUPTING CAPACITY	KCMIL	THOUSAND CIRCULAR MILS
AL	ALUMINUM	LTG	LIGHTING
ARCH	ARCHITECT	LC	LIGHTING CONTACTOR
AS	AMP SWITCH RATING	LCL	LONG CONTINUOUS LOAD
AT	AMP TRIP	LV	LOW VOLTAGE
ATS	AUTOMATIC TRANSFER SWITCH	MDF	MAIN DISTRIBUTION FRAME
AV	AUDIO VISUAL	MTD	MOUNTED
AWG	AMERICAN WIRE GAGE	MTB	MAIN TELEPHONE BACKBOARD
BKBD	BACKBOARD	MTG	MOUNTING
BLDG.	BUILDING	MV	MERCURY VAPOR
BIL	BASIC IMPULSE LEVEL	MH	METAL HALIDE
C	CONDUIT	MFG	MANUFACTURER
CB	CIRCUIT BREAKER	MPOE	MAIN POINT OF ENTRY
CBC	CALIFORNIA BUILDING CODE	(N)	NEW
CEC	CALIFORNIA ELECTRICAL CODE	NC	NORMALLY CLOSED
CF	COMPACT FLUORESCENT	NEC	NATIONAL ELECTRICAL CODE
CFC	CALIFORNIA FIRE CODE	NIC	NOT IN CONTRACT
CONT.	CONTINUATION	NL	NIGHT LIGHT
CKT	CIRCUIT	NO	NORMALLY OPEN
CLG	CEILING	NTS	NOT TO SCALE
CO	CONDUIT ONLY	P	POWER OR POLE
CSFM	CA. STATE FIRE MARSHALL	PBO	PROVIDED BY OTHERS
CTV	CABLE TELEVISION	PNL	PANEL
(CU)	COPPER	(R)	REMOVED
CW	COLD WATER PIPE	RGS	RIGID GALVANIZED STEEL CONDUIT
COMM	COMMUNICATION	RM	ROOM
DIS	DISCONNECT	SN	SYSTEM NEUTRAL
DS	DISCONNECT SWITCH	TC	TIME CLOCK
DWG	DRAWING	TTB	TELEPHONE TERMINAL BOARD
EC	ELECTRICAL CONTRACTOR	TTC	TELEPHONE TERMINAL CABINET
(E)	FRONT	TR	TRANSFORMER
FAU	FORCED AIR UNIT	TYP	TYPICAL
FS	SHALLOW FLOOR BOX	UON	UNLESS OTHERWISE NOTED
GC	GENERAL CONTRACTOR	UNSW	UNSWITCHED
GFI	GROUND FAULT INTERRUPTER	VA	VOLT AMPS
GND	GROUND	V	VOLTS/VOLTAGE
HID	HIGH INTENSITY DISCHARGE	W	WATTS/WATTAGE
HP	HORSEPOWER	WP	WEATHERPROOF
HV	HIGH VOLTAGE	W/	WITH
HZ	HERTZ	(X)	EXISTING

U.L. STANDARD 486B TORQUING RECOMMENDATIONS

TIGHTENING TORQUE FOR SCREWS (a)

TORQUE, POUND – INCHES

WIRE SIZE	SLOTTED HEAD NO. 10 AND LARGER (b)				HEXAGONAL HEAD/EXTERNAL DRIVE SOCKET WRENCH	
	SLOT WIDTH (IN.)		SLOT LENGTH (IN.)		SPLIT-BOLT	OTHER
	TO 3/64	OVER 3/64	TO 1/4	OVER 1/4	CONNECTORS	CONNECTORS
18–10 AWG	20	35	20	35	80	75
8	25	40	25	40	80	75
6	35	45	35	45	165	110
4	–	45	–	45	165	110
3	–	50	–	50	275	150
2	–	50	–	50	275	150
1	–	50	–	50	275	150
1/0	–	50	–	50	385	180
2/0	–	50	–	50	385	180
3/0	–	50	–	50	500	250
4/0	–	50	–	50	500	250
250 kcmil	–	50	–	50	650	325
300	–	50	–	50	650	325
350	–	50	–	50	650	325
400	–	50	–	50	825	325
500	–	50	–	50	825	375
600	–	50	–	50	1000	375
700	–	50	–	50	1000	375
750	–	50	–	50	1000	375
800	–	50	–	50	1100	500
900	–	50	–	50	1100	500
1000	–	50	–	50	1100	500
1250	–	–	–	–	1100	600
1500	–	–	–	–	1100	600
1750	–	–	–	–	1100	600
2000	–	–	–	–	1100	600

THIS TABLE GIVES RECOMMENDED CONNECTOR INSTALLING TORQUE'S FOR COPPER AND ALUMINUM CONDUCTORS. THEY ARE FOR GUIDANCE ONLY WHERE NO TIGHTENING INFORMATION IS AVAILABLE AND SHOULD NOT BE USED TO REPLACE MANUFACTURERS' INSTRUCTIONS WHICH SHOULD ALWAYS BE FOLLOWED.

(a) CLAMPING SCREWS WITH MULTIPLE TIGHTENING MEANS; FOR EXAMPLE, FOR A SLOTTED HEXAGONAL HEAD SCREW, USE THE HIGHEST TORQUE VALUE ASSOCIATED WITH THE DIFFERENT TIGHTENING MEANS.

(b) FOR VALUES OF SLOT WIDTH OR LENGTH OTHER THAN THOSE SPECIFIED, SELECT THE LARGEST TORQUE VALUE ASSOCIATED WITH CONDUCTOR SIZE.

CEC ART. 310 CONDUCTOR DERATING

NEC §310.15 (B)(3)(a) ADJUSTMENT FACTORS

(a) MORE THAN THREE CURRENT–CARRYING CONDUCTORS IN A RACEWAY OR CABLE. WHERE THE NUMBER OF CURRENT–CARRYING CONDUCTORS IN A RACEWAY OR CABLE EXCEEDS THREE, THE ALLOWABLE AMPACITIES SHALL BE REDUCED AS SHOWN IN THE FOLLOWING TABLE:

NUMBER OF CURRENT–CARRYING CONDUCTORS	PERCENT OF VALUES IN TABLES AS ADJUSTED FOR AMBIENT TEMPERATURE IF NECESSARY
4 THROUGH 6	80
7 THROUGH 9	70
10 THROUGH 20	50
21 THROUGH 30	45
31 THROUGH 40	40
41 AND ABOVE	35

WHERE SINGLE CONDUCTORS OR MULTICONDUCTOR CABLES ARE STACKED OR BUNDLED LONGER THAN 24 INCHES (610 mm) WITHOUT MAINTAINING SPACING AND ARE NOT INSTALLED IN RACEWAYS, THE ALLOWABLE AMPACITY OF EACH CONDUCTOR SHALL BE REDUCED AS SHOWN IN THE ABOVE TABLE.

EXCEPTION NO. 1: WHERE CONDUCTORS OF DIFFERENT SYSTEMS, AS PROVIDED IN SECTION 300–3, ARE INSTALLED IN A COMMON RACEWAY OR CABLE, THE DERATING FACTORS SHOWN ABOVE SHALL APPLY TO THE NUMBER OF POWER AND LIGHTING (ARTICLES 210, 215, 220, AND 230) CONDUCTORS ONLY.

EXCEPTION NO. 2: FOR CONDUCTORS INSTALLED IN CABLE TRAYS, THE PROVISIONS OF SECTION 392.11 SHALL APPLY.

EXCEPTION NO. 3: DERATING FACTORS SHALL NOT APPLY TO CONDUCTORS IN NIPPLES HAVING A LENGTH NOT EXCEEDING 24 INCHES (600mm).

EXCEPTION NO. 4: DERATING FACTORS SHALL NOT APPLY TO UNDERGROUND CONDUCTORS ENTERING OR LEAVING AN OUTDOOR TRENCH IF THOSE CONDUCTORS HAVE PHYSICAL PROTECTION IN THE FORM OF RIGID METAL CONDUIT, INTERMEDIATE METAL CONDUIT, OR RIGID NONMETALLIC CONDUIT HAVING A LENGTH NOT EXCEEDING 10 FEET (3.05m) ABOVE GRADE AND THE NUMBER OF CONDUCTORS DOES NOT EXCEED FOUR.

CEC WIRE FILL TABLE 314.16(a)

JUNCTION BOX DIMENSION, INCHES TRADE SIZE OR TYPE	MIN. CU. IN. CAP.	MAXIMUM NUMBER OF CONDUCTORS				
		NO.14	NO.12	NO.10	NO.8	NO.6
4 x1–1/4 ROUND OR OCTAGONAL	12.5	6	5	5	5	2
4 x1–1/2 ROUND OR OCTAGONAL	15.5	7	6	6	5	3
4 x2–1/8 ROUND OR OCTAGONAL	21.5	10	9	8	7	4
4 x1–1/4 SQUARE	18.0	9	8	7	6	3
4 x1–1/2 SQUARE	21.0	10	9	8	7	4
4 x2–1/8 SQUARE	30.3	15	13	12	10	6
4–11/16 x1–1/4 SQUARE	25.5	12	11	10	8	5
4–11/16 x1–1/2 SQUARE	29.5	14	13	11	9	5
4–11/16 x2–1/8 SQUARE	42.0	21	18	16	14	8
3 x2 x1–1/2 DEVICE	7.5	3	3	3	2	1
3 x2 x2 DEVICE	10.0	5	4	4	3	2
3 x2 x2–1/4 DEVICE	10.5	5	4	4	3	2
3 x2 x2–1/2 DEVICE	12.5	6	5	5	4	2
3 x2 x2–3/4 DEVICE	14.0	7	6	5	4	2
3 x2 x3–1/2 DEVICE	18.0	9	8	7	6	3
4 x2–1/8 x1–1/2 DEVICE	10.3	5	4	4	3	2
4 x2–1/8 x1–7/8 DEVICE	13.0	6	5	5	4	2
4 x2–1/8 x2–1/8 DEVICE	14.5	7	6	5	4	2
3–3/4 x2 x2–1/2 MASONRY BOX / GANG	14.0	7	6	5	4	2
3–3/4 x2 x3–1/2 MASONRY BOX / GANG	21.0	10	9	8	7	4
FS – MINIMUM INTERNAL DEPTH 1–3/4 SINGLE COVER / GANG	13.5	6	6	5	4	2
FD – MINIMUM INTERNAL DEPTH 2–3/8 SINGLE COVER / GANG	18.0	9	8	7	6	3
FS – MINIMUM INTERNAL DEPTH 1–3/4 MULTIPLE COVER / GANG	18.0	9	8	7	6	3
FD – MINIMUM INTERNAL DEPTH 2–3/8 MULTIPLE COVER / GANG	24.0	12	10	9	8	4

GENERAL ELECTRICAL NOTES

A. GENERAL

1. SCOPE
THE DRAWINGS AND THESE GENERAL NOTES DESCRIBE THE SCOPE OF WORK AND SYSTEMS. THE MATERIAL REQUIRED FOR THE WORK SHALL BE CONTRACTOR FURNISHED AND CONTRACTOR INSTALLED, UNLESS SPECIFICALLY NOTED OTHERWISE. THE WORK INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING PRINCIPAL SYSTEMS AND EQUIPMENT.

2. PERMITS AND CHARGES
OBTAIN AND PAY FOR ALL NECESSARY CONSTRUCTION PERMITS, INSPECTION FEES, AND OTHER CHARGES BY AGENCIES HAVING JURISDICTION.

3. REGULATIONS AND CODES
PROVIDE AND INSTALL ALL MATERIALS IN CONFORMANCE WITH THE NATIONAL ELECTRICAL CODE, CALIFORNIA ADMINISTRATIVE CODE TITLE 8, AND OTHER CODES AND REGULATIONS HAVING JURISDICTION. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE REQUIREMENTS OF THE INSPECTING AUTHORITY AND THE MANUFACTURERS RECOMMENDATIONS.

CONSTRUCTION SHALL COMPLY WITH THE FOLLOWING:

APPLICABLE CODES

2022 BUILDING STANDARDS ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R.
2022 CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24 C.C.R.;
2022 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, TITLE 24 C.C.R.;
2022 CALIFORNIA MECHANICAL CODE (CMC), PART 4, TITLE 24 C.C.R.;
2022 CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24 C.C.R.;
2022 CALIFORNIA FIRE CODE (CFC), PART 9, TITLE 24 C.C.R.;
2022 CALIFORNIA REFERENCED STANDARDS CODE, PART 12, TITLE 24, C.C.R.
2022 TITLE 19 C.C.R. PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS

CONSTRUCTION SHALL COMPLY WITH THE FOLLOWING:

NFPA 13–AUTOMATIC SPRINKLER SYSTEMS, 2016 EDITION
NFPA 14–STANDPIPES SYSTEMS, 2019 EDITION
NFPA 17A–WET CHEMICAL SYSTEMS, 2017 EDITION
NFPA 24–PRIVATE FIRE MAINS, 2019 EDITION– PART OF NFPA 13 CHAPTER 5
NFPA 72 (CALIFORNIA AMENDED)– NATIONAL FIRE ALARM CODES, 2019 EDITION
NFPA 101 LIFE SAFETY CODE, 2018 EDITION
NFPA 253–CRITICAL RADIANT FLUX OF FLOOR COVERING SYSTEMS, 2019 EDITION
NFPA 2001–CLEAN AGENT FIRE EXTINGUISHING SYSTEMS, 2018 EDITION

4. VERIFYING EXISTING CONDITIONS
BEFORE SUBMITTING BID, BECOME THOROUGHLY FAMILIAR WITH ACTUAL EXISTING CONDITIONS AT THE BUILDING SITE. THE INTENT OF THE WORK IS SHOWN ON THE DRAWINGS AND DESCRIBED HEREINAFTER. BY THE ACT OF SUBMITTING A BID PROPOSAL FOR THE WORK, THE CONTRACTOR SHALL BE DEEMED TO HAVE MADE SUCH STUDY AND EXAMINATION AND TO ACCEPT ALL CONDITIONS PRESENT AT THE SITE. NO REQUEST FOR ADDITIONAL PAYMENT WILL BE CONSIDERED AS VALID, DUE TO FAILURE TO ALLOW FOR CONDITIONS WHICH MAY EXIST.

5. COORDINATION
COORDINATE ALL WORK WITH OTHER TRADES. OBTAIN ALL DRAWINGS THAT WILL REQUIRE COORDINATION AND PROVIDE ALL ELECTRICAL CONNECTION, DEVICES, RACEWAYS, WIRING, LIGHT FIXTURES, CONTROLS, ETC. REQUIRED WHETHER SHOWN ON ELECTRICAL DRAWINGS OR NOT.

ELECTRICAL EQUIPMENT LOCATIONS INDICATED ARE SHOWN DIAGRAMMATICALLY, EXACT LOCATION SHALL BE VERIFIED.

6. SERVICE CONTINUITY
UNINTERRUPTED EXISTING ELECTRICAL POWER SHALL BE MAINTAINED TO OTHER TRADES FOR TEMPORARY POWER AREAS OF THE SITE DURING CONSTRUCTION. PROVIDE ANY TEMPORARY SERVICES AS MAY BE REQUIRED. IDENTIFY AT BID TIME, ALL WORK TO BE DONE ON PREMIUM TIME AND THE TOTAL OVERTIME MAN–HOURS REQUIRED FOR COMPLETION.

7. AS BUILT
PROVIDE RECORD DRAWINGS TO THE OWNER WITH ALL CHANGES NOTED THEREON AT THE COMPLETION OF THE PROJECT. RECORD DRAWINGS SHALL BE SIGNED AND DATED BY CONTRACTOR PRIOR TO RELEASE OF FINAL RETENTION OF ALL MONIES.

MARK PROJECT RECORD DOCUMENTS DAILY TO INDICATE ALL CHANGES MADE IN THE FIELD.
A.) IN ADDITION TO GENERAL REQUIREMENTS OF PROJECT RECORD DRAWINGS, INDICATE ON DRAWINGS, CHANGES OF EQUIPMENT LOCATIONS AND RATINGS, TRIP SIZES, AND SETTINGS ON CIRCUIT BREAKERS, ALTERATIONS IN RACEWAY RUNS AND SIZES, CHANGES IN WIRE SIZES, CIRCUIT DESIGNATIONS, INSTALLATION DETAILS, ONE–LINE DIAGRAMS, CONTROL DIAGRAMS AND SCHEDULES.

USE GREEN TO INDICATE DELETIONS AND RED TO INDICATE ADDITIONS.
A.) USE THE SAME SYMBOLS AND FOLLOW THE SAME DRAFTING PROCEDURES USED ON THE CONTRACT DRAWINGS.

LOCATE UNDERGROUND CONDUIT STUBBED–OUT FOR FUTURE USE, UNDERGROUND FEEDER CONDUITS, AND FEEDER PULL BOX LOCATIONS USING BUILDING LINES BY INDICATING ON THE PROJECT RECORD DRAWINGS.

AT THE COMPLETION OF UNDERGROUND CONDUIT INSTALLATION PROVIDE UNDERGROUND CONDUIT RECORD DOCUMENTS TO OWNER'S REPRESENTATIVE.

TWO COPIES, IN BINDER FORM, OF ALL TEST RESULTS AS REQUIRED BY THESE DOCUMENTS.

TWO COPIES OF LOCAL AND/OR STATE CODE ENFORCING AUTHORITIES FINAL INSPECTION CERTIFICATES.

TWO COPIES, IN BINDER FORM, OF ELECTRICAL EQUIPMENT CUT SHEETS, MANUFACTURER'S INSTALLATION INSTRUCTIONS, WARRANTY CERTIFICATES, AND PRODUCT LITERATURE FOR ALL PRODUCTS UTILIZED ON PROJECT.

8. GUARANTEE
CONTRACTOR SHALL UNCONDITIONALLY GUARANTEE ALL LABOR AND MATERIALS ON ALL WORK AGAINST DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR.

9. SHOP DRAWINGS
SUBMIT SHOP DRAWINGS AND MATERIAL LIST FOR REVIEW PRIOR TO COMMENCING ANY WORK. ALL EQUIPMENT TO BEAR U.L. LABEL OR THAT OF ANOTHER ACCEPTABLE TESTING LABORATORY. SHOP DRAWINGS MUST BE STAMPED BY THE CONTRACTOR FOR CONFORMANCE PRIOR TO SUBMITTAL.

SUBMIT SIX SETS OF SHOP DRAWINGS FOR REVIEW PRIOR TO PURCHASING ALL BREAKER MOUNTING HARDWARE, DISCONNECT SWITCHES, FUSES, CONTROLLERS, LIGHTING FIXTURES, LIGHT SWITCHES, RECEPTACLES, ETC.

10. CONTRACTOR BID
CONTRACTOR'S BID SHALL BE BASED ON ALL WORK SHOWN ON THE PLANS AND AS SPECIFIED. IF CONTRACTOR PROPOSES TO SUBSTITUTE FOR EQUIPMENT SPECIFIED, HE SHALL SUBMIT HIS REQUEST FOR CONSIDERATION OF THE OWNER AND ENGINEER PRIOR TO BID IN WRITING. ALL SUBSTITUTIONS MUST BE REVIEWED BY THE ENGINEER IN WRITING. SUCH REVIEW SHALL NOT RELIEVE THE CONTRACTOR FROM COMPLYING WITH THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS, AND THE CONTRACTOR SHALL BE RESPONSIBLE AT HIS OWN EXPENSE FOR ANY CHANGES RESULTING FROM HIS PROPOSED SUBSTITUTIONS WHICH AFFECT OTHER PARTS OF HIS OWN WORK, THE OWNER, ENGINEER OF RECORD OR THE WORK OF OTHER CONTRACTORS.

B. MATERIAL AND INSTALLATION
ALL WORK AND MATERIAL SHALL CONFORM TO THE LATEST RULES OF THE GOVERNING ELECTRICAL CODE AND INSTALLATION SHALL BE OF THE LATEST INDUSTRY STANDARDS OF WORKMANSHIP.

ALL MATERIALS SHALL BE NEW AND LISTED BY UNDERWRITERS LABORATORY (U.L.).

1. CONDUITS
CONDUIT SHALL BE EMT, PVC, IMC, RIGID OR FLEXIBLE STEEL TYPE. CONDUIT SHALL BE MANUFACTURED IN ACCORDANCE WITH UL–1. A GROUND WIRE IS REQUIRED IN ALL FLEXIBLE CONDUIT AND UNDERGROUND CONDUIT. BUSHINGS SHALL BE INSTALLED ON ALL COMMUNICATION, TELEPHONE & SPEAKER CONDUITS. PROVIDE 3/16" NYLON PULL STRING IN ALL EMPTY CONDUITS. NO MC, BX OR AC90 SHALL BE PERMITTED.

2. SWITCHES AND RECEPTACLES
PROVIDE 20AMP NEMA RATED SWITCHES AND RECEPTACLES OF SPECIFICATION GRADE. ALL SWITCHES SHALL BE RATED FOR 120 AND/OR 277 VOLT AND RECEPTACLES SHALL BE NEMA 5–20R. IN ALL OFFICES AND OFFICE AREAS DEVICES SHALL BE DECORA TYPE WITH COLOR SELECTION BY CONTRACTOR/OWNERS REPRESENTATIVE.

3. FEEDERS AND BRANCH CIRCUITS IDENTIFICATION
IDENTIFY FEEDERS WITH THE CORRESPONDING CIRCUIT DESIGNATION AT THE OVER–CURRENT DEVICE, LOAD END, AND IN PULL BOXES WITH E–Z CODE OR OTHER APPROVED WIRE MARKER.

IDENTIFY BRANCH CIRCUITS WITH I.D. MARKERS, THE CORRESPONDING CIRCUIT DESIGNATION AT THE OVER–CURRENT DEVICE, AT ALL SPLICES, IN JUNCTION BOXES, AND IN OUTLETS. USE PLASTIC COATED SELF–STICKING MARKERS SUCH AS THOMAS & BETTS E–Z CODE FOR IDENTIFICATION OF CONDUCTORS.

IDENTIFY SIGNAL & COMMUNICATION CABLES AT TERMINAL AND OUTLET.

4. CONDUCTORS
DELIVER ALL CONDUCTORS TO THE JOB SITE IN ORIGINAL UNBROKEN CARTON OR REEL, PROPERLY TAGGED WITH U.L. LABEL, SIZE, TYPE, MANUFACTURER, TRADE NAME AND THE DATE OF MANUFACTURE. (MUST BE MANUFACTURED WITHIN 6 MONTHS)

PROVIDE COPPER CONDUCTORS #12 AWG MINIMUM UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS. PROVIDE STRANDED COPPER CONDUCTORS FOR ALL WIRING. USE CONDUCTORS WITH THHN/THWN 600 VOLTS INSULATION, UNLESS OTHERWISE NOTED.

CONTRACTOR SHALL FURNISH AND INSTALL ALL WIRE TERMINATORS, STRESS CONES, COMPRESSION PIN ADAPTERS, LUGS, WIRE NUTS, ETC. AS REQUIRED TO TERMINATE ANY AND ALL CONDUCTORS.

5. PANELBOARDS (BID SQUARE D)
DISTRIBUTION AND LIGHTING PANELBOARDS WITHIN PROJECT AREA SHALL BE OF THE COPPER BUS THREE PHASE, FOUR WIRE DISTRIBUTED PHASING TYPE. CIRCUITING SHALL BE ARRANGED TO PROVIDE, AS NEARLY AS POSSIBLE, AN EVENLY BALANCED LOAD ON ALL PHASES. PANELBOARDS SHALL BE BOLT–ON CIRCUIT BREAKER TYPE. AVAILABLE FAULT CURRENT IS STATED ON PANELBOARD SCHEDULE. PROVIDE PANEL IDENTIFICATION NAMEPLATE (ENGRAVED ON–ADHESIVE 1/2" MINIMUM LETTERS) AND TYPEWRITTEN LIST OF CIRCUITS IN THE DIRECTORY FRAME.

6. STRUCTURAL SUPPORT
EACH SECTION OF FLOOR MOUNTED SWITCHBOARD, DISTRIBUTION BOARD, MCC, ETC. SHALL BE BOLTED TO THE CONCRETE HOUSEKEEPING PAD USING (6) 3/4"–10 GRADE 2 BOLTS AND CONICAL WASHERS TORQUED TO 70LB–FT. PROVIDE MINIMUM 4000 PSI STRENGTH CONCRETE BELOW ALL FLOOR MOUNTED ELECTRICAL EQUIPMENT. TIE THE TOP OF ALL FLOOR MOUNTED ELECTRICAL EQUIPMENT TO THE BUILDING STRUCTURE IN A SEISMICALLY APPROVED MANNER.

CEC 110.34(C)

CONTRACTOR SHALL PROVIDE PERMANENT SIGNAGE AT ALL HIGH VOLTAGE ENCLOSURES, FENCING, ROOMS, VAULTS, ETC. PER CEC 110.34(C). SIGNAGE SHALL READ "DANGER–HIGH VOLTAGE–KEEP OUT"

CEC 110.16

ALL SWITCHBOARDS & PANELBOARDS SHALL BE FIELD MARKED TO WARN QUALIFIED PERSONS OF POTENTIAL ELECTRICAL ARC FLASH HAZARDS, PER CEC 110.16 THE MARKING SHALL BE LOCATED SO AS TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.

C. DEMOLITION
NOTIFY THE OWNER IMMEDIATELY WHEREVER EXISTING EQUIPMENT IS ENCOUNTERED WHICH MUST BE RELOCATED DUE TO THE NEW CONSTRUCTION, AND WHICH IS NOT INDICATED ON THE PLANS.

1. ALL REMOVED MATERIALS AND EQUIPMENT WHICH ARE SALVAGEABLE SHALL REMAIN THE PROPERTY OF THE OWNER. DELIVER SUCH SALVAGED MATERIALS AND EQUIPMENT ON THE PREMISES AS DIRECTED BY OWNER, AND NEATLY PILE OR STORE THEM AND PROTECT FROM DAMAGE. REMOVE FROM PREMISES AND DISPOSE OF ALL MATERIALS CONSIDERED BY THE OWNER TO BE SCRAP.

2. ALL DEVICES, CIRCUITS CONDUCTORS, FEEDERS ETC., WHEN NOTED TO BE REMOVED, SHALL BE REMOVED TO THE LAST ACTIVE DEVICE. ALL OVER–CURRENT PROTECTION AND DISCONNECT DEVICES NO LONGER UTILIZED BUT REMAINING AS LAST ACTIVE DEVICE SHALL BE LABELED AS 'SPARE'. COORDINATE ALL OUTAGES WITH OWNERS REPRESENTATIVE.

D. EXECUTION
CAREFULLY PROTECT ALL WALLS, TRIM, FLOORS, EQUIPMENT UTILITY LINES AND MATERIALS. WHEN WORKING ON FINISHED SURFACES, LIMIT DAMAGE TO THE CONFINES AS MUCH AS POSSIBLE AND RESTORE TO THE ORIGINAL CONDITION ALL SURFACES WHICH ARE DAMAGED BECAUSE OF THE INSTALLATION OF THIS WORK.

1. EQUIPMENT, MATERIALS AND SUPPLIES REMOVED FOR PROTECTION SHALL BE REPLACED IN ORIGINAL LOCATIONS. ANY MATERIALS DAMAGED SHALL BE REPLACED WITH NEW MATERIALS OF LIKE KIND AND QUALITY.

2. DO ALL DRILLING, CUTTING, CHANNELING AND PATCHING REQUIRED TO INSTALL ELECTRICAL WORK AS INDICATED OR HEREIN SPECIFIED. ALL HOLES, CURBS, ETC., IN FLOORS, CEILINGS AND WALLS SHALL BE PATCHED, UNLESS INDICATED OTHERWISE. PAINT ALL NEW ELECTRICAL RACEWAYS, CABINETS, ENCLOSURES AND FITTINGS PENETRATING INTO FIRE RATED ENVELOPES, SPACES, ETC.

3. ALL CONDUIT RUNS SHALL BE CONCEALED, UNLESS SHOWN OTHERWISE. PROVIDE A PULL WIRE IN ALL EMPTY CONDUITS.

4. EXISTING CONDITION SHOWN IS FROM AVAILABLE RECORD DRAWINGS AND VISUAL FIELD SURVEY AND SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL VERIFY ACTUAL EXISTING CONDITION AT SITE.

5. ALL WORK SHOWN IS NEW UNLESS SPECIALLY INDICATED AS EXISTING (X). ALL ELECTRICAL EQUIPMENT MOUNTING AND ANCHORAGE MUST CONFORM WITH LOCAL AND STATE SEISMIC CODES.

E. VOICE\DATA SYSTEMS
PROVIDE RACEWAYS, CAT 6 CABLING, PATCH PANELS, JACKS, TERMINATIONS, BOXES, SUPPORTS, AND ALL MATERIALS INCLUDING PULLING NEW CABLE FROM IDF TO OUTLET AT DESK OR WORKSTATION.

F. GROUNDING & BONDING
FURNISH AND INSTALL COMPLETE BONDING AND GROUNDING SYSTEM AS REQUIRED BY CODES. CONTINUITY OF GROUNDING SHALL BE MAINTAINED MECHANICALLY AND ELECTRICALLY THROUGHOUT THE SYSTEM. A GREEN GROUNDING CODE SIZED CONDUCTOR SHALL BE CARRIED IN ALL CONDUITS.

G. INSTALLATION
IT IS THE INTENT OF THESE PLANS AND SPECIFICATIONS THAT A COMPLETE AND WORKABLE ELECTRICAL INSTALLATION BE PROVIDED FOR ALL THE EQUIPMENT DESCRIBED OR SHOWN AS BEING IN THIS CONTRACT. TOWARD THIS END FURNISH ALL LABOR AND TOOLS NECESSARY AND FURNISH AND INSTALL ALL APPARATUS, MATERIALS AND EQUIPMENT IN A FASHION COMPLYING WITH ALL APPLICABLE CODES, INCLUDING ITEMS REQUIRED BUT NOT NORMALLY SHOWN, SUCH AS LAMPS, COUPLINGS, HANGERS, BRACKETS, CLAMPS, BOXES, CONNECTORS AND HARDWARE. REFER ALSO TO WRITTEN SPECIFICATIONS FOR GENERAL, MECHANICAL AND ELECTRICAL SECTIONS.

1. PROCURE ALL PERMITS FROM LEGALLY CONSTITUTED AUTHORITIES, ARRANGE FOR ALL INSPECTIONS AND PAY ALL COSTS FOR FEES AND TESTS IN CONNECTION THEREWITH. COMPLY WITH CODES: NOTHING IN THESE PLANS AUTHORIZES DEVIATION FROM APPLICABLE CODES.

2. DETERMINE EXACT ROUTING OF CONCEALED FEEDERS AND BRANCH HOMERUNS IN COOPERATION WITH OTHER TRADES TO SIMPLIFY INSTALLATION WHEREVER POSSIBLE BUT SUBJECT TO APPROVAL OF ARCHITECT FOR VISUAL AND STRUCTURAL REASONS.

3. PROVIDE A CODE APPROVED DISCONNECT SWITCH OR BREAKER WITHIN SIGHT OF EVERY MOTOR AND FEED MOTORS NOT EQUIPPED WITH "BUILT IN" PROTECTION THROUGH A MAGNETIC OR MANUAL STARTER WITH OVERLOAD HEATERS SIZED TO COMPLY WITH MOTOR MANUFACTURER'S RECOMMENDATIONS AND APPLICABLE CODES.

4. FOR CONNECTIONS TO EXHAUST FANS, PUMPS, COMPRESSORS, SPACE HEATERS, WATER HEATERS, AQUASTATS, SOLENOID VALVES AND OTHER MECHANICAL EQUIPMENT AND FOR CONDUITS AND WIRE REQUIRED BUT NOT NECESSARILY SHOWN ON THESE DRAWINGS REFER TO MECHANICAL PLANS AND DETERMINE EXACT LOCATIONS UNDER DIRECTION OF HEATING AND VENTILATING CONTRACTOR.

5. DO NOT RUN ANY CONDUIT IN SLAB IF ITS OUTSIDE DIAMETER EXCEEDS 1/3 THE THICKNESS OF THE SLAB. LOCATE CONDUITS WITHIN THE MIDDLE OF THE SLAB. WHERE CONDUITS ARE GROUPED IN PARALLEL RUNS, SPACE THEM 3" OR MORE APART. WHERE CONDUITS CROSS EACH OTHER, THICKEN SLAB PROPORTIONATELY OVER A HORIZONTAL AREA EQUAL TO TEN TIMES THE DIAMETER OF THE LARGEST CONDUIT. REFER ALSO TO DETAILS SHOWN.

6. SIZE OUTLET BOXES IN CONFORMITY WITH CODE FOR NUMBER AND GAUGE OF CONDUCTORS THEREIN, EXCEPT WHERE NOTED TO BE LARGER. MINIMUM BOX SIZE SHALL BE 4" SQUARE BY 1–1/2" DEEP.

7. EXAMINE PLANS TO DISCERN CEILINGS WITH A FIRE RATING OF ONE HOUR OR MORE, PROVIDE A ONE HOUR FIRE–RATED ENCLOSURE OVER EACH LIGHT FIXTURE RECESSED THEREIN.

8. ALL ELECTRICAL WORK SHALL BE INSTALLED SO AS TO BE READILY ACCESSIBLE FOR OPERATING, SERVICING, MAINTAINING AND REPAIRING. ALL CONDUIT SHALL BE CONCEALED WHERE POSSIBLE. EXPOSED CONDUIT SHALL BE IN STRAIGHT LINES PARALLEL WITH, OR AT RIGHT ANGLES TO, COLUMN LINES OR BEAMS AND SEPARATED BY AT LEAST THREE (3) INCHES FROM WATER LINES WHENEVER THEY RUN LONG SIDE OR ACROSS SUCH LINES. CONDUIT SHALL NOT BE RUN BELOW CABLE TRAYS OR LIGHT FIXTURES WITHOUT SPECIFIC APPROVAL OF THE OWNERS REPRESENTATIVE. HANGERS SHALL BE FASTENED TO STEEL, CONCRETE OR MASONRY, BUT NOT TO PIPING. HANGERS AND SUPPORT SYSTEMS ARE AN INTEGRAL PART OF THE VISUAL ENVIRONMENT. ALL HANGERS AND SUPPORTS EXPOSED TO PUBLIC VIEW MUST BE SHOWN IN DETAIL ON PLANS SUBMITTED TO LANDLORD FOR APPROVAL OF APPEARANCE. ALL HANGERS MUST BE UNIFORMLY SPACED AND NEATLY INSTALLED WITH NO EXCESS MATERIAL BEYOND WHAT IS REQUIRED FOR THE SUPPORT FUNCTION. CONTRACTOR SHALL SELECT ACCESSORIES AND HARDWARE WITH A SMOOTH, NEAT FINISHED APPEARANCE AND PAINT ALL EXPOSED CONDUIT HANGERS TO MATCH THE ADJACENT FINISHES.

9. ALL WALL SWITCHES AND RECEPTACLES SHALL BE MOUNTED BETWEEN 18" AND 48" TO TOP OF OUTLET BOX PER ADA REQUIREMENT

GENERAL ELECTRICAL SPECIFICATIONS SHEET

GENERAL

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE A COMPLETE AND OPERABLE ELECTRICAL SYSTEM AS SHOWN ON THE DRAWING(S). THE COMPLETE INSTALLATION SHALL MEET REQUIREMENTS OF THE LATEST NATIONAL ELECTRICAL CODE AND ALL LOCALLY ADOPTED AMENDMENTS, INCLUDING BUT NOT NECESSARILY LIMITED TO THE FOLLOWING:

CALIFORNIA ELECTRICAL CODE – LATEST EDITION

1. CALIFORNIA ADMINISTRATIVE CODE, TITLE 24
2. CALIFORNIA ADMINISTRATIVE CODE, TITLE 19, FIRE CODE
3. UNDERWRITERS LABORATORY
4. AMERICAN NATIONAL STANDARD INSTITUTE
5. NEMA (NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION)
6. ALL OTHER APPLICABLE STATE, LOCAL LAWS AND REGULATIONS 7.

WHERE THESE SPECIFICATIONS CALL FOR A HIGHER STANDARD THAN THE ABOVE–MENTIONED RULES, THE SPECIFICATIONS SHALL GOVERN.

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO INSTALL ALL WORK IN ACCORDANCE WITH STAMPED PLANS APPROVED BY THE ELECTRICAL DIVISION OF THE DEPARTMENT OF BUILDING AND SAFETY.

PRIOR TO CONTRACTOR SUBMITTING HIS BID, HE SHALL VISIT THE JOB SITE TO BECOME COMPLETELY FAMILIAR WITH ALL ASPECTS OF THE NEW CONSTRUCTION AND ALL REQUIREMENTS THAT MAY BE IMPOSED BY THE OWNER. FAILURE TO DO THIS WILL RELIEVE OWNER FROM ANY FINANCIAL OBLIGATION FOR EXTRA WORK OR COST INCURRED BY THE CONTRACTOR. CONTRACTOR TO TAKE NOTE OF ALLOWABLE WORK HOURS, ON–SITE STORAGE FACILITIES, AND AVAILABLE PARKING AND INCLUDE THIS IN HIS BID.

ALL PERMITS SHALL BE OBTAINED AND PAID FOR BY THE CONTRACTOR.

ACCURATE RECORD DRAWINGS SHALL BE MAINTAINED AND PRESENTED TO THE OWNER AND THE ELECTRICAL ENGINEER AT THE TIME OF OCCUPANCY PERMIT.

THE CONTRACTOR SHALL UNCONDITIONALLY GUARANTEE ALL HIS WORK FOR ONE YEAR AFTER ACCEPTANCE AND FURNISH ALL MANUFACTURER WARRANTIES FOR THE EQUIPMENT HE FURNISHES.

THE CONTRACTOR SHALL INSTALL ALL ELECTRIC EQUIPMENT IN A NEAT AND WORKMANLIKE MANNER. ELECTRICAL EQUIPMENT SHALL BE FIRMLY SECURED TO THE SURFACE ON WHICH IT IS MOUNTED.

CERTIFICATION OF THE QUALIFICATION OF MEDIUM VOLTAGE CABLE SPLICERS/TERMINATORS SHALL BE SUBMITTED, FOR APPROVAL, 30 DAYS BEFORE SPLICES OR TERMINATION ARE TO BE MADE IN MEDIUM VOLTAGE (5 KV TO 35 KV) CABLES. THE CERTIFICATIONS SHALL INCLUDE THE TRAINING AND EXPERIENCE OF THE INDIVIDUAL ON THE SPECIFIC TYPE AND CLASSIFICATION OF CABLE TO BE PROVIDED UNDER THIS CONTRACT. THE CERTIFICATIONS SHALL INDICATE THAT THE INDIVIDUAL HAS HAD THREE OR MORE YEARS RECENT EXPERIENCE SPLICING AND TERMINATING MEDIUM VOLTAGE CABLES. THE CERTIFICATION SHALL ALSO LIST A MINIMUM OF THREE SPLICES/TERMINATIONS THAT HAVE BEEN IN OPERATION FOR MORE THAN ONE YEAR. THE CONTRACTOR SHALL PROVIDE DETAILED MANUFACTURER'S INSTRUCTIONS FOR THE CABLE TO BE SPLICED. THE ENGINEER RESERVES THE RIGHT TO REQUIRE ADDITIONAL PROOF OF COMPETENCY OR TO REJECT THE INDIVIDUAL AND CALL FOR CERTIFICATION ON AN ALTERNATE CABLE SPLICER.

THE ELECTRICAL CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF THE SHOP DRAWINGS TO THE ARCHITECT FOR APPROVAL WITHIN THIRTY (30) DAYS AFTER THE AWARD OF THE GENERAL CONTRACT. IF SUCH A SCHEDULE CANNOT BE MET, THE ELECTRICAL CONTRACTOR MAY REQUEST IN WRITING FOR AN EXTENSION OF TIME TO THE ARCHITECT. IF THE ELECTRICAL CONTRACTOR DOES NOT SUBMIT SHOP DRAWINGS IN THE PRESCRIBED TIME, THE ARCHITECT HAS THE RIGHT TO SELECT THE EQUIPMENT.

SHOP DRAWINGS SHALL BE SUBMITTED ON ALL MAJOR PIECES OF ELECTRICAL EQUIPMENT, INCLUDING SERVICE–ENTRANCE EQUIPMENT, LIGHTING FIXTURES, PANELBOARDS, SWITCHES, WIRING DEVICES AND PLATES, AND EQUIPMENT FOR MISCELLANEOUS SYSTEMS. EACH ITEM OF EQUIPMENT PROPOSED SHALL BE A STANDARD CATALOG PRODUCT OF AN ESTABLISHED MANUFACTURER. THE SHOP DRAWING SHALL GIVE COMPLETE INFORMATION ON THE PROPOSED EQUIPMENT. EACH ITEM OF THE SHOP DRAWINGS SHALL BE PROPERLY LABELED, INDICATING THE INTENDED SERVICE OF THE MATERIAL, THE JOB NAME AND ELECTRICAL CONTRACTOR'S NAME.

WHERE EQUIPMENT IS IDENTIFIED BY MANUFACTURER AND CATALOG NUMBER, IT SHALL BE CONSTRUED AS THE BASE OF REQUIREMENTS FOR QUALITY AND PERFORMANCE. WHERE MANUFACTURERS FOR EQUIPMENT ARE IDENTIFIED BY NAME, THE ELECTRICAL SUBCONTRACTOR MAY SUBMIT FOR APPROVAL, SIMILAR EQUIPMENT OF OTHER MANUFACTURERS AS SUBSTITUTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE SUFFICIENT SUPPORTING DATA TO PERMIT EVALUATION OF THE PROPOSED SUBSTITUTE WITH RESPECT TO QUALITY, PERFORMANCE, SERVICEABILITY, AND WARRANTY. THE ENGINEER'S DECISION AS TO WHETHER THE SUBMITTED EQUIPMENT IS ACCEPTABLE SHALL BE FINAL AND BINDING.

ALL CHANGES NECESSARY TO ACCOMMODATE THE SUBSTITUTED EQUIPMENT SHALL BE MADE AT THE CONTRACTOR'S EXPENSE, AND SHALL BE AS APPROVED BY THE ENGINEER. DETAILED DRAWINGS INDICATING THE REQUIRED CHANGES SHALL BE SUBMITTED FOR APPROVAL AT THE TIME THE SUBSTITUTION IS REQUESTED.

IF SUBSTITUTIONS ARE MADE IN LIEU OF THE LIGHTING FIXTURES SPECIFIED, POINT BY POINT PHOTOMETRIC CALCULATIONS, PHOTOMETRIC PERFORMANCE, FORM, DIMENSION, DESIGN AND PROFILE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

AT COMPLETION OF WORK, THIS CONTRACTOR SHALL CLEAN UP AND REMOVE ALL DEBRIS AND MATERIALS NOT INSTALLED IN WORK, DISPOSE IN AN ENVIRONMENTALLY APPROVED MANNER, LEAVING PREMISES CLEAN.

ELECTRICAL CONTRACTOR SHALL PROVIDE A TEMPORARY CONSTRUCTION SERVICE IF REQUIRED FOR THIS PROJECT TO MAINTAIN ESSENTIAL SERVICES DURING CIRCUIT CUT–OVER PERIODS.

SECURE PERMISSION FROM THE OWNER BEFORE PERFORMING ANY CUTTING OR PATCHING WORK WHICH IS LIKELY TO AFFECT THE STRENGTH OF A STRUCTURAL MEMBER. ALL PENETRATIONS THROUGH CONCRETE CONSTRUCTION SHALL BE DONE BY THE MEANS DENOTED BY ARCHITECT.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL EQUIPMENT AND WIRING AS REQUIRED AND AS INDICATED ON THE ELECTRICAL AND MECHANICAL DRAWINGS AND SPECIFICATIONS. SEE MECHANICAL DRAWINGS FOR EXACT EQUIPMENT LAYOUTS AND REQUIREMENTS INCLUDING SIZES, VOLTAGES, CONTROL WIRING, CONTROL DEVICES TO BE FURNISHED AND/OR INSTALLED, LOCATIONS AND OTHER REQUIREMENTS.

CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY. EXACT LOCATIONS AND ROUTING TO BE DETERMINED IN THE FIELD TO SUIT CONDITIONS.

THE CONTRACTOR SHALL BE RESPONSIBLE TO MAKE AND OBTAIN APPROVAL FOR ALL NECESSARY ADJUSTMENTS IN CIRCUITING AS REQUIRED TO ACCOMMODATE THE RELOCATIONS OF EQUIPMENT AND/OR DEVICES WHICH ARE AFFECTED BY ANY APPROVED AUTHORIZED CHANGE. ALL CHANGES SHALL BE CLEARLY INDICATED ON THE RECORD (AS–BUILT) DRAWINGS.

ALL MATERIAL AND EQUIPMENT SHALL BE NEW, UL LISTED, APPROVED BY THE LOCAL JURISDICTION AND, UNLESS OTHERWISE NOTED, SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. EQUIPMENT EXPOSED TO WEATHER SHALL BE UL LISTED WEATHERPROOF.

ALL MOTORS OR EQUIPMENT LOCATED OUT OF SIGHT OR MORE THAN 50 FEET FROM THE PANEL SHALL HAVE HORSEPOWER RATED DISCONNECTS INSTALLED AT THE MOTOR EQUIPMENT.

ALL REQUIRED POWER OUTAGES THAT ARE NECESSARY IN ORDER TO COMPLETE ANY PORTION OF THE WORK SHALL BE ENTIRELY AT THE OWNER'S CONVENIENCE AND AT A TIME DESIGNATED BY HIM AND BE FULLY COORDINATED WITH THE OWNER'S REPRESENTATIVE. A MINIMUM OF 48 HOURS OF ADVANCED NOTICE SHALL BE GIVEN TO THE OWNER OF TIME DESIRED. OWNER SHALL APPROVE TIME OF OUTAGE BEFORE THIS CONTRACTOR DISCONNECTS ANY CIRCUITS. CONTRACTOR SHALL FURNISH, INSTALL, AND REMOVE ANY TEMPORARY JUMPERS ETC. TO MAINTAIN ALL LOADS THAT THE OWNER DESIGNATES AS NOT BEING ABLE TO SHUT DOWN DURING CONSTRUCTION.

SHOULD ANY CONDITIONS EXIST THAT DIFFER FROM WHAT IS INDICATED ON THESE DRAWINGS THAT CAUSE DEVIATIONS IN THE WORK SHOWN, THE CONTRACTOR SHALL IN A TIMELY MANNER SO NOT TO IMPAIR THE CONSTRUCTION SCHEDULE OR SEQUENCE OF EVENTS, SUBMIT A WRITTEN REPORT OF THE CONDITIONS FOUND TO THE OWNER'S REPRESENTATIVE FOR APPROPRIATE DIRECTION ON HOW TO COMPLETE THE WORK IN QUESTION.

PRIOR TO START OF INSTALLATION THE CONTRACTOR SHALL COORDINATE THE FINAL LOCATION OF EACH LIGHT FIXTURE, SWITCH, DISCONNECT, RACEWAY, PANELBOARD, OUTLET, OCCUPANCY SENSOR, WIREMOLD, FIRE ALARM DEVICE, DATA PORT, SPEAKER, MISCELLANEOUS PROJECT DEVICE, ETC. WITH THE OWNER'S REPRESENTATIVE. THE OWNER RESERVES THE RIGHT TO RELOCATE ANY OUTLET OR DEVICE UP TO 8 FEET FROM THE LOCATION INDICATED ON THE PLANS AT NO ADDITIONAL COST.

ALL FEEDER LENGTHS INDICATED ON SINGLE LINE DIAGRAMS OR FEEDER SCHEDULE ARE FOR VOLTAGE DROP PURPOSES ONLY AND ARE NOT TO BE USED FOR MATERIAL TAKE–OFF OR BIDDING PURPOSES.

WHERE ACCESS PANELS FOR ACCOMMODATING ELECTRICAL WORK ARE LOCATED AND/OR SIZED ON THESE DRAWINGS, OR DRAWINGS PREPARED UNDER SEPARATE DIVISIONS OF THE WORK, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO RE–SIZE AND/OR PROVIDE SUITABLE ACCESS PANELS FOR THE CONDITIONS. WHERE INSUFFICIENT SPACE EXISTS TO ACCOMMODATE LARGER ACCESS PANELS, A SUITABLE ALTERNATIVE IS TO MOUNT THE ELECTRICAL COMPONENTS TO THE BACKSIDE OF THE HINGED DOOR WITH AN APPROPRIATELY SIZED AND CODE APPROVED FLEXIBLE FITTING, THUS ALLOWING ACCESS TO ELECTRICAL COMPONENTS FROM THE OCCUPIED SPACE IN LIEU OF THE ATTIC.

WHERE ELECTRICAL RACEWAYS ARE INSTALLED THROUGH 2 TO 4–HOUR RATED FLOORS OR WALLS, THE CONTRACTOR SHALL PROVIDE APPROPRIATE FITTINGS APPROVED BY ALL LOCAL AUTHORITIES FOR THE INTENDED PURPOSE AND APPLICATION. FITTINGS SHALL SEAL TIGHT THE INTERIOR AND EXTERIOR OF EACH RACEWAY PENETRATION TO PROHIBIT FIRE PASSING FROM ONE AREA TO ANOTHER. WHERE EMPTY CONDUITS ARE INSTALLED FOR FUTURE USE, THE CONTRACTOR SHALL PROPERLY SEAL THE RACEWAY TO COMPLY WITH THE PROVISIONS INDICATED ABOVE. THE ELECTRICAL CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW THE PROPOSED FITTINGS TO BE USED AND DETAILS REGARDING THE INSTALLATION METHODS PRIOR TO THEIR INSTALLATION. THE INSTALLATION SHALL NOT BE COMPLETED UNTIL FINAL APPROVAL HAS BEEN RECEIVED FROM THE ARCHITECT TO PROCEED.

AS A CONDITION FOR FURNISHING MATERIAL TO THIS PROJECT, THE MANUFACTURERS AND SUPPLIERS AGREE TO DEFEND, HOLD HARMLESS, AND TO INDEMNIFY OWNER, ARCHITECT, ELECTRICAL ENGINEER, AND ALL RELATED SUBSIDIARIES AGAINST ANY LIABILITY ARISING OUT OF PRODUCT FAILURE OR MANUFACTURING DEFECT OF THE EQUIPMENT THEY FURNISH.

2.0 DEMOLITION

THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OF THE NECESSARY DEMOLITION WORK REQUIRED TO ACCOMMODATE THE REMODELING WITHIN THE VARIOUS AREAS. RESTORE CONTINUITY OF ALL EXISTING CIRCUITING THAT IS TO REMAIN THAT BECOMES DISTURBED AS A RESULT OF THE NEW WORK. FURNISH ALL LABOR AND MATERIAL TO REROUTE CIRCUITRY TO REMAIN, CONCEAL FROM VIEW IN PUBLIC AREAS AND MAINTAIN ALL CODE REQUIRED CLEARANCES AND ACCESSIBILITY. FIELD VERIFY ALL CONDITIONS AND REQUIREMENTS PRIOR TO STARTING WORK. WHERE EXISTING CONDUITS BECOME EXPOSED AS A RESULT OF THE NEW WORK, CONTRACTOR SHALL REWORK AS REQUIRED TO SUIT CONDITIONS TO CONCEAL SUCH CONDUIT FROM VIEW IN ALL PUBLIC AND BACK OF HOUSE AREAS.

ALL WIRING WITHIN EXISTING OUTLETS ARE TO BE RE–IDENTIFIED WITH EASY–MARKERS TO REFLECT THE NEW CIRCUIT DESIGNATIONS WHERE REWORK OR EXISTING IS REQUIRED TO COMPLETE NEW WORK.

ALL EXISTING ELECTRICAL EQUIPMENT AND MATERIAL THAT IS REMOVED AS A PART OF THIS WORK SHALL BE DELIVERED TO OWNER AT A LOCATION ON THE PROPERTY THAT HE DESIGNATES.

WHERE EXISTING OUTLETS, AFFECTED BY THE NEW WORK ARE TO BE ABANDONED, REMOVE EXISTING OUTLET AND WIRING, CUT OFF AND PLUG EXISTING CONDUIT. WHERE THERE IS A POSSIBILITY TO REUSE A PORTION OF THE EXISTING CONDUIT SYSTEM, EXTEND EXISTING CONDUIT TO NEAREST ACCESSIBLE LOCATION AND PROVIDE JUNCTION BOX WITH SUITABLE COVER. COORDINATE EXTENT OF THIS WORK WITH OWNER'S REPRESENTATIVE.

3.0 WIRE AND CABLES

ALL WIRING SHALL BE COPPER, MINIMUM SIZE #12–AWG. USE THHN IN DRY LOCATIONS ONLY AND THWN IN WET LOCATIONS.

ALL FIXED ELECTRICAL APPLIANCES SHALL BE WIRED IN APPROVED WIRING ENCLOSURES.

ALL FINAL FLEX CONDUIT CONNECTIONS TO ANY EQUIPMENT SHALL INCLUDE SUFFICIENT SLACK IN FLEX TO MOVE WITH THE EQUIPMENT.

ALL CONDUCTORS SHALL BE IDENTIFIED FOR USE AND SYSTEM PER CEC ARTICLE 200. COLOR CODE SECONDARY SERVICE, FEEDER, AND BRANCH CIRCUIT CONDUCTORS WITH FACTORY APPLIED COLOR AS FOLLOWS:

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

CONTRACTOR SHALL FURNISH AND INSTALL ALL WIRE TERMINATORS, STRESS CONES, COMPRESSION PIN ADAPTERS, LUGS, WIRE NUTS, ETC. AS REQUIRED TO TERMINATE ANY AND ALL CONDUCTORS.

4.0 CONDUIT

CONDUIT INSTALLED WITHIN CONCEALED AREAS MAY BE EMT OR RIGID STEEL IN EXPOSED AREAS SUBJECT TO CONDUIT DAMAGE, ONLY GALVANIZED RIGID STEEL MAY BE USED. ALL CONDUIT IN FINISHED AREAS TO BE CONCEALED

A MAXIMUM OF 4' OF CONDUIT AND WIRE SHALL BE SOLAR EXPOSED

ALL CONDUITS INSTALLED UNDERGROUND SHALL BE MINIMUM 1". UNDERGROUND CONDUITS SHALL BE PVC, SCHEDULE 40 ELECTRICAL CONDUIT FOR 0–600 VOLT SYSTEMS, SCHEDULE 80 ELECTRICAL CONDUIT FOR 600 TO 25KV SYSTEMS, AS MANUFACTURED BY CARLON OR EQUAL UNLESS NOTED OTHERWISE.

CONDUITS SHOWN ON THE DRAWINGS HAVE BEEN SIZED BASED ON METALLIC RACEWAYS UNLESS NOTED. ELECTRICAL CONTRACTOR MAY OPT TO USE SCHEDULE 40 PVC WHERE PERMITTED BY CODE AND THE OWNER. IF PVC IS USED, ELECTRICAL CONTRACTOR SHALL SIZE ALL SUCH CONDUITS AS REQUIRED TO INCLUDE GROUND CONDUCTOR, AND SHALL SIZE GROUND WIRE PER CODE. PVC RACEWAYS SHALL NOT BE INSTALLED ABOVE GROUND. ALL FLEX CONDUITS SHALL INCLUDE A GROUNDING CONDUCTOR SIZED PER THE NEC.

ALL PVC UNDERGROUND CONDUITS SHALL UTILIZE COATED OR WRAPPED RIGID STEEL ELBOWS AND RISERS WHEN RISING ABOVE GRADE, EXCEPT IN AREAS NOT SUBJECT TO MECHANICAL DAMAGE AND WITH PRIOR APPROVAL FROM THE ELECTRICAL ENGINEER.

MAINTAIN A MINIMUM OF 6" CLEARANCE BETWEEN ALL CONDUIT SLEEVES. VERIFY WITH GENERAL CONTRACTOR.

THE ELECTRICAL CONTRACTOR SHALL PROVIDE EXPANSION/DEFLECTION FITTINGS FOR CONDUITS CROSSING EXPANSION JOINTS. FITTINGS SHALL BE SUITABLE FOR CONDITIONS TO BE ENCOUNTERED. VERIFY WITH OWNER'S REPRESENTATIVE PRIOR TO COMMENCING WORK. SUBMIT SHOP DRAWINGS FOR REVIEW.

UNDERGROUND CONDUITS SHALL HAVE A MINIMUM 24" OF COVER.

5.0 OUTLET, PULL AND JUNCTION BOXES

JUNCTION BOXES AND OUTLET BOXES SHALL BE SIZED PER CODE, BUT IN NO CASE LESS THEN THE FOLLOWING: OUTLETS WITH 9 OR LESS #12 CONDUCTORS SHALL BE 4"/S X 2–1/2"/D AND OUTLETS WITH 10 THROUGH 18 CONDUCTORS SHALL BE 4–11/16"/S X 2–1/8"/D.

ALL JUNCTION BOXES SHALL CLEARLY INDICATE WITH PERMANENT BLACK MARKER, IN 1/2–INCH LETTERING THE CIRCUIT NUMBERS AND THE SOURCE OF POWER OF ALL CONDUCTORS CONTAINED WITHIN THAT JUNCTION BOX.

OUTLETS FOR THE ATTACHMENT OF THE FIXTURES TO BE PROVIDED WITH 3/8" MALLEABLE IRON FIXTURE STUDS AND BOX HANGERS WHERE REQUIRED.

TELEPHONE OUTLETS SHALL BE DOUBLE GANG BOX WITH SINGLE GANG 1–HOLE TELEPHONE COVER PLATE, UNLESS OTHERWISE NOTED ON DRAWINGS.

CABLE TELEVISION OUTLETS SHALL BE DOUBLE GANG BOX WITH SINGLE GANG 1–HOLE CATV COVER PLATE, UNLESS OTHERWISE NOTED ON DRAWINGS.

INTERIOR BOXES SHALL BE GALVANIZED STEEL, MANUFACTURERS: B & C METAL STAMPING, BRYANT, GENERAL ELECTRIC, LEVITON COMPANY, NORRIS STEEL CITY, CROUSE–HINDS, APPLETON, RACO, CARLON.

EXTERIOR BOXES SHALL BE "FS" TYPE BOXES WITH THREADED HUBS AS REQUIRED AND FULLY GASKETED UNLESS OTHERWISE NOTED.

6.0 PANELBOARDS AND SWITCHBOARDS

ALL SWITCHBOARDS AND PANELBOARDS SHALL BE CONSTRUCTED PER THE NATIONAL ELECTRICAL CODE AND ALL LOCALLY ADOPTED AMENDMENTS. WHERE REGULATIONS APPLY, CONSTRUCTION SHALL MEET REQUIREMENTS OF SERVING UTILITY.

ALL SWITCHBOARDS AND MOTOR CONTROL CENTERS SHALL HAVE WITHSTAND RATINGS GREATER THAN THE AVAILABLE FAULT CURRENT WITH 42,000 AMP BEING THE MINIMUM. CONFIRM CONDITIONS WITH SERVING UTILITY. SUBMIT CERTIFICATION OF COMPLIANCE WITH SHOP DRAWINGS.

ALL OVERCURRENT DEVICES IN EQUIPMENT SHALL BE UL LISTED TO INTERRUPT THE AVAILABLE FAULT CURRENT.

ALL PANELBOARD SWITCHBOARDS SHALL BE GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ALL LOCALLY ADOPTED AMENDMENTS.

WALL–MOUNTED PANELS SHALL BE PROVIDED WITH TRIM AND DOOR CONSTRUCTED OF CODE GAUGE SHEET STEEL AND SHALL HAVE FACTORY FINISH. DOOR SHALL BE FITTED WITH HINGES, SPRING CATCH LATCH AND CYLINDER LOCK. PROVIDE 2 KEYS WITH EACH PANEL. PROVIDE DIRECTORY CARD HOLDER AND TYPEWRITTEN PANEL SCHEDULE. PANELBOARD SHALL BE SO CONSTRUCTED AS TO PROVIDE FOR ADJUSTABLE ALIGNMENT OF TRIM AND INTERIOR PANEL.

PROVIDE ENGRAVED NAMEPLATES IDENTIFYING SWITCHBOARDS AND PANELBOARDS. ALL EQUIPMENT NAMEPLATE IDENTIFICATIONS SHOWN ON THE DRAWINGS ARE FOR REFERENCE ONLY. PRIOR TO FABRICATING THE FINISHED NAMEPLATES, CONSULT WITH THE OWNER'S BUILDING ENGINEER FOR THE ACTUAL NOMENCLATURE TO BE USED.

PROVIDE PANELBOARDS WITH SEPARATE GROUND BAR.

UNLESS OTHERWISE INDICATED ON PLANS, PANEL SHALL BE INSTALLED WITH TOP OF CABINET AT 6'–6" A.F.F.

MANUFACTURERS SHALL BE SQUARE D OR EQUAL APPROVED BY ENGINEER PRIOR TO BID PROPOSAL.

WHERE LOADS ARE ADDED TO EXISTING PANELBOARDS, THE PANEL SCHEDULE SHALL BE UPDATED AND SHALL INDICATE THE LOCATION AND DESCRIPTION OF THE LOAD.

ALL LUG CONNECTIONS TO PANEL BUSSING, SWITCHES, AND BREAKERS TO BE SIZED TO ACCOMMODATE CONDUCTOR SIZES INDICATED ON THESE DRAWINGS. REDUCTION OF CIRCULAR MIL CAPACITY OF CONDUCTORS IS NOT PERMITTED. ALL LUGS SHALL BE RATED FOR 75° C.

ALL SWITCHBOARDS & PANELBOARDS SHALL BE FIELD MARKED TO WARN QUALIFIED PERSONS OF POTENTIAL ELECTRICAL ARC FLASH HAZARDS, PER CEC 110.16 THE MARKING SHALL BE LOCATED SO AS TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.

CONTRACTOR SHALL PROVIDE PERMANENT SIGNAGE AT ALL HIGH VOLTAGE ENCLOSURES, FENCING, ROOMS, VAULTS, ETC. PER CEC 110.34(C). SIGNAGE SHALL READ "DANGER–HIGH VOLTAGE–KEEP OUT"

7.0 CIRCUIT BREAKERS

ALL CIRCUIT BREAKERS RATED 1200 AMPS OR HIGHER SHALL BE PROVIDED WITH ARC ENERGY REDUCTION PER CEC REQUIREMENTS, BY ENERGY REDUCING MAINTENANCE SWITCHING WITH LOCAL STATUS INDICATOR, OR OTHER CEC APPROVED METHOD.

MOLDED CASE CIRCUIT BREAKERS SHALL BE OF THE QUICK–MAKE, QUICK–BREAK, TRIP–FREE, THERMAL MAGNETIC BOLT–ON TYPE WITH ON–OFF–TRIPPED POSITIONS.

CIRCUIT BREAKERS ABOVE 225 AMPERE TRIP RATING SHALL HAVE INTERCHANGEABLE TRIP ELEMENTS.

ALL BREAKERS SHALL BE CALIBRATED FOR OPERATION IN AN AMBIENT TEMPERATURE OF 40° C.

ALL MULTI–POLE BREAKERS SHALL BE SO DESIGNED THAT AN OVERLOAD IN ONE POLE AUTOMATICALLY CAUSES ALL POLES TO OPEN.

ALL PANELBOARD CIRCUIT BREAKERS USED FOR DIRECT SWITCHING OR LIGHTING CIRCUITS, SHALL BE SWITCH DUTY RATED.

ALL CIRCUIT BREAKERS SHALL HAVE A MINIMUM 10,000 AIC RATING FOR 250V PANELS AND 14,000 AIC RATING FOR 600V PANELS.

ALL MULTIWIRE BRANCH CIRCUIT HOMERUNS & WIRING WITH A SHARED NEUTRAL SHALL BE SUPPLIED WITH A MULTIPOLE CIRCUIT BREAKER PER CEC 210.4(B)

8.0 FUSES

ALL FUSES SHALL BE AS MANUFACTURED BY GOULD SHAMUT, LITTELFUSE, OR BUSSMANN MANUFACTURING CO.

9.0 WIRING DEVICES

SINGLE–POLE SWITCHES SHALL BE 20 AMPERES, 120/277 VOLT, AC, VERIFY FINISH COLOR WITH ARCHITECT, SIDE AND BACK WIRED, HUBBELL CAT. #HBL–1221–W EQUAL BY, G.E., PASS & SEYMOUR, OR LEVITON.

THREE–WAY SWITCHES SHALL BE 20 AMPERES, 120/277 VOLT, AC, VERIFY FINISH WITH ARCHITECT, SIDE AN D BACK WIRED, HUBBELL CAT. #HBL–1223–W OR EQUAL BY , G.E., PASS & SEYMOUR, OR LEVITON.

DIMMER SWITCHES SHALL BE SLIDE CONTROL 800W, 120 VOLT, AC, FOR INCANDESCENT LOADS OR AS INDICATED ON PLANS.

DUPLEX RECEPTACLES FOR 120 VOLT, SINGLE–PHASE SERVICE TO BE RATED 20 AMPERES, 125 VOLT, BACK AND SIDE WIRED, 2–WIRE (NEMA–5–20R) GROUNDING TYPE, VERIFY FINISH COLOR WITH ARCHITECT, HUBBELL CAT. #HBL5362W OR EQUAL BY PASS & SEYMOUR, G.E., OR LEVITON.

DOUBLE DUPLEX RECEPTACLES (4–PLEX): TO BE SAME AS DUPLEX RECEPTACLES. TWO DUPLEX RECEPTACLES IN 4" X 4" OUTLET BOX WITH ONE TWO–GANG FACEPLATE. LEVITON, PASS & SEYMOUR, G.E., OR HUBBELL.

RECEPTACLES THAT ARE LOCATED WITHIN, WAITING ROOMS, EXAM ROOMS, TREATMENT ROOMS, RESTROOMS, OR SPACES WHERE PATIENTS ARE PRESENT, SHALL BE LISTED TAMPER–RESISTANT AND SHALL EMPLOY A LISTED TAMPER–RESISTANT COVER WHICH WILL HAVE A GREEN DOT ON IT'S FACE, AND A "TR" ON THE TOP RIGHT OF THE RECEPTACLE PER CEC 517. HUBBELL #8300TRA OR EQUAL.

ALL DEVICE PLATES SHALL BE OF THE UNBREAKABLE PLASTIC TYPE, MANUFACTURED BY PASS & SEYMOUR, LUTRON, LEVITON G.E., OR HUBBELL AND OF VERIFY FINISH COLOR WITH ARCHITECT. DEVICE PLATES FOR EQUIPMENT, STORAGE, AND KITCHEN AREAS SHALL BE STAINLESS STEEL.

OUTLETS AND DEVICES SHALL BE SET RIGID, PLUMB, FASTENED SECURELY; WHERE CONCEALED, SET FLUSH WITH FINISH SURFACE.

WIRING CONNECTIONS: CURL WIRE AROUND TERMINAL SCREWS AND TIGHTEN SCREWS FIRMLY. SNAP–IN, PRESSURE–TYPE TERMINALS NOT ACCEPTABLE.

EXTERIOR DUPLEX RECEPTACLES FOR 120 VOLT, SINGLE–PHASE SERVICE TO BE RATED 20 AMPERES, 125 VOLT, BACK AND SIDE WIRED, 2–WIRE (NEMA 5–20R) GFCI TYPE, WP, HUBBELL CAT #GF5362WA TAYMAC CORPORATION #20510 COVER OR EQUAL.

ALL RECEPTACLE AND SWITCH COVER PLATES SHALL CLEARLY INDICATE, WITH PERMANENT BLACK MARKER ON THE INSIDE OF THE PLATE, THE CIRCUIT NUMBER AND THE SOURCE OF POWER FEEDING THAT SWITCH OR RECEPTACLE.

ALL WALL SWITCHES AND RECEPTACLES SHALL BE MOUNTED BETWEEN 18" AND 48" TO TOP OF OUTLET BOX PER ADA REQUIREMENTS UNLESS NOTED OTHERWISE.

ELECTRICAL SWITCHES, CONTROLS AND SWITCHES INTENDED TO BE USED BY THE OCCUPANT OF THE ROOM OR AREA TO CONTROL LIGHTING AND RECEPTACLE OUTLETS, APPLIANCES OR COOLING, HEATING AND VENTILATING EQUIPMENT, SHALL BE LOCATED NO MORE THAN 48 INCHES MEASURED FROM THE TOP OF OUTLET BOX NOR LESS THAN 15 INCHES MEASURED FROM THE BOTTOM OF THE OUTLET BOX TO THE LEVEL OF THE FINISH FLOOR OR WORKING PLATFORM.

ELECTRICAL RECEPTACLE OUTLETS. ELECTRICAL RECEPTACLE OUTLETS ON BRANCH CIRCUITS OF 30 AMPERES OR LESS AND COMMUNICATION SYSTEM RECEPTACLES SHALL BE LOCATED NO MORE THAN 48 INCHES MEASURED FROM THE TOP OF THE RECEPTACLE OUTLET BOX OR RECEPTACLE HOUSING NOR LESS THAN 15 INCHES MEASURED FROM THE BOTTOM OF THE RECEPTACLE OUTLET BOX OR RECEPTACLE HOUSING TO THE LEVEL OF THE FINISH FLOOR OR WORKING PLATFORM.

ALL WALL MOUNTED ELECTRICAL AND COMMUNICATION BOXES SHALL BE COVERED ENTIRELY WITH ONE HOUR FIRE PUTTY.

ALL WALL MOUNTED ELECTRICAL AND COMMUNICATION BOXES SHALL BE SEPARATED BY A MINIMUM OF 24".

10.0 TRANSFORMERS

TRANSFORMERS SHALL BE TP–1 RATED, DRY TYPE, SHEET METAL ENCLOSED, CLASS 220° INSULATION, TWO WINDING, WITH PRIMARY AND SECONDARY VOLTAGES AND KVA RATINGS AS SHOWN ON THE DRAWINGS.

THREE–PHASE TRANSFORMERS SHALL BE DELTA CONNECTED ON PRIMARY WINDINGS. SECONDARY WINDINGS SHALL BE WYE CONNECTED.

TRANSFORMERS SHALL BE PROVIDED WITH FOUR (4) 2–1/2% TAPS TWO ABOVE AND TWO BELOW NORMAL VOLTAGE ON PRIMARY WINDING.

TERMINALS SHALL BE READILY ACCESSIBLE FROM TOP AND FRONT OF TRANSFORMER, WITH TOP AND/OR FRONT PANELS REMOVABLE.

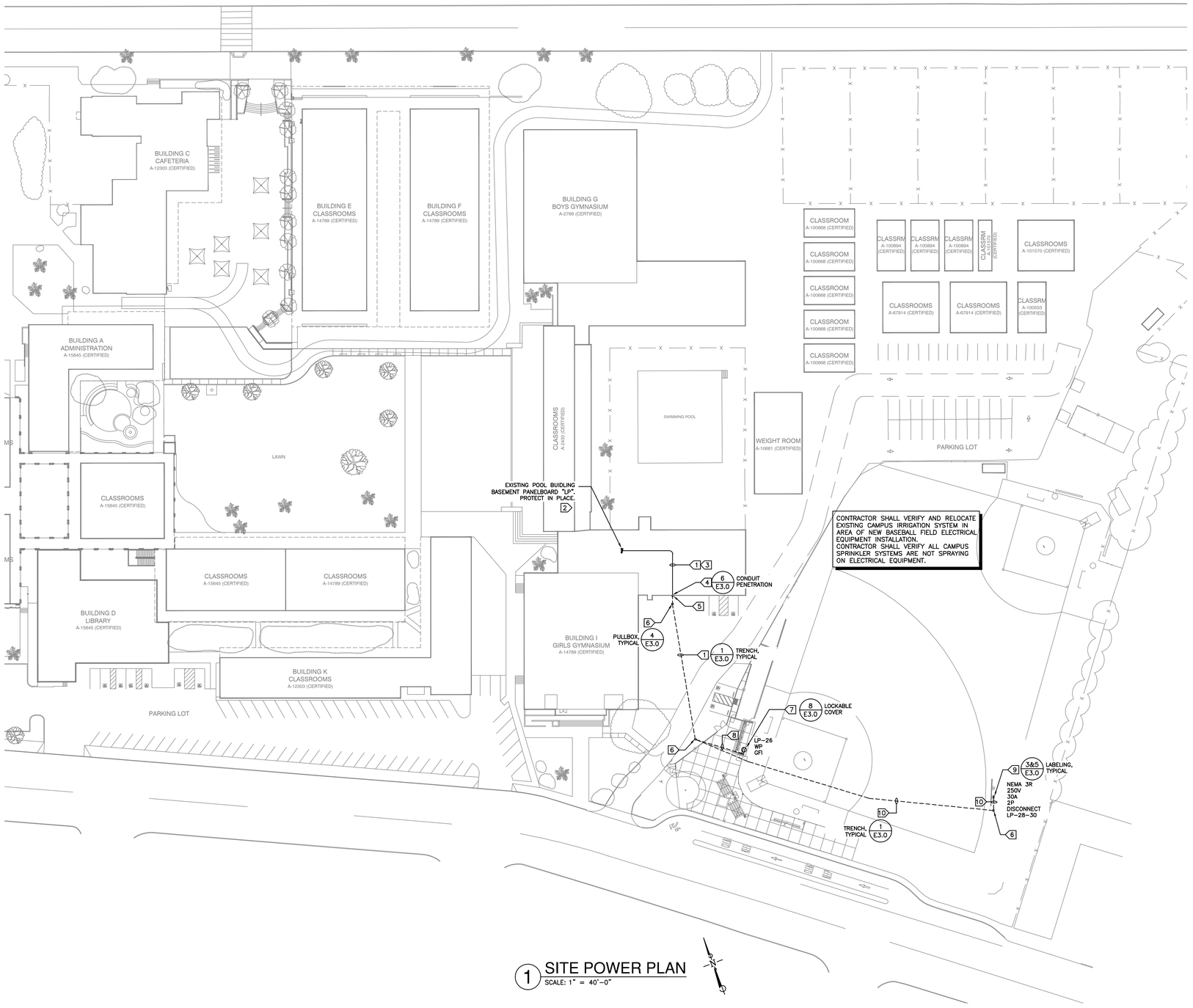
TRANSFORMERS 15 KVA AND LARGER SHALL BE IN A HEAVY GAUGE, SHEET STEEL, VENTILATED ENCLOSURE. THE VENTILATING OPENINGS SHALL BE DESIGNED TO PREVENT ACCIDENTAL ACCESS TO LIVE PARTS IN ACCORDANCE WITH UL, NEMA, AND NATIONAL ELECTRICAL CODE STANDARDS FOR VENTILATED ENCLOSURES. SINGLE PHASE TRANSFORMERS THROUGH 167 KVA, AND THREE PHASE TRANSFORMERS THROUGH 112.5 KVA SHALL BE DESIGNED SO THEY CAN BE EITHER FLOOR OR WALL MOUNTED. ABOVE 112.5 KVA THEY SHALL BE FLOOR MOUNTED DESIGN.

ALL TRANSFORMERS SHALL BE INSTALLED TO MEET THE MANUFACTURERS RECOMMENDED NAMEPLATE CLEARANCES.

TRANSFORMERS SHALL BE MOUNTED ON VIBRATION ISOLATORS FINAL CONDUIT CONNECTIONS TRANSFORMERS SHALL USE FLEXIBLE CONDUIT AS VIBRATION ISOLATION.

11.0 GROUNDING

GENERAL: PROVIDE A COMPLETE GROUNDING SYSTEM AND SAFELY GROUND ALL SERVICE DISTRIBUTION EQUIPMENT AND RELATED METALLIC EQUIPMENT IN AN APPROVED MANNER AND AS REQUIRED BY CEC AND AS SHOWN



1 SITE POWER PLAN
SCALE: 1" = 40'-0"

SHEET NOTES

1. VERIFY LOCATION OF ALL BUILDINGS AND APPENDITURES ON ARCHITECTURAL AND CIVIL PLANS.
2. CONTRACTOR SHALL VERIFY LOCATION & REQUIREMENTS OF ALL ELECTRICAL DEVICES PRIOR TO BID. ROUGH-IN & INSTALLATION.
3. CONTRACTOR SHALL, IN ROUTING ALL CIRCUITS, INCREASE CONDUCTOR & CONDUIT SIZE TO ALLOW FOR VOLTAGE DROP SHOULD THE CONTRACTOR EXCEED ROUTING INDICATED ON DRAWING. ENGINEER OF RECORD MUST BE NOTIFIED PRIOR TO ANY DEVIATIONS FROM APPROVED PLAN CHECK (PERMIT SET) DRAWINGS.
4. FIELD VERIFY LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO TRENCHING. SCHEDULE AND COORDINATE ALL SITE WORK WITH OWNER PRIOR TO ANY TRENCHING.
5. ALL CONDUIT 90° CONDUIT BENDS AND RISERS SHALL BE PVC COATED RIGID STEEL.
6. CONTRACTOR SHALL COORDINATE AND PROVIDE ALL SITE ELECTRICAL SERVICE REQUIREMENTS WITH SERVING UTILITY.
7. ALL SERVICE ENTRANCE EQUIPMENT SHOP DRAWINGS SHALL BE SUBMITTED TO THE LOCAL UTILITY COMPANY FOR APPROVAL WITH WRITTEN APPROVAL RECEIVED PRIOR TO SUBMISSION TO ELECTRICAL ENGINEER FOR APPROVAL.
8. VERIFY LOCATION OF ALL EQUIPMENT AND DEVICES ON ARCHITECTURAL AND CIVIL PLANS.
9. MINIMUM CONDUIT BURIAL DEPTH IS 24", 36" MINIMUM BELOW STREETS & PARKING LOTS FOR 0-600 VOLT SYSTEMS. 48" FOR 600V-25KV SYSTEMS.
10. CONTRACTOR TO PROVIDE GROUND CONDUCTORS IN ALL CONDUITS.
11. 1" CONDUIT MINIMUM UNDERGROUND.
12. COORDINATE WORK WITH OTHER TRADES. OBTAIN ALL DRAWINGS THAT WILL REQUIRE COORDINATION AND PROVIDE ALL ELECTRICAL CONNECTIONS, DEVICES, AND WIRING REQUIRED WHETHER SHOWN ON ELECTRICAL DRAWINGS OR NOT.
13. CONTRACTOR SHALL FURNISH AND INSTALL PULL BOXES AS REQUIRED TO INSTALL CONDUCTORS PER CONDUCTOR MANUFACTURERS RECOMMENDATIONS, PER THE NATIONAL ELECTRICAL CODE AND PER LOCAL AUTHORITIES HAVING JURISDICTION.
14. FIELD CONDITIONS GOVERN DEMOLITION AND NEW CONSTRUCTION. CONTRACTOR SHALL VERIFY ACTUAL CONDITIONS PRIOR TO START OF WORK. ARCHITECT / ENGINEER SHALL BE NOTIFIED OF POSSIBLE FIELD PROBLEMS PRIOR TO DEMOLITION. CONTRACTOR SHALL NOTIFY DISTRICT REPRESENTATIVE OF WORK BEING PERFORMED. COORDINATE WITH DISTRICT REPRESENTATIVE.
15. CONTRACTOR WILL BE REQUIRED TO TEST THE FIRE ALARM SYSTEM IN COMPLIANCE WITH THE NFPA 72. TESTING SHALL BE PERFORMED WITH FIRE MARSHALL AND STATE INSPECTOR PRESENT.
16. ALL EMPTY CONDUITS SHALL BE PROVIDED WITH DIMENSIONED NYLON PULL STRING.
17. SITE INSPECTOR IS TO WITNESS & VERIFY GROUNDING SYSTEM TEST.
18. CONTRACTOR SHALL FIELD VERIFY LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO ANY EXCAVATION OF TRENCHING, CONTRACTOR SHALL PROTECT ALL EXISTING / REMAINING UTILITIES IN PLACE. CONTRACTOR AT HIS SOLE EXPENSE, SHALL REPAIR ANY UTILITIES SYSTEM DAMAGED DURING CONSTRUCTION.
19. VERIFY & PROVIDE ALL UTILITY SYSTEMS PER SERVING UTILITY STANDARD REQUIREMENTS.

KEY NOTES

1. 1-1/2"C.-2#8 & 1#10 GND & 2#2 & 1#3 GND FROM POOL BUILDING BASEMENT PANELBOARD "LP" TO PULLBOX ADJACENT DUGOUT AREA.
2. PROVIDE (NEW) 20A 1P CIRCUIT BREAKER (120V) POWER FOR RECEPTACLE IN EXISTING PANELBOARD "LP". PROVIDE CIRCUIT BREAKER TO MATCH EXISTING PANELBOARD MANUFACTURER AND AIC RATINGS.

   PROVIDE (NEW) 20A 2P CIRCUIT BREAKER (208V) POWER FOR SCOREBOARD IN EXISTING PANELBOARD "LP". PROVIDE CIRCUIT BREAKER TO MATCH EXISTING PANELBOARD MANUFACTURER AND AIC RATINGS.
3. CONTRACTOR SHALL ROUTE AND SUPPORT CONDUIT PER CEC REQUIREMENTS UNDER POOL BUILDING BASEMENT CEILING AND PAINT TO MATCH SURROUNDING AREAS.
4. PROVIDE CONDUIT PENETRATION & SEAL REQUIREMENTS PER CEC REQUIREMENTS AND DETAIL 5\E3.0.
5. PROVIDE 1-1/2"C. RIGID STEEL LB CONDULET AT EXTERIOR WALL PENETRATION. PROVIDE CONDUIT SUPPORTS PER CEC REQUIREMENTS. PAINT TO MATCH ELECTRICAL RACEWAY SYSTEM, TYPICAL.
6. PROVIDE 12"x18" "N-ROADWAY" RATED CONCRETE PULLBOX WITH STEEL LID. LABEL STEEL LID "ELECTRICAL" PER CEC REQUIREMENTS.
7. PROVIDE SURFACE MOUNTED 1-GANG JUNCTION BOX WITH WEATHERPROOF RATED GFI DUPLEX RECEPTACLE, TAYMAC STEEL LOCKABLE COVER, LOCK & KEY. PAINT ELECTRICAL SYSTEM RACEWAYS AND SUPPORTS TO MATCH SURROUNDING AREAS.
8. 1"C.-2#8 & 1#10 GND (LP-26) FROM PULLBOX TO DUGOUT RECEPTACLE JUNCTION BOX.
9. MOUNT NEMA 3R 30A 2P RATED SCOREBOARD DISCONNECT AT POST. PAINT ELECTRICAL SYSTEMS AND SUPPORTS TO MATCH SURROUNDING AREAS.
10. 1-1/4"C.-2#2 & 1#3 GND (LP-28-30) FROM PULLBOX TO SCOREBOARD.

DSA STAMP & SIGNATURE

VENTURA UNIFIED SCHOOL DISTRICT
VENTURA HIGH SCHOOL
2 NORTH CATALINA STREET, VENTURA, CA 93001
GIRLS SOFTBALL IMPROVEMENTS

KRUGER BENSEN ZIEMER ARCHITECTS, INC. AIA
199 FIGUEROA ST, SUITE 100A VENTURA CA 93001
TELEPHONE (805) 650-1033 WWW.KBZARCH.COM

TODD A JESPERSEN, AIA
PRINCIPAL-IN-CHARGE

JONATHAN D LEE, AIA
PROJECT MANAGER

All ideas, design arrangements and plans indicated or represented by this drawing are owned by and are the property of Kruger-Bensen-Ziemer AIA architects, and were created and developed for use on, and in connection with the specified projects. None of such ideas, designs, arrangements or plans shall be used by or disclosed to any person, firm or corporation for any purpose whatsoever without the written permission of Kruger-Bensen-Ziemer.

ARCHITECTS STAMP & SIGNATURE



ENGINEERS STAMP & SIGNATURE



CONSULTANT INFORMATION

C. HOOD & ASSOCIATES, INC.
CONSULTING ELECTRICAL ENGINEERS
858 East Front Street Phone (805) 641-4012
Ventura, California 93001 Fax (805) 641-0450
www.choodassociates.com

Copyright © 2024

DSA STAMP & SIGNATURE

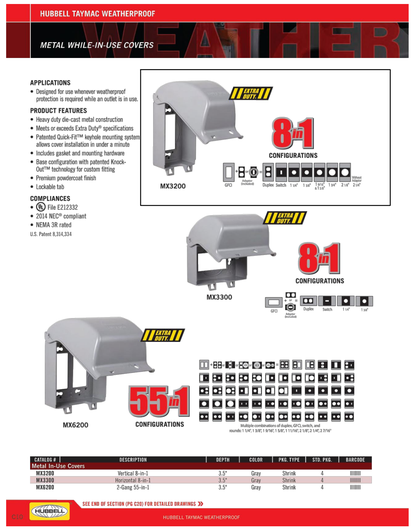
REVISION	DESCRIPTION	DATE	BY
5	-	-/-/-	XX
4	-	-/-/-	XX
3	-	-/-/-	XX
2	-	-/-/-	XX
1	-	-/-/-	XX

DRAWN
CHECKED
DATE 09/27/2024
JOB NO. 23046
CHA NO. 24-517

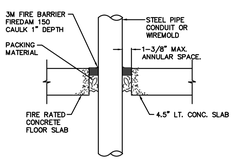
SHEET TITLE SITE POWER PLAN

SHEET E2.0

CONTACT 811 BEFORE YOU DIG
811
SAFE DIGGING PARTNER

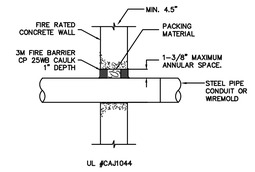


8 HEAVY DUTY WEATHERPROOF RECEPTACLE LOCKABLE COVER
SCALE: NONE



UL #CAJ1017

PENETRATION THRU CONCRETE FLOOR
NO SCALE



UL #CAJ1044

PENETRATION THRU CONCRETE WALL
NO SCALE

NOTE:
DO NOT CUT OR DAMAGE REBARS.

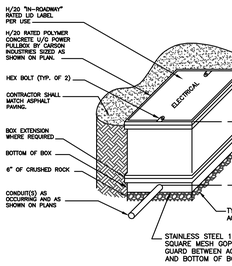
SYSTEM NO. WL1001
(FORMERLY SYSTEM NO. 147)
F RATINGS – 1,2,3, AND 4 HR (SEE ITEMS 2 AND 3)
T RATINGS – 0,1,2,3, AND 4 HR (SEE ITEM 3)
L RATING AT AMBIENT – LESS THAN 1 CFM/SQ FT (SEE ITEM 3)
L RATING AT 400 F – LESS THAN 1 CFM/SQ FT (SEE ITEM 3)

1. WALL ASSEMBLY – THE 1, 2, 3, OR 4 HR FIRE –RATED GYPSUM WALL BOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL OR PARTITION DESIGN IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
   A. STUDS – WALL FRAMING MAY CONSIST OR EITHER WOOD STUDS (MAX. 2 HR FIRE RATED ASSEMBLIES) OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED IN 18 IN. OC WITH NOM 2 BY 4 IN. LUMBER AND PLATES AND CROSS BRACES. STEEL STUDS TO BE MIN 3–5/8 IN. WIDE BY 1–3/8 IN. DEEP CHANNELS SPACED MAX 24 IN. CC .
   B. WALLBOARD, GYPSUM – NOM 1/2 OR 5/8 IN. THICK, 4 FT. WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD RYPS, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIA. OF OPENING IS 13–1/2 IN.
2. PIPE OR CONDUIT – NOM 12 IN. DIA. (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE NOM 6 IN. DIAM(OR SMALLER) STEEL CONDUIT, NOM 4 IN. DIA. (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR TYPE L OR (OR HEAVIER) COPPER TUBING NOM 1 IN. DIA. (OR SMALLER) FLEXIBLE STEEL CONDUIT. WHEN COPPER PIPE OR FLEXIBLE STEEL CONDUIT IS USED, MAX F RATING OF FIRESTOP SYSTEM (ITEM CONSTRUCTED USING STEEL CHANNEL STUDS) A MAX OF ONE PIPE OR CONDUIT IS PERMITTED IN THE FIRESTOP SYSTEM. PIPE OR CONDUIT TO BE INSTALLED NEAR CENTER OF STUD CAVITY WIDTH AND TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY.
3. FILL, VOID OR CAVITY MATERIAL – CAULK – CAULK FILL MATERIAL INSTALLED TO COMPLETELY FILL ANGULAR SPACE BETWEEN PIPE OR CONDUIT AND GYPSUM WALLBOARD AND WITH A MIN 1/4 IN. DIA. BOARD OF CAULK APPLIED TO PERIMETER OF PIPE OR CONDUIT AT ITS EGRESS FROM THE WALL. CAULK INSTALLED SYMMETRICALLY ON BOTH SIDES OF WALL ASSEMBLY. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS SHOWN IN THE FOLLOWING TABLE. THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE TYPE OR SIZE OF THE PIPE OR CONDUIT AND THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS TABULATED BELOW:

MAX PIPE OR CONDUIT DIAM, IN	ANGULAR SPACE IN	F RATING HR	T RATING HR
1	0 TO 3/16	1 OR 2	0 + 1 OR 2
1	1/4 TO 1/2	3 OR 4	3 OR 4
4	0 TO 1/4	1 OR 2	0
6	1/4 TO 1/2	3 OR 4	0
12	3/16 TO 3/8	1 OR 2	0

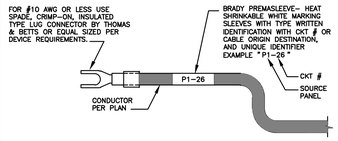
+ WHEN COPPER PIPE IS USED , T RATING IS 0 NOM. MINNESOTA MINING & MFG. CO.
– TYPES CP–25 S/L, CP–25 N/8 , CP–25 WS, CP–25 WS
+ (NOTE: L RATINGS APPLY WHEN TYPE CP–25 WS+ CAULK IS USED.)

6 TYPICAL RATED WALL PENETRATION
SCALE: NONE

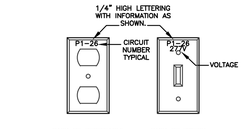


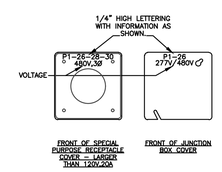
4 TYPICAL "IN-ROADWAY RATED" CONCRETE IN-GRADE PULLBOX
SCALE: NONE

NOTE:
CONTRACTOR SHALL PROVIDE CONDUCTOR AND JUNCTION BOX LABELING TO ALL POWER FEEDERS, BRANCH CIRCUITS, GROUNDED CONDUCTORS, CONTROL, COMMUNICATION, FIRE ALARM, & SECURITY CONDUCTORS.



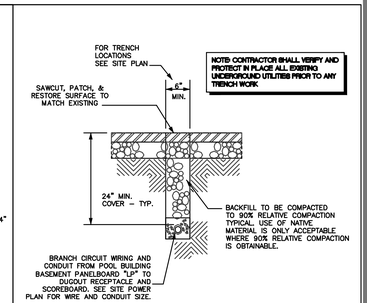
TYPICAL CONDUCTOR LABEL



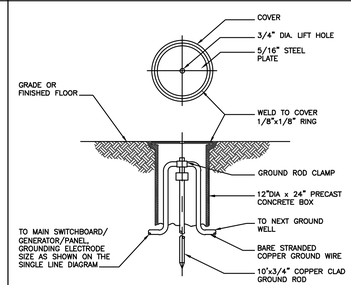


TYPICAL DEVICE COVER PLATE LABELING

5 TYPICAL LABELING DETAIL
SCALE: N.T.S.



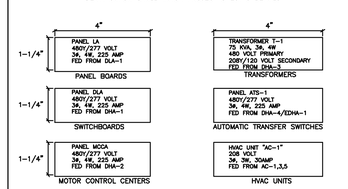
1 TYPICAL TRENCH DETAIL
SCALE: NONE



2 GROUND ROD IN INSPECTION WELL
SCALE: NONE

NOTE:
CONTRACTOR SHALL PROVIDE NAMEPLATES ON ALL ELECTRICAL EQUIPMENT INCLUDING, BUT NOT LIMITED TOO, PANELBOARDS, FEEDER BREAKERS, PULLBOXES, GENERATORS, TRANSFER SWITCHES, DISCONNECTS, ETC.

IDENTIFICATION SHALL MATCH PROJECT SPECIFIC DETAILS



3 TYPICAL NAMEPLATE DETAILS
SCALE: NONE

EXISTING PANEL BOARD

PANEL NUMBER LP VOLTAGE 208Y/120V PHASE 3 WIRE 4
SOURCE DPI A.I.C. 22,000
PANEL LOCATION BUILDING I BUS AMPERE RATING 225
■ NEMA 1 ■ COPPER BUSS
■ MAIN LUGS ONLY
■ SURFACE MOUNTING

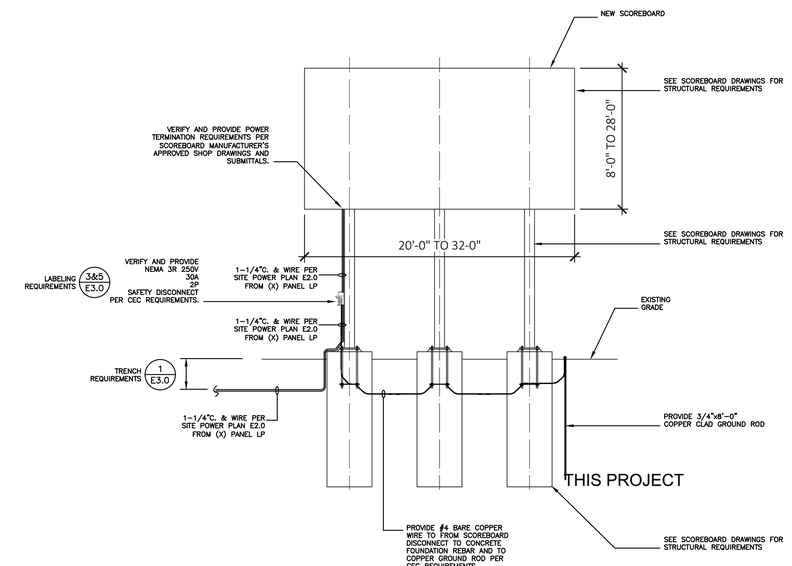
LCL	MISC	LTG	CIRCUIT DESCRIPTION	LOAD (VA) A	B	C	BRKR POLE	AMP	CKT	PHASE A B C	CKT	BRKR AMP	POLE	LOAD (VA) A	B	C	CIRCUIT DESCRIPTION	MISC	LTG	LCL
			(X) LOADS	500			1	20	1		2	20	1	500			(X) LOADS			
					500				3		4				500					
						500			5		6					500				
				500					7		8			500						
					500				9		10				500					
						500			11		12					500				
			(X) WH–1 BLOWER	500					13		14			500						
			(X) WH–2 BLOWER		500				15		16				500					
			(X) CP–1			500			17		18					500				
			SPARE	0					19		20			500						
					0				21		22				0		(X) BUSSED SPACE			
						0			23		24					0	(X) BUSSED SPACE			
			(X) BUSSED SPACE	0					25		26	20	1	180			(NEW) RECEPTACLE			
					0				27		28	20			516		(NEW) SCOREBOARD			
						0			29		30		2			516				
			TOTALS	1500	1500	1500								2180	2016	2016	TOTALS			

(X) LOADS PROTECT IN PLACE.
(X) LOADS PROTECT IN PLACE.
(●) (NEW) LOAD THIS PERMIT

L.C.L. VOLT AMPS:	1602	PHASE A 0	PHASE B 801	PHASE C 801
TOTAL VOLT AMPS:	12314	PHASE A 3680	PHASE B 4317	PHASE C 4317
TOTAL AMPS:	34.2	PHASE A 30.7	PHASE B 36.0	PHASE C 36.0

● PROVIDE NEW CIRCUIT BREAKER TO MATCH EXISTING PANELBOARD MANUFACTURER AND AIC RATINGS.

9 EXISTING BUILDIING I PANELBOARD "LP"
SCALE: N.T.S.



7 SCOREBOARD POWER REQUIREMENTS
SCALE: N.T.S.

DSA STAMP & SIGNATURE

VENTURA UNIFIED SCHOOL DISTRICT
VENTURA HIGH SCHOOL
2 NORTH CATALINA STREET, VENTURA, CA 93001
GIRLS SOFTBALL IMPROVEMENTS

KRUGER BENSEN ZIEMER ARCHITECTS, INC. AIA
199 FIGUEROA ST, SUITE 100A VENTURA CA 93001
TELEPHONE (805) 650-1033 WWW.KBZARCH.COM
TODD A JESPERSEN, AIA
PRINCIPAL-INCHARGE
JONATHAN D LEE, AIA
PROJECT MANAGER

All ideas, design arrangements and plans indicated or represented by this drawing are owned by and are the property of Kruger-Bensen-Ziemer, AIA architects, and were created, evolved and developed for use on, and in connection with, the specified projects. None of such ideas, designs, arrangements or plans shall be used by or disclosed to any person, firm or corporation for any purpose whatsoever without the written permission of Kruger-Bensen-Ziemer.

ARCHITECTS STAMP & SIGNATURE
TODD A. JESPERSEN REGISTERED ARCHITECT No. C-25839 Ren. 06/30/2025 STATE OF CALIFORNIA

ENGINEERS STAMP & SIGNATURE
REGISTERED PROFESSIONAL ENGINEER GRAIG C. HOOD 15392 EXP 6-30-25 ELECTRICAL STATE OF CALIFORNIA

CONSULTANT INFORMATION

C. HOOD & ASSOCIATES, INC.
CONSULTING ELECTRICAL ENGINEERS
858 East Front Street Phone (805) 641-4012
Ventura, California 93001 Fax (805) 641-0450
www.choodassociates.com
Copyright © 2024

DSA STAMP & SIGNATURE

REVISION	DESCRIPTION	DATE	BY
5	-	-/-/-	XX
4	-	-/-/-	XX
3	-	-/-/-	XX
2	-	-/-/-	XX
1	-	-/-/-	XX

DRAWN
CHECKED
DATE 09/27/2024
JOB NO. 23046
CHA. NO. 24-517
SHEET TITLE ELECTRICAL DETAILS

SHEET
E3.0