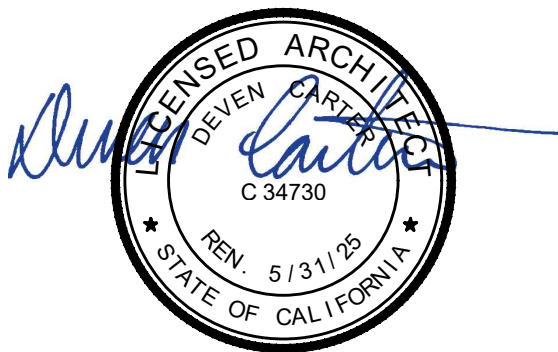




## Technical Specification

# Humboldt County Courthouse Auditor-Controller Office

PROJECT NUMBER: 2023-101



April 2023

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NOTICE TO CONTRACTORS

SECTION 00 00 20

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NOTICE IS HEREBY GIVEN that informal sealed bids are invited by the County Administrative Office/Purchasing Agent of Humboldt County, a public body, corporate and politic, for the performance of all the work and the furnishing of all the labor, materials, supplies, tools, and equipment for the following project:

CONSTRUCTION OF  
HUMBOLDT COUNTY DISTRICT ATTORNEY, AUDITOR-CONTROLLER OFFICE  
COUNTY OF HUMBOLDT  
PROJECT NUMBER: 2023-101

Pursuant to the Contract Documents on file with the County Administrative Office of Humboldt County.

A pre-bid meeting is scheduled for 2:00 PM, Pacific Daylight Time, May 3, 2023, at the Humboldt County Courthouse Conf. Room A, 825 5th Street, Eureka, California. Contract Documents, Plans, and Specifications will be available on April 18, 2023.

Each Bid must be contained in a sealed envelope addressed as set forth in said Bid Documents and filed at the office of the Clerk of the Board of Supervisors of Humboldt County, 825 5th Street, Room 111, Eureka, California at or before 2:00 PM, Pacific Daylight Time, on May 16, 2023. All Bids will be publicly opened, and summary amounts read aloud. The officer whose duty it is to open the Bids will decide when the specified time for the opening of Bids has arrived.

Plans and Specifications and other Contract Document forms will be available for examination at the County Administrative Office, Room 112, 825 5th Street, Eureka, CA, Phone: (707) 445-7266. Plans will also be available for viewing at area plan centers. Complete sets may be obtained from Nichols, Melburg & Rossetto, 300 Knollcrest Drive, Redding, CA 96002. Complete sets may be obtained upon advanced payment of \$100.00 each, 100 % of which shall be refunded upon the return of such sets unmarked and in good condition within ten (10) days after the bids are opened. Checks should be made payable to County of Humboldt.

Each Bid shall be submitted on the forms furnished by the County within the Bid Documents. All forms must be completed.

Each Bid shall be accompanied by one of the following forms of Bidder's Security to with a certified check or a cashier's check payable to the County, U.S. Government Bonds, or a Bid Bond executed by an admitted insurer authorized to issue surety bonds in the State of California (in the form set forth in said Contract Documents). The Bidder's security shall be in the amount equal to at least ten percent (10%) of the Bid.

The successful Bidder will be required to furnish and pay for a satisfactory faithful performance bond and a satisfactory payment bond in the forms set forth in said Bid Documents.

The County reserves the right to reject any or all Bids or to waive any informalities in any Bid. No Bid shall be withdrawn for a period of one hundred (100) calendar days after the opening of Bids without the consent of the County.

All Bidders will be required to certify that they are eligible to submit a Bid on this project and that they are not listed either (1) on the Controller General's List of Ineligible Bidders/Contractors, or (2) on the debarred list of the Labor Commissioner of the State of California.

The successful Bidder shall possess a valid Contractor's license in good standing, with a classification of "B" (General Building Contractor) at the time the contract is awarded.

The successful Bidder will be required to comply with all equal employment opportunity laws and regulations both at the time of award and throughout the duration of the Project.

The Contractor and all Subcontractors are required to be registered with the Department of Industrial Relations pursuant to labor code section 1725.5. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. A Contractor or Subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the Contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.

The Contractor, and each subcontractor participating in the Project, shall be required to pay the prevailing wages as established by the Department of Industrial Relations, Division of Labor Statistics and Research, P.O. Box 420603, San Francisco, CA, Phone: (415) 703-4780.

The attention of Bidders is directed to the fact that the work proposed herein to be done will be financed in whole or in part with State and County funds, and therefore all the applicable State and County statutes, rulings and regulations will apply to such work.

In the performance of this contract, the Contractor will not discriminate against any employee or applicant for employment in accordance with the provisions of the California Fair Employment and Housing Act. (Government Code section 12900et seq)

In accordance with the provisions of Section 22300 of the Public Contractor's Code, the Contractor may elect to receive 100% of payments due under the contract from time to time, without retention of any portion of the payment, by entering into an Escrow Agreement for Security Deposits In Lieu of Retention.

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INSTRUCTIONS TO BIDDERS

SECTION 00 01 00

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Formal Sealed Bids will be received by the Clerk of the Board of Supervisors of the County of Humboldt, Humboldt County Courthouse, 825 5th Street, Room 111, Eureka, California 95501, until 2:00 PM, Pacific Daylight Time, on May 16, 2023, at which time they will be publicly opened by the Clerk of the Board of the County of Humboldt at a public meeting in the Office of the Clerk of the Board, for performance of the following work:

CONSTRUCTION OF  
HUMBOLDT COUNTY DISTRICT ATTORNEY, AUDITOR-CONTROLLER OFFICE  
PROJECT NUMBER: 2023-101

**1. SECURING DOCUMENTS**

Plans and Specifications and other Contract Document forms will be available for examination at the County Administrative Office, Room 112, 901 5th Street, Eureka, CA, Phone: (707) 445-7266. Plans will also be available for viewing at area plan centers. Complete sets may be obtained through the Nichols, Melburg & Rossetto, 300 Knollcrest Drive, Redding, CA 96002 upon advanced payment of \$100.00 each, 100 % of which shall be refunded upon the return of such sets unmarked and in good condition within ten (10) days after the bids are opened. Checks should be made payable to County of Humboldt.

**2. BASIC INFORMATION**

These instructions pertain to the work (as hereinafter defined) to be performed under Agreement with the County of Humboldt (hereinafter sometimes called "Owner"):

<u>Owner</u>	<u>Humboldt County Board of Supervisors</u> 825 Fifth Street Eureka, CA 95501
Owner's Lead Agency:	County Administrative Office/Purchasing Agent County of Humboldt 825 5 <sup>th</sup> Street Eureka, California 95501 Phone: (707) 445-7266 Fax: 445-7299
Project Location:	Humboldt County Courthouse 825 5th Street Eureka, CA 95501 Humboldt County, California
Architect:	Nichols, Melburg & Rossetto 300 Knollcrest Drive Redding, California 96002 Phone: (530) 222-3300

**3. RECEIPT OF BIDS.** Each bidder should mark its bid as "Bid for the Construction of Humboldt County District Attorney – Auditor-Controller Office." Bids shall be deemed to include the written responses to the bidder to any questions or requests for information of County made as part of bid evaluation process after submission of bid. Telephone and telefax proposals will not be accepted. County will reject all bids received after the specified time and will return such bids to bidders unopened.

**4. DETERMINATION OF APPARENT LOW BIDDER.** Apparent low bid will be based on the amount of the base bid listed of the Bid Form.

- 5. REQUIRED BID FORM.** All bidders must submit bids on the Section 00 30 00, the "Bid Form." County will reject as non-responsive any bid not submitted on the required form. Bids must be full and complete. Bidders must complete all bid items and supply all information required by the bidding documents and specifications. County reserves the right in its sole discretion to reject any bid as non-responsive as a result of any error or omission in the bid. Bidders may not modify the Bid Form or qualify their bids. Bidders must submit clearly and distinctly written bids. Bidders must clearly make any changes in their bids by crossing out original entries, entering new entries and initialing new entries. County reserves the right to reject any bid not clearly written. The Bid Form shall be signed by the bidder's legal representative as indicated on the Bid Form. If the bid is made by an individual, it shall be signed and his/her full name and his/her address shall be given; if it is made by a partnership, it shall be signed with the co-partnership name by a member of the firm, who shall sign his/her own name and provide the name and address of each member; and if it is by a corporation, the bid shall show the name of the corporation and the state under the laws of which the corporation was chartered. When the bid is signed by the duly authorized officer or officers of the corporation, it shall be attested by the corporate seal, and the names and titles of the principal officers of the corporation shall be given. When a bid is signed by an agent, other than the officer or officers of a corporation authorized to sign contracts on its behalf or a member of a partnership, a "Power of Attorney" must be filed with the County prior to opening bids or shall be submitted with the bid; otherwise, the bid may be rejected as irregular and unauthorized. Bids submitted as joint ventures must so state and be signed by each venturer.
- 6. CONTENTS OF BID ENVELOPE.** The bid envelope shall contain all of the following:
- Section 00 30 00 - Bid Form
  - Section 00 41 00 - Bid Security Form (Bid Bond)
  - Section 00 43 00 - Subcontractor List
  - Section 00 44 00 - Non-collusion Affidavit
  - Section 00 45 00 - Responsibility/Non-responsibility
  - Section 00 46 00 - Public Contract Code 10232 Statement
  - Section 00 47 00 - Workers' Compensation Certification
  - Section 00 48 00 - Debarment and Suspension Certification
- 7. BID OPENING.** The County will stamp bids with the date and time of receipt. Bids will be opened and read publicly at the time and place indicated in Section 1 above. Bidders or their authorized agents may be present. After opening of bids, the County will review all bids for accuracy and reserves the right to correct obvious errors. Upon completion of review, the bids will be ranked by the bid amount and the apparent low bidder will be determined and notified.
- 8. FAILURE TO EXECUTE AND DELIVER DOCUMENTS.** IF the bidder to whom the Contract is awarded shall fail or neglect , with ten (10) calendar days from the date of the receipt of a notice of award, to execute and deliver all required Contract Documents and file all required bonds, insurance certificates and other documents, County may, in its sole discretion, deposit bidder's surety bond, cashier's check or certified check for collection, and retain the proceeds thereof as liquidated damages for bidder's failure to enter into the Contract Documents. Bidder agrees that calculating the damages County may suffer as a result of bidder's failure to execute and deliver all required Contract Documents would be extremely difficult and impractical and that the amount of bidder's required bid security shall be the agreed and presumed amount of County's damages.
- 9. BIDDER'S BOND, PERFORMANCE BOND AND PAYMENT BOND.** Bid security must be submitted with the bid. The successful bidder, prior to execution of the Contract, must submit a Performance Bond in the full amount of the Contract. The successful bidder, prior to execution of the Contract, must submit a Payment Bond in the full amount of the Contract.
- 10. INSURANCE.** It is highly recommended that bidders confer with their respective insurance carriers or brokers to determine in advance of bid submission the availability of the insurance certificates and endorsements required. A bidder, who executes the Contract and thereafter fails to comply strictly with the insurance requirements, will be deemed to be in breach of Contract.

- 11. RESERVATION OF RIGHTS:** County specifically reserves the right, in its sole discretion, to reject any or all bids, or re-bid, or to waive minor irregularities from bid requirements. If no bids are received, the County reserves the right to identify interested contractor(s) and negotiate directly without re-bidding.
- 12. SECURITIES IN LIEU OF RETENTION:** Public Contract Code Section 22300 gives the Contractor for option to deposit securities with an escrow agent as a substitute for retention earnings to be withheld by the County.
- 13. PRE-BID MEETING:** The Pre-Bid Meeting is scheduled for 2:00 PM, Pacific Daylight Time, May 3, 2023 at the Humboldt County **Courthouse Conference Room A**, 825 5th Street, Eureka, California.
- 14. WITHDRAWAL OF BIDS.** Any bidder may withdraw his/her bid, either personally or by written request, any time prior to the scheduled closing time for receipt of bids.
- 15. QUESTIONS AND CLARIFICATIONS.** To avoid any misinterpretation or misrepresentation between the Bidder, the Architect and the County as regards the plans and specifications for the Project, neither the County nor Architect will respond to any verbal or telephone inquiries, however Bidders may submit written inquiries for clarifications or questions by email to the attention of Deven Carter, Project Architect. Nichols Melburg & Rossetto. Email: carter@nmrdesign.com. Any responses to written Bidder inquiries will be at the full discretion of the County, and any responses will be in writing in the form of an Addendum to these Contract Documents, which will be sent to all Bidders.
- 16. ADDENDA OR BULLETINS.** Any Addenda or Bulletins issued during the time of bidding or forming a part of the Documents loaned to the Bidder, for the preparation of his Bid, shall be covered in the Bid, and shall be made a part of the Contract.
- 17. BIDDERS INTERESTED IN MORE THAN ONE BID.**  
No person, firm, or corporation shall be allowed to make or file, or be interested in more than one bid for the same work, unless alternate bids are called for. A person, firm, or corporation, who has submitted a subproposal to a bidder, is not thereby disqualified from submitting a subproposal or quoting prices to the other bidders.
- 18. VISITING THE SITE & KNOWLEDGE OF PLANS & SPECIFICATIONS**  
Before submitting a bid for the work, it is recommended that the Bidder inspect the sites and inform himself as to the conditions under which he will be obligated to execute the work. A Pre-Bid meeting and walk-through are scheduled for this project. See Paragraph "13" above.  
  
No allowance will be subsequently made for failure to inspect, and the Bidder will be solely responsible for the consequences of his negligence or lack of diligence. Before submitting any proposal, each Bidder shall examine the General Conditions, Plans, Specifications, as well as these Instructions to Bidders, and the forms appended hereto and made a part hereof.

**END OF SECTION**



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SPECIAL CONDITIONS

SECTION 00 01 10

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1. PROJECT DESCRIPTION

This project is in Humboldt County in the City of Eureka. It consists of remodeling the 1st floor of Auditor-Controller office. The Courthouse will remain in operation during the entire project.

- A. Project Location:  
Humboldt County Courthouse  
825 5th Street  
Eureka, CA 95501  
Humboldt County, California

2. ENGINEER'S ESTIMATE:

The engineer's estimate for the base bid is \$550,000. This is an estimate only and bidders should not rely upon this figure when preparing or submitting their bids.

3. TIME FOR COMPLETION

The Contractor shall complete the entire project within 180 calendar days from the County's issuance of the "Notice to Proceed".

4. LIQUIDATED DAMAGES

As actual damages for any delay in completion are impossible to determine, the Contractor and their sureties shall be liable for and shall pay to the County of Humboldt the sum of \$750.00 as fixed, agreed, and liquidated damages for each calendar day of delay beyond the overall contract completion date until the work is completed and accepted.

5. SUBSTITUTIONS

- A. All pre-bid substitution requests for "equal" products or systems shall be submitted to the Owners Representative. 10 days prior to the contract bid opening date. All pre-bid substitution requests shall be submitted on the PRE-BID SUBSTITUTION REQUEST FORM - SECTION 00158, see Section 00 70 00, GC 27, B.
- B. Product substitution requests for products that are "equal" to specified products but not produced by an "Acceptable Manufacturer", per each technical specification shall be submitted within 35 days after the contract is awarded. All product substitution requests shall be submitted on the PRODUCT SUBSTITUTION REQUEST FORM; see Section 01 60 00, "Product Requirements."

6. ADDENDA

No addenda shall be issued within 48 hours of the designated Bid opening time. Any addenda resulting in material changes, addition, or deletion shall be issued at least 72 hours before the designated Bid opening time, otherwise the Bid time shall be extended by not less than 72 hours.

7. COMMUNICATIONS

- A. All notices, demands, requests, instructions, approvals, proposals, and claims must be in writing.
- B. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Contract or at such other office as Contractor may from time to time designate in writing to the County of Humboldt or deposited in the United States mail in a sealed postage-prepaid envelope, or if delivered with charges prepaid to any delivery company for transmission, in each case addressed to such office.
- C. All papers required to be delivered to the County shall, unless otherwise specified in writing to the Contractor, be delivered to the County and any notice to or demand upon the County of Humboldt shall be mailed in a sealed, postage-prepaid envelope, or delivered with charges prepaid to any delivery company for transmission to the County of Humboldt at such address, or to such other representatives of the County of Humboldt or to such other address as the County may subsequently specify in writing to the Contractor for such purpose.
- D. Any such notice shall be deemed to have been given as of the time of actual delivery; or, in the case of mailing, when the same should have been received in due course of post; or, in case of any delivery company, at the time of actual receipt.

8. MINIMUM RATES OF PAY

A schedule of the minimum rates of pay applicable to this Contract is on file at the principal office of Humboldt County Public Works at 1106 Second Street, Eureka, California, and shall be made available to any interested party on request.

9. JOB OFFICES

- A. The Contractor must designate an area to serve the posting requirements of this contract. On this board will be posted EEO and wage information in compliance with the General Conditions of this contract.
- B. The Contractor and their subcontractors may maintain such office and storage facilities on the site as may be necessary for the proper conduct of the work. These shall be located to cause no interference with any work to be performed on the site. The Owner's Representative shall be consulted about locations.
- C. Upon completion of the project, or as directed by the County of Humboldt, Owner's Representative, the Contractor shall remove all such temporary structures and facilities from the site, same to become their property, and leave the premises in the condition required by the County.
- D. The Contractor shall furnish and maintain, during construction of the project, adequate facilities at the site to be designated by the County of Humboldt for the use of the County of Humboldt and the Architect.

10. PERFORMANCE AND PAYMENT BONDS

The company providing the required performance and payment bonds must be listed in U.S. Treasury Circular No. 570 as a surety approved to issue bonds securing Government contracts in the State of California.

11. NOISE ABATEMENT PROVISIONS

- A. Noise Affecting Existing Courthouse:
  - 1. The ground and second floor of the building contains an active courthouse including courtrooms, judge's offices, and court operations. These areas are operated by the Superior Court of California, not by Humboldt County. Contractor's work shall not impact the court's operations. For all work that may impact the court's operations,

including excessive noise and vibration, the contractor shall coordinate and schedule in advance with the Owner's Representative and receive approval from the Owner's Representative.

2. The Owner's Representative and the Owner shall be the sole judges of permissible noise and vibration levels and they have the right to designate times when specific items of equipment may be used.
- C. Vibration Control: Provide ten (10) working days notice before conducting construction activities that might cause vibration, such as, but not limited to, drilling, demolition, compaction, etc.
  - D. Noise Levels: Do not exceed an average continuous sound level of 72 dBA, measured at the perimeter of the work area, and do not exceed an impact noise level of 100 dBA measured at the perimeter of the work area, and only two impact occurrences between 72 dBA and 100 dBA are permitted in a one-hour period.
  - E. Objectionable discernible noise transmitting is prohibited during normal Courthouse hours.

**END OF SECTION**

BID CHECKLIST  
SECTION 00 01 40

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The following documents shall be submitted by each Bidder, as part of their complete Bid:

1. Section 00300 - Bid Form
2. Section 00410 - Bid Security Form (Bid Bond)
3. Section 00430 - Subcontractor List
4. Section 00440 - Non-collusion Affidavit
5. Section 00450 - Responsibility/Non-responsibility
6. Section 00460 - Public Contract Code 10232 Statement
7. Section 00470 - Workers' Compensation Certification
8. Section 00480 - Debarment and Suspension Certification

**END OF SECTION**

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PRE-BID SUBSTITUTION FORM

SECTION 00 15 80

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PROJECT: Humboldt County District Auditor-Controller Office DATE: \_\_\_\_\_  
Project Number: 2023-101

Note to Contractor: All substitution requests for "equal" products or systems shall be submitted to the Owner's Representative, (10) ten days prior to the contract bid date.

We hereby submit for your consideration the following product in lieu of the specified item for the above project.

SECTION: \_\_\_\_\_ Paragraph: \_\_\_\_\_

Specified Item: \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_

Attach completed technical data, including laboratory tests, if applicable.

Include complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation.

Does the substitution affect dimensions shown on Drawings? \_\_\_\_\_(Yes) \_\_\_\_\_(No)

Will the undersigned pay for changes to the building design, including detailing costs caused by the requested substitution? \_\_\_\_\_(Yes) \_\_\_\_\_(No)

What effect does substitution have on other trades? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Differences between proposed substitution and specified item? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Manufacturer's guarantees of the proposed and specified items are:

Same \_\_\_\_\_ Different (Explain on attachment) \_\_\_\_\_

The undersigned states that the function, appearance, and quality are equivalent or superior to the specified item.

Submitted By: \_\_\_\_\_

Signature: \_\_\_\_\_

Firm: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

FOR USE BY ARCHITECT:

\_\_\_\_\_ Accepted                      \_\_\_\_\_ Accepted as Noted

\_\_\_\_\_ Not Accepted                      \_\_\_\_\_ Received Too Late

By: \_\_\_\_\_ Date: \_\_\_\_\_

Remarks: \_\_\_\_\_

\_\_\_\_\_

**END OF SECTION**

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BID FORM

SECTION 00 30 00

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TO  
THE COUNTY OF HUMBOLDT

CONSTRUCTION OF HUMBOLDT COUNTY DISTRICT ATTORNEY, AUDITOR-CONTROLLER  
OFFICE

CONTRACT NUMBER 2023-101

Name of Bidder: \_\_\_\_\_

Business Address: \_\_\_\_\_

\_\_\_\_\_

Telephone Number: \_\_\_\_\_

Residence Address: \_\_\_\_\_

The work to be done shall be constructed in accordance with the Contract Documents, prepared by NMR Architects, dated 11/2022, the Agreement annexed hereto and the General Prevailing Wage provisions as specified in the "Notice to Contractors".

Bids are submitted for the entire work. The amount of "The Bid" for comparison purposes will be the determination of the apparent low bid as specified in Section 00 01 00, "Instructions to Bidders".

The Bidder shall set forth for the Base Bid and each Alternate, if any, in clearly legible figures, a written lump sum price and a numeric lump sum price.

In case of a discrepancy between the two notated prices, the written price shall prevail, unless, however, if the amount set forth in writing is ambiguous, unintelligible or uncertain for any cause, or is omitted, then the amount set forth in the numeric column for the item shall prevail.

If this proposal shall be accepted and the undersigned shall fail to enter into the Contract and to give the two required bonds in the sums to be determined as aforesaid, with surety satisfactory to the Department of Public Works, within seven (7) days, not including Sundays and legal Holidays, after the Bidder has received notice from the Department that the contract has been awarded, the County may, at its option, determine that the Bidder has abandoned the Contract, and thereupon this Proposal and the acceptance thereof shall be null and void and the forfeiture of such security accompanying this Proposal shall operate and the same shall be the property of the County of Humboldt.

The undersigned, as Bidder, declares that the only persons or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any other person, firm, or corporation; that Bidder has carefully examined the location of the proposed work, the annexed proposed form of contract, and the plans therein referred to; and proposes and agrees if this proposal is accepted, that Bidder will contract with the County of Humboldt, in the form of the copy of the contract annexed hereto, to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all the material specified in the contract, in the manner and time therein prescribed, and according to the requirements of the Architect as therein set forth, and that he will take in full payment therefor the following item prices to wit:

Receipt and compliance with the following Addenda to the Contract Documents is acknowledged:

1. Addendum No.\_\_\_\_ Dated\_\_\_\_\_
2. Addendum No.\_\_\_\_ Dated\_\_\_\_\_
3. Addendum No.\_\_\_\_ Dated\_\_\_\_\_
4. Addendum No.\_\_\_\_ Dated\_\_\_\_\_
5. Addendum No.\_\_\_\_ Dated\_\_\_\_\_

I, \_\_\_\_\_, as an agent for

\_\_\_\_\_, declare under penalty of perjury under the laws of the State of California, that the information contained in this Bid is true and correct.

Executed at \_\_\_\_\_, California, on \_\_\_\_\_, 2019

The project shall be complete within the time limits specified in Section 00 01 10, "Special Conditions." The undersigned is aware the Contract includes provisions for liquidated damages as specified in Section 00 01 10, "Special Conditions," if the Project is not completed within the agreed time of completion.

**THE UNDERSIGNED**, as Bidder, proposes the following:

**BASE BID:**

To furnish and complete the entire work as shown on the drawings and listed in the specifications, including required contract bonds and insurance, without additions or subtractions on account of specified alternates, for the sum of:



<b>Base Bid (Lump Sum):</b>	
_____	\$ _____
Total Amount in Words	Total

**Proposal Signature Page**

Accompanying this proposal is \_\_\_\_\_

(Insert the words "Cash (\$)", "Cashier's Check", "Certified Check", or "Bidder's Bond", as the case may be)

in the amount of at least ten percent (10%) of the total Bid Price submitted. The names of all persons interested in the foregoing proposal as Principals are as follows:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(NOTE: If a Bidder or other interested person is a Corporation, state the legal name of the corporation, also names of the president, secretary, treasurer, and manager thereof; if a Co-partnership, state the true name of the firm, also state the names of all individual co-partners composing the firm; if the Bidder or other interested person is an Individual, state the first and last names in full.)

Licensed in accordance with an Act providing for the registration of Contractors:

License No.: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

By my signature on this proposal I certify, under penalty of perjury under the laws of the State of California, that the foregoing questionnaire and statements of Public Contract Code Section 10162, and 10232, are true and correct and that the bidder has complied with the requirements of Section 8102 of the Fair Employment and Housing Commission Regulations (Chapter 5, Title 2 of the California Administrative Code). By my signature on this proposal I further certify, under penalty of perjury under the laws of the State of California and the United States of America, that the Noncollusion Affidavit required by Title 23 United States Code, Section 112 and Public Contract Code Section 7106; and the Title 49 Code of Federal Regulation, Part 29 Debarment and Suspension Certification are true and correct.

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Date

If a Bidder is a Corporation or a Co-partnership:

\_\_\_\_\_  
Name of Corporation or Firm Name of Co-partnership

Signatures of officer(s) or partners authorized to sign contracts on behalf of the Corporation or Co-partnership, Corporations require signature by 2 (two) corporate officers:

_____	_____
Name	Title
_____	_____
Name	Title

If Signature is by an agent, other than an officer of a corporation or a member of a partnership, a Power of Attorney must be on file with the Department prior to opening Bids or may be submitted with the Bid; otherwise the Bid will be disregarded as irregular and unauthorized.

Bidder's Business Address: \_\_\_\_\_

Place of Residence: \_\_\_\_\_

Date: \_\_\_\_\_

**END OF SECTION**

BID SECURITY FORM

SECTION 00 41 00

LET THE FOLLOWING BE KNOWN:

That \_\_\_\_\_, as Principal, and  
, a corporation, organized and existing under and by virtue of the laws of the State of  
and authorized to do surety business in the State of California, as Surety, are held and firmly bound unto the  
\_\_\_\_\_, State of California, as Obligee, in the sum of  
, Dollars (\$ \_\_\_\_\_), for the payment of which sum well and truly to be made, we, and each  
of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly  
by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted a bid to  
the County of Humboldt, State of California, for all work specifically described in the accompanying bid;

NOW, THEREFORE, if the aforesaid Principal is awarded the contract, and within the time and  
manner required under the specifications, after the prescribed forms are presented to Principal for signature,  
enters into a written contract in the prescribed form, in accordance with the bid, and files the two bonds, one  
guaranteeing faithful performance and the other guaranteeing payment for labor and materials as required by  
law, or if the said Principal shall fully reimburse and save harmless the Obligee from any damage sustained by  
the Obligee through failure of the Principal to enter into the written contract and to file the required  
performance and labor and material bonds, then this obligation shall be null and void; otherwise, it shall be and  
remain in full force and effect.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the Surety shall  
pay all costs incurred by the Obligee in such suit, including a reasonable attorney's fee to be fixed by the  
Court.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this \_\_\_\_\_ day  
of \_\_\_\_\_, 20\_\_\_\_\_.

By: \_\_\_\_\_

By:

Principal (Seal)

Surety (Seal)

- NOTE:
- (1) Signature of those executing for the surety must be properly acknowledged.
  - (2) This bond must be in an amount equal to at least ten (10%) percent of the amount bid.
  - (3) Bidders must use this form unless the surety company form is substantially the same.

**END OF SECTION**

---

SUBCONTRACTOR LIST

SECTION 00 43 00

---

**LIST OF SUBCONTRACTORS**

**PROJECT NAME: HUMBOLDT COUNTY DISTRICT ATTORNEY, AUDITOR-CONTROLLER OFFICE**  
**PROJECT NUMBER: 2023-101**

The Bidder shall list all Subcontractors in accordance with Article 18 of the Supplementary General Conditions. All Subcontractors shall be listed with the Department of Industrial Relations to work on public works projects.

<u>Name of Subcontractor, CA Contractor License Number.</u>	<u>Address</u>	<u>Description of Work to be Performed</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
-----		
_____	_____	_____
_____	_____	_____
_____	_____	_____
-----		
_____	_____	_____
_____	_____	_____
_____	_____	_____
-----		
_____	_____	_____
_____	_____	_____
_____	_____	_____

---

<u>Name of Subcontractor, CA Contractor License Number &amp; Dir. Reg. Number</u>	<u>Address</u>	<u>Description of Work to be Performed</u>
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**END OF SECTION**

---

NONCOLLUSION AFFIDAVIT

SECTION 00 44 00

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**TO THE COUNTY OF HUMBOLDT, DEPARTMENT OF PUBLIC WORKS**

Non-Collusion Affidavit

(Title 23 United States Code Section 112 and Public Contract Code Section 7106)

In accordance with Title 23 United States Code Section 112 and Public Contract Code 7106 the Bidder declares that the Bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the Bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and they have not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or any other Bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other Bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the Bidder has not directly or indirectly, submitted their bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member of agent thereof to effectuate a collusive or sham bid.

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Date

Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

**END OF SECTION**

---

RESPONSIBILITY/NONRESPONSIBILITY

SECTION 00 45 00

---

1. DETERMINATION OF BIDDER RESPONSIBILITY

- A. A responsible bidder is a bidder who has demonstrated the attribute of trustworthiness, as well as quality, fitness, capacity, and experience to satisfactorily perform the contract. It is the County's policy to conduct business only with responsible contractors. (Ord. 2291, § 1, 01/07/2003)
- B. Bidders are hereby notified that the County may determine whether the bidder is responsible based on a review of the bidder's performance on any contracts, including but not limited to County contracts. Particular attention will be given to violations of labor laws related to employee compensation and benefits, and evidence of false claims made by the bidder against public entities. This will include subcontractors and their employees as well. (Ord. 2291, § 1, 01/07/2003)
- C. The County may declare a bidder to be non-responsible for the purpose of this contract, if the Board of Supervisors, in its discretion, finds that the bidder has done any of the following: (1) committed any act or omission which negatively reflects on the bidder's quality, fitness or capacity to perform this contract with the County or a contract with any other public entity, or engaged in a pattern or practice which negatively reflects on same; (2) committed an act or omission which indicates a lack of business integrity or business honesty; or (3) made or submitted a false claim against the County or any other public entity. (Ord. 2291, § 1, 01/07/2003)
- D. If there is evidence that the apparent low bidder may not be responsible, the department shall notify the bidder in writing of the evidence relating to the bidder's responsibility, and its intention to recommend to the Board of Supervisors that the bidder be found not responsible. The department shall provide the bidder and/or the bidder's representative with an opportunity to present evidence as to why the bidder should be found to be responsible and to rebut evidence which is the basis for the department's recommendation. If the bidder fails to avail itself of the opportunity to rebut the department's evidence, the bidder may be deemed to have waived all rights of appeal. (Ord. 2291, § 1, 01/07/2003)
- E. If the bidder presents evidence in rebuttal to the department, the department shall evaluate the merits of such evidence, and based on that evaluation, make a recommendation to the Board of Supervisors. The final decision concerning the responsibility of the bidder shall reside with the Board of Supervisors. (Ord. 2291, § 1, 01/07/2003)
- F. These terms shall also apply to proposed [subcontracts/ subconsultants] of bidders on County contracts. (Ord. 2291, § 1, 01/07/2003)

2. DETERMINATION OF BIDDER DEBARMENT

- A. The bidder is hereby notified that the County may debar the bidder from bidding on other County contracts for a specified period of time, not to exceed three (3) years, and the County may terminate any or all of the bidder's existing contracts with the County, if the Board of Supervisors finds, in its discretion, that the bidder has done any of the following: (1) violated any term of a contract with the County; (2) committed any act or omission which negatively reflects on the bidder's quality, fitness, or capacity to perform a contract with the County or any other public entity, or engaged in a pattern or practice which negatively reflects on same; (3) committed an act or offense which indicates a lack of business integrity or business honesty; or (4) made or submitted a false claim against the County or any other public entity. (Ord. 2291, § 1, 01/07/2003)
- B. If there is evidence that the apparent low bidder may be subject to debarment, the department shall notify the bidder in writing of the evidence which is the basis for the proposed debarment and

shall advise the bidder of the scheduled date for a debarment hearing before the Contractor Hearing Board (CHB). (Ord. 2291, § 1, 01/07/2003)

- C. The CHB shall conduct a hearing where evidence on the proposed debarment is presented. The bidder and/or the bidder's representative shall be given an opportunity to submit evidence at that hearing. After the hearing, the CHB shall prepare a proposed decision, which shall contain a recommendation regarding whether the bidder should be debarred, and, if so, the appropriate length of time of the debarment. If the bidder fails to avail itself of the opportunity to submit evidence to the CHB, the bidder may be deemed to have waived all rights of appeal. (Ord. 2291, § 1, 01/07/2003)
- D. A record of the hearing, the proposed decision, and any other recommendation of the CHB shall be presented to the Board of Supervisors, by the department head. The Board of Supervisors shall have the right to modify, deny or adopt the proposed decision and recommendation of the hearing board. (Ord. 2291, § 1, 01/07/2003)
- E. These terms shall also apply to proposed [subcontractors/ subconsultants] of bidders on County contracts. (Ord. 2291, § 1, 01/07/2003)

**EVIDENCE OF RESPONSIBILITY / NONRESPONSIBILITY**  
(Humboldt County Code Sections 2141 et seq.)

The bidder shall, under penalty of perjury, answer each of the questions below and provide supporting documentation. The term "bidder" shall include any person associated with the bidder in the capacity of owner, partner, director, officer, or manager.

- 1. Is the bidder under suspension, debarment, or determination of ineligibility by any federal, state, or local agency?   \_\_\_No   \_\_\_Yes (explain)
  
- 2. Has the bidder been suspended, debarred, or determined ineligible by any federal, state, or local agency within the preceding 5 years:   \_\_\_No   \_\_\_Yes (explain)
  
- 3. Is there pending against the bidder any proposed debarment or suspension proceeding?  
   \_\_\_No   \_\_\_Yes (explain)
  
- 4. Has the bidder been indicted, charged with, or convicted, or assessed civil or administrative penalties, or had a civil judgment rendered against it, in any matter involving:
  - (a) fraud, false claims, or dishonesty.
  - (b) any serious or willful violation of the California Occupational Safety and Health Act of 1973 (Labor Code Sections 6300 et seq) or the Federal Occupational Safety and Health Act of 1970.
  - (c) violation of the state workers' compensation laws.
  - (d) violation of the Contractor's State License Law (Bus & Prof Code Sections 7000 et seq.)
  - (e) violation of prevailing wage laws.
  - (f) violation of state or federal environmental laws.
  - (g) violation of local laws related to permits, land use, or waste disposal.   \_\_\_No   \_\_\_Yes (explain)
  
- 5. Has the bidder defaulted on a construction contract within the preceding 10 years?  
   \_\_\_No   \_\_\_Yes (explain)



6. Provide information concerning any bankruptcy or receivership of bidder, and information regarding all legal claims, disputes, or lawsuits (including administrative matters) arising from any construction project performed within the preceding 5 years, including information regarding any work completed by a surety.

NOTE: This information will not necessarily result in denial of award but will be considered in determining bidder responsibility. Bidders are cautioned that making a false certification may subject the bidder to criminal prosecution.

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Date

**END OF SECTION**

---

PUBLIC CONTRACT CODE SECTION 10232 STATEMENT

SECTION 00 46 00

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In accordance with Public Contract Code Section 10232, the Contractor, hereby states under penalty of perjury, that no more than one final unappealable finding of contempt of court by a Federal court has been issued against the Contractor within the immediately preceding two-year period because of the Contractor's failure to comply with an order of a Federal court which orders the Contractor to comply with an order of the National Labor Relations Board.

---

Signature of Bidder

---

Date

Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

**END OF SECTION**

---

WORKERS' COMPENSATION CERTIFICATE

SECTION 00 47 00

---

Labor Code Section 3700.

"Every employer except the State shall secure the payment of compensation in one or more of the foregoing ways:

- (a) By being insured against liability to pay compensation in one or more insurers duly authorized to write compensation insurance in this state.
- (b) By securing from the Director of Industrial Relations a certificate of consent to self-insure either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to their employees."

I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and that I will comply with such provisions before commencing the performance of the work of this contract.

Signature of Contractor: \_\_\_\_\_

Date: \_\_\_\_\_

In accordance with Article 5 [commencing at Section 1860], Chapter 1, Part 7, Division 2, of the Labor Code, the above certificate must be signed and filed with the awarding body prior to commencing any work under this contract.

**END OF SECTION**

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DEBARMENT AND SUSPENSION CERTIFICATION

SECTION 00 48 00

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TITLE 49, CODE OF FEDERAL REGULATIONS, PART 29

The CONTRACTOR, under penalty of perjury, certifies that, except as noted below, he/she or any other person associated therewith in the capacity of owner, partner, director, officer, manager:

1. is not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any Federal, State, or local agency.
2. has not been suspended, debarred, voluntarily excluded, or determined ineligible by any Federal, State, or local agency within the past 3 years.
3. does not have a proposed debarment pending; and
4. has not been indicted, convicted, or had a civil judgment rendered against it by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years.

If there are any exceptions to this certification, insert the exceptions in the following space.

Exceptions will not necessarily result in denial of award but will be considered in determining bidder responsibility. For any exception noted above, indicate below to whom it applies, initiating agency, and dates of action.

Notes: Providing false information may result in criminal prosecution or administrative sanctions.

The above certification is part of the Proposal. Signing this Proposal on the signature portion thereof shall also constitute signature of this Certification.

Signature of Contractor: \_\_\_\_\_

Date: \_\_\_\_\_

**END OF SECTION**

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AGREEMENT

SECTION 00 50 00

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This is an AGREEMENT made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2023 by and between the County of Humboldt, a political subdivision of the State of California (hereinafter referred to as COUNTY) and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, a partnership consisting of \_\_\_\_\_; an individual doing business as \_\_\_\_\_ in the State of California, (hereinafter referred to as "CONTRACTOR").

County and Contractor for the consideration hereinafter named agree as follows:

**SECTION 1 - SCOPE OF WORK**

Contractor shall furnish all labor, tools and materials and perform all the work for the construction of:

**HUMBOLDT COUNTY DISTRICT ATTORNEY, AUDITOR-CONTROLLER OFFICE  
PROJECT NUMBER: 2023-101**

in accordance with the Contract Documents referred to in Section 3 of this Agreement.

The scope of work includes the work included in the "Base Bid" for the project and the following bid alternatives: \_\_\_\_\_

**SECTION 2 - CONTRACT PRICE**

County shall pay, and Contractor shall accept Contractor's Price, as follows:

\_\_\_\_\_ Dollars and \_\_\_\_\_ /100 (\$ \_\_\_\_\_ )

as full compensation for furnishing all materials and for doing all the work contemplated and embraced in this Agreement; also for all loss or damage, arising out of the work aforesaid, or from the actions of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered in the prosecution of the work until its acceptance by County, and for all risks of every description connected with the work; also for all expenses incurred by or in consequence of the suspension or discontinuance of the work and for well and faithfully completing the work, and the whole thereof, in the manner and according to the Plans and Specifications, and the requirements of the Owner.

**SECTION 3 - CONTRACT DOCUMENTS**

The complete contract between the parties hereto shall consist of the following, hereinafter referred to as the CONTRACT DOCUMENTS:

- Notice to Contractors
- Bid Form
- Bid Security Form
- This Agreement
- Payment Bond
- Performance Bond
- Insurance Certificates
- General Conditions
- Supplementary General Conditions
- General Requirements
- Technical Specifications
- Plans and Drawings
- Subcontractor List
- Non collusion Affidavit

- Public contract code Statement
- Special Conditions
- Evidence of Responsibility/Non-responsibility
- Debarment suspension certification

And, as published by the California Department of Industrial Relations:

- General Prevailing Wage Rates

And any addenda to any of the above documents, all of which are on file in the office of the Director of Public Works of the County of Humboldt. Each of said CONTRACT DOCUMENTS is incorporated and made a part of this Agreement by the reference contained in this Section.

All rights and obligations of the County and the Contractor are fully set forth and described in the Contract Documents. All of the above-named documents are intended to be complementary, so that any work called for in one, and mentioned in the other is to be performed and executed the same as if mentioned in all said documents.

#### **SECTION 4 - BEGINNING OF WORK**

Following receipt and full execution and approval of the Contract Documents and posting of the requisite Bonds as called for therein, the COUNTY will issue a "Notice to Proceed". Under no circumstances shall the CONTRACTOR enter upon the site of work until receipt of the "Notice to Proceed", unless so authorized in writing by the COUNTY.

#### **SECTION 5 - TIME OF COMPLETION**

The work called for in this Agreement shall be commenced within ten (10) calendar days of the date of receipt by Contractor of the Notice to Proceed and shall be fully completed within 200 calendar days following receipt of the Notice to Proceed by the Contractor.

#### **SECTION 6 - PREVAILING WAGE**

Pursuant to Section 1770 of the Labor Code, the County has determined the Prevailing Wage Rate to be as listed by the Department of Industrial Relations, Division of Labor Statistics and Research, P.O. Box 420603, San Francisco, CA, 94101, Phone: (415) 703-4780. Complete Certified Payrolls must be submitted to the OWNER together with each application for progress payment. Electronic submittal directly to DIR may be required.

#### **SECTION 7 - WORKERS' COMPENSATION**

By my signature hereunder, as CONTRACTOR, I certify that I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

#### **SECTION 8 - NOTICES**

All notices shall be in writing and delivered in person or transmitted by mail. Notices required to be given to the COUNTY shall be addressed as follows:

County Administrative Office  
825 5<sup>th</sup> Street, Eureka, California, 95501

Notices required to be given to CONTRACTOR shall be addressed as follows:

**SECTION 9 - NUCLEAR FREE HUMBOLDT COUNTY ORDINANCE COMPLIANCE**

Neither the Contractor, his Subcontractors or their suppliers are Nuclear Weapons Contractors, and are not knowingly or intentionally engaged in the research, development, production, or testing of nuclear warheads, nuclear weapons systems, or nuclear weapons components, as defined by the Nuclear Free Humboldt County Ordinance. Contractor, his Subcontractors and/or their suppliers agree to notify Owner immediately if they become a nuclear weapons contractor as defined above.

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IN WITNESS WHEREOF, the parties hereto have entered into this Agreement as of the date first above set forth.

**COUNTY OF HUMBOLDT**

(SEAL)

By: \_\_\_\_\_  
Chairperson, Board of Supervisors of the County of Humboldt, State of California

ATTEST:

By: \_\_\_\_\_  
Clerk of the Board of Supervisors of the County of Humboldt, State of California

**CONTRACTOR:** Corporations require signature by 2 (two) corporate officers

By: \_\_\_\_\_

Title: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

APPROVED AS TO FORM:

By: \_\_\_\_\_  
Deputy County Counsel

INSURANCE CERTIFICATES REVIEWED AND APPROVED:

By: \_\_\_\_\_  
Risk Manager

**END OF SECTION**



PERFORMANCE BOND

SECTION 00 61 00

LET THE FOLLOWING BE KNOWN:

That \_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called Principal, and:  
(Corporation, Partnership or Individual)

\_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

HUMBOLDT COUNTY  
825 5th Street  
Eureka, California 95501

hereinafter called OWNER, in the penal sum of

\_\_\_\_\_  
Dollars ..... (\$ \_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bond ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_, a copy of which is hereto attached and made a part hereof for the construction of:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all of the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if Principal shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

By: \_\_\_\_\_  
Principal

By: \_\_\_\_\_  
Surety

**SURETY**

(Power of Attorney for person signing for Surety Company, or a certified copy thereof, must be attached. Signatures of person or persons executing for the Surety must be acknowledged.)

**END OF SECTION**

---

PAYMENT BOND

SECTION 00 62 00

---

LET THE FOLLOWING BE KNOWN, THAT WHEREAS, the County of Humboldt, by its order made \_\_\_\_\_, 20\_\_\_\_, has awarded to \_\_\_\_\_, hereinafter designated as the "Principal," a contract for the work described as follows:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOW, THEREFORE, we the Principal and \_\_\_\_\_, Surety, are held and

THE CONDITION OF THIS OBLIGATION IS SUCH that is said Principal, his/her or its heirs, executors, administrators, successors or assigns, shall fail to pay any of the persons named in Section 9100 of the Civil Code, or amounts due under the Unemployment Insurance Code with respect to work or labor performed by any such claimant, or for any amounts required to be deducted, withheld, and paid over to the Franchise Tax Board from the wages of employees of the Contractor and their subcontractors pursuant to Section 18806 of the Revenue and Taxation Code with respect to such work and labor as required by Sections 9550 et seq. of the Civil Code of California, then said Surety will pay for the same, in or to an amount not exceeding the amount hereinafter set forth, and also will pay in case suit is brought upon this bond, such reasonable attorney's fees, as shall be fixed by the court, awarded and taxed as in the above-mentioned statutes provided.

AND, the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any wise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract, or to the work, or to the specifications.

IN WITNESS WHEREOF, this instrument has been duly executed by the Principal and Surety above named, on the \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

\_\_\_\_\_  
PRINCIPAL

\_\_\_\_\_  
SURETY

BY: \_\_\_\_\_

BY \_\_\_\_\_  
ATTORNEY-IN-FACT

**END OF SECTION**

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GENERAL CONDITIONS

SECTION 00 70 00

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**GC 1. DEFINITIONS**

- A. COUNTY: The term "County", or pronouns in place of same where it is used herein, shall mean Humboldt County acting through its Board of Supervisors.
- B. BOARD: The term "Board", or pronouns in place of same where it is used herein, shall mean the Humboldt County Board of Supervisors.
- C. OWNER: The "Owner" is the person or entity identified as such in the Owner-Contractor Agreement; the term Owner means the Owner or their authorized representative.
- D. ARCHITECT: The term "Architect" shall mean, Nichols, Melburg & Rossetto as employed by the Owner.
- E. CONTRACTOR: The term "Contractor", where used herein, shall mean the Contractor to whom the contract for the work described and specified herein has been awarded by the Board.
- F. PLANS AND SPECIFICATIONS: The term "Plans and Specifications", where used herein, shall mean, and include all specifications and provisions of every kind, whether general, detailed or otherwise, relating to the equipment, material of work, and the installation thereof, and the plans and drawings accompanying same which are made a part thereof. Such Plans and Specifications are recognized as instruments of professional service.
- G. OWNER'S REPRESENTATIVE: The term "Owner's Representative" shall mean agent assigned to the Project by Humboldt County Department of Public Works.
- H. PROJECT INSPECTOR: The term "Project Inspector" shall mean agent assigned to the Project by Humboldt County Department of Public Works.

**GC 2. CONTRACT**

- A. The Contract Documents include all documents identified as such in the Agreement (Section 00500), any amendments and Change Orders thereto
- B. In the execution of the work or any portion thereof, Contractor shall operate as an independent contractor and not as the agent of Owner or Architect.
- C. No verbal agreement or conversation with any officer, agent, or employee of Owner or Architect, either before or after execution of the Agreement, shall affect or modify any terms or obligations of the Contract unless duly incorporated into the Contract by written Change Order or amendment of the Contract.
- D. The Contract Documents shall not be construed to create any contractual relationship of any kind between the Architect and the Contractor, but the Architect shall be entitled to performance of obligations intended for their benefit, and to enforcement thereof. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner or the Architect and any subcontractor or sub-subcontractor.

**GC 3. BONDS**

- A. The successful bidder, simultaneously with the execution of the Agreement, will be required to furnish a Payment Bond in an amount equal to one hundred (100%) percent of the contract price, and a faithful Performance Bond in an amount equal to one hundred (100%) percent of the contract price. The Contractor must submit a certificate from the Humboldt County Clerk's Office with all payment bonds. The Clerk's certificate must indicate that the surety is admitted transacting business in the State of California, and certify that the surety's certificate of authority, issued by the Insurance Commissioner, has not been suspended, revoked, canceled, or annulled.
- B. The bonds shall comply with Section 9554 of the Civil Code of the State of California. The payment Bond and the faithful Performance Bond shall each be in a form that is satisfactory to the County Counsel, or Risk Management of the County of Humboldt. A copy of an acceptable format is attached to the Agreement forms of these specifications.

**GC 4. INSURANCE REQUIREMENTS**

- A. THIS CONTRACT/AGREEMENT SHALL NOT BE EXECUTED BY COUNTY and the CONTRACTOR is not entitled to any rights, unless certificates of insurance, or other sufficient proof that the following provisions have been complied with, and such certificate(s) are filed with the Clerk of the Humboldt County Board of Supervisors.
- B. Without limiting Contractor's indemnification provided herein, Contractor shall and shall require any of its subcontractors to take out and maintain, throughout the period of this Agreement, the following policies of insurance placed with insurers with a current A.M. Bests rating of no less than A:VII or its equivalent against injury/death to persons or damage to property which may arise from or in connection with the activities hereunder of Contractor, its agents, employees or subcontractors:
  - 1. The County, its officers, employees, and agents, are covered as additional insured for liability arising out of the operations performed by or on behalf of Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the County, its officers, agents, and employees.
  - 2. The policy shall not be canceled or materially reduced in coverage without thirty (30) days prior written notice (10 days for non-payment of the premium) to County by certified mail.
  - 3. The inclusion of more than one insured shall not operate to impair the rights of one insured against another insured, and the coverage afforded shall apply as though separate policies had been issued to each insured, but the inclusion of more than one insured shall not operate to increase the limits of the insurer's liability.
  - 4. For claims related to this project, the Contractor's insurance is primary coverage to the County, and any insurance or self-insurance programs maintained by the County are excess to Contractor's insurance and will not be called upon to contribute with it.
  - 5. Any failure to comply with reporting or other provisions of the parties, including breach of warranties, shall not affect coverage provided to County, its officers, employees, and agents.
- C. Comprehensive or Commercial General Liability Insurance at least as broad as Insurance Services Office Commercial General Liability coverage (occurrence from CG 0001), in an amount of \$2,000,000 per occurrence. If work involves explosive, underground or collapse risks, XCU must be included. If a general aggregate limit is used, either the general aggregate limit shall apply separately to this project, or the general aggregate shall be \$5,000,000. Said policy shall contain, or be endorsed with, the following provisions:
  - 1. The County, its officers, employees, and agents, are covered as additional insured for liability arising out of the operations performed by or on behalf of Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the County, its officers, agents, and employees.
  - 2. The policy shall not be canceled or materially reduced in coverage without thirty (30) days prior written notice (10 days for non-payment of the premium) to County by certified mail.
  - 3. The inclusion of more than one insured shall not operate to impair the rights of one insured against another insured, and the coverage afforded shall apply as though separate policies had been issued to each insured, but the inclusion of more than one insured shall not operate to increase the limits of the insurer's liability.
  - 4. For claims related to this project, the Contractor's insurance is primary coverage to the County, and any insurance or self-insurance programs maintained by the County are excess to Contractor's insurance and will not be called upon to contribute with it.
  - 5. Any failure to comply with reporting or other provisions of the parties, including breach of warranties, shall not affect coverage provided to County, its officers, employees, and agents.
- D. Automobile liability insurance with coverage at least as broad as Insurance Services Office form CA 0001 06092, Code 1 (any auto), for vehicles used in the performance of this Agreement with minimum coverage of not less than \$1,000,000 per accident combined single limit (CSL). Such policy shall contain or be endorsed with the provision that coverage shall not be canceled or materially reduced in coverage without thirty (30) days prior written notice (10 days for non-payment of premium) to County by certified mail.

- E. Workers' Compensation insurance meeting statutory limits of the California Labor Code which policy shall contain or be endorsed to contain a waiver of subrogation against County, its officers, agents, and employees and provide for thirty (30) days prior written notice in the event of cancellation.
- F. If applicable, Builder's Risk or Course of Construction, written on an "All-Risk" form, for 100% of the completed value of the insurable part of the project. The Builder's Risk policy shall provide for losses to be payable to County and the Contractor as their interests may appear, and that in the event of payment for any loss under the coverage provided, the insurer shall have no rights of recovery against County and Contractor.
- G. Contractor shall furnish County with certificates and original endorsements effecting the required coverage prior to execution of this Agreement by County. The endorsements shall be on forms as approved by the County's Risk Manager or County Counsel. Any deductible or self-insured retention over \$100,000 shall be disclosed to and approved by County. If Contractor does not keep all required policies in full force and effect, County may, in addition to other remedies under this Agreement, take out the necessary insurance, and Contractor agrees to pay the cost of said insurance.
- H. SUBCONTRACTORS: Should contractor subcontract any portion of the work to be performed under this Agreement, said subcontractors shall be required by contractor to:
  - 1. Enter into a written contract with contractor acknowledging that no employee/employer relationship exists between contractor and subcontractor and that no Workers' Compensation, unemployment benefits, or other personnel benefits are required by or available to subcontractor through contractor or County.
  - 2. Hold harmless and to indemnify, defend and save harmless contractor and County, its Board of Supervisors, officers, agents, employees, and volunteers, from any and all claims and losses accruing or resulting to any and all contractors, subcontractors, material suppliers, laborers, and any other person, firm or corporation who may be injured or damaged by subcontractor in the performance of this Agreement.
- I. HOLD HARMLESS/INDEMNIFICATION CLAUSE

Pursuant to Government Code section 895.4, the parties to this Agreement shall indemnify, defend and hold harmless the other parties hereto and their officers, agents, and employees, from any and all claims, demands, losses, damages, and liabilities of any kind or nature, including attorney's fees, which arise by the virtue of its own acts or omissions (either directly or through or by its officers, agents or employees) in connection with its duties and obligations under this Agreement and any amendments hereto.

Acceptance of insurance, if required by this Agreement, does not relieve Contractor from liability under this indemnification clause. This indemnification clause shall apply to all damages or claims for damages suffered by Contractor's operations regardless if any insurance is applicable or not.

**GC 5. TERMINATION OF CONTRACT**

- A. Each of these general conditions, whether preceding or following this paragraph, is to be considered material and failure to comply with any of such conditions by the Contractor will be deemed a breach of contract.
- B. Should the Contractor fail to perform any of the provisions of the Contract, the Owner shall have the right, whether an alternative right is provided, to declare the Contract terminated. A written notice by the Owner to the Contractor that the Contract is terminated shall be deemed a complete termination of same.



C. On the Contract being so terminated, the Contractor shall, provided Contractor is ordered to do so by the Owner, immediately remove from the premises all or any materials and personal property belonging to Contractor which have not been used in the construction of the Work or which is not in place in the Work; and both Contractor and their surety shall be liable upon their bond for all damages caused to the Owner by reason of failure to complete the Contract.

D. See GC Article 29, SUFFICIENT LABOR, OR MATERIAL.

**GC 6. NON-CONTINUANCE OF WORK**

A. Should the Contractor at any time during the progress of the Work refuse, neglect or be unable for any reason, except the documented inability to supply a sufficiency of materials or workmen necessary, to complete the Work within the time specified in the Contract, the Owner shall have the power to terminate the Contract as prescribed.

**GC 7. ASSIGNMENT OF CONTRACT**

A. The Contractor shall not assign or sublet the Contract in whole or in part without the prior written consent of the Owner. The Contractor shall not assign any monies due or to become due to them under the Contract without the prior written consent of the Owner.

B. Any assignments permitted under these documents or approved by the Owner shall, in addition, have prior written approval of all sureties of the Contractor executing bonds or insurance in the interest of this Contract.

C. If the Contractor seeks to assign any portions or monies as permitted, Contractor shall pay to the Owner \$1,000 to cover Owner's costs each time an assignment occurs.

**GC 8. SEPARATE CONTRACTS**

A. The Owner reserves the right to let other contracts in connection with this Project. The Contractor shall afford all other such contractors reasonable opportunity for storage of their materials; shall provide that the execution of their work properly connects and coordinates with theirs; and shall cooperate with them to the end of facilitating the Work.

B. The work performed or executed under other contracts in advance of work under this Contract shall be inspected and determined to be in proper condition by the Contractor before permitting related or connecting work to proceed under this Contract.

C. Contractor shall immediately notify Architect of any discrepancies, defects or other conditions found unsuitable for proper execution of the work.

**GC 9. CONFERENCES**

A. At any time during the progress of the Work, the Owner, Owner's Representative, or Architect shall have authority to require the Contractor to attend a conference of any or all the contractors engaged in the Work; and any notice of such conference shall be duly observed and complied with by the Contractor.

**GC 10. TERMS OF PAYMENT**

A. At the end of each calendar month, the Contractor shall submit to the Owner's Representative a statement of all materials actually placed in the building during the month, the labor expended thereon, and the cost thereof; whereupon after verification by the Owner's Representative it is

found to be acceptable, a certificate for the amount less five percent (5%) thereof will be issued by the Owner's Representative except that no certificate will be issued for defective work and materials until they have been removed, replaced and made good. The Owner will also pay the costs of material on hand under the following conditions: Written approval is given by the Owner's Representative prior to requesting payment. Approved items have been inventoried by the Owner's Representative and they are stored in a safe and weather protected manner and are major items that delay in receiving will adversely affect the construction time schedules. The Owner's Representative will issue a certificate for the certified invoice amount, less five percent (5%) thereof. The Contractor shall be paid monthly as the work progresses, the amount of each such certificate. Final payment shall be made in accordance with E. below.

- B. As a basis for determining the number of monthly payments, the Contractor shall, before commencing the work, submit to the Owner's Representative for approval a detailed statement of all materials and labor included in their original estimate. This statement shall be so arranged that the value of the work as it progresses may be readily determined. Payment for change order work will be made if the change order work is complete and is approved prior to the Owner's Representative issuing the monthly certification of payment. The regular initial schedule of values shall be prepared and submitted by Contractor twenty (20) calendar days in advance of the time the first request for payment is due, allowing sufficient time for review, approval and modifications as may be required prior to use for said first payment. The total sum of the schedule of values shall equal the Contract Price.
- C. Acceptance of any work and payments therefore shall be made upon written recommendation of the Owner's Representative and Architect.
- D. Payments to the Contractor will be made within 30 days of an approved pay estimate in accordance with Owner's regular approval and accounting procedures, based upon statements or certificates received as issued or approved by the Owner's Representative, including written certification that complete certified payroll records have been, or will be, submitted to the Labor Commissioner as required by the California Labor Code.
- E. Thirty-five (35) days after the acceptance of the work by the Owner's Representative and Architect (provided the project has been accepted by the Board of Supervisors), the Contractor shall be entitled to the balance due for the completion and acceptance of the work, provided that all claims for labor and materials have been paid, and that no claims shall have been filed with the County based upon acts or omissions of the Contractor and that no stop notices have been filed.

**GC 11. CONFLICTS OR ERRORS**

- A. During construction, if any conflicts are discovered in the plans or specifications, they shall be immediately submitted to the Owner's Representative who will render an interpretation on what was intended, and the Contractor agrees to furnish all things necessary by such interpretation to the satisfaction of the Owner's Representative without additional expense to the Owner.
- B. The Contractor shall not contend that any error, delay, or default in their work is due to omission or ambiguity in said plans or specifications.
- C. If errors are found in the Construction Documents that can not be termed conflicts (shown, sized or called out differently in different places) the Contractor shall immediately notify the Owner's Representative within 15 calendar days following the discovery of any error so that a change order can be prepared, and the item corrected prior to construction.
- D. Refer to G.C. 24, Unity of Documents.

**GC 12. CHANGES TO PLANS AND SPECIFICATIONS**

- A. No modification or deviation from plans and specifications will be permitted by the Contractor without prior written consent of Owner. However, within the limits allowed by law, the Contractor

agrees that Owner, without invalidating the Contract, may order extra work or make changes by altering, adding to, or deducting from the Work, the contract sum being adjusted accordingly, and that Contractor will enter a modification of the original contract to make such changes by means of a written Change Order.

- B. Change Orders shall be signed by the Contractor, Architect, and authorized representative of the Owner.
- C. All such work shall be executed under the conditions of the original contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change. Both parties agree that the credit to, or charge against the Owner shall be determined as follows:
  - 1. In the event that a modification results in a reduction of the amount of labor and material to be supplied by the Contractor, the Owner shall be given a credit equal to the actual value of such labor and materials plus a reasonable amount for the use of tools, materials and overhead and profit; or, in the event that a modification results in an increase in the amount of labor and materials to be supplied by the Contractor, the Owner shall pay the Contractor the actual value of such labor materials and equipment plus not more than 15% which shall cover the use of Contractor's overhead and profit. In no case shall the total of any subcontractor(s) together with the Contractor's overhead, profit, bonds, and insurance exceed 15%. All costs shall be included as a lump sum price on change orders.
  - 2. Cost Estimates for all changes shall be submitted by the Contractor to the Owner's Representative for checking by the Owner's Representative and Architect. The Contractor shall submit all Cost Estimates within 15 calendar days following the discovery of any potential change. The Owner's Representative shall render a written decision as to reasonable costs within 15 calendar days of receiving cost estimate unless more time is agreed to by both Contractor and Owner's Representative.
  - 3. Any increases in cost or extension of time shall be approved by the Owner's Representative, Architect and Owner, on a signed change order.
  - 4. If the Contractor, for whatever reason, does not accept the dollar amount of increase or decrease or extension of time to the contract amount in the decisions rendered by the Owner, Contractor shall, upon receiving written order from the Owner, proceed with the work called for in the Change Order on a force account basis. Any claim for dollar increases or extension of time shall be made in writing to the Owner's Representative in accordance with the provisions of GC 51, Claims Procedures.
- D. In response to a request for a proposed modification, Contractor shall promptly furnish within 15 calendar days, relevant cost breakdowns, time estimates and other information as may be required to the Owner's Representative.

**GC 13. GUARANTEE**

- A. The Contractor shall be held responsible to make-good any defects due to faulty, improper, or inferior workmanship or materials arising or discovered in any part of the Work within one (1) year after the completion and final acceptance of the same by the Owner's Representative, Architect and Owner unless a longer period is called for in the Technical Specification Sections.
- B. Acceptance of the Work by the Owner's Representative, Architect or Owner shall in no way absolve the Contractor from the responsibility of complying with the provisions of the plans and specifications and other contract documents, even though deviations may not be discovered within the one-year period.
- C. The bond for faithful performance furnished by the Contractor shall cover such defects and protect the Owner against them and remain in force during the one-year guarantee period.

**GC 14. INTERPRETATIONS**

- A. The Contractor shall comply with the obvious intent and meaning of the plans and specifications which shall be construed to include all material, measures and modes or work necessary to complete the work required in a workmanlike manner, in strict accordance with these plans and specifications, and to the satisfaction of the Owner.
- B. Should any question arise as to the intent and interpretation of the plans or specifications, the Contractor shall promptly, upon discovery thereof, refer the same in writing to the Owner's Representative, whose decision thereon shall be final.

**GC 15. DECISIONS BY ARCHITECT AND/OR OWNER'S REPRESENTATIVE**

- A. The Owner's Representative shall, in all cases, determine whether the amount and quality of the several kinds of work which are to be paid for under the Contract are in accordance with the plans and specifications.
- B. The Owner's Representative shall have power to cause all or any part of the work to be expedited with greater diligence when delayed or stopped.
- C. When requested by the Owner's Representative, the Architect's decisions in matters relating to artistic effect will be final if consistent with the intent of the Contract Documents.
- D. Where not involving a change in the agreed Contract Price or Completion Time, and not inconsistent with the intent of the Contract Documents, the Owner's Representative shall have authority to:
  - 1. Correct any errors or inconsistencies in and make any deletions from or additions to the drawings and specifications.
  - 2. Order minor changes or adjustments in the work, whether by field order, notations on Contractor's submittals, or other instructions.
  - 3. Order certain portions of the work delayed when particularly involved with or affected by any Change Order in process or being considered by Owner.
- E. The Owner's Representative will be the interpreter of the requirements of the Contract Documents and the judge of the performance thereunder by both the Owner and Contractor.
- F. The Architect through the Owner's Representative will render interpretations necessary for the proper execution or progress of the Work, with reasonable promptness and within fifteen calendar days.
- G. Claims, disputes, and other matters in question between the Contractor and the Owner relating to the execution or progress of the Work or the interpretation of the Contract Documents shall be referred to the Owner's Representative for decision which the Owner's Representative will render in writing with a reasonable promptness and within fifteen calendar days.

**GC 16. ADMINISTRATION OF THE CONTRACT**

- A. The Owner's Representative will provide administration of the Contract. Maintenance of the Project records for the contract shall be as prescribed by the Owner's Representative and as hereinafter described.
- B. The Owner's Representative will be the representative of the Owner during construction and until final payment is due. The Architect will advise and consult with the Owner's Representative and Owner. The Owner's instruction to the Contractor shall be forwarded through the Owner's Representative. The Owner's Representative will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument.

- C. The Owner's Representative or Architect will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work and will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Owner's Representative or Architect will not be responsible for or have control acts or omissions of the Contractor, Subcontractors, or any of their agents or employees, or any other persons performing any of the Work.
- D. The Owner's Representative and Architect shall always have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so the Owner's Representative and Architect may perform their functions under the Contract Documents.
- E. Based on the Owner's Representative and Architect's observations and an evaluation of the Contractor's Applications for Payment, the Owner's Representative will determine the amounts owing to the Contractor and will issue Certificates for Payment in such amounts as provided in GC Article 10.
- F. The Owner's Representative shall, upon receipt of a complete submittal from the Contractor, make the submission to the Architect. The Architect shall review and take appropriate action on shop drawings, product data, samples, and other submittals required by the Contract Documents. Such review shall be only for general conformance with the design concept and general compliance with the information given in the Contract Documents. It shall not include review of quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor. The Architect's review shall be conducted with reasonable promptness, and within 15 calendar days unless otherwise noted, consistent with sound professional practice. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Architect shall not be required to review and shall not be responsible for any deviations from the Contract Documents not clearly noted by the Contractor, nor shall the Architect be required to review partial submissions or those for which submissions for correlated items have not been received.
- G. The Owner's Representative will prepare Change Orders in accordance with GC Article 12.
- H. The Contractor shall provide sufficient, safe, and proper facilities always for the full inspection of the Work by the Architect or other representatives of the Owner, at the project site and at the various other locations where project is being performed.
- I. The Owner's Representative and Architect will have authority to reject Work which does not conform to the Contract Documents. Whenever, in their opinion, the Owner's Representative and Architect considers it necessary or advisable for the implementation of the intent of the Contract Documents, the Owner's Representative or Architect will have authority to require special inspection or testing of the Work in accordance with GC Article 31, whether such Work be then fabricated, installed, or completed. However, the Owner's Representative and Architect's authority to act under this Subparagraph and any decision made by them in good faith to exercise or not to exercise such authority, shall not give rise to any duty or responsibility of the Owner's Representative or Architect to the Contractor, and Subcontractor, any of their agents or employees, or any other person performing any the Work.
- J. The duties, responsibilities, and limitations of authority of the Owner's Representative as the representative of the Owner during construction as set forth in the Contract Documents will not be modified or extended without written consent of the Owner.

**GC 17. NON-CONFORMING WORK**

- A. The fact that the work and materials have been inspected from time to time and payments on account have been made, shall not relieve the Contractor from the responsibility of replacing and making good any defective work or materials that may be discovered within one year from the

date of completion of the Work by the Contractor and its approval by the Owner's Representative, Architect, and its acceptance by the Owner.

- B. Failure of Owner's Representative, Architect or Owner to object to any defects in work or material or variances from the plans and specifications during or after construction shall not be deemed a waiver by Owner, Owner's Representative or Architect of such defects or variances; nor by such failure shall Owner, Owner's Representative or Architect be deemed stopped from requiring Contractor to correct such defects or variances.
- C. At Owner's sole option, if Owner prefers to accept non-conforming work, Owner may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect an appropriate reduction in the Contract Sum, or if the amount is determined after final payment, it shall be paid by the Contractor.
- D. Uncovering of Work:
  - 1. If any portion of the Work should be covered contrary to the request of the Owner's Representative, Architect or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Owner's Representative, be uncovered for their observation and shall be replaced at the Contractor's expense.
  - 2. If any other portion of the Work has been covered which the Owner's Representative or Architect has not specifically requested to observe prior to being covered, the Owner's Representative or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work be found in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work be found not in accordance with the Contract Documents, the Contractor shall pay such costs unless it be found that this condition was caused by the Owner or a separate contractor as provided in GC 8 above, in which event the Owner shall be responsible for the payment of such costs.

**GC 18. OWNERSHIP OF DOCUMENTS**

- A. All plans and specifications shall remain the property of the Owner and shall be returned to the Owner's Representative or shall be accounted for by the Contractor before the final acceptance of building by the Owner.
- B. Documents for this project shall not be used on or for any other work or purposes without express written consent of Owner's Representative, Architect and Owner.

**GC 19. DOCUMENTS FURNISHED**

- A. The Contractor will be supplied ten (10) sets of Contract Documents for use in the Work.
- B. Additional sets of Contract Documents may be obtained from Architect, at cost, at Contractor's expense.

**GC 20. DRAWING DIMENSIONS**

- A. The general dimensions are shown in figures on the drawings furnished to the Contractor. These figured dimensions shall invariably have preference to scaled measurements; but the Contractor shall exercise proper caution and care to verify the figures before laying out the Work and shall be held responsible for any omissions or errors therein that might have been avoided.

**GC 21. DETAILED DRAWINGS**

- A. Drawings and details may be furnished to the Contractor as work progresses, showing in more elaboration the work intended to be done and the Contractor shall conform to them as being a part of the Contract.
- B. No work shall be performed in advance of the receipt by the Contractor of such detailed drawings, except such work as the Owner's Representative shall order in writing to be done without details. Any complaint as to the character and extent of the details shall be made to the Owner's Representative within ten days after the Contractor has received the same. The Contractor shall notify the Owner's Representative in ample time as to when the Contractor will require these drawings so they may be prepared without causing any delay to the Work.

**GC 22. SUBMITTALS**

- A. Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.
- B. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.
- C. Samples are physical examples which illustrate materials equipment or workmanship and establish standards by which the Work will be judged.
- D. The Contractor shall review, approve, and submit, with such promptness as to cause no delay in their own work or in that of any other contractor, copies of all Shop Drawings or Setting Drawings, Schedules for the Work of the various trades and samples of materials and finishes required for the Work, together with information or supporting data as may be required or called for. The Owner's Representative will pass upon them with reasonable promptness in accordance with GC Article 16. The Contractor shall make any corrections required by the Owner's Representative or Architect and resubmit corrected copies.
- E. Samples required or called for shall be exactly as specified for and intended to be used in the work; and Shop Drawings shall accurately portray the Work required. Materials, finishes and workmanship shall be equal in every respect to that of the reviewed submittals.
- F. Submittals shall be delivered as directed by the Owner's Representative, postage, or delivery charges prepaid by the Contractor in all cases. Samples returned upon request from the Contractor shall be returned by collect mail, parcel post or any carrier named by Contractor.
- G. The furnishing by the Contractor or the review by the Architect of drawings, samples, schedules, or other data shall not relieve the Contractor from responsibility for deviations from drawings or specifications, nor shall it relieve them of responsibility for errors of any sort in shop drawings, schedules, or other submittals.
- H. By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that they have determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that they have checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- I. Each Submittal shall be properly identified as required by the Owner's Representative.

- J. Deviations from requirements of Contract Documents, errors, inconsistencies with submittals previously made to or reviewed by Architect, and corrections to dimensions or supporting data shall be clearly identified by the Contractor by notations on the submittals or attached explanations.
- K. No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been reviewed by the Architect as provided in Subparagraph of GC Article 16. All such portions of the Work shall be in accordance with reviewed submittals.

**GC 23. SURVEY AND LAYOUT**

- A. All work pertaining to this Contract shall be laid out on the premises by the Contractor who shall be held responsible for its correctness.
- B. The Contractor shall retain and pay for the services of a registered Engineer or licensed surveyor, when applicable, who shall lay out the main lines of the building and other improvements at the site and provide other primary lines, pile locations and levels as may be required.
- C. All stakes, benchmarks, survey marks, monuments and other line or level points which have been or may be established in the building or on or about the premises shall be carefully preserved and respected by the Contractor.
- D. On-site work shall be laid out to properly meet existing off-site work not required to be removed or replaced, or to lines and levels established by civil authorities having jurisdiction, as applicable to conditions at the place of the Work.

**GC 24. UNITY OF DOCUMENTS**

- A. The Plans and Specifications are one document and any work shown, required, or called for in the one and not in the other, or vice versa, shall be furnished or performed as though it were shown, required, or called for in both.
- B. The Contractor admits and agrees that the Contract Documents exhibit the intent and purpose of the Owner regarding the Work, and that they are not complete in every detail and are to be considered as showing the purpose and intent only; and Contractor further agrees to furnish all labor or material for any detail that is necessary to carry out said intent and purpose without extra charge to the Owner.
- C. The misplacement, addition or omission of any word, letter or punctuation mark shall in no way change the intent, purpose of meaning or the Plans and Specifications.
- D. Any part of the Work or any article or detail pertaining thereto which is not specifically set forth in the Specifications or shown on the Drawings, but which is necessary for the proper completion of the Work, shall be furnished and installed at the Contractor's expense the same as if it had been partly or fully shown or specified. The Contractor shall do and furnish all things necessary to make a complete and workmanlike job in accordance with the intent and purpose of the Contract Documents.

**GC 25. INSPECTION BY CONTRACTOR**

- A. The Contractor shall inspect, review, compare and familiarize himself with the Contract Documents and the premises of the Work, and shall at once report to the Architect, in writing if requested, any error, omission or inconsistency within the documents or between information given and conditions observed or found at the premises.
- B. The Contractor shall make a close inspection of all materials as delivered and shall promptly return all damaged or defective materials without waiting for their rejection by the Owner's Representative, Project Inspector, or Architect.



- C. Before beginning any of the work, the Contractor shall examine all construction and work of other contractors or trades that may affect this work, and to satisfy that everything is in proper condition to receive this work; and shall at once notify the Owner's Representative, in writing if requested, of any exception taken to any construction or condition so affecting this work, whether placed under this Contract or other contracts.
- D. Failure to file with the Owner's Representative any notice to the contrary shall constitute acceptance by the Contractor of the construction of other contractors or trades as being suitable in all ways to receive their work, except as to defects which later develop in the work of other contractors after the execution of their own work.
- E. Contractor's inspection of documents and premises shall include making known to himself the general and location, nature and character of the project work, the physical and contractual conditions, provisions and requirements, the nature and extent of work and equipment to be furnished by Owner, and the limitations and various other aspects relative to this project, including all coordination necessary for proper and timely execution of the Work.
- F. Owner will not consider any claims whatsoever on account of Contractor's failure to fully investigate or determine their requirements in advance of commencing the work or the conditions of the work throughout its progress.

**GC 26. DEVIATION FROM PLANS OR SPECIFICATIONS**

- A. No deviations shall be made from the plans or the specifications. If the Contractor shall vary from the plans the amount or value of the materials herein provided for, the Owner shall have the right to order such improper work or materials removed or replaced; any other work disturbed or damaged by such alteration shall be made good at the Contractor's expense.

**GC 27. STANDARDS OF MATERIALS**

- A. Wherever the name or brand of a manufacturer's article is specified herein, it is used as a measure of quality and utility, a standard.
- B. If the Contractor desires to use any other brand or manufacturer of equal quality and utility to that specified, Contractor shall make application to the Owner's Representative in writing and submit samples if requested. The Architect will then determine whether the named brand or article is equal in quality and utility to that specified and Architect's decision shall be final. Submit at least 14 days prior to bid date. Refer to sections of Technical Specifications for these items.

**GC 28. QUALITY OF MATERIALS AND LABOR**

- A. All materials used on this Contract shall be new and the best market quality unless specified or shown otherwise. All labor used on this Contract shall be competent and skilled for the Work. All Work executed under this Contract shall be done in the best, most thorough, substantial, and workmanlike manner. All material and labor shall be subject to the approval of the Architect as to its quality and fitness and shall be immediately removed if it does not meet with approval. The Owner's Representative may refuse to issue a Certificate of Payment for unapproved work until all defective materials or work have been removed and other material of proper quality substituted, therefore.

**GC 29. SUFFICIENT LABOR OR MATERIALS**

- A. Should the Contractor abandon the Work called for under these specifications, or seek to assign this Contract, or if at any time the Owner's Representative shall be of the opinion and so certify in writing to the Owner that the Contractor is unnecessarily and unreasonably delaying the work, or that the Contractor is willfully violating any of the conditions or provisions of the plans and specifications, or is performing their work in bad faith, the Owner shall, in addition to all other

remedies provided by Contract or by law, after seven (7) days written notice to the Contractor, have the power to notify the Contractor to discontinue all work or any part thereof under this Contract; and thereupon, the Contractor shall cease to continue said Work or such part thereof as the Owner may designate, and the Owner shall thereupon have the power to obtain by contract, purchase or hire, such implements, tools, labor or materials by contract or otherwise, as Owner may deem advisable, to work at and be used to complete the Work herein described, or such part thereof as the Owner's Representative shall certify has not been completed, and to use such material as it may find at the building site. The expenses so incurred in the process shall be deducted by the Owner out of such monies as may either be due or may at any time thereafter become due to the Contractor under and by virtue of these plans and specifications, or any part thereof.

- B. If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work, including compensation for the Owner's Representative or Architect's additional services made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor or their bondsmen shall pay the difference to the Owner on notice to from Owner. The amount to be paid to the Contractor or to the Owner shall be certified by the Owner's Representative, upon application, in the manner provided in GC Article 10, and this obligation for payment shall survive the termination of the Contract.

**GC 30. OLD MATERIAL**

- A. Old material shall not be used.
- B. Construction materials or other items used or placed in the work later shall be considered old materials and not reused.

**GC 31. TESTS**

- A. Contractor shall comply with the requirements set forth in Division 1, General Requirements Sections.

**GC 32. PATENT RIGHTS, COPYRIGHTS, TRADE NAMES AND ROYALTIES**

- A. The Contractor shall indemnify and save harmless the Owner and authorized persons acting for the Owner against all liability on account of any patent rights, copyrights or trade names which may affect the articles or materials or their application under the Contract.
- B. The Contractor shall pay all royalties or other charges that may arise due to methods, types of construction, processes, materials, or use of equipment and shall hold the Owner harmless from any claims or charges whatsoever which may arise; and shall furnish written assurance satisfactory to the Owner that such charges have been paid.

**GC 33. COMPLIANCE WITH BUILDING LAWS**

- A. The Contractor shall conform to and abide by all applicable city, county, regional, state and federal building, labor, sanitary, health and safety laws, ordinances, rules and regulations as currently adopted or enforced, including Part 1 & 2 of Title 24, Calif. Code of Regulation and the International Building Code; a copy of Title 24, CCR and the current California Building Code shall be kept at the job site at all times by the Contractor. Such laws and regulations shall be considered a part of these specifications the same as if set forth herein full, and all work hereunder shall be executed in accordance therewith.
- B. All work and materials shall be in full accordance with the latest rules and regulations of the State Fire Marshal, the Safety Orders of the Division of Industrial Safety, the National Electric Code, the Uniform Plumbing & Mechanical Codes published by the International Association of Plumbing and Mechanical Officials, and other applicable state laws or regulation including all of Title 24,

Calif. Code of Regulation. Nothing in these plans or specifications is to be construed to permit work not conforming to these codes.

**GC 34. PERMITS AND LICENSES**

- A. Unless otherwise provided in the Contract Documents, the Owner shall give all notices and procure and pay for permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the Contract and not excluded in Paragraph D below.
- B. LICENSES: Professional, trade, business and other licenses required by state statute or local government are entirely the responsibility of the Contractor and Subcontractors and shall be prerequisite to submitting a bid proposal or performing work on the Project.
- C. PERMITS:
  - 1. Permits shall also include any cash deposits, returnable or otherwise, required by authorities having legal jurisdiction to make such demands.
  - 2. Owner reserves the right to cancel and declare null and void the Contract should any legal permit be refused or not issued for any reason.
  - 3. Due to cancellation for said reasons, Owner will not consider any claims by Contractor for loss of anticipated profits; or for work performed or materials procured prior to obtaining all permits required herein.
  - 4. The Contractor shall obtain Encroachment Permits from the City of Eureka, County of Humboldt, and Caltrans as needed.
- D. Contractor shall procure and deliver to the Owner's Representative, in forms prescribed and complete with dates and authorized signatures, all certificates of inspection, testing or approvals required of or by State or Civil authorities having legal jurisdiction or any public authority bearing on the performance of the Work.
- E. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the performance of the Work.

**GC 35. TEMPORARY FACILITIES**

- A. The Contractor shall provide and maintain a temporary field base of operation on the sites. Said base of operation shall be for the exclusive use of the Contractor; and shall be wind and weatherproof, furnished with sufficient lighting to permit reading of blueprints. A complete set of plans and specifications shall be kept continuously at each site. When vacated, said structure shall be removed and the work in that area completed in accordance with the Contract requirements. Based on need, Contractor shall maintain and pay for all utilities and fuels; shall provide maintenance and other services necessary for proper use and operation; and comply with related provisions as specified.
- B. The Contractor shall maintain a viable communications system at each site acceptable to the Owner's Representative and shall maintain the same until the final completion of the Contract and the acceptance of the Work. The Owner's Representative, Architect and Inspector shall have free and unrestricted use of this communications system for all purposes in conjunction with the Work.
- C. The Contractor shall provide water closets and urinals for use by their employees and subcontractors and their employees, and in no case shall the permanent plumbing fixtures of buildings on the site be used for this purpose without the written consent of the Owner's Representative.
- D. The Contractor and each subcontractor shall furnish, at their own expense, all tools, equipment, appliances, materials, scaffolding, or other means necessary for the entire completion of the Work; and shall be responsible for the care and guarding of same.

- E. The Contractor and each subcontractor shall erect and maintain where necessary to the progress and completion of the Work, all exterior and interior scaffolding which shall be erected in accordance with the safety rules of the State of California; and use of which shall be unrestricted for all persons performing work on the Project.
- F. The Contractor shall pay the cost of all water, gas and electricity used by their employees or subcontractors during the process of the Work, or as required for temporary services or tests and inspections.
- G. Also refer to Division 1, General Requirements Sections.

**GC 36. LIABILITY FOR ACCIDENTS**

- A. The Contractor shall be liable for any and all loss, accident, neglect, injury, or damage to person, life or property which may be the result of or may be caused by their building operations or their execution of this Contract, and for which the Owner might be held liable; and shall protect and indemnify the Owner, the Owner's Representative, the Project Inspector, the Architect, and/or any officer, agent or employee of the Owner and hold them harmless in every way from all claims and from all suits or actions at law for damage or injury to persons, life or property that may arise or be occasioned in any way because of their building operations or their execution of this Contract.
- B. Safety Precautions and Programs:
  - 1. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.
- C. The Contractor shall assume the full responsibility for personnel safety on the project and the means and methods of construction that pertain to personnel safety. Contractor is responsible that such means and methods of construction are adequate to provide safety to all personnel while accomplishing all requirements and standards of the Contract Documents. The Owner, Architect, Inspector and/or their representatives have no obligation, responsibility, or jurisdiction over safety or means and methods of construction that pertain to personnel safety on the project.

**GC 37. ACCIDENT PREVENTION**

- A. The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, and any other necessary construction required to secure safety of life or property; and shall maintain during all night hours sufficient lights to prevent accidents or damage to life or property.
- B. No earth, building, temporary or other structure shall be loaded, used, or stressed to endanger its safety.
- B. In the event of an emergency affecting the safety of persons or property, the Contractor shall act, at their discretion, to prevent threatened damage, injury, or loss. Claims by Contractor on account of alleged emergency actions shall be filed in writing with the Owner's Representative.

**GC 38. EXISTING PREMISES AND IMPROVEMENTS**

- A. The Contractor shall care for, preserve, and protect existing structures, utilities and other features, fixtures, or improvements at the premises, including adjacent or co-terminus properties which are not required to be removed or altered by reason of work under this Contract; and shall, likewise, care for and protect work or improvements newly placed or recently installed at the premises. Any part or portion of said existing or newly placed improvements which are removed, damaged, or

disturbed because of this work, shall be replaced, cleaned, or otherwise returned to the original condition entirely at the expense of the Contractor.

- B. The removal and/or replacing of any existing structure, pipe, conduit, pavement, or other existing improvement necessary for the proper completion of any work under the Contract shall be performed by the Contractor, and no claim for extra work shall be made on account of such removal and replacement.
- C. In case it shall be necessary to remove any telephone, telegraph or electrical power transmission poles, water pipes, electrical conduits, or underground structures of any character, or any portion thereof, the Owner or their agents shall be notified by the Contractor and the Contractor shall make the necessary arrangements for such removal. The right is reserved to the Owner and to gas, water, telephone, telegraph, and electrical power transmission companies to enter upon the Work for purpose of making repairs and changes that have become necessary by reason of work related to the Project.
- D. The Contractor shall thoroughly investigate all existing poles, wires, pipes, and conduits above and below ground and shall provide for the maintenance or replacing of same, in good condition and at no expense to the Owner. Any necessary new or additional pipe or materials shall be furnished by the Contractor at their expense.
- E. At the completion of the Work, the Contractor shall furnish the Owner's Representative with a written certificate from the owner of each and all conduits, pipes, or structures to the effect that such replacements and maintenance have been satisfactorily performed.
- F. The Contractor shall amply protect all work or improvements, set in the building or at the premises, against any possible damage; and shall furnish all necessary building paper, rough boarding or other means or materials necessary.
- G. Also refer to Division 1, General Requirements Sections.

**GC 39. USE OF PREMISES AND CLEAN-UP**

- A. During the progress of the Work, materials shall be neatly stacked at such points so as not to interfere with site access and shall be properly cared for and protected against damage by weather or other causes. Project staging and parking area are defined in the plans.
- B. In the case where there are several contractors operating at one time, arrangements must be made to allow the joint use of storage space to prevent delays in the work and unnecessary inconveniences.
- C. At the end of each working day, or as directed by the Owner's Representative, Project Inspector or Architect, the Contractor shall clean the building, premises, streets and adjacent properties of accumulated rubbish, debris, unnecessary appliances, or any unused material which may constitute an obstruction to the progress or completion of the Work, whether the same was caused by their work or by the work of other crafts. Failure by the Contractor to maintain the site and building premises in a safe and clean condition will be considered a breach of contract and Contractor agrees to pay Owner for costs to have site cleaned or deduct said costs from any money due the Contractor under the contract.
- D. At the completion of the Work, and as one of the requisites thereof, the Contractor shall remove any and all tools, construction equipment, machinery, surplus materials, appliances, rubbish, packing, debris or other extraneous matter of any kind from the building, premises, sidewalks, streets or adjacent premises; Contractor shall go over all of their work and put the same in perfect order and condition and in strict accordance with the terms of the Contract; and shall repair or replace all damaged, broken or stained parts of their work, whether so injured by their workmen or others.

- E. No advertising signs of any kind shall be displayed on the building, premises, fences, offices or elsewhere upon the job, except the Project sign as called for in the specifications.
- F. At the completion of each phase of work of each kind of work or activity, the areas so used or involved shall be left in a "broom clean" condition daily unless otherwise more particularly required.

**GC 40. DIRECTION OF THE WORK**

- A. The Contractor shall have control or charge over their Subcontractors; shall be responsible to the Owner for the acts and omissions of their employees, subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the Contractor, and for all orders or instructions from the Owner, Owner's Representative, or the Architect.
- B. It shall be the Contractor's duty to see that all the subcontractors commence their work properly at the proper time and carry it on with due diligence as not to cause delay or injury either to work or materials; and that all damage caused by them, or their workmen be properly made good by them or by himself at no cost to the Owner.
- C. The Contractor shall always keep on the Work Site and until the acceptance certificate is issued, a competent Project Manager and Project Superintendent for the purpose of receiving and executing without delay any orders in keeping with the terms of the Contract issued by the Owner, Owner's Representative or Architect. This Superintendent shall have charge of Plans and Specifications kept on the job; shall be instructed to be familiarized closely with all the provisions of the plans and specifications and to follow them in a precise manner.
- D. If at any time the Superintendent or workman who shall be employed by the Contractor or any of their Subcontractors shall be declared by the Owner's Representative to be incompetent or unfaithful in executing the work, then the Contractor upon receiving written notice shall, forthwith, dismiss such person and shall not again employ him on any part of the Work.
- E. Contractor shall supervise and direct the Work using their best skill and attention, and shall be solely responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the work under the Contract; except that said responsibilities shall not be construed to permit use of any material, process, method or means if they are deemed unsuitable by Owner's Representative.
- F. Processing of Change Orders, Cost Estimates and like administrative matters, shall follow the procedures established and approved by the Owner at commencement of Work under the Contract. Change orders and other forms shall be as approved by the Owner's Representative or otherwise required or directed by Owner. Refer to GC 12.
- G. Review of Contract Documents: The Contractor shall carefully study and compare the Contract Documents and shall at once report to the Architect through the Owner's Representative any conflict, error, inconsistency, or omission Contractor may discover. Refer to GC 11 A.
- H. The Contractor shall not be relieved from their obligations to perform the Work in accordance with the Contract Documents by the activities or duties of the Owner's Representative in their administration of the Contract, or by inspections, tests or approvals required or performed under GC 31, by person other than the Contractor.
- I. Progress Schedule:
  - 1. The Contractor shall prepare and submit to the Owner's Representative with copy to the Architect and the Construction Inspector the Contractor's Initial Construction Schedule within ten (10) calendar days after date on the Notice to Proceed. The Contractor's Initial Construction Schedule shall be comprised of either a Detailed Bar Chart, if the contract value is less than one million dollars (\$1,000,000), or a Critical Path Method network, if the contract value is one million dollars (\$1,000,000) or more. The Contractor's Initial

Construction Schedule shall show the dates on which each part or division of the work is expected to be started and completed and shall show all submittals associated with each work activity, allowing a minimum of fifteen (15) calendar days (per GC 16 F) for the Architect's review of each submittal unless a longer period of time is specified elsewhere in these Contract Documents. The work activities making up the schedule shall be of sufficient detail to assure that adequate planning has been done for proper execution of the work and such that, in the sole judgment of the Owner, it provides an appropriate basis for monitoring and evaluating the progress of the work. The schedule shall show the interdependence of each activity and a single critical path. The Contractor shall also submit a separate progress schedule listing all submittals required under the contract and when it is anticipated that each submittal will be submitted.

2. The Contractor's Initial Construction Schedule shall show the sequence, duration in calendar days, and interdependence of activities required for the complete performance of all work. The Contractor's Initial Construction Schedule shall begin with the date of issuance of the Notice to Proceed and conclude with the date of final completion.
3. Float, slack time, or contingency within the schedule (i.e., the difference in time between the project's early completion date and the required contract completion date), and total float within the overall schedule, is not for the exclusive use of either the Owner or the Contractor but is jointly owned by both and is a resource available to and shared by both parties as needed to meet contract milestones and the contract completion date.
4. The Contractor shall not sequester shared float through such strategies as extending activity duration estimates to consume available float, using preferential logic, or using extensive crew/resource sequencing, etc. Since float time within the schedule is jointly owned, no time extensions will be granted nor delay damages paid until a delay occurs which extends the work beyond the Contract completion date. Since float time within the construction schedule is jointly owned, it is acknowledged that Owner caused delays on the project may be offset by Owner caused time savings (i.e., critical path submittals returned in less time than allowed by the contract, approval of substitution requests which result in a savings of time to the Contractor, etc.) In such an event, the Contractor shall not be entitled to receive a time extension or delay damages until all Owner caused time savings are exceeded and the contract completion date is also exceeded.
5. Comments made by the Owner on the Contractor's Initial Construction Schedule during review will not relieve the Contractor from compliance with the requirements of the contract documents. The review is only for general conformance with the scheduling requirements of the contract documents. Upon the Owner's request, the Contractor shall participate in the review of the Contractor's Initial Construction Schedule submissions (including the original submittal, all update submittals, and any re-submittals). The Owner may request the participation of subcontractor in these reviews, as determined necessary by the Owner. All revisions shall be resubmitted within fifteen (15) calendar days after the Owner's review.
6. The submittal of a fully revised and acceptable Contractor's Initial Construction Schedule shall be a condition precedent to the processing of the first monthly payment application.
7. On any project with a construction value equal to or greater than one million dollars (\$1,000,000), the Contractor must submit a Critical Path Method (CPM) network. The network shall provide a workable plan for monitoring the progress of all the elements of the work, establish and clearly display the critical elements of the work, forecast completion of the construction, and match the contract duration in time. Exclusive of those activities for submittal review and material fabrication and delivery, activity duration shall not be less than one (1) or more than thirty (30) calendar days, unless otherwise approved by the Owner. In addition to the detailed network diagram, the Contractor shall submit the following reports with the original submittal and all updates and revisions:
  - a. Predecessor/Successor Report or a list showing the predecessor activities and successor activities for each activity in the schedule.
  - b. Activity Report sorted by early start or a list showing each activity in the schedule, arranged by early start dates.
8. Regardless of which schedule method the Contractor elects to use in formulating the Contractor's construction schedule, and unless the Owner's Representative in writing

each month, specifically waives this requirement, an updated construction schedule shall be submitted to the Owner's Representative five (5) days prior to the submittal of the Contractor's monthly payment request. The submittal of the updated construction schedule which satisfies the requirements of the Contract Documents accurately reflects the status of the work, and incorporates all changes into the schedule, shall be a condition precedent to the processing of the monthly payment application. Updated schedules shall also be submitted at such other times as the Owner may direct. Upon approval of a change order or issuance of a direction to proceed with a change, the approved change shall be reflected in the next schedule update submittal by the Contractor, or other update submittal approved by the Owner.

9. If completion of any part of the work, the delivery of equipment or materials, or submittal of the Contractor submittals is behind the updated construction schedule and will impact the end date of the work past the contract completion date, the Contractor shall submit in writing, a plan acceptable to the Owner for completing the work on or before the current contract completion date.
  10. No time extensions shall be granted nor delay damages paid unless the delay can be clearly demonstrated by the Contractor based on the updated construction schedule current as of the month the change is issued or the delay occurred and which delay cannot be mitigated, offset, or eliminated through such actions as revising the intended sequence of work or other means. Contractor shall submit all disputes or claims under the provisions of GC 51, Claims Procedure, otherwise it shall be waived.
  11. As a condition precedent to the release of retained funds, the Contractor shall, after completion of the work has been achieved, submit a final Contractor's construction schedule which accurately reflects the way the project was constructed and includes actual start and completion dates for all work activities on the construction schedule.
- J. The Contractor shall forward all communications to the Owner and Architect through the Owner's Representative.

**GC 41. CUTTING, FITTING AND PATCHING**

- A. The Contractor shall do all cutting, fitting and patching of Work that may be required to make its several parts come together properly and prepare it to join or be joined by the work of other contractors; and Contractor shall make good after them.
- B. The Contractor shall not endanger any work by cutting, digging or otherwise; and shall not cut or alter the work of any other contractor without the written consent of the Architect; and shall not cut a beam, timber or support of any kind without the consent of the Architect. Under no circumstances shall any principal brace, timber, truss, support or other structural member be cut or structurally weakened in any way.
- C. Where the construction is required to join with or match existing work, it shall be finished exactly similar to that work so as to form complete, unified and finished work.
- D. Contractor shall be responsible for and particularly supervise each operation and all work which in any way may affect the structural integrity of the various works, including below, or, or above grade structures, and whether for temporary or permanent work.
- E. Any cost for repairs or restoration caused by cutting, digging or otherwise due to ill-timed or defective work shall be borne by the Contractor.
- F. Also refer to Division 1, General Requirements Sections.

**GC 42. RIGHT TO OCCUPY OR USE**

- A. The Owner reserves the right to occupy or use any part or parts, or the entirety of the building and/or grounds when the Owner deems the same may be safe for use or occupancy.



- B. The exercising of this right shall in no way constitute an acceptance of such parts, or any part of the work, nor shall it in any way affect the dates and times when payments shall become due from the Owner to the Contractor, nor shall it in any way prejudice the Owner's right under the Contract or any bonds guaranteeing the same. The Contract shall be deemed completed only when all the Work contracted for shall be duly and properly performed and accepted by the Board of Supervisors.
- C. When any part or portion of the Project is to be used or occupied by Owner in advance of final completion and acceptance, and when duly notified by Owner's Representative, the Contractor shall arrange for completion of said portions of the Work the same as required under the Documents for the whole Work, including cleaning and other readying by the date stipulated with such notice.
- D. Contractor shall not be held responsible for any damage to the occupied part of the Project resulting from Owner's occupancy.
- E. Occupancy by Owner shall not be deemed to constitute a waiver of existing claims on behalf of Owner or Contractor against each other.
- F. Use and occupancy by Owner prior to project acceptance shall not relieve Contractor's responsibility to maintain all insurance and bonds required of Contractor under the Contract until the entire Project is completed and accepted by Owner.
- G. If after written notification by the Owner of the intent to occupy, the Contractor feels that such occupancy will delay progress of the work or will cause additional expense to the Contractor, Contractor may file a request for an equitable adjustment in Contract Price or Time of Completion, or both, with the Owner's Representative. If the Owner's Representative agrees he will either prepare a written change order for the Owner to sign or advise the Owner to delay occupancy.

**GC 43. CHANGE OF CONTRACT TIME & LIQUIDATED DAMAGES**

- A. Change by Change Order. The contract time may only be changed by change order. A request for an extension or shortening of the contract time shall be based on written notice delivered by the party making the request to County promptly after the occurrence of the event giving rise to the request and stating the general nature of the request. Notice of the extent of the request with supporting data shall be delivered to County and shall be accompanied by the written statement that the adjustment requested is the entire adjustment to which the requesting party has reason to believe it is entitled because of the occurrence of said event. No request for an adjustment in the contract time will be valid if not submitted in accordance with the requirements of this paragraph.
- C. Contract time may be extended. The contract time will be extended in an amount equal to time lost due to delays beyond the control of Contractor if the request is made therefor as provided in this article. Such delays shall include, but not be limited to, acts of neglect by County or others performing additional work, or to fires, floods, labor disputes, epidemics, abnormal weather conditions or acts of God.
- D. Delay and price change. All time limits stated in the contract documents are of the essence. There shall be no adjustment of contract price due to delays for fires, floods, labor disputes, epidemics, abnormal weather conditions or acts of God. The provisions of this Provision shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court costs) for delay by either party.
- E. Delays in completion of work:
  - 1. Notice of delays. Whenever the Contractor foresees any delay in the prosecution of the work, and in any event immediately upon the occurrence of any delay which the Contractor regards as unavoidable, Contractor shall notify County in writing of the

probability of the occurrence of such delay and its cause in order that County may take immediate steps to prevent, if possible, the occurrence or continuance of the delay or, if this cannot be done, may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the work are to be delayed thereby. It will be assumed that all delays which have occurred in the prosecution and completion of the work have been avoidable delays, except such delays as shall have been called to the attention of County at the time of their occurrence and found by County to have been unavoidable. The Contractor shall make no requests for extensions of time as to delay not called to the attention of County at the time of its occurrence.

2. Avoidable delays. Avoidable delays in the prosecution or completion of the work shall include all delays which in the opinion of County would have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or Contractor's subcontractors.
3. Unavoidable delays. Unavoidable delays in the prosecution or completion of the work shall include all delays which, in the opinion of County, result from causes beyond the control of the Contractor and which could not have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor or the subcontractors and/or any suppliers. Delay in completion due to contract modifications ordered by County and unforeseeable delays in the completion of work or interference by other contractors employed by County will be considered unavoidable delays insofar as they interfere with the Contractor's completion of the work.

F. Extension of time:

1. Avoidable delays. In case the work is not completed in the time specified, including such extensions of time as may have been granted for unavoidable delays, the Contractor will be assessed damages for delay in accordance with liquidated damages provision. The County, however, shall have the right to grant an extension of time for avoidable delay if it is deemed in County's best interest to do so. During such extension of time, the Contractor will be charged for engineering and inspection services and other costs but will not be assessed damages for the delay.
2. Unavoidable delays. For delays which County considers to be unavoidable, the Contractor shall, pursuant to Contractor's application, be allowed an extension of time beyond the time herein set forth, proportional to such delay or delays, in which to complete the contract. During such extension of time, neither extra compensation for engineering and inspection provided nor damages for delay will be charged to the Contractor.
3. Liquidated damages. County and Contractor recognize that time is of the essence and that County will suffer financial loss if the work is not completed within the time specified above, plus any extensions thereof allowed in accordance with this contract. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by County if the work is not completed on time. Accordingly, instead of requiring any such proof, and due to impracticality and difficulty of ascertaining exact damages caused by delay, County and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay County that amount set forth in the Contract, or if no such amount is specified, then one-half of one percent of the total contract price for each day that expires after the time specified above for completion. In case of joint responsibility for delay in the final completion of the work, where two or more separate contracts are in force at the same time and cover work at the same site, liquidated damages assessed against any one Contractor will be based upon the individual responsibility of that Contractor for the delay as determined by, and in the judgment of, County.

County shall have the right to deduct the liquidated damages from any money in its hands, otherwise due, or to become due, to Contractor, or to sue for and recover compensation for damages for nonperformance of this contract within the time stipulated. County has determined and the Contractor acknowledges that the liquidated damages as established herein are governed by the provisions of Government Code § 53069.85 and

are predicated upon the reasonable damages accruing to County stemming from any delay in the completion of this project.

**GC 44. HOURS OF WORK**

- A. The time of service of any labor, workman or mechanic employed upon any of the Work herein specified, shall be limited, and restricted to that allowed by law, and no laborer, workman or mechanic employed upon said Work herein specified shall be required or permitted to labor more than that allowed by law, except in cases of extraordinary emergency caused by fire, military or naval defenses or works in time of war.
- B. Within thirty (30) days after any workman is permitted to work over that allowed by law in any one calendar day due to such an extraordinary emergency, the Contractor shall file with the Owner a verified report setting forth the nature of the said emergency, which shall contain the name of said workman and the hours worked by them on said particular day; and failure to file said report within the said thirty day period shall be prima facie evidence that no extraordinary emergency existed.
- C. The Contractor and each subcontractor shall keep an accurate record showing the name of and actual hours worked by each worker employed by said Contractor and subcontractor in connection with the work contemplated by this agreement. The record shall be kept open at all reasonable hours to inspection by the Owner or its officers or agents and by the Division of Labor Law Enforcement of the Department of Industrial Relations.
- D. The Contractor shall forfeit as a penalty to the Owner twenty-five dollars (\$25) for each laborer, workman or mechanic employed in the execution of this Contract by them or by any subcontractor under him, upon any public work herein specified for (a.) each calendar day during which any laborer, workman or mechanic is required or permitted to labor more than that allowed by law; or (b.) each calendar week during which any laborer, workman or mechanic is required or permitted to labor more than that allowed by law of the Labor Code of the State of California. Said sums and amounts which shall have been so forfeited pursuant to the herein paragraph and said provisions of said Labor Code shall be withheld and retained from payments due to the Contractor under this Contract, pursuant to this Contract, and the terms of said Code; but no sum shall be so withheld, retained or forfeited except from the final payment without a full investigation by either the Division of Labor Law Enforcement of the State Department of Industrial Relations or by the Owner.

**GC 45. PREVAILING WAGE RATES & PAYROLL RECORDS**

- A. Prevailing Wage Rates
  - 1. Pursuant to section 1770 and following of the Labor Code of the State of California, the Director of Industrial Relations has ascertained the general prevailing rate of per diem wages and the rates for overtime and holiday work in the locality in which the work is to be performed for each craft, classification or type of worker needed to execute the Contract which will be awarded to the successful bidder, copies of which are on file at Humboldt County Public Works, 1106 Second Street, Eureka, CA 95501, Phone (707) 445-7493 and are available to interested parties on request and by reference are incorporated herein and made a part hereof. Contractor will maintain a copy of prevailing rates and wages on the job site during the contract period.
  - 2. It shall be mandatory upon the Contractor and upon any subcontractor under it, to pay not less than the specified rates to all laborers, workers, and mechanics employed in the execution of the Contract. It is further expressly stipulated that the Contractor shall, as a penalty to the Owner, forfeit not more than \$200 for each calendar day, or portion thereof, for paying less than the stipulated prevailing rates for any work done under this contract by Contractor or by any subcontractor under it; and Contractor agrees to comply with all provisions of Section 1775 of the Labor Code.

3. In case it becomes necessary for the Contractor or any subcontractor to employ on the project under this Contract any person in a trade or occupation (except executives, supervisory, administrative, clerical, or other non-manual workers as such) for which no minimum wage rate is herein specified, the Contractor shall immediately notify the Owner, who will promptly thereafter determine the prevailing rate for such additional trade or occupation and shall furnish the Contractor with the minimum rate based thereon. The minimum rate thus furnished shall be applicable as a minimum for such trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment. Each contractor shall file a certified copy of the payroll records with the entity that requested the records within ten (10) days after receipt of a written request.
  4. Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the Owner, shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of the contractor awarded the contract for performing the contract shall not be marked or obliterated.
  5. The Contractor shall inform the Owner of the location of the payroll records, including the street address, city and county, and shall, within five working days, provide a notice of any change of location and address.
  6. The Prime Contractor shall be responsible for compliance with this section.
- B. Payroll Records. The Contractor agrees to comply with all requirements of Section 1776 of the Labor Code, including, without limitation, the following:
1. The Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by it in connection with the public work. Each payroll record shall be verified by written declaration, under penalty of perjury, stating both the following:
    - a. The information contained in the payroll record is true and correct.
    - b. The employer has complied with the requirements of sections 1771, 1811 and 1815 of Labor Code for any work performed by his employees on the project.
  2. The above-referenced payroll records shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:
    - a. A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or their authorized representative on request.
    - b. A certified copy of all payroll records shall be made available for inspection or furnished upon request to the Owner, the Division of Labor Standards Enforcement, or the Division of Apprenticeship Standards of the Department of Industrial Relations.
    - c. A certified copy of all payroll records shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the Owner, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided, pursuant to paragraph b. above, the requesting party shall, prior to being provided the records, reimburse the cost of the Contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the Contractor.
- C. Pursuant to Section 1771.1(a) of the California Labor Code, a contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code or engage in the performance of any contract for public work, as defined in Sections 1770 et seq. of the Labor Code, unless currently registered and qualified to perform public work pursuant to Section 1725.5 of the Labor Code. It is not a violation of Section 1771.1(a) for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the

Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.

**GC 46. TAXES**

- A. Any federal, state or city tax, including sales, excise, use and other taxes payable on articles furnished by the Contractor under the Contract shall be included in the Contract Price and paid for by the Contractor.

**GC 47. SUBCONTRACTORS**

- A. In accordance with the provisions of Section 4100 et seq, of the Public Contract Code of the State of California, each bidder for the work herein specified shall set forth in their Bid Proposal the name and location of the place of business of each subcontractor who will perform work or labor or render service to the General Contractor in or about the construction of the Work or improvements an the amount in excess of one-half (1/2) of one percent (1%) of the General Contractor's total Base Bid; and the portion of the Work which will be done by each subcontractor if the Contract or said Work is awarded to said Bidder.
- B. If any General Contractor fails to specify a subcontractor or specifies more than one subcontractor for the same portion of the Work to be performed on the Contract more than one-half of one percent of the General Contractor's total Bid, Contractor agrees to perform such portion himself and, if Contractor's Bid is accepted, Contractor shall not be permitted to subcontract that portion of the Work.
- C. Should the General Contractor violate any provision of the subletting and subcontracting Fair Practices Act, the Contractor will be deemed in violation of the contract and the Owner may at its option, (1) cancel the Contract. (2) assess upon the Contractor a penalty in an amount of not more than ten percent (10%) of the amount of the subcontract involved.
- D. Prior to the award of the Contract, the Owner's Representative shall notify the successful bidder in writing if the Owner, after due investigation, has reasonable objection to any person or organization on the required list of subcontractors. Failure of the Owner to make an objection to any person or organization on the list prior to the award shall constitute acceptance of such person or organization.
- E. The Contractor shall not contract with any subcontractor or any person or organization for any portion of the work who has not been accepted by the Owner. The Contractor will not be required to contract with any subcontractor or person or organization against whom Contractor has a reasonable objection.
- F. If after the award of the contract, the Owner refuses to accept any person or organization on the required list of subcontractors, the Contractor shall submit an acceptable substitute and the Contract Sum shall be increased or decreased by the difference in cost occasioned by such substitution, and an appropriate Change Order shall be issued; however, no increase in the Contract Sum shall be allowed for any such substitution unless the Contractor has acted promptly and responsively in submitting a name with respect thereto prior to the award.
- G. After the award, the Contractor shall resubmit the list of subcontractors, corrected or modified as may be necessary as directed by the Owner.

H. Subcontracting

1. Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between Owner and any subcontractor. The Divisions or Sections of the Specifications, and the divisioning of the Drawings are not intended to control the Contractor in dividing the Work among subcontractors or to limit the Work performed by any trade.
2. The Owner, Owner's Representative or Architect will not undertake to settle any differences between the Contractor and their subcontractors or between subcontractors.
3. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions, and other Contract Documents insofar as applicable to the work of subcontractors; and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents. The Contractor shall make available to each proposed subcontractor prior to the execution of the Subcontract, copies of the Contract Documents to which the subcontractor will be bound by this Paragraph and identify to the subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract Documents. Each subcontractor shall similarly make copies of such Documents available to their sub-subcontractors.

I. Payments to Subcontractors:

1. Contractor shall pay each subcontractor or supplier upon receipt of payment from Owner, an amount equal to the percentage of completion allowed to Contractor on account of such work performed or material supplied. Contractor shall also require each subcontractor to make similar payments to their subcontractors or suppliers.
2. Contractor shall pay each subcontractor a just share of any insurance monies received by Contractor when and as applicable, and Contractor shall require each subcontractor to make similar payments to their subcontractors or suppliers.
3. The Owner's Representative may, on request and at their discretion, furnish to any subcontractor, if practicable, information regarding percentages of completion certified to the Owner on account of Work done under the Contract.
4. Neither Owner, Owner's Representative or Architect shall have any obligation to see to the payment of any monies to any subcontractor except as may otherwise be required by law.

**GC 48. RECORDS, ACCOUNTS AND SEGREGATED PRICES**

- A. Contractor agrees to keep one complete set of records and books of accounts, on a recognized cost accounting basis, satisfactory to Owner and Owner's Representative showing all expenditures, of whatever nature, made pursuant to this Contract.
- B. Contractor shall furnish such records, information and data as may be reasonably required and shall cooperate with Owner or Owner's Representative in establishing total costs for various major portions of the Work as will be designated by the Owner's Representative.
- C. If required for convenience of Owner's accounting, Contractor shall furnish segregated prices for various other portions of the Work. These segregated prices shall be in addition to or separate from the required Schedule of Values.

**GC 49. LIABILITY FOR TREES**

- A. In case of damage to or loss of trees due to carelessness or lack of sufficient protective measures specified, Contractor shall forfeit an amount in proportion to the extent of damage or loss, which shall not be less than two hundred (\$200) dollars nor exceed one thousand (\$1,000) dollars per tree for total loss.

**GC 50. LIABILITY FOR SURVEY MARKS**

- A. In case of damage to, disturbance or removal of survey marks, field markers, monuments, or other survey or layout devices due to carelessness or lack of sufficient protective means, the party responsible for such damage, disturbance or removal shall be liable for the expense to have them replaced and reset in compliance with specified requirements.

**GC 51. CLAIMS PROCEDURES**

- A. For purposes of this section:
1. "Claim" means a separate demand by a contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:
    - a. A time extension, including, without limitation, for relief from damages or penalties for delay assessed by the County under the contract for the project.
    - b. Payment by the County of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for the project and payment for which is not otherwise expressly provided or to which the claimant is not otherwise entitled.
    - c. Payment of an amount that is disputed by the County.
  2. "Contractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the California Business and Professions Code who has entered a direct contract with the County for a project.
  3. "Subcontractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the California Business and Professions Code who either is in direct contract with a Contractor or is a lower tier subcontractor.
- B. Upon receipt of a Contractor's claim, the County shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the claimant a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, the County and a contractor may, by mutual agreement, extend the time provided in this section.
- C. The claimant shall furnish reasonable documentation to support the claim.
- D. If the County needs approval from its Board of Supervisors to provide the claimant a written statement identifying the disputed portion and the undisputed portion of the claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the County shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide the claimant a written statement identifying the disputed portion and the undisputed portion.
- E. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the County issues its written statement. If the County fails to issue a written statement, paragraph (K) shall apply.
- F. If the Contractor disputes the County's written response, or if the County fails to respond to a claim issued pursuant to this section within the time prescribed, the Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the County shall schedule a meet and confer conference within 30 days for settlement of the dispute.
- G. Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the County shall provide the Contractor a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the County issues its written statement.

Any disputed portion of the claim, as identified by the contractor in writing, shall be submitted to nonbinding mediation, with the County and the claimant sharing the associated costs equally. The County and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate regarding the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside this section.

- H. For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.
- I. Unless otherwise agreed to by the County and the Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.
- J. This section does not preclude the County from requiring arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program, if mediation under this section does not resolve the parties' dispute.
- K. Failure by the County to respond to a claim from the Contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of the County's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding regarding the merits of the claim or the responsibility or qualifications of the claimant.
- L. Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.
- M. If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against the County because privity of contract does not exist, the Contractor may present to the County a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the Contractor present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the County shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the Contractor shall notify the subcontractor in writing as to whether the Contractor presented the claim to the County and, if the original Contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.
- N. A waiver of the rights granted by this section is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable, and (2) the County may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of this section, so long as the contractual provisions do not conflict with or otherwise impair the time frames and procedures set forth in this section.

**GC 52. ATTORNEY'S FEES**

- A. Contractor hereby agrees to pay Owner, Owner's Representative and/or Architect a reasonable sum as attorney's fees in all court actions including arbitration brought by either of them against



the other or in which they are both plaintiffs or defendants, and also in court actions involving claims of subcontractors or material suppliers and in actions involving offsetting claims between Contractor and Owner, Owner's Representative or Architect because of any doubts, disputes or actions arising out of this Contract, except in the following cases:

1. When Contractor obtains a favorable net judgment against the Owner, Owner's Representative and/or Architect after consideration of claims and offsets of Owner which are allowed by the court against Contractor for breach of this Contract.
2. When Owner, Owner's Representative and/or Architect is denied a favorable judgment by a court in a suit against Contractor which may be brought by Owner, Owner's Representative or Architect.

**END OF GENERAL CONDITIONS**

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SUPPLEMENTARY GENERAL CONDITIONS

SECTION 00 80 00

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**SGC 1. GUARANTEE WORK**

- A. In the event of failure of Contractor to comply with the requirements of any guarantee by this Contract within seven (7) days after being notified in writing, Owner is authorized to proceed to have the defects repaired and made good at the expense of Contractor, who shall pay the costs and charges therefore immediately on demand.

**SGC 2. LAWS AFFECTING PUBLIC WORKS**

- A. Attention to bidders is called to necessity of being familiar with the various Federal, State and Local laws affecting public work, especially, but not limited to, those laws relating to hours of employment, minimum wage rates, payment of wages, sanitary and safety conditions for workmen, workmen's compensation insurance, type and kind of materials that can be used, non-discrimination in employment and affirmative-action programs. Contractor is advised that this project is being paid for by State and local funds. Contractor shall comply with applicable regulations and hold harmless the Owner for their failure to comply. Certain of those provisions may be set forth herein or in the General Construction Contract. The existence of these provisions does not excuse the Contractor from complying with other statutory requirements or provisions which are not set forth in these Contract Documents.

**SGC 3. OWNER'S REPRESENTATIVE, INSPECTOR**

- A. The Owner will employ an "Owner's Representative" and "Inspector". The Inspector will observe the installation of all materials and equipment to be incorporated into the Work and the placing of such materials and equipment to determine in general if the Work is proceeding in accordance with the Contract Documents. Based on their observations, the Inspector will keep the Owner's Representative informed as to the progress of the Work and will endeavor to guard the Owner against defects and deficiencies in the Work of the Contractor and subcontractors employed by the Contractor in the prosecution of the Work. The Owner's Representative and Inspector shall not be responsible for means, methods, techniques, sequences, or procedures of construction, nor be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents.

**SGC 4. RESPONSIBILITY FOR COMPLIANCE WITH OSHA**

- A. All work, materials, work safety procedures and equipment shall be in full accordance with the latest OSHA rules and regulations.
- B. Contractor warrants that Contractor and each of their subcontractors shall, in performance of this Contract, comply with each compliance order issued pursuant to OSHA and CAL-OSHA. The Contractor assumes full and total responsibility for compliance with OSHA and CAL-OSHA Standards by their subcontractors as well as himself. The cost of complying with any compliance order and/or payment of any penalty assessed pursuant to OSHA and CAL-OSHA shall be borne by the Contractor. Contractor shall save, keep, and hold harmless the Owner and all officers, employees, and agents thereof from all liabilities, costs, or expenses in law or in equity, that may at any time arise or be set up because of Contractor's or subcontractor's non-compliance or alleged non-compliance with OSHA and CAL-OSHA requirements.
- C. Nothing contained herein shall be deemed to prevent the Contractor and their subcontractors from otherwise allocating between themselves responsibility for compliance with OSHA and CAL-OSHA requirements; provided, however, that the Contractor shall not thereby be, in any manner whatsoever, relieved of their responsibility to the Owner as herein above set forth.

**SGC 5. AS BUILT DRAWINGS**

- A. The Contractor shall be given an extra set of drawings and specifications which shall be always kept at the site of the Work. Exact locations of all pipes and conduits, and all changes in construction and details shall be indicated and dimensioned upon these drawings, and all changes in materials and equipment installed shall be indicated in these specifications. The as-built drawings shall be current (up to date) to qualify for payment; the job Inspector will verify. Upon completion of the Work, the As-Built Drawings shall be prepared by the Contractor and Specifications shall be reviewed by the Owner's Representative and Consultants and returned to the Owner prior to the final payment. The As-Built Drawings shall be neatly drafted on erasable mylar reproducible transparencies or printed on vellum and submitted as a .dwg file if prepared electronically.

**SGC 6. FINAL CERTIFICATES**

- A. When the Work is ready for acceptance, by the Owner, the Owner's Representative shall so certify in writing to the Owner, indicating substantial completion and that the building can be occupied and used and a Certificate of Acceptance will be issued to the Contractor which will bring their Progress Payment up to ninety-five (95%) percent of the Contract Price, with five (5%) percent to remain in retention until after Notice of Completion, less sums withheld regarding liquidated damages, if any, or any other damages incurred by owner, or other sums withheld pursuant to the terms of this agreement or by law.
- B. Notice of Completion will be filed by the Owner after substantial completion and acceptance of the Work by the Board of Supervisors. Providing no stop notices have been filed, thirty-five days after filing of such notice of completion, payment due under the Contract will become due to the Contractor and the Owner's Representative shall so certify to the Owner authorizing the final payment. Such payment may withhold any reasonable sums payable to Contractor for any Work which has not been completed on said date, or that the Owner may have found defective and ordered to be replaced; final payment for withholding to be made when certified by Owner's Representative in writing to Owner.

**SGC 7. LIENS AND STOP NOTICES**

- A. Should Stop Notices be filed with the Owner, Owner shall in accordance with California Civil Code Section 9358, withhold the amount claimed, plus an allowance of 25% to cover its litigation costs plus interest at the rate of 10%, from certificates until such claims have been resolved pursuant to law.

**SGC 8. GUARANTEES AND MAINTENANCE MANUALS**

- A. The Contractor and each subcontractor and each supplier shall provide to the Owner, copies of all maintenance guarantees, maintenance manuals and technical specifications relating to their portion of the Project prior to completion of the Project, and in accordance with the GENERAL REQUIREMENTS, PROJECT CLOSE-OUT.

**SGC 9. THE WORK**

- A. The Work comprises the completed construction required by the Contract Documents and approved change orders and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.

**SGC 10. THE PROJECT**

- A. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part.

- B. By executing the Contract, the Contractor represents that Contractor has visited the sites, familiarized themselves with the local conditions under which the Work is to be performed, and correlated their observations with the requirements of the Contract Documents.
- C. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required by anyone shall be as binding as if required by all. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonably inferable therefrom as being necessary to produce the intended results. Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings.
- D. The organization of the Specifications into divisions, sections and articles, and the arrangement of Drawings shall not control the Contractor in dividing the Work among subcontractors or in establishing the extent of Work to be performed by any trade.

**SGC 11. OWNER**

- A. The Owner shall forward all instruction to the Contractor through the Owner's Representative.
- B. Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness to avoid delay in the orderly progress of the Work.

**SGC 12. OWNER'S RIGHT TO STOP THE WORK**

- A. If the Contractor fails to correct defective Work as required by GC 17, or persistently fails to carry out the Work in accordance with the contract Documents, the Owner, by a written order signed personally or by an agent specifically so empowered by the Owner in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

**SGC 13. OWNER'S RIGHT TO CARRY OUT THE WORK**

- A. If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within seven calendar days after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, after seven calendar days following receipt by the Contractor of an additional written notice and without prejudice to any other remedy the Owner may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Owner's Representative or Architect's additional services made necessary by such default, neglect, or failure. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner immediately upon demand.

**SGC 14. INDEMNIFICATION**

- A. To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, Owner's Representative, Inspector and the Architect and their agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense is (1) attributable to bodily injury, sickness, disease or death, or the injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the Contractor, and subcontractor, anyone directly or indirectly employed by any of them or anyone for

whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder; excepting only such claims as are caused by the sole negligence or willful misconduct of the Owner, Owner's Representative, Inspector or Architect. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this paragraph.

- B. In any and all claims against the Owner, Owner's Representative, Inspector or the Architect or any of their agents or employees by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under Workers' or Workmen's Compensation Acts, disability benefit acts or other employee benefit acts.
- C. The obligations of the Contractor under this paragraph shall not extend to the liability of Owner's Representative or the Architect, their agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, design or specification, or (2) the giving of or the failure to give directions or instruction by the Owner's Representative or the Architect, their agents or employees provided such giving or failure to give is the primary cause of the injury or damage.

**SGC 15. COMPLIANCE WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS AND THE INTERNATIONAL BUILDING CODE**

- A. Governing Codes: Title 24, California Code of Regulations (C.C.R.), latest edition which adopts and amends the International Building Code, latest edition; International Fire Code, latest edition; Uniform Mechanical Code, latest edition; National Electrical Code, latest edition; Uniform Mechanical Code, latest edition; and the Uniform Plumbing Code, latest edition. The project shall also comply with the Americans with Disabilities Act, and the latest editions of associated regulations.

**SGC 16. LIABILITY OF CONTRACTOR**

- A. The Contractor shall do all the Work and furnish all labor, materials, tools, and appliances, except as otherwise herein expressly stipulated, necessary or proper for performing the Work herein required in the manner and within the time herein specified. The mention of any specific duty or liability imposed upon the Contractor shall not be construed as a limitation or restriction of any general liability or duty imposed upon the Contractor by this contract, said reference to any specific duty or liability being made herein merely for the purpose of explanation.
- B. The right of general supervision by the Owner shall not make the Contractor an agent or employee of the Owner, and the liability of the Contractor for all damages to persons or to public or private property arising from the Contractor's execution of the Work shall not be lessened because of such general supervision.
- C. Until the completion and final acceptance by the Owner of all the Work under and implied by this contract, the Work shall be under the responsible care and charge of the Contractor. The Contractor shall rebuild, repair, restore and make good all injuries, damages, re-erectments and repairs occasioned or rendered necessary or caused of any nature whatsoever, excepting only acts of God not covered by all-risk insurance policy called for in Article GC 4 and not other, to all or any portions of the Work except as otherwise expressly stipulated.

**SGC 17. NUCLEAR FREE HUMBOLDT COUNTY ORDINANCE COMPLIANCE**

- A. Neither the Contractor, their Subcontractors or their suppliers are Nuclear Weapons Contractors, and are not knowingly or intentionally engaged in the research, development, production, or testing of nuclear warheads, nuclear weapons systems, or nuclear weapons components, as

defined by the Nuclear Free Humboldt County Ordinance. Contractor, their Subcontractors and/or their suppliers agree to notify Owner immediately if they become a nuclear weapons contractor as defined above.

**SGC 18. REQUIRED LISTING OF PROPOSED SUBCONTRACTORS**

- A. Each proposal shall have listed therein the name, address, description of work, contractor's license number, and DIR registration number of each subcontractor to whom the bidder proposes to subcontract portions of the work in the amount of 1/2 of one percent of their total bid, in accordance with the Subletting and Subcontracting Fair Practices Act, commencing with Section 4100 of the Public Contract Code and for verification of conformance with Labor Code Sections 1771 and 1725.5. The bidder's attention is invited to other provisions of said Act related to the imposition of penalties for a failure to observe its provisions by using unauthorized subcontractors or by making unauthorized substitutions.
- B. Pursuant to Section 1771.1(a) of the California Labor Code, a contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code or engage in the performance of any contract for public work, as defined in Sections 1770 et seq. of the Labor Code, unless currently registered and qualified to perform public work pursuant to Section 1725.5 of the Labor Code. It is not a violation of Section 1771.1(a) for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.
- C. A sheet for listing the subcontractors, as required herein, is included in the proposal.

**SGC 19. NONDISCRIMINATION**

- A. During the performance of this contract, the Contractor and its subcontractors shall not deny the contract's benefits to any person on the basis of religion, color, ethnic group identification, sex, age, physical or mental disability, nor shall they unlawfully discriminate, harass or allow harassment, against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age (over 40), marital status, denial of family care leave and denial of pregnancy disability leave in connection with any program or activity funded in whole or in part by Federal and/or State funds provided through this grant contract.
- B. Contractor and all subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. Contractor and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12990 [a-f] et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7285.0 et seq.).
- C. The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations are incorporated into this contract by reference and made a part hereof as set forth in full. Contractor and subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.
- D. Contractor shall comply with all applicable nondiscrimination laws and regulations.
- E. The Contractor and all subcontractors shall include the nondiscrimination and compliance provisions of this clause in all contracts and subcontracts to perform work under the contract.

**SGC 20. HAZARDOUS WASTE IN EXCAVATION**

- A. If the Contractor encounters material in excavation which Contractor has reason to believe may be hazardous waste, as defined by Section 25117 of the Health and Safety Code, Contractor shall immediately so notify the Owner's Representative in writing. Excavation in the immediate area of the suspected hazardous material shall be suspended until the OWNER authorizes it to be resumed. If such suspension delays the current controlling operation, the Contractor will be granted an extension of time by means of a change order.
- B. The Owner reserves the right to use other forces for exploratory work to identify and determine the extent of such material and for removing hazardous material from such area.

**SGC 21. CONSTRUCTION ACTIVITIES**

- A. Construction activities at the site shall be as required by the Contractor to complete the project by the prescribed completion date. Contractor must comply with Noise Abatement Provisions.

**SGC 22. DISCOVERY OF HUMAN REMAINS OR AN ARCHAEOLOGICAL SITE**

- A. If during construction activities, human remains or evidence of an archaeological site, including outhouse pits, construction shall be immediately halted and the Owner's Representative notified who will request an evaluation by a qualified archaeologist, approved by the Owner as to whether the discovery constitutes an "important archaeological resource" as defined in Section III, Appendix K of the CEQA Guidelines.
- B. If the resource is determined to be important, mitigation shall proceed as outlined by Appendix K of the Guidelines and as recommended by the archaeologist.

**SGC 23. CONTRACTOR RESPONSIBILITY AND DEBARMENT**

- A. A responsible contractor is a contractor who has demonstrated the attribute of trustworthiness, as well as quality, fitness, capacity, and experience to satisfactorily perform the contract. It is the County's policy to conduct business only with responsible contractors. (Ord. 2291, § 1, 01/07/2003)
- B. The contractor is hereby notified that, in accordance with Title II, Division 14 of the County Code, if the County acquires information concerning the performance of the contractor on this or other contract which indicates that the contractor is not responsible, the County may, in addition to other remedies provided in the contract, debar the contractor from bidding on County contracts for a specified period of time, not to exceed three (3) years, and terminate any or all existing contracts the contractor may have with the County. (Ord. 2291, § 1, 01/07/2003)
- C. The County may debar a contractor if the Board of Supervisors finds, in its discretion, that the contractor has done any of the following: (1) violated any term of a contract with the County; (2) committed any act or omission which negatively reflects on the contractor's quality, fitness, or capacity to perform a contract with the County or any other public entity, or engaged in a pattern or practice which negatively reflects on same; (3) committed an act or offense which indicates a lack of business integrity or business honesty; or (4) made or submitted a false claim against the County or any other public entity. (Ord. 2291, § 1, 01/07/2003)
- D. If there is evidence that the contractor may be subject to debarment, the department will notify the contractor in writing of the evidence which is the basis for the proposed debarment and will advise the contractor of the scheduled date for a debarment hearing before the CHB (Contractor's Hearing Board). (Ord. 2291, § 1, 01/07/2003)



- E. The CHB will conduct a hearing where evidence on the proposed debarment is presented. The contractor and/or the contractor's representative shall be given an opportunity to submit evidence at that hearing. After the hearing, the CHB shall prepare a proposed decision, which shall contain a recommendation regarding whether the contractor should be debarred, and, if so, the appropriate length of time of the debarment. If the contractor fails to avail itself of the opportunity to submit evidence to the CHB, the contractor may be deemed to have waived all rights of appeal. (Ord. 2291, § 1, 01/07/2003)
- F. A record of the hearing, the proposed decision, and any other recommendation of the CHB shall be presented to the Board of Supervisors. The Board of Supervisors shall have the right to modify, deny or adopt the proposed decision and recommendation of the hearing board. (Ord. 2291, § 1, 01/07/2003)
- G. These terms shall also apply to subcontractors and subconsultants of County contractors. (Ord. 2291, § 1, 01/07/2003)

**SGC 24. BID PROTEST**

Any bid protest must be in writing and must be received by the Director of Public Works, Humboldt County Department of Public Works, 1106 Second Street, Eureka, CA, 95501, Fax: (707) 445-7409 or by email before 5:00 p.m. no later than three (3) working days following bid opening (the "Bid Protest Deadline") and must comply with the following requirements:

- A. Only a bidder who has submitted a Bid Proposal is eligible to submit a bid protest another bidder. Subcontractors are not eligible to submit bid protests. A bidder may not rely on the bid protest submitted by another bidder but must timely pursue its own protest.
- B. The bid protest must contain a complete statement of the basis for the protest and all supporting documentation. Material submitted after the Bid Protest Deadline will not be considered. The protest must refer to the specific portion or portions of the Contract Documents upon which the protest is based. The protest must include the name, address and telephone number of the person representing the protesting bidder if different from the protesting bidder.
- C. A copy of the protest and all supporting documents must also be transmitted by fax or by e-mail, by or before the Bid Protest Deadline, to the protested bidder and any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest.
- D. The protested bidder may submit a written response to the protest, provided the response is received by the Department Director before 5:00 p.m., within two (2) working days after the Bid Protest Deadline or after receipt of the bid protest, whichever is sooner (the "Response Deadline"). The response must include all supporting documentation. Material submitted after the Response Deadline will not be considered. The response must include the name, address and telephone number of the person representing the protested bidder if different from the protested bidder.
- E. The procedure and time limits set forth in this section are mandatory and are the bidder's sole and exclusive remedy in the event of bid protest. The bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue a bid protest, including filing a Government Code Claim or initiation of legal proceedings.

**END SUPPLEMENTARY GENERAL CONDITIONS**

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SUMMARY OF WORK

SECTION 01 11 00

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**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Contractor's use of site and premises.
- B. County-furnished, Contractor-installed (OFICI) items.
- C. County's occupancy requirements.
- D. Specification formats and conventions.

1.2 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Vehicle access to Project site shall be held to a minimum. Vehicle access will be on one specific route approved by County; no exceptions will be allowed.
- B. Coordinate use of the premises under the direction of the County.
- C. Assume full responsibility for the protection and safekeeping of materials, products, and equipment under this Contract, stored on the site.
- D. Move any stored materials, products, and equipment under Contractor's control which interfere with the operations of County or a separate contractor.
- E. Obtain and pay for the use of additional storage or work areas needed for Contractor's operations.
- F. Contractor shall be aware of and abide by the Humboldt County and local Noise Ordinance and County's noise prevention requirements. Contractor to verify County's requirements.

1.3 COUNTY-FURNISHED AND CONTRACTOR-INSTALLED (OFICI) ITEMS

- A. County-Furnished and Contractor-Installed (OFICI) Items: As indicated on the Drawings and Technical Specifications.
- B. County's Responsibilities:
  - 1. County will furnish products indicated. Schedule relocation of items with County.
  - 2. After relocation, County will inspect delivered items for damage, jointly with Contractor.
- C. Contractor's Responsibilities:
  - 1. Contractor is responsible for relocating, unloading, and handling County-furnished items at Project site.
  - 2. Contractor is responsible for protecting County-furnished items from damage during storage and handling, including damage from exposure to the elements.
  - 3. Contractor shall install and incorporate County-furnished items into the Work, as indicated and as required. Work includes providing support systems to receive County's equipment and making plumbing, mechanical, electrical connections, and miscellaneous work items associated with installation of County-furnished items.
  - 4. Contractor shall repair or replace County-furnished items damaged by Contractor's operations, as approved by County in writing.

5. Contractor shall furnish and install fasteners and other accessories, as required for complete installation of County-furnished items.

#### 1.4 COUNTY'S OCCUPANCY REQUIREMENTS

- A. Full County Occupancy: County will occupy the Project site, except for areas under construction, during the entire construction period to conduct normal operations.
- B. Cooperate with County to minimize conflicts, and to facilitate County's operations.
- C. Verify occupancy requirements with County and schedule the Work to accommodate County's requirements.
- D. Maintain access to existing walkways and other adjacent occupied or used facilities. Do not close or obstruct walkways or other occupied or used facilities without written permission from County and authorities having jurisdiction.
- E. Provide not less than 72 hours' notice to County of activities that will affect County's operations.

#### 1.5 ENVIRONMENTAL MANAGEMENT

- A. Spills: Contractor shall clean up all fluid spills caused by leaks in the equipment or generated while Contractor is performing the work under this Contract. Contractor shall provide drip catch pans for all equipment that drips or leaks oils or other fluids. Spills generated by Contractor's operation shall be cleaned up by Contractor at no cost to County.
- B. Dust and Noise Control:
  1. Precaution shall be always exercised to control dust and excessive noise created as a result of any operations during the construction period.
  2. If serious problems and/or complaints arise due to airborne dust and excessive noise, and when directed by the County, operations causing such problems shall be temporarily discontinued until a suitable remedy is established. The remedy shall be approved by the County before implementation and shall be considered part of Contractor's normal effort to maintain safety and cleanliness without cause for further payment.

#### 1.6 MATERIALS AND WORKMANSHIP

- A. Except as otherwise specified all materials and equipment incorporated in the Work under the Contract shall be new. All workmanship shall be first-class and by persons qualified in the respective trades.

#### 1.7 ACCIDENT PREVENTION AND PROTECTION OF LIVES AND HEALTH

- A. Precaution shall be always exercised for protection of all personnel and occupants, including employees of Contractor, County, and property.
- B. The California Department of Industrial Relations, Division of Occupational Safety and Health (DOSH, also known as Cal/OSHA) requirements for safety and health protection of workers and public apply. Other requirements not covered by Cal/OSHA, shall be in accordance with U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) requirements.
- C. Comply with safety requirements of CCR, Title 8, Division 1, Chapter 4, "Division of Industrial Safety," and Title 8, Division 1, Chapter 3.2, "Cal/OSHA Regulations"; CCR, Title 24, CBC; and other applicable building and construction codes. Machinery, equipment, openings, power lines, and all other safety hazards shall be guarded or eliminated in accordance with safety requirements of Title 8, and Manual of Accident Prevention in Construction published by the Associated General Contractors of America.

1.8 PROTECTION OF EXISTING FACILITIES

- A. Contractor shall take appropriate measures to prevent damage to existing facilities. Should damage occur, such facilities shall be restored to original condition, at no cost to County.
  - 1. Contractor shall always arrange for protection of existing buildings. Contractor shall furnish, install, and maintain, necessary barricades, temporary coverings, etc., as required for protection, and remove them at completion of the Work. When all Work is complete, damaged areas of the premises shall be restored to original undamaged condition that existed prior to installation of temporary protection.
- B. Housekeeping: The premises shall be kept in a clean, safe condition always. Rubbish shall be removed as fast as it accumulates.
- C. Burning: Burning of refuse, debris, and construction waste at Project site will not be permitted.

1.9 OVERLOADING

- A. Contractor shall not overload any part or parts of structures beyond their safe calculated carrying capacities by placing materials, equipment, tools, machinery, or any other item thereon. No loads shall be placed on floors or roofs before they have attained their permanent and safe strength.

1.10 MANUFACTURER'S INSTRUCTIONS

- A. Where required in the Specifications that materials, products, equipment, and processes be installed or applied in accordance with manufacturer's instructions, directions, or specifications, or stated in words to that effect, it shall be construed to mean that said installation or application shall be in strict accordance with printed instructions furnished by manufacturer of the specified item and is suitable for use under conditions like those at the jobsite. Three copies of such instructions shall be included in the applicable submittal and furnished to the County for review. Obtain County's acceptance prior to commencement of the Work.

1.11 RESPONSIBILITY FOR THEFT AND DAMAGE

- A. County will not be responsible for the loss or theft of Contractor's tools, equipment, and materials.

1.12 FIRE PROTECTION

- A. Contractor shall always maintain good housekeeping practices to reduce the risk of fire and water damage. All scrap materials, rubbish and trash shall be removed daily from jobsite, inside and around the buildings or structures, as applicable, and shall not be scattered on adjacent property.
- B. Suitable storage space shall be provided outside immediate building areas during construction for temporary storage of flammable materials and paints, as required by CFC Chapter 14 and NFPA 241. Excess flammable liquids being used inside the building shall be kept in closed metal containers and be removed from the building during unused periods.
- C. Contractor shall provide temporary fire extinguishers during construction in accordance with the recommendations of CBC Chapter 33, CFC Chapter 14, and NFPA Bulletins Nos. 10 and 241. However, in all cases a minimum of one fire extinguisher shall be available for use.
- D. Under provisions of CFC Chapters 14 and 26, provide a fire extinguisher at each location where cutting, soldering, or welding is being performed. Where electric or gas welding or cutting work is done, interposed shields of noncombustible material shall be used to protect against fire damage due to sparks and hot metal. When temporary heating devices are used, a watchman shall be present to cover periods when other workmen are not on the premises.

1.13 EMERGENCY CONDITIONS

- A. Emergency condition shall be any condition at the Project site which has the actual or potential for significant adverse effects to persons or property, whether resulting from Contractor's operations.
- B. Immediate action shall be taken by Contractor by whatever means necessary to alleviate the condition and to prevent damage or injury to persons or property. County shall be notified of the existence of such a condition but shall not be called upon to perform emergency service.
- C. County may not respond to the emergency condition, which shall not be used as an excuse by Contractor to neglect immediate action; County will not be responsible or liable for any resulting conditions. Absence of Contractor's Representative during emergency conditions at jobsite shall not relieve Contractor from contractual responsibility of providing an immediate response to the situation, for restoration of conditions to normalcy.
- D. If the emergency conditions are not caused by Contractor's fault or neglect, the Contract Sum shall be adjusted to reflect the actual direct field costs of labor and materials to perform and complete emergency measures.
- E. The Contract Time shall also be adjusted to reflect the actual direct effect of such actions to the then critical path of the Construction Progress Schedule. The foregoing notwithstanding, adjustments of the Contract Sum or the Contract Time for actions taken by Contractor in response to emergency circumstances shall be subject to Contractor's strict compliance with all other applicable provisions of the Contract Documents relating to notices and time for delivery of notices.

1.14 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and numbering system of CSI "MasterFormat, 2004 Edition.
- B. Division 01 Sections govern the execution of the Work of all Sections in the Specifications.
- C. Specifications Conventions: Singular words shall be interpreted as plural and plural words shall be interpreted as singular, where applicable, as the context of the Contract Documents indicates.
- D. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

**PART 2 PRODUCTS**

Not Used

**PART 3 EXECUTION**

Not Used

**END OF SECTION**

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MODIFICATION PROCEDURES

SECTION 01 35 00

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing the following contract modifications:
  - 1. Request for Information.
  - 2. Field Order.
  - 3. Request for Cost Proposal.
  - 4. Cost Proposal.
  - 5. Change Orders.

1.2 DEFINITIONS

- A. Request for Information (RFI)
  - 1. Written request submitted by Contractor to Owner's Representative via the County's online project management system on a form supplied by Owner's Representative requesting clarification, interpretation, or additional information pertaining to Contract Documents.
  - 2. An RFI shall not be used as a vehicle for only confirming or verifying issues.
- B. Field Order (FO)
  - 1. Owner's Representative written directives to the Contractor covering a specific aspect of work, signed by the Owner or Owner's lead agency that authorizes changes in the Work to expedite the change order process.
- C. Request for Cost Proposal (RFCP)
  - 1. Written request by the Owner's Representative to the Contractor to quote change to Contract Sum and/or Contract Time for proposed change to Contract Document.
- D. Cost Proposal (CP)
  - 1. Written request by the Contractor to the Owner's Representative to change Contract Sum and/or Contract Time for proposed change to Contract Document.
- E. Change Order (CO)
  - 1. Initiated by the Owner, Contractor, Consultant, Owner's lead agency, or the Owner's Representative and signed by the Owner and Contractor stating their agreement to a change to Contract Documents and adjustment to Sum and/or Contract Time.

1.3 REQUEST FOR INFORMATION (RFI)

- A. Submit RFIs numbered in sequential order, reviewed by the Contractor with respect to Contract Documents.
  - 1. Submit RFIs on forms designated by the Owner's Representative.

- B. Owner's Representative will monitor the RFI process and responses from the Consultant. The Consultant will receive RFIs only from the Owner's Representative; Consultant will not accept RFIs directly from any other entity.
- C. Owner's Representative will receive only legible, properly prepared RFI:
  - 1. Unreadable facsimile machine RFIs, illegibly written RFIs, or RFIs with incomplete information, will be returned promptly without action.
  - 2. RFIs may be transmitted to Owner's Representative by online project management system.
    - a. Owner's Representative will forward to consultant for review and return response by same method received from Contractor.
  - 3. Consultant will review RFIs with respect to Contract Documents and return response in a timely manner, generally within 7 calendar days, or commensurate with RFI subject.
    - a. RFIs marked "URGENT" will take precedence over outstanding RFIs and be answered by consultant as soon as possible.
- D. Contractor being fully familiar with Contract Documents, shall not be relieved of responsibility to coordinate the Work to prevent adverse impact to Project schedule when submitting RFIs to Owner's Representative for clarification or interpretation of Contract Documents, or additional information.
- E. If the Contractor believes the scope of work referenced in the RFI has a cost and /or time impact, he will not proceed with the work until either a Field Order or a Change Order has been issued.

#### 1.4 FIELD ORDER (FO)

- A. Field Orders may include supplementary or revised Drawings and/or Specification to describe changes to Contract Documents.
- B. Field Orders will be executed on forms designated by the Owner's Representative.
- C. Field Orders may be generated by the Contractor's written notice submitted on a Cost Proposal form, that an RFI response or other unforeseen condition has changed the Contract cost and /or time, and that schedule impact will result if written directive is not provided in a timely manner.
- D. Contractor shall provide an estimate of cost and/or time impact at the time of the request for a Field Order.
- E. Owner's Representative will review the request for a Field Order and initiate a written Field Order for authorization by the Owner or Owner's lead agency.
- F. If the Field Order is approved by the Owner or Owner's lead agency, Owner's Representative will release the signed Field Order to the Contractor. If rejected, the Contractor is so notified by the Owner's Representative.

#### 1.5 REQUEST FOR COST PROPOSAL (RFCP)

- A. Request for Cost Proposal is an informational request only and is not an instruction or authorization to execute a change, or an order to stop Work in progress.
- B. Request for Cost Proposal may include supplementary or revised Drawings and/or Specification to describe proposed changes to Contract Documents.
- C. Contractor shall submit cost and/or time quotation to Owner's Representative within 15 calendar days following receipt of Request for Cost Proposal.

1.6 COST PROPOSAL (CP)

- A. Contractor shall submit to the Owner's Representative a Cost Proposal for all occurrences the Contractor believes impacts Scope of Work cost and/or time.
  - 1. A Cost Proposal shall be submitted within 15 calendar days of the occurrences.
- B. Submit Cost Proposal numbered in sequential order, reviewed by the Contractor with respect to Contract Documents.
  - 1. Submit Cost Proposals on forms designated by the Owner's Representative.
- C. All Cost Proposals submitted shall have detailed breakdowns for all associated work, cost and/or time.
- D. Owner's Representative will solicit and monitor independent cost estimates responses from the Consultant.
- E. Owner's Representative shall return Cost Proposal responses and reviews to the Contractor within 15 calendar days following receipt of Cost Proposal.
- F. A processed Cost Proposals is informational back-up for a potential Change Order, and not an instruction or authorization to execute a change, or an order to stop Work in progress.

1.7 CHANGE ORDER (CO)

- A. Change Orders may be initiated by the Owner, Contractor, Consultant, Owner's lead agency, or the Owner's Representative.
- B. Changes to the Project Contract Sum and/or Contract Time listed or indicated in Change Orders shall include or be determined by methods described in the General Conditions.
- C. Owner's Representative has responsibility for processing and administering Change Orders for the Project and will prepare each Change Order using form designated by the Owner's Representative.
- D. Contractor shall provide all pricing proposals Cost Proposals for a Change Order. The Consultant shall provide independent cost estimates to Cost Proposals.
  - 1. Cost differentials between the Contractor's Cost Proposal and the Owner's Representative may negotiate the Consultants cost estimates.
  - 2. If no agreement is reached, the Owner's Representative may issue a time and material change Order.
    - a. Use Daily Force Account Report designated by Owner's Representative.
- E. The Contractor, Consultant, Owner's Representative, Owner's lead agency and Owner will sign a fully documented Change Order.

1.8 CORRELATING CHANGE ORDERS WITH OTHER CONTRACT REQUIREMENTS

- A. Revise Schedule of Values and Applications for Payment to record each Change Order as a separate item of work with adjustment to Contract Sum and Contract Time.
- B. Revise Construction Schedule to reflect each change in Contract Time.
- C. Record modifications in Record Documents.

**END OF SECTION**



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PRODUCT REQUIREMENTS

SECTION 01 60 00

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**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Products.
- B. Product Delivery Requirements.
- C. Product Storage and Handling Requirements.
- D. Product Options.

1.2 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- B. All products shall be new, of first-class quality, and shall be delivered, installed, connected, and finished in every detail, and shall be so selected and arranged as to fit correctly into the proper spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by Architect shall be furnished. Contractor shall provide satisfactory evidence as to the kinds and quality of material and workmanship.
- C. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- D. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Delivery of materials to the Project site shall be coordinated by and received by Contractor or his representative and stored in secured areas as agreed upon at the job start meeting.
- C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- D. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- E. Contractor shall take into consideration the available space and location of work site when delivery of materials is necessary.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- B. For exterior storage of fabricated products, place on sloped supports above ground.

- C. Provide off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation and degradation of products.
- E. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.
- H. Contractor shall be responsible to provide all new materials in unopened manufacturer's original containers and deliver such items to Project site in good condition for use on this project. Contractor shall be responsible to store all new materials received as per manufacturer recommendations. All materials discovered to be improperly stored and/or damaged will be replaced at the sole expense to Contractor. Any requests for delays or extension of the Contract Time due to the above will not be considered.
- I. Contractor shall use all means necessary to protect all materials before, during and after installation and to protect the installed work and materials of all other trades and of existing structures. In event of damage, Contractor is to immediately make all repairs and replacements necessary using compatible and like materials.

#### 1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One Manufacturer and stating "No Substitutions Allowed, County's Standard": Products of manufacturer named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers without naming a Product, with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
- D. Products specified by Naming One or More Manufacturers and Naming Product(s) by the first listed Manufacturer, with a Provision for Substitutions: Submit a request for substitution for any product, by any manufacturer, listed or not listed, other than the product(s) listed.

### **PART 2 PRODUCTS**

#### 2.1 MATERIALS

- A. Materials furnished shall be new and never been used before, unless specified otherwise, and will satisfy the requirements herein and all specifications referenced by provisions within these specifications. Contractor shall furnish, upon request of Project Manager, an affidavit from the manufacturer or supplier to the effect that materials furnished shall conform to the General Conditions, the latest revision of AWWA Specifications, ASTM, and Federal Specifications that pertain. All materials shall be installed in accordance with manufacturer's recommendations and the Standard Drawings and Specifications that pertain. Material for one specific product shall be one manufacturer unless otherwise approved by Architect. All materials shall be subject to inspection after delivery to the site and during installation of the Work. Failure of the Inspector, Project Manager or Architect to note faulty material shall not relieve Contractor of the responsibility for removing or replacing any such material at no additional cost to County.

- B. For the ease of maintenance and parts replacement, to the maximum extent possible use materials of a single manufacturer, delivered in manufacturer's original, unopened containers with labels intact and legible, and in sufficient quantity to allow continuity of work. Deviation from this requirement shall require written approval from County.
- C. County reserves the right to reject any materials list which contains materials from various manufacturers if suitable materials can be secured from fewer manufacturers and to require that source of materials be unified to maximum extent possible.

**PART 3 EXECUTION**

Not Used

**END OF SECTION**

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CONTRACT CLOSEOUT

SECTION 01 75 00

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
  - 1. Inspection procedures.
  - 2. Project record document submittal.
  - 3. Operation and maintenance manual submittal.
  - 4. Submittal of warranties.
  - 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections.

1.2 SUBSTANTIAL COMPLETION

- A. Prior to requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
  - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
    - a. 100 percent completion will bring the Contractor's progress Payment up to (95%) ninety percent of the Contract Price with (5%) percent to remain in retention until after Notice of Completion.
    - b. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
    - c. If 100 percent completion cannot be shown, include a list ("punchlist") of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
  - 2. Advise the Owner of pending insurance changeover requirements.
  - 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
  - 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
  - 6. Deliver tools, spare parts, extra stock, and similar items.
  - 7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
  - 8. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
  - 9. Complete final cleanup requirements, including touchup painting.
  - 10. Touch up and otherwise repair and restore marred, exposed finishes.
- B. Substantial Completion will not be issued without the following:
  - 1. Issuance of a Certificate of Occupancy.
  - 2. The electrical system, fire alarm, and sprinkler system 100% complete.
  - 3. Operation manuals, maintenance manuals and warranties submitted and approved.

4. Instruction of staff in the operation and maintenance of equipment and systems.
5. Record drawings submitted and approved.
6. Any extra material required by contract delivered.

C. Inspection Procedures:

1. On receipt of a request for inspection, the Owner's Representative and the Architect will either proceed with inspection or advise the Contractor of unfilled requirements.
2. The Owner's Representative will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
  - a. The Owner's Representative and the Architect will repeat inspection when requested and assured that the Work is substantially complete.
  - b. Results of the completed inspection will form the basis of requirements for final acceptance.
3. Owner will allow the Contractor no longer than 30 calendar days from the Date of Substantial Completion to remedy deficiencies.

1.3 FINAL ACCEPTANCE

A. Prior to requesting final inspection for certification of final acceptance and final payment, complete and submit the following:

1. Final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Certified copy of the Owner's Representative and Architect's final inspection list of items to be completed or corrected endorsed and dated by the Owner's Representative and Architect.
  - a. Certification shall state that each item has been completed or otherwise resolved for acceptance.
4. Submit consent of surety to final payment.
5. Submit all subcontractor final unconditional lien releases.
6. Submit a final liquidated damages settlement statement.
7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Re-inspection Procedure:

1. Owner's Representative and /or Architect will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed.
  - a. Indicate items whose completion is delayed under circumstances acceptable to the Owner's Representative.
2. Should the Owner's Representative determine that Work is incomplete or defective:
  - a. Owner's Representative will notify the Contractor, in writing, listing incomplete or defective Work.
  - b. Contractor shall remedy deficiencies promptly and notify Owner's Representative when ready for re-inspection.

C. Final Acceptance Certificate

1. Upon completion of inspection or any re-inspections, the Owner's Representative and /or Owner's Lead Agency will prepare a certificate of final acceptance in accordance with the Project Specification Section 00800, Supplemental General Conditions.
2. Final Acceptance will be presented to the County Board of Supervisors.
  - a. Only the County Board of Supervisors has final authority over Acceptance of Project.

D. Notice of Completion

1. Upon final acceptance by the County Board of Supervisors, the Owner's Lead Agency will prepare and file a Notice of Completion in accordance with the Project Specification Section 00800, Supplemental General Conditions.
  - a. Start of mandatory 35-day lien period.

1.4 RECORD DOCUMENT SUBMITTALS

A. Project Record Drawings:

1. Maintain a clean, undamaged set of Contract Drawings and Shop Drawings and identify as "RECORD DRAWINGS - PROJECT SET".
2. Mark the Drawings to show the actual installation where the installation varies substantially from the Work as originally shown.
  - a. Using an erasable colored pencil (not ink or indelible pencil) clearly describes change by graphic line or note.
  - b. Date all entries and note related Change Order number where applicable.
  - c. Call attention to all entries by a "cloud" drawn around area affected.
  - d. Where overlapping changes occur, mark with different colors.
3. Conversion of schematic layouts:
  - a. Design of future modifications of facility may require accurate information as to final physical layout of items that are shown schematically on Drawings.
  - b. Show on Project set of Record Drawings, by dimension accurate to within one inch, centerline of each run of items shown schematically on Drawings. Clearly identify item by accurate note such as "cast iron drain", "galv. water", and the like. Show, by symbol or note, vertical location of item ("under slab", "in ceiling plenum", "exposed" and the like).
4. Prior to request for Substantial Completion, secure from the Owner's Representative at no charge to the Contractor, a complete set, full sized drawings and (.DWG) files of all Contract Documents.
  - a. Clearly transfer change data shown on Project set of Record Drawings to corresponding transparencies, coordinating changes as required.
  - b. Clearly indicate at each affected detail and other drawings a full description of changes made during construction, and actual location of items.
  - c. Show final location of electrical junction boxes and outlets, telephone and data outlets, supply and return registers, and like items.
  - d. Call attention to all entries by a "cloud" drawn around area affected.
  - e. Make changes neatly, consistently, and with proper media to assure longevity and clear reproduction.

B. Record Specifications:

1. Maintain one complete copy of the Project Manual, including addenda and other written construction documents, such as Change Orders and modifications issued during construction.
2. Mark Specifications to show substantial variations in actual Work performed in comparison with the text of the Specifications.
3. Note substitutions in reference to items specified.

C. Maintenance Manuals:

1. Contractor to submit a written summary of all maintenance manuals to be transmitted to Owner's Representative.
2. Submit 3 complete copies of all maintenance manuals prior to start-ups and instruction of operation to maintenance personnel.

3. Provide manuals in 8-1/2 x 11-inch format with plastic/fiberboard covers and colored flysheets separating sections, to include the following:
  - a. Covered labeled as "Operating and Maintenance Instructions" with name and address of Project, and names of Contractor and Subcontractor.
  - b. Typewritten index near front of manual, providing immediate information as to location within manual of emergency information regarding installation.
  - c. Complete instructions regarding operation and maintenance of all equipment, including lubrication, disassembly, and re-assembly.
  - d. Complete nomenclature of all parts of all equipment.
  - e. Complete nomenclature and part number of all replacement parts, name and address of nearest vendor, and all other data pertinent to procurement and procedures.
  - f. Copy of garnets and warranties issued.
  - g. Manufacturers' bulletins, cuts, and descriptive data, where applicable, clearly indicating precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturers' data which this installation is not concerned.
  - h. Such other data as required in applicable Specification Sections.

D. Guarantees/warranties and Bonds:

1. General:
  - a. Manufacturers' warranties notwithstanding, warrant the entire Work against defects in materials and workmanship for twelve (12) months from the date of Substantial Completion in accordance with the GENERAL CONDITIONS AND SUPPLEMENTARY CONDITIONS.
  - b. Guarantee/warrant or bond Work as required in the Specifications.
  - c. Warranties between the Contractor and manufacturers, and the Contractor and suppliers, shall not affect guarantees/ warranties between the Contractor and the Owner.
  - d. The Contractor will not be held responsible for defects due to misuse, negligence, willful damage, improper maintenance, or accident caused by Others, nor shall he be responsible for defective parts whose replacement is necessitated by failure of the Owner's maintenance forces to properly clean and service them, provided the Contractor has furnished complete maintenance instructions to the Owner.
  - e. Compile specified guarantees/warranties and bonds.
  - f. Time of Submittal:
    - i. For equipment or component parts of accepted equipment put into service for the Owner's benefit during the progress of the Work, submit guarantees/warranties within ten (10) calendar days after acceptance of the Work.
    - ii. Otherwise, submit guarantees/warranties within ten (10) calendar days after date of Substantial Completion and prior to the Final Application for Payment.
    - iii. For items of Work where acceptance is delayed materially beyond the date of Substantial Completion, furnish updated submittal within ten (10) calendar days after such delayed acceptance, listing the date of delayed acceptance as the start of the guarantee/warranty period.

E. Other Documents:

1. Three sets of warranties, guaranties, and bonds.
2. Spare parts and materials extra stock list.
3. One set of evidence of compliance with requirements of governmental agencies having jurisdiction including, but not limited to:
  - a. Certificates of Inspection.
  - b. Certificates of Occupancy.
4. One set of certificates of insurance for products and completed operations.
5. One set of evidence of payment and release of liens.
6. One copy of list of Subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be always reached for emergency service including nights, weekends, and holidays.

## 1.5 INSTRUCTION

- A. Arrange for each Installer of equipment and systems that requires regular maintenance to meet with the Owner's personnel for instruction in proper operation and maintenance of systems, equipment and similar items, which were provided as part of the Work.
  - 1. Submit to Owner's Representative an instruction schedule listing instruction subjects and proposed dates at least 15 calendar days prior to the first proposed date.

## 1.6 FINAL CLEANING

- A. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
  - 1. Remove labels that are not permanent labels.
  - 2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
  - 3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
  - 4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
  - 5. Clean the site, sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
- B. Remove temporary protection and facilities installed for protection of the Work during construction.
- C. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
  - 1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.

**END OF SECTION**



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DEMOLITION  
SECTION 02 41 16

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. This Section includes the following:
1. Demolition and removal of existing building elements.
  2. Disconnecting, capping, or sealing, and removing utilities.
  3. Salvaging items for reuse by Owner.
  4. Removal of hazardous materials shall be performed by a licensed abatement contractor and shall be included in scope of work. An asbestos report shall be provided to the contractor by the owner.
  5. Protect existing building from weather damage.
  6. Repair procedures for selective demolition operations.

1.2 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 SUBMITTALS

- A. Proposed Protection Measures: Submit informational report, including drawings, that indicates the measures proposed for protecting individuals and property for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Building Demolition Activities: Indicate the following:
1. Detailed sequence of demolition work, with starting and ending dates for each activity.
  2. Temporary interruption of utility services.
  3. Shutoff and capping of utility services.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI A10.6 and NFPA 241.
- C. Pre-demolition Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

- A. Existing building will be occupied during the entire course of construction. Conduit demolition to minimize interference with adjacent building areas.
- B. Always maintain protected egress and access.
- C. Provide not less than 72 hours' notice of activities that will affect operations on adjacent spaces.
- D. Hazardous Materials: It is expected that hazardous materials will be encountered in the Work.
  - 1. Hazardous materials will be removed by Owner or under a separate contract. Coordinate removal schedule with the County.
  - 2. If materials suspected of containing hazardous substances are encountered, do not disturb; immediately notify Owner.
  - 3. Refer to Appendix for Hazardous Materials Surveys by Brunelle and Clark Consulting identifying hazardous materials.

1.7 COORDINATION

- A. Arrange demolition schedule so as not to interfere with Owner's on-site operations.

**PART 2 - PRODUCTS**

2.1 REPAIR MATERIALS

- A. Where available and appropriate for use, provide repair materials that are identical to existing materials.
- B. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually fully match existing adjacent surfaces possible.
- C. Use materials whose installed performance equal or surpass that of existing materials.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Inventory and record the condition of items to be removed and salvaged if any. These should be removed prior to demolition by Owner.
- D. Verify that hazardous materials have been remediated before proceeding with demolition operations.

### 3.2 PREPARATION

- A. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving building components to be demolished.
  - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
  - 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
- B. Temporary Shoring: Provide and maintain shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

### 3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, building entries, and other building facilities during demolition operations. Maintain exits from existing building.
- B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
  - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
  - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
    - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- C. Temporary Protection: Erect temporary protection.
  - 1. Protect adjacent facilities from damage due to demolition activities.
  - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
  - 3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent facilities to remain.
  - 4. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of building.
  - 5. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
- D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

### 3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated existing construction completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
  - 2. Maintain fire watch during and for at least two hours after flame cutting operations.
  - 3. Maintain adequate ventilation when using cutting torches.

4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Explosives: Use of explosives is not permitted.
- D. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- E. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within 5 feet outside footprint indicated for new construction. Abandon utilities outside this area.
1. Fill abandoned utility structures with satisfactory soil materials according to backfill requirements in Division 31 Section "Earth Moving."

### 3.5 REPAIRS

- A. Promptly repair damage to building caused by demolition operations.

### 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and legally dispose of them in an approved landfill acceptable to authorities having jurisdiction.
1. Do not allow demolished materials to accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

### 3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

**END OF SECTION**

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CONCRETE CRACK REPAIR

SECTION 03 94 00

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**PART 1 - GENERAL**

1.1 SUMMARY:

- A. Furnish all materials, labor, tools, equipment, and incidentals required to make all concrete crack repairs. The County will direct the Contractor where to perform concrete crack repairs.
- B. Concrete Crack Repairs are classified as follows:
  - 1. Type 1- Repair to be used, as directed by the County, for 1/16" to 1/8" wide structural cracks.
  - 2. Type 2- Repair to be used, as directed by the County, for 1/16" to 1/8" wide structural cracks, with exposed surfaces ground smooth for finishes.
- C. Measurement and Payment Procedures:
  - 1. Work documented on the contract drawings shall be included in the base bid.
  - 2. Undocumented Concrete Crack Repair Type 1 discovered during construction will be measured separately for payment and be paid for at the contract unit price per linear foot of repair length.
  - 3. Undocumented Concrete Crack Repair Type 2 discovered during construction will be measured separately for payment and be paid for at the contract unit price per linear foot of repair length. Concrete REFERENCES
- D. Codes, Regulations and Referenced Standards:
  - 1. ASTM C-881: "Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete."

1.2 SUBMITTALS

- A. The Contractor shall furnish recent independent laboratory tests showing compliance with requirements specified. Certification or affidavits will not be acceptable.
- B. The Contractor shall furnish manufacturer's literature describing product and instructions for use.

1.3 QUALITY ASSURANCE

- A. Qualifications:
  - 1. The Contractor qualifications shall include:
    - a. A minimum of five years experience in applying crack repair materials like those specified.
    - b. A list of the five previous jobs that successfully utilized the application of the crack repair material.
    - c. A letter from the crack repair material manufacturer, on the manufacturer's letterhead, signed by an officer of the company, stating that the applicator has been trained in the proper techniques for the proper preparation of the surface, and

proper methods of mixing, placing, curing, caring and application of the manufacturer's product.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Product shall be delivered in moisture proof containers with the manufacturer's name, product name and general instructions for placement printed on the container.
- B. Product shall be stored and handled per manufacturer's instructions and protected from damage and freezing. Material that freezes shall be discarded.

**PART 2 - PRODUCTS**

2.1 MATERIALS

- A. Concrete Crack Repair Types 1 and 2 — Product shall be very low viscosity, low VOC, high strength moisture tolerant epoxy adhesive.
  - 1. Product shall be:
    - a. Sikadur 35, Hi-Mod LV, as manufactured by Sika Corporation.
    - b. Eucopoxy Injection Resin, as manufactured by The Euclid Chemical Company.
    - c. Or Accepted Equal.

**PART 3 - EXECUTION**

3.1 SURFACE PREPARATION:

- A. Crack must be clean and sound, free of standing water and in accordance with the Manufacturer's written instructions regarding surface preparation. Removal of all dust, grease, and foreign particles from cracks shall be done with compressed air.

3.2 MIXING:

- A. Product shall be mixed in strict accordance with the manufacturer's written instructions.
- B. At most mix only that quantity of material that can be placed within 20 minutes after mixing.

3.3 APPLICATION:

- A. All work shall be done in strict accordance with the manufacturer's recommendations, including special procedures for hot and cold weather application.
- B. At the request of the County, the manufacturer's representative shall be called to the job site for consultation regarding detailed use of the product.
- C. At enclosed, occupied spaces, seal area and keep under constant negative pressure as required to minimize odor.

3.4 PROCEDURES:

- A. Concrete Crack Repair Types 1 and 2
1. All cracks identified by the Engineer for Type 1 or 2 Crack Repair shall have resin product pressure injected into crack. The manufacturer's installation instructions and recommendations shall be followed.
  2. Location of Injection Ports: Injection ports shall be spaced as recommended by the manufacturer and as needed to insure complete penetration of the joint of crack with the injected material. Spacing of injection ports shall not exceed 2 feet.
  3. Drilling Ports: Holes for injection ports shall be drilled to the depth needed for proper distribution of the injected material. Care shall be taken to not damage any reinforcing steel.
  4. Port Penetration: Holes for injection ports shall be cleaned of all debris and fitted with an injection fitting as provided by the manufacturer of the injected material, or equal. The injection fitting shall be installed as per manufacturer's instructions and will remain in place until injection work has been completed at that area. Caps or valves will be installed at the injection ports to prevent back flow of the uncured injected material after it has been injected.
  5. Injection Produces:
    - a. The Contractor shall follow the instructions of the manufacturer and their representatives for all mixing and injection procedures.
    - b. All cracks shall be sealed at the surface where needed to provide for complete penetration of the injected material and prevent loss of material.
    - c. Prior to sealing material injection, water shall be injected into the ports to flush the crack clean and to verify continuity between adjacent ports. Water shall be injected into each of the ports until it begins to flow from an adjacent or nearby port.
    - d. If the water injection procedure indicates the potential presence of voids within members or behind members resting against soil, the County shall be notified immediately.
    - e. Beginning at the lowest injection port, inject the sealing material until it begins to flow from an adjacent or nearby port. Repeat the process until the crack is filled. In general, the port-to-port travel of the injection will be from low to high in a continuous operation.
    - f. If port to port continuity does not occur at locations where continuity was verified through water injection, mark location and notify the County.
    - g. Avoid sudden application of high pressures during the injection process.
    - h. After completion of the injection operation, all ports and surface sealing materials shall be removed to leave an undamaged surface.
- B. Finishing Concrete Crack Repair Type 2
1. Grind all exposed surfaces smooth and flush with adjacent concrete.

**END OF SECTION**

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CUSTOM CASEWORK

SECTION 06 40 00

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes: Provide mill fabricated custom casework with accessories as required for complete finished installation including cabinetwork hardware.
  - 1. Provide cabinetwork.
  - 2. Provide plastic laminate countertops.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's literature for manufactured items.
- B. Shop Drawings: Indicate materials and wood species, component profiles, fastening, joining details, finishes, and accessories.
  - 1. Certification: Provide WI Certified Compliance Label on shop drawings.
  - 2. Shop drawings shall be complete, accurate, to-scale, and in conformance with applicable and referenced industry standards. cursory use of Architect's interior elevation drawings as shop drawings will not be accepted.
- C. Samples: Furnish samples of each of the following:
  - 1. Plastic laminates: Complete sample ring which includes manufacturer's full range of available colors and patterns, excluding metallics.
    - a. Architect reserves the right to request sample rings from more than one manufacturer.
  - 2. Melamine: Samples of each available standard color. ("Standard" colors shall be defined as White, Almond, and Gray.)
  - 3. PVC edge strips, as requested by Architect.
  - 4. 4" wire pull, in specified finish.
  - 5. All exposed casework hardware.
  - 6. Wood veneer samples, showing proposed range of grain patterns.
- D. Certificates: WI certification is required.
  - 1. General: Before delivery to jobsite, provide WI Certified Compliance Certificate indicating grade of millwork products to be furnished and certify WI requirements for specified grades shall be met.
  - 2. Casework: Each unit to bear WI Certified Compliance Label.



3. Plastic Laminate Countertop: Each unit to bear WI Certified Compliance Label.
4. Installation: Provide WI Certified Compliance Certificate for Installation.

### 1.3 QUALITY ASSURANCE

- A. Fabricator Qualifications: Member of Woodwork Institute (formerly Woodwork Institute of California) with minimum five years successful experience fabricating architectural woodwork like that required for Project.
- B. Standards: Perform architectural woodwork in accordance with recommendations Woodwork Institute (formerly Woodwork Institute of California) "Manual of Millwork" (WI MoM).
  1. Installation Certification Program: Install work in this section as specified in the WI Manual of Millwork and provide WI Certified Compliance Certificate for installation at completion of Project installation.
- C. Seismic Anchorage: Provide seismic anchorage for wall cabinets; comply with loads required by California Code of Regulations (CCR), Title 24, Part 2.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver architectural woodwork until site conditions are adequate to receive work; protect items from weather while in transit.
  1. Allow architectural woodwork shop finish to completely dry prior to delivery to site; allow materials to off-gas volatile organic compound (VOC) emissions off site.
- B. Store materials indoors, in ventilated areas with constant but minimum temperature of 60 degrees F and maximum relative humidity of 25% to 55%.
- C. Do not begin installation of architectural woodwork until space is fully enclosed and mechanical systems are fully operational.
  1. Maintain interior installation areas at 70 degrees F and 50% to 55% relative humidity.
- D. Immediately remove from site materials with visible mold and materials with mildew.

## **PART 2 - PRODUCTS**

### 2.1 MATERIALS

- A. Plastic Laminate Finished Casework and Countertops:
  1. Quality: WI/Custom Grade, Type I, Style A, frameless, multiple unit construction.
  2. Plastic Laminates:
    - a. Types: NEMA LD-3.1 high pressure laminates.
      - 1) Horizontal Surfaces: General Purpose Type, nominal 0.050".
      - 2) Vertical Surfaces: Vertical Surface Type, nominal 0.032".
      - 3) Unexposed Surfaces: Balanced with 0.030" melamine backing sheet.
      - 4) Formed Surfaces: Postforming Type, nominal 0.042".

- 5) Manufacturers: See Finish Schedule.
  - b. Colors: See Finish Schedule and Legend.
  3. Particleboard Core: formaldehyde-free medium density fiberboard (MDF) or particleboard made from recycled wood products.
  4. Provide 1 1/8" thick plastic laminate covered plywood shelving at all open casework units and at all locations where shelving span exceeds 36" (thirty-six inches)
- B. Casework Hardware: Provide casework hardware items as required for complete installation as indicated; provide types as listed in WI "Manual" but no less than following types. Plug-In Pin Type Shelf Supports (Transparent Finished Casework): Provide holes 1" on center.
1. Adjustable Shelf Standards and Supports (Contractor Option at Plastic Laminate Casework): Flush mounted in cabinet.
    - a. Manufacturers:
      - 1) Futura/No. AS 662 with AS 563/663 support.
      - 2) Knape & Vogt/No. 255 with No. 256 support.
      - 3) Or accepted equal.
    2. Cabinet Hinges: European concealed type, minimum 160 degree opening, with spring closer.
    3. Cabinet and Drawer Pulls: Wire type, 4" center to center, brushed chrome.
      - a. Manufacturers:
        - 1) Baldwin Hardware Manuf. Corp.
        - 2) Stanley Hardware.
        - 3) The Engineered Products Co.
        - 4) Or accepted equal
      4. Drawer Slides: Full extension, rail mounted type, minimum 100 lb. capacity with ball-bearing rollers.
        - a. Manufacturers:
          - 1) Accuride.
          - 2) Knape & Vogt.
          - 3) Or accepted equal
      5. Cabinet Locks: Pin and tumbler slide bolt lock, two keys each.
        - a. Manufacturers:
          - 1) Schlage Lock Co./46-002 Cabinet Locks.
          - 2) Best Access Systems/5L Series.
          - 3) CompX International/Timberline Locks.
          - 4) Or accepted equal
    - C. Anchors, Nails and Screws: Select material, type, size and finish required by each substrate for secure anchorage; provide toothed steel or lead expansion bolt screws for drilled-in-place anchors.
    - D. Wood Filler: Color to match wood being filled.

## 2.2 FABRICATION

- A. General: Fabricate architectural woodwork in accordance with specified quality standards.
- B. Plastic Laminate:
  - 1. Apply plastic laminate finish in full, uninterrupted sheets consistent with manufactured sizes.
  - 2. Make corners and joints hairline; slightly bevel arises.
  - 3. Locate butt joints at least 2'-0" from cutouts.
  - 4. Cap exposed edges with plastic laminate of same finish and pattern.
  - 5. Apply laminate backing sheet to reverse side of laminate surfaces.
  - 6. Provide cutouts for inserts, fixtures, and fittings; verify locations from on-site dimensions.
  - 7. Prime paint contact surfaces of cutouts.
  - 8. Plastic Laminate Countertops: Square butt joints and self edging; applied plastic or metal edging not permitted.
- C. Countertops: Provide maximum sizes available. Locate butt joints at least 2'-0" from cutouts where more than one-piece countertops are required.
  - 1. Make corners and joints hairline; slightly bevel arises.
  - 2. Provide cutouts for inserts, fixtures, and fittings; verify locations from on-site dimensions.
- D. Use exposed fastening devices or nails only when approved and unavoidable; arrange neatly.
- E. Assemble woodwork in shop in sizes easily handled and to ensure passage through building openings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible; do not delay job progress, allow for trimming and fitting.

### 3.2 INSTALLATION

- A. Install work consistent with specified quality grade, plumb, level, true and straight with no distortions.
  - 1. Shim as required, using concealed shims.
- B. Ensure mechanical and electrical items affecting architectural woodwork are properly placed, complete, and have been inspected by Architect prior to commencement of installation.
- C. Secure work to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation.

- D. Scribe and cut for accurate fit to other finished work.
- E. Install architectural woodwork under supervision of factory-trained mechanics.
- F. Attach architectural woodwork securely in place with uniform joints providing for thermal and building movements.
- G. Acceptable Tolerances:
  - 1. Variation from True Position: Maximum 1/16" at any position and maximum 1/8" in any 10'-0" length.
  - 2. Adjoining Surfaces of Same Material: No variation permitted.
  - 3. Offset with Abutting Materials: Maximum 1/32".

**END OF SECTION**

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BATT INSULATION SYSTEMS

SECTION 07 21 00

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**PART 1 – GENERAL**

1.1 SUMMARY

1.1 Section Includes:

1. Provide acoustic batt insulation at interior walls with accessories as required for complete installation.

1.2 SUBMITTALS

All submittals shall be submitted under the provisions of Section 01 33 00.

2.1 Product Data: Furnish manufacturer's literature for each type of insulation.

1. Indicate thermal insulation name and number as included in California Energy Commission's Directory of Certified Material.
2. Submit Underwriter's Laboratory approval numbers for required fire ratings, and approvals of other laboratories contingent upon acceptance of applicable authorities.
3. Installation Instructions: Submit manufacturer's installation instructions.

**PART 2 - PRODUCTS**

2.1 MATERIALS

A. Acceptable Manufacturers:

1. Knauf Insulation
2. Johns Manville/FSK-25 Thermal-Shield Insulation.
3. Owens-Corning Fiberglas Corp./Fiberglas FS-25 Insulation.
4. Certainteed.
5. Or accepted equal.

B. Materials

1. Acoustic Batt Insulation at Interior Walls: R-11 unfaced.
2. Insulation Supports: Galvanized or electroplated steel wire supports with friction attachment to framing.

3. Nails or staples: Steel wire; electroplated; type and size to suit application.
  4. Line Wire: Galvanized steel, 19-gauge wire.
  5. Wire Mesh: 1 ½" x 17-gauge poultry netting.
  6. Accessories: Furnish as recommended by insulation manufacturer for insulation types, substrates, and conditions involved.
- C. Insulation shall comply with California standards for insulating material. Maximum flame spread rating of 25 and maximum smoke density per 2010 CBC Section 803.
1. Flame Spread/Smoke Density Rating: Maximum 25/450, ASTM E84.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify substrate and adjacent materials are dry and ready to receive insulation; beginning installation signifies acceptance of conditions.
- B. Ensure mechanical and electrical items affecting work are properly placed, complete, and have been inspected prior to commencement of installation.

#### **3.2 INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Cut and trim insulation neatly, to fit spaces.
  1. Backed Insulation: Use insulation free of ripped backs and edges.
- C. Fit insulation tight within spaces and tight to and behind mechanical and electrical services within insulation plane; leave no gaps or voids; maintain integrity of thermal barrier.
- D. Maintain minimum ventilating airspace as required by the Drawings.
- E. Friction fit in place; use tape or friction supports as necessary to assure permanent installation.
  1. Taping: Tape joints and tears in vapor retarder, including joints between insulation and surrounding construction, to ensure vapor-tight installation.
  2. Penetration Supports: Cut or bend pins in locations accessible to maintenance personnel, to eliminate potential hazards from exposed pinpoints.

**END OF SECTION**

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JOINT PROTECTION

SECTION 07 90 00

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**PART 1 - GENERAL**

1.1 SUMMARY

A. Section Includes: Provide joint sealers for interior joints not specified elsewhere, with backing rods and accessories as required for complete installation.

1. Joint sealers include sealants and caulking as indicated.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Select materials for compatibility with joint surfaces and indicated exposures.
2. Where not indicated, select modulus of elasticity and hardness or grade recommended by manufacturer for each application indicated.
3. Comply with applicable limitations on volatile organic compound (VOC) emissions.

1.3 SUBMITTALS

All submittals shall be made under the provisions of Section 01 33 00.

A. Product Data

1. Submit product data for all specified products.
2. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.

B. Installation Instructions

1. Submit manufacturer's installation instructions
2. Submit manufacturer's certificate under provisions of Section 01 33 00 that products meet or exceed specified requirements.
3. Furnish certification indicating installers are trained in proper use of specified products, qualified, and familiar with proper installation techniques.

C. Samples for Verification

1. Submit samples of specified products.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Firm with minimum five years successful experience on projects of similar type and size, using specified products.
  - 1. Installers shall be familiar with proper application procedures to ensure maximum joint sealer expansion and contraction capabilities.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, cure time, and mixing instructions.

#### 1.6 SITE CONDITIONS

- A. Do not proceed with installation of joint sealers under unfavorable weather conditions.
- B. Install elastomeric sealants when temperature is in lower third of temperature range recommended by manufacturer.
- C. Do not install solvent curing sealants in enclosed building spaces.

#### 1.7 WARRANTY

- A. Special Warranty: Repair or replace joint sealers that fail to perform as intended, because of leaking, crumbling, hardening, shrinkage, bleeding, sagging, staining and loss of adhesion.
  - 1. Special Warranty Period: Three years.

### **PART 2 - PRODUCTS**

#### 2.1 MATERIALS

- A. Non-Elastomeric Sealants:
  - 1. Acrylic-Emulsion Sealant: ASTM C834 acrylic or latex-rubber-modified acrylic sealant, permanently flexible, non-staining, and non-bleeding; recommended for general interior exposure; compatible with paints specified in Section 09 91 90.
    - a. Provide at general interior applications.
    - b. Manufacturers:
      - 1) Pecora Corp./AC-20.
      - 2) Sonneborn Division of ChemRex/Sonolac.
      - 3) Tremco/Ultrem 1500
      - 4) Substitutions: Refer to Section 01 25 13.
- B. Miscellaneous Materials:
  - 1. Primers/Sealers: Non-staining types recommended by joint sealer manufacturer for joint surfaces to be primed or sealed.



2. Joint Cleaners: Non-corrosive types recommended by joint sealer manufacturer; compatible with joint forming materials.
  3. Bond Breaker Tape: Polyethylene tape as recommended by joint sealer manufacturer where bond to substrate or joint filler must be avoided for proper performance of joint sealer.
  4. Sealant Backer Rod: Compressible polyethylene foam rod or other flexible, permanent, durable non-absorptive material as recommended by joint sealer manufacturer for compatibility with joint sealer.
    - a. Oversize backer rod minimum 30% to 50% of joint opening.
- C. Colors: Provide colors indicated or as selected by Architect from manufacturer's full range of colors.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Prepare joint surfaces in accordance with ASTM C1193 and as recommended by joint sealer manufacturer.
- B. Clean joint surfaces immediately before installation of joint sealer; remove dirt, insecure materials, moisture, and other substances that could interfere with bond of joint sealer.
- C. Prime or seal joint surfaces where it is recommended by joint sealer manufacturer; do not allow primer/sealer to spill or migrate onto adjoining surfaces.
- D. Ensure protective coatings on surfaces in contact with joint sealers have been completely stripped.

#### **3.2 INSTALLATION**

- A. Comply with manufacturer's printed instructions and ASTM C1193, except where more stringent requirements are shown or specified.
- B. Set sealant backer rods at proper depth or position in joint to coordinate with other work, including installation of bond breakers and sealant; do not leave voids or gaps between ends of backer rods.
  1. Do not stretch, twist, puncture, or tear backer rods.
- C. Install bond breaker tape where required by manufacturer's recommendations to ensure joint sealers will perform properly.
- D. Size materials to achieve required width/depth ratios.
- E. Employ installation techniques that will ensure joint sealers are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of bond surfaces equally on opposite sides.
- F. Joint Configuration: Fill sealant joint to a slightly concave surface, slightly below adjoining surfaces, unless otherwise indicated.

- G. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture or dirt.
- H. Install joint sealers to depths recommended by joint sealer manufacturer but within the following general limitations, measured at center (thin) section of bead.
  - 1. Horizontal Joints: 75% width with minimum depth of 3/8".
  - 2. Elastomeric Joints: 50% width with minimum depth of 1/4".
  - 3. Non-Elastomeric Joints: 75% to 125% of joint width.
- I. Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces.
  - 1. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
- J. Cure joint sealers in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength, and surface durability.
- K. Maintain finished joints free of embedded matter, ridges, and sags.

### 3.3 CLEANING AND REPAIRING

- A. Clean all work and adjacent soiled surfaces.
- B. Repair or replace defaced or disfigured finishes caused by work of this Section.

### 3.4 PROTECTION OF FINISHED WORK

- A. Protect sealants until cured.

**END OF SECTION**

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HOLLOW METAL FRAMES

SECTION 08 11 00

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes: Provide steel frames, including anchors and silencers.
  - 1. Pressed steel frames include both door and window framing.

1.2 REFERENCES

- A. Steel Door Institute (SDI): SDI-100 (ANSI/SDI A250.8) - Recommended Specifications - Standard Steel Doors and Frames.
- B. National Association of Architectural Metal Manuf. (NAAMM): Hollow Metal Manual.
- C. ASTM E152: Methods of Fire Test of Door Assemblies.
- D. NFPA 105: Smoke Control Guide
- E. ANSI 117.1: Handicap Code
- F. Underwriters Laboratories: Standards as applicable to fire rated doors and frames.
  - 1. Materials tested, labeled, and inspected by Warnock Hersey International are acceptable upon approval of authorities.
- G. All fire rated doors, frames, and windows shall conform to and shall comply with the California Building Code as adopted. They shall bear an appropriate UL or WH label.

1.3 SUBMITTALS

All submittals shall be made under the provisions of Section 01 33 00.

- A. Shop Drawings
  - 1. Submit complete shop drawings listing openings numerically by architect's opening numbers showing product construction, sizes, anchors, reinforcing, cutouts, elevations, and finish.
  - 2. Submit notes with shop drawings indicating items that vary from plans and specifications, have conflicts for label compliance, are not in compliance with standards referenced above, have door, frame, hardware, or function conflicts, or require review and clarification by architect.
- B. Installation Instructions
  - 1. Submit installation instructions or field delivery receipt.
  - 2. Instructions for installation, maintenance, and preparation for field painting supplied with delivery of material to jobsite.
- C. Schedule: Prepared by supplier, using same reference numbers for details and openings as those on Drawings.

1.4 DELIVERY, STORAGE AND PRODUCT PROTECTION

- A. Doors and Frames will be delivered to the job site undamaged with the doors properly protected by cardboard and plastic covering and shall be stored in upright positions, 4 inches off the floor or ground with proper separation for air circulation and shall be stored inside or under complete weather protection. Damage not acknowledged at delivery shall be considered job site damage and the responsibility of the contractor.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
1. Curries
  2. Steelcraft
  3. The Ceco Corporation

- B. Or accepted equal.

2.2 MATERIALS

- A. Frames:

1. Welded (pre-assembled) type; minimum 14 gage, galvanized.
  - a. Frames shall be full face welded, square, accurately sized and have a welded spreader bar at the base for field removal. Acceptable tolerances per SDI 117.
2. Door Silencers: Manufacturer's standard resilient type; removable for replacement.

- B. Glazing Stops: Full flush type with glass centered in opening, unsecured side integral with unit, secured side fastened with flush, countersunk Allen type fasteners; minimum 16 gage.

- C. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
  - a. Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    - 1) Three anchors per jamb up to 60 inches high
    - 2) Four anchors per jamb from 60 to 90 inches high
    - 3) Five anchors per jamb from 90 to 96 inches high
    - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high
    - 5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

- D. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
  - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
  - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.
- E. Door Louvers: Weatherproof Z-shaped blades with U-shaped frames; 1-3/8" thick; blades 1-1/2" on center; 16 gage welded construction.
  - 1. Provide removable bird screens on interior faces, 1/2" x 1/2" bronze wire mesh.

### 2.3 FABRICATION

- A. Conform to requirements of SDI (ANSI A250 Series) or NAAMM.
- B. Reinforce and prepare frames to receive hardware.
  - 1. Refer to Section 08 71 00 for hardware requirements.
  - 2. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  - 3. Reinforce frames to receive non-templated, mortised and surface-mounted door hardware.
  - 4. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
- C. Frames:
  - 1. Welded Frames: Accurately form and cut mitered corners of welded type frames; weld on inside surfaces; grind welded joints to smooth uniform finish.
  - 2. Head Reinforcement: Reinforce frames wider than 4'-0" with minimum 12 gage formed steel channels welded in place, flush with top of frames.
  - 3. Doors at Glazed Panels: Reinforce jambs and heads of frames for doors which occur adjacent to glazed sidelights and partitions.
- D. Door Silencers:
  - 1. Place minimum three single bumpers on single door frames; space equally along strike jambs.
  - 2. Place minimum of two single bumpers on double door frames; place on frame heads.
- E. Provide jamb anchors per SDI-100 (ANSI/SDI 250.8) and NAAMM, weld floor jamb anchors in place.
- F. Provide double doors tested and approved without astragals.
- G. Edge Clearances:
  - 1. Between Doors and Frames: Maximum 1/8" at head and jambs.
  - 2. Door Sills (No Threshold): Maximum 3/8".
  - 3. Door Sills (Threshold): Maximum 3/4" above finished floor.
  - 4. Between Edges of Pairs of Doors: Maximum 1/8".

- H. Finish: Comply with requirements of Section 09 90 00 for primer including application and compatibility with specified finishes.
  - 1. Interior Units: Prime paint.
  - 2. Exterior Exposed Units: Apply minimum A60 non-spangle galvanized coating, ASTM A924 and A653.
    - a. Surface treat after galvanizing to remove oils and prepare for painting and apply one coat of primer; comply with requirements in Section 09 90 00 – Painting and Coating.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install frames in accordance with SDI-100 (ANSI/SDI A250.8) and ANSI/SDI A250.11 or NAAMM "Hollow Metal Manual" and with manufacturer's recommendations and installation instructions.
  - 1. Install fire rated units in conformance with fire label requirements and NFPA 80.
- B. Install frames plumb and square, and with maximum diagonal distortion of 1/16".
  - 1. Coordinate hardware installation with requirements of Section 08 71 00.
  - 2. Coordinate glass installation with requirements of Section 08 80 00.
- C. Remove and replace frames damaged during delivery, storage, installation, and construction.
  - 1. Paste filler repair shall not be permitted.
- D. After installation, touch-up scratched paint surfaces.

**END OF SECTION**

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WOOD DOORS  
SECTION 08 14 00

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**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Flush wood doors – rated and non-rated.
- B. Door glazing.

1.2 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 “References” for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
  - 1. ANSI/WDMA I.S.1-A – Architectural Wood Flush Doors.
  - 2. ASTM F152 – Standard Test Methods for Tension Testing of Nonmetallic Gasket Materials.
  - 3. AWI Quality Standards for Wood Doors (AWI Section 1300 – Flush Wood Doors).
  - 4. California Referenced Standard Code – SFM Standard 12-7-4, Fire Door Assembly Tests.
  - 5. ITS Directory of Listed Products.
  - 6. UL 10B – Fire Tests of Door Assemblies.
  - 7. WI/AWI Architectural Woodwork Standards, including Supplemental Text.

1.3 SUBMITTALS

- A. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, fire ratings, swings, undercuts required, special beveling, special blocking for hardware and identify cutouts for glazing and louvers.
- B. Product Data: Indicate door core materials and construction; veneer species, type, and characteristics; factory machining criteria, factory finishing criteria.
- C. Samples: Submit two samples of door veneer, 8” x 10” in size illustrating wood species, grain, and color.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with WI, Section 9, Custom Grade.

1.5 REGULATORY REQUIREMENTS

- A. Fire Door Construction: Conform to California State Fire Marshal Standard 12-7-4.
- B. Fire-Rated Doors: All fire rated doors shall have metal labels (including “S” labels) permanently fastened to the hinge stile indicating the fire rating and Testing Agency name. Do not apply primer or finish over fire rating labels.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this Section.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Accept doors on site in manufacturer's packaging. Inspect for damage.
- B. Comply with requirements in ANSI/WDMA I.S.1 A: How to store, handle, finish, install and maintain wood doors.
- C. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.
- D. Store flat on a level surface in a dry, well-ventilated building. Cover to keep clean but allow air circulation.
- E. Handle with clean gloves and do not drag doors across one another or across other surfaces.
- F. Do not subject door to abnormal heat, dryness or humidity.
- G. Deliver in clean trucks and, in wet weather, under cover.

1.8 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.9 COORDINATION

- A. Coordinate the work with door opening construction, doorframe, door hardware, door glazing and door louver installation.

1.10 WARRANTY

- A. Provide warranty to the following term:
  - 1. Interior Solid Core Doors: Lifetime.
- B. Include coverage for delamination of veneer, warping or twisting (not to exceed 1/4" in any face including diagonal) or other defects. Warranty shall cover replacement of door plus costs of hanging and finishing.

**PART 2 PRODUCTS**

2.1 MANUFACTURERS

- A. Western Oregon Door, Inc.
- B. Marshfield Door Systems
- C. Mohawk Flush Doors, Inc.
- D. VT Industries.
- E. Graham.
- F. Or accepted equal.



## 2.2 DOOR CONSTRUCTION

- A. All doors shall be 1-3/4" thickness, unless noted otherwise.
- B. Solid, non-rated particleboard core: WI Section 12, 5- or 7-ply; Custom Grade standards shall prevail.
- C. Solid, 20-minute rated particleboard core: WI Section 12, 5- or 7-ply, Custom Grade.
- D. Solid, 45-, 60- and 90-minute rated mineral core: WI Section 12. Stile edges shall be a minimum of 1" before trim on hinge side and 3/4" on lock side, including 1/4" outer edge band of hardwood.
- E. Faces: Plain sliced, stain grade cherry veneer for custom finish to match existing wood doors. Use solid stock for exposed edges to match face veneer. Face veneers for pairs of doors shall be selected for color and grain match. Face veneers shall not be less than 1/50" at 12% MC after factory sanding. Crossbanding shall be hardwood, MDF will not be allowed as a veneer substrate (crossband). Thin veneers are not acceptable.
- F. Top and bottom rails shall be a minimum of 2-1/4" before trimming, mill option species solid lumber for 20 minute rated and non-rated doors.
- G. Provide solid firestop blocking on fire-rated doors with surface mounted hardware or closers, for attachment with screws in lieu of through-bolts.
- H. Fire Resistive Doors with 20-minute Fire Rating (positive pressure): Construction shall have fire rating of not less than 20 minutes when tested in accordance with SFM Standard 12-7-4.
- I. Fire Resistive Doors with 3/4 Hour or Longer Fire Ratings (positive pressure): Meet requirements of SFM Standard 12-7-4, UL 10 (b)-80 and ASTM F152 for fire rating noted.

## 2.3 ADHESIVE

- A. Facing Adhesive: Type I – waterproof.

## 2.4 ACCESSORIES

- A. Glass Glazing: Comply with wood door manufacturer's written instructions.
- B. Glazing Stops: Anemostat Model LoPro, Air Louver, or accepted equal. Factory primed, galvanized steel; mitered corners; prepared for countersink style screws. Sizes as indicated on the Drawings. Install glazing stop fasteners on the non-secure side of doors. Finish in custom color as selected by Architect
  - 1. At fire-rated doors, fire-rating of glazing stops shall match door fire-rating.

## 2.5 FABRICATION

- A. Fabricate non-rated doors in accordance with WI/AWI Architectural Woodwork Standards requirements.
- B. Provide blocking at top of door for closer for attachment with screws.
- C. Bond edge banding to cores.
- D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- E. Glass Cutouts: Provide cutouts for glass of size and shape indicated.
- F. Louver Cutouts: Provide cutouts for louvers of size and shape indicated.
- G. Factory seal top and bottom rails before shipment.

- H. Bevel both stiles 1/8" in 2" (3° bevel) and undersize doors 1/4" in width so that they swing freely and do not hinge bind.

2.6 FINISH

- A. All doors shall be factory pre-finished, equal to WI Section 5, System #3, or accepted equal. Transparent finish, stain color and tone as selected by Architect and accepted on submitted sample. Apply seal coat at all edges of doors prior to final installation.

**PART 3 EXECUTION**

3.1 EXAMINATION

- A. Verify frame opening conditions.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION

- A. Install rated and non-rated doors in accordance with WI Section 12 requirements, SFM Standard 12-7-4, and UL or Intertek Testing Services (ITS) requirements.
- B. Where required, trim non-rated door width by cutting equally on both jamb edges.
- C. Where required, trim door height by cutting bottom edge to a maximum of 3/4" above finished floor or threshold.
- D. Pilot drill screw and bolt holes.
- E. Machine cut for hardware. Core for handsets and cylinders.
- F. Coordinate installation of doors with installation of frames specified in Section 08 11 13 "Hollow Metal Doors and Frames", hardware specified in Section 08 71 00 "Door Hardware", glazing as specified in Section 08 81 00 "Glass Glazing", and louvers as specified in this Section.

3.3 INSTALLATION TOLERANCES

- A. Maximum Diagonal Distortion (Warp): 1/4" measured with straight edge or taught string, corner to corner, over an imaginary 36" x 84" surface area.
- B. Maximum Vertical Distortion (Bow): 1/4" measured with straight edge or taught string, top to bottom, over an imaginary 36" x 84" surface area.

3.4 ADJUSTING

- A. Adjust door for smooth and balanced door movement, and wipe clean.

**END OF SECTION**

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DOOR HARDWARE

SECTION 08 71 00

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes: Provide hardware for hollow metal, aluminum, and wood doors.

1.2 QUALITY ASSURANCE

- A. Access for Persons with Disabilities: Comply with California Code of Regulations, Title 24, and Americans with Disabilities Act Accessibility Guidelines (ADAAG).
- B. Supplier: Recognized builders' hardware supplier with minimum five years successful experience in scheduling and furnishing hardware; factory-authorized to distribute specified hardware.
1. Provide services of architectural hardware consultant to supervise hardware supply, as directed.
  2. Coordinate work of this Section with others directly affected.
  3. Send templates within 10 days of hardware schedule approval.
- C. Products: Provide each type of hardware (hinges, pivots, locksets, latchsets, closers, trim) from single manufacturer unless otherwise indicated in Hardware Schedule.
- D. Existing hardware that is to be removed and re-used is to be maintained in the current condition. Any existing hardware that is damaged during construction is to be replaced.

1.3 REFERENCES

- A. ANSI A115 and A115W Series: Door and Frame Preparation Standards.
- B. ANSI A156.1 through A156.20: Standards for various hardware items.
- C. National Fire Protection Association: NFPA 80, 101,105.
- D. California Code of Regulations: Title 24, Part 2, California Building Code.
- E. Americans with Disabilities Act Accessibility Guidelines (ADAAG).

1.4 SUBMITTALS

- A. Hardware Schedule: Prepare a vertical schedule of hardware:
1. Door numbers must be in numerical sequence.
  2. List each opening, door size, door hand, door and frame material, description of to and from, manufacturer's numbers, and finish.

3. Hardware supplier shall retype schedule when changes occur during the project and supply new schedules, at no additional expense.
- B. Shop Drawings: Indicate locations and mounting heights of hardware.
1. Supply templates to door and frame manufacturers for proper and accurate sizing and locations of cut-outs for hardware.
- C. Product Data: Submit catalog cuts for each type of hardware.
1. Keying Schedule: Coordinate with the Architect.
- 1.5 KEYING CONFERENCE
- A. Upon receipt of approved Hardware Schedule, architectural hardware consultant shall attend keying conference with Owner and Architect.
- 1.6 WIRELESS ENTRY LICENSES
- A. Provide (25) licenses and training to enroll (25) users to the ENGAGE cloud-based mobile and web application for NDE Series wireless locksets.
- 1.7 OPERATION AND MAINTENANCE DATA
- A. Provide manufacturer's parts list and maintenance instructions for each type of hardware supplied and necessary wrenches and tools required for proper maintenance of hardware.
- 1.8 DELIVERY, STORAGE AND HANDLING
- A. Deliver hardware in manufacturer's original packages, marked for intended opening and use.
- B. Pack complete with necessary screws, bolts, keys, instructions, and installation template, if necessary, for spotting mortising tools.
- C. Upon delivery, furnish complete list of hardware for checking, clearly marked to correspond with marking on each package.
1. Review list for completeness and accuracy.
- 1.9 WARRANTY
- A. Provide 1-year warranty covering products and workmanship. Warranty period for closers shall be 10 years.
- 1.10 MAINTENANCE MATERIALS
- A. Contractor will provide the owner with all wrenches and tools which were included with hardware including extra screws.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. General: Provide complete hardware with accessories as required for doors and applications indicated.

- B. Acceptable Manufacturers: Provide manufacturers specified and manufacturers listed in Hardware Schedule, with references to catalog numbers and designations.
- C. Templates: Furnish templates or physical hardware items to manufacturers concerned sufficiently in advance to avoid delay in Work.
- D. Reinforcing Units: Furnished by door manufacturer, coordinated by hardware manufacturer.
- E. Fasteners: Furnish as recommended by manufacturer and as required to install secure hardware.
  - 1. Finish: Match hardware.
  - 2. Furnish screws for items applied on gypsum board sufficiently long to provide solid connection to framing or backing
- F. Electrical and Mechanical: Make provisions and coordinate requirements for mechanical and electrical devices in connection with hardware.

## 2.2 HARDWARE ITEMS

- A. Review Drawings for hardware group locations and door types; where not fully covered in Hardware Schedule, comply with following general requirements; inform the owner where conflicts occur.
  - 1. Provide hardware items with accessories complete to function as intended.
- B. Hinges and Butts: ANSI A156.1; comply with following unless otherwise indicated.
  - 1. Acceptable Manufacturers:
    - a. Ives.
    - b. Stanley Hardware Division of Stanley Works. (Hardware Schedule symbol: "ST").
    - c. C. McKinney
    - d. Or accepted equal.
  - 2. Provide minimum 3 hinges to 90" high, 4 hinges to 120" high for each door leaf, unless otherwise indicated.
  - 3. Provide nonferrous butts with non-removable pins at exterior and locked out-swinging doors, non-rising at interior doors; stainless steel where labeled; steel butts at labeled interior doors.
  - 4. Provide ball bearing or oilite bearing hinges at doors with closers.
  - 5. Tips: Flat button tips with matching plug.
- C. Locking Devices: Provide of metal matching specified finish; interior parts of steel and zinc-dichromate plating, to resist rusting and corrosion; do not supply plastic, die-cast, or aluminum mechanisms.
  - 1. Acceptable Manufacturers:
    - a. Sargent
    - b. Schlage Lock Co.
    - c. Or accepted equal.

2. Type:
    - a. Mortise Locksets: ANSI A156.13, Series 1000, Grade 1, Mortise Type with 6 pin tumbler cylinders, except where otherwise indicated in Hardware Schedule.
    - b. Cylindrical Locksets: ANSI A156.2, Series 4000, Grade 1, Bored Type (cylindrical) with 6 pin tumbler cylinders, except where otherwise indicated in Hardware Schedule.
  3. Lockset and Latchset Design: Solid lever with escutcheon, as selected by Architect.
  4. Backset: 2-3/4".
  5. Strikes: Furnish standard strikes with extended lips where required to protect trim from being marred by latch bolt; verify type of cutouts provided in metal frames.
- D. Cylinders, Keys, and Keying: Hardware manufacturers shall provide for grand master, master key alike or key different keying as directed by the owner.
1. Provide cylinders of extruded brass bar material.
  2. Provide construction cylinders for doors requiring locking during construction; construction cylinders shall be removed and replaced just prior to owner occupancy.
  3. Submit keys for final use to owner; provide not less than two keys for each lockset, five of each type and level of master key, five grand master keys, all stamped "DO NOT DUPLICATE"; and 5% extra blanks.
  4. Hardware manufacturers shall key and register lock cylinders.
  5. Key Control System: Provide complete key control system with identification and storage capacity suitable for Project.
- E. Other Hardware: Provide as indicated, as specified, as included in Hardware Schedule, and as required for complete installation.
1. Acceptable Manufacturers:

PRODUCT	MANUFACTURER	APPROVED SUBSTITUTIONS
HINGES	STANLEY	HAGER, IVES
LOCKS & LATCHES	SCHLAGE "ND"	NONE
ELECTRIC STRIKES	HES	VON DUPRIN
CLOSERS	LCN 4040XP	NONE
OVERHEAD STOPS	GLYNN JOHNSON	RIXSON
WALLSTOPS	IVES	HAGER, TRIMCO
FLOORSTOPS	TRIMCO	HAGER, IVES
SEALS	NGP	PEMKO, ZERO

2. Weatherstripping: Provide continuous weatherstripping at top and sides of exterior doors.
3. Sound Gasketting: Continuous at top and sides of doors, where indicated.

## 2.3 FINISHES

- A. Finishes are identified in the Hardware Schedule included in this Section, but generally brushed chrome unless otherwise noted.

### **PART 3- EXECUTION**

#### **3.1 INSTALLATION**

- A. Install finish hardware specified under this Section, coordinate with manufacture and installation of doors and frames.
- B. Fit hardware prior to painting, then remove for painting of doors and frames before final installation of hardware.
- C. Install hardware in accordance with manufacturer's instructions and DHI installation guide for doors and hardware.
- D. Fasteners: Use only manufacturers supplied fasteners. Drill and tap at metal and pilot holes at wood. No Tek type screws are acceptable.
- E. Installers qualifications
  - 1. Approved by supplier.
- F. Install finish hardware before painting for accurate fit and then remove for painting and reinstall after final painting.
- G. Adjust closers to conform with ADA and California Title 24.
- H. Hardware supplier shall visit jobsite prior to ordering hardware to verify compatibility of new hardware specified on existing doors and frames.
- I. No extra cost will be allowed because of changes or corrections necessary to facilitate installation of hardware.

#### **3.2 MOUNTING POSITIONS**

- A. Heights given are center line heights from finished floor.
  - 1. Locks and Latches: 38" to center of lever.
  - 2. Door Pulls: 42" to center of grip.
  - 3. Push Plate: 42"; coordinate with pull location.
  - 4. Push-Pull Bar: 42" to center of bar.
  - 5. Top Hinge: To jamb manufacturer's standard, but not greater than 10" from head of frame to center line of hinge.
  - 6. Bottom Hinge: To jamb manufacturer's standard, but not greater than 12-1/2" from floor to center line of hinge.
  - 7. Intermediate Hinges: Equally spaced between top and bottom hinges and from each other.
  - 8. Hinge Mortise on Door Leaf: 1/4" to 5/16" from stop side of door.
  - 9. Dead Bolt: Not more than 44" from floor to operating lever.

- B. Comply with recommendations of Builders Hardware Manufacturers Association, subject to approval, for heights of items not indicated.

3.3 ADJUSTMENT

- A. After air supply is turned on, qualified hardware supplier's or manufacturer's representatives shall inspect installation and adjust.
  - 1. Adjust closers, locks, and critical operational hardware.
  - 2. Deliver instructions for maintenance and future adjustments to the owner's representative.

3.4 CERTIFICATION

- A. At the completion of the Project and prior to final closeout, the hardware consultant shall visit the project and inspect all hardware installed. Consultant shall advise the owner by letter that all hardware is per specification, properly installed and correctly adjusted, or note matters that require correction. Failure to perform these obligations after notification shall result in the hiring of an outside consultant, at Contractor's expense.

3.5 HARDWARE SCHEDULE

- A. The Hardware Schedule establishes a type and standard of quality.
- B. Examine Drawings and Specifications and furnish proper hardware for door openings, whether listed or not.
- C. Bring omissions to attention of the Architect prior to bid opening for instructions; otherwise, list will be considered complete; no extras will be allowed.
- D. Hardware Schedule by Groups:

**GROUP 1**

DOOR 126.1

3 EA.	HINGES FBB168 4.5 X 4.5	652
1 EA.	ENTRY LOCK ND53R RHO (VERIFY KWY)	626
1 EA.	CLOSER 4040XP RWPA TBSRT	ALUM
1 EA.	OVERHEAD STOP 100S @ 90DEG	630
1 EA.	KICKPLATE 8400 10" X 2" LDW B-CS	630
1 SET	SEALS 5040B	BROWN

**GROUP 2**

DOOR 126.2, 126.3

3 EA.	HINGES FBB168 4.5 X 4.5	652
1 EA.	CARD READER BY ACCESS CONTROL PROVIDER	
1 EA.	DPS BY ACCESS CONTROL PROVIDER	
1 EA.	POWER SUPPLY BY ACCESS CONTROL PROVIDER	
1 EA.	STOREROOM LOCK ND80R RHO (VERIFY KWY)	626
1 EA.	ELECTRIC STRIKE 1006CS 12/24V	630
1 EA.	CLOSER 4040XP EDA TBSRT	ALUM
1 EA.	KICKPLATE 8400 10" X 2" LDW B-CS	630
1 EA.	FLOOR STOP 1211	626
1 SET	SEALS 5040B	BROWN

**NOTE OF OPERATION:** PRESENTING AUTHORIZED CREDENTIAL TO CARD READER ENERGIZES ELECTRIC STRIKE AND ALLOWS DOOR TO OPEN FOR ENTRY. LOSS OF POWER REQUIRES USE OF KEY TO GAIN ENTRY. DEPRESSING INSIDE LEVER ALWAYS ALLOWS FOR IMMEDIATE EGRESS.



**GROUP 3**

DOOR 126A.1, 126B.1, 126C.1, 128.1

3 EA.	HINGES FBB179 4.5 X 4.5	652	
1 EA.	ENTRY LOCK ND53R RHO (VERIFY KWY)	626	
1 EA.	WALLSTOP WS406/407CCV	630	
1 SET	SEALS 5040B		BROWN

**GROUP 4**

DOOR 126E.1, 126E.2

NO HARDWARE REQUIRED

**GROUP 5**

DOOR 126F.1

3 EA.	HINGES FBB168 4.5 X 4.5	652	
1 EA.	CARD READER BY ACCESS CONTROL PROVIDER		
1 EA.	DPS BY ACCESS CONTROL PROVIDER		
1 EA.	POWER SUPPLY BY ACCESS CONTROL PROVIDER		
1 EA.	STOREROOM LOCK ND80R RHO (VERIFY KWY)	626	
1 EA.	ELECTRIC STRIKE 1006CS 12/24V	630	
1 EA.	CLOSER 4040XP RWPA TBSRT		ALUM
1 EA.	KICKPLATE 8400 10" X 2" LDW B-CS	630	
1 EA.	WALLSTOP WS406/407CCV	630	
1 SET	SEALS 5040B		BROWN

**NOTE OF OPERATION:** PRESENTING AUTHORIZED CREDENTIAL TO CARD READER ENERGIZES ELECTRIC STRIKE AND ALLOWS DOOR TO OPEN FOR ENTRY. LOSS OF POWER REQUIRES USE OF KEY TO GAIN ENTRY. DEPRESSING INSIDE LEVER ALWAYS ALLOWS FOR IMMEDIATE EGRESS.

**GROUP 6**

DOOR 126I.1, 126I.2

3 EA.	HINGES FBB179 4.5 X 4.5	652	
1 EA.	PASSAGE ND10 RHO	626	
1 EA.	WALLSTOP WS406/407CCV	630	
1 SET	SEALS 5040B		BROWN

**END OF SECTION**

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GLAZING  
SECTION 08 80 00

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**PART 1 - GENERAL**

1.1 SUMMARY

A. Section Includes:

1. Provide miscellaneous glass and glazing for hollow metal work, windows and doors not provided elsewhere including accessories as required for complete installation.

1.2 REFERENCES

- A. Glass Association of North America (GANA): Glazing Manual and Sealant Manual.

1.3 SYSTEM DESCRIPTION

- A. Safety Glass Standard: CPSC 16 CFR 1201, ANSI Z97.1, and California Building Code Chapter 24.

1.4 SUBMITTALS

- A. All submittals shall be submitted under the provisions of Section 01 33 00.
- B. Product Data: Furnish for each type of glass, and each type of exposed glazing material.
- C. Samples: Furnish two 12 x 12 samples for each glazing type.

1.5 WARRANTY

A. Special Warranties

1. Special Warranty Period: Two years.

**PART 2 – PRODUCTS**

2.1 GLAZING MATERIALS

- A. Tempered Safety Glass: Select glazing quality, clear float glass, fully tempered, ASTM C1048, Kind FT; nominal thickness 1/4"; safety glass.
1. Manufacturers:
    - a. Ford Glass Division.
    - b. PPG Industries, Inc.
    - c. Substitutions: Refer to Section 01 25 13
  2. Locations: Provide at doors and at window openings where it is indicated on drawings and required by applicable codes and federal requirements.

## 2.2 FIRE-RATED GLAZING

- A. Manufacturer: FireLite® as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065; Ph: (800) 426-0279, Fax: (425) 396-8300, E-Mail: sales@fireglass.com, Web: <http://www.fireglass.com>.
- B. Passes positive pressure test standards UL 10C.
- C. Labeling: Permanently label each piece of FireLite® with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite® label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).
- D. Fire Rating: Fire rating classified and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with NFPA 257, UL 9 and UL 10B.
- E. Substitutions: No substitutions permitted.

## 2.3 GLAZING ACCESSORIES:

- A. Glazing Sealant: ASTM C920, Type S, Grade NS, elastomeric one-component silicone glazing sealants as recommended by sealant manufacturer for application involved.
  - 1. Manufacturers:
    - a. Dow Corning Corp.
    - b. General Electric Co.
    - c. Pecora Corp.
    - d. Substitutions: Refer to Section 01 25 13.
  - 2. Color: As selected by Architect from manufacturer's full range of available colors.
- B. Setting Blocks: 70-90 durometer hardness; 4" long by 3/8" thick by 1/4" high standard setting blocks.
- C. Spacer Shims: Silicone compatible, 50 durometer hardness; 3" long by 3/32" thick by 1/4" high.

## 2.4 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS (G5.1)

- A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.
- B. Glazing Compound: DAP 33 putty.
- C. [Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
  - 1. Dow Corning 795 - Dow Corning Corp.
  - 2. Silglaze-II 2800 - General Electric Co.
  - 3. Spectrem 2 - Tremco Inc.

- D. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Clean glazing channels and framing members to receive glass immediately before glazing; remove coatings not firmly bonded to substrate.
- B. Apply primer to joint surfaces where it is recommended by sealant manufacturer.

#### **3.2 INSTALLATION**

- A. Comply with GANA Glazing Manual and Sealant Manual and glazing manufacturer instructions.
  - 1. Do not allow glass to touch metal surfaces.
  - 2. Comply with NFPA 80 for glass in fire rated openings.
- B. Place setting blocks at quarter points in thin course of sealant.
- C. Install removable stops with glass centered in space with spacer shims at 2'-0" intervals on both sides of glass, 1/4" below sightline.
- D. Sealant at Glazing: Fill gap between glass and stops with sealant to depth equal to bite of frame on glass but not more than 3/8" below sightline.
  - 1. Apply sealant to uniform and level line, flush with sightline; tool or wipe sealant surface for smooth appearance; at exterior locations tool sealant so water is carried away from glass.

#### **3.3 CLEANING**

- A. Mark glass after installation by crossed streamers attached to framing and held away from glass; do not apply markers to surface of glass.
- B. Remove nonpermanent labels immediately after sealant cures, cure sealants for high early strength and durability.
- C. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged during construction period, including natural causes, accidents, and vandalism.

**END OF SECTION**

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GYPSUM BOARD ASSEMBLIES

SECTION 09 21 16

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes: Provide gypsum board systems including gypsum board, joint treatment, acoustical accessories, and general accessories for complete installation.

1.2 REFERENCES

- A. ASTM C754: Installation of Steel Framing Members to Receive Screw-Attached Gypsum Wallboard.
- B. ASTM C840: Application and Finishing of Gypsum Board.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: Perform gypsum board systems work in accordance with recommendations of ASTM C754 and ASTM C840 unless otherwise specified.
  - 1. Loads: Comply with California Building Code requirements for design of metal framing for gypsum board systems.
    - a. Deflection: Maximum L/240 typical, L/360 where plaster or tile is indicated.
  - 2. Seismic Requirements: Comply with code requirements for seismic bracing.
- B. Systems Responsibility: Provide products manufactured by or recommended by manufacturer of gypsum board to maintain single-source responsibility for system.
- C. Openings: Obtain dimensions and locations from other trades and provide openings and enclosures for accessories, specialties, equipment, and ductwork.

1.4 SUBMITTALS

All submittals shall be made under the provisions of Section 01 33 00.

- A. Product Data
  - 1. Provide product data on metal framing, gypsum board, joint tape, and decorative finish.
  - 2. Furnish manufacturer's certification indicating products comply with Contract Documents and applicable codes.

1.5 PROJECT CONDITIONS

- A. Do not begin installation of interior gypsum board until space is enclosed, space is not exposed to other sources of water, and space is free of standing water.
- B. Maintain areas to receive gypsum board at minimum 50-degree F for 48 hours prior to application and continuously after application until drying of joint compound is complete; comply with ASTM C840.

- C. Immediately remove from site gypsum board for interior use exposed to water, including gypsum board with water stains, with signs of mold, and gypsum board with mildew.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A. United States Gypsum Co., USG Corp.
- B. Georgia-Pacific Corp.
- C. National Gypsum Co.
- D. Or accepted equal.

### 2.2 MATERIALS

- A. Gypsum Board - Standard
  - 1. ASTM C1396, TYPE X, FIRE RATED, 5/8" thick paper faced gypsum panels with tapered edges.
- B. Moisture Resistant Gypsum Board
  - 1. Equal to Georgia Pacific Corp. "Dens-Armor Plus High Performance" 5/8" thick fiberglass faced, treated gypsum panels with tapered edges. Fire rated Type X.
- C. Gypsum Board Accessories: Comply with ASTM C840.
  - 1. Gypsum board sealer: Provide one Coat "Hamilton Prep Coat Plus" prior to application of gypsum board texture.
  - 2. Provide protective coated steel corner beads and edge trim; type designed to be concealed in finished construction by tape and joint compound.
  - 3. Corner Beads: Manufacturer's standard metal beads.
  - 4. Edge Trim: "J", "L", "LK", or "LC" casing beads – manufacturer's standard.
  - 5. Reinforcing Tape, Joint Compound, Adhesive, Water, Fasteners: Types recommended by system manufacturer and conforming to ASTM C475.
    - a. Typical Joint Compound: Chemical hardening type for bedding and filling, ready-mixed or powder vinyl type for topping.
  - 6. Control Joints: Back-to-back casing beads.
    - a. Back control joints with 4 mil thick polyethylene air seal.
  - 7. Reveals: Extruded aluminum special trim pieces in manufacturer's standard or custom shapes to conform to configurations and dimensions indicated.
    - a. Manufactures:
      - 1) Fry Reglet Corp./Drywall Moldings.

- 2) MM Systems Corp./Drywall Moldings.
- 3) Gordon Inc./Final Forms I Drywall Trims.
- 4) Substitutions: Refer to Section 01 62 00.

- D. Gypsum Board Texture: Equal to USG "Sheetrock Brand" ready mixed wall and ceiling spray texture.
- E. Acoustic Sealant: Serious Energy "Quiet Seal Pro", non-hardening, gun grade sealant per ASTM C834.
- F. Electrical Box Pads: Provide at outlet, switch, and telephone boxes in all walls.

### **PART 3 - EXECUTION**

- A. Gypsum Board Installation: Install in accordance with ASTM C840 and manufacturer's recommendations.
1. Use screws when fastening gypsum board to furring and to framing.
  2. Erect gypsum board with ends and edges occurring over firm bearing.
    - a. Ensure joints of second layer do not occur over joints of first layer in double layer applications.
  3. Place control joints to be consistent with lines of building spaces and as directed by Architect.
    - a. Provide where system abuts structural elements.
    - b. Provide at dissimilar materials.
    - c. Lengths exceeding 30'-0" in partitions.
    - d. Ceiling areas exceeding 50'-0" or 2500 square feet.
    - e. Wings of "L", "U" and "T" shaped ceilings.
  4. Place corner beads at external corners; use longest practical lengths.
  5. Place edge trim where gypsum board abuts dissimilar materials.
  6. Tape, fill, and sand exposed joints, edges, corners, and openings to produce surface ready to receive finishes, feather coats onto adjoining surfaces.
  7. Finishing: Comply with Gypsum Association (GA) "Levels of Gypsum Board Finish".
    - a. GA Level 4 (Typical): Provide three coat finishing and sanding is required for surfaces indicated to be painted; provide flush, smooth joints and surfaces ready for applied paint finishes.
    - b. Texture: Smooth.
  8. Remove and replace defective work.

**END OF SECTION**

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NON-STRUCTURAL METAL FRAMING

SECTION 09 22 16

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**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Section includes metal stud framing and accessories.

1.2 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
  - 1. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 2. ASTM A924/A924M – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
  - 3. ASTM C645 – Standard Specification for Nonstructural Steel Framing Members.
  - 4. ASTM C754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
  - 5. ASTM C1513 – Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
  - 6. SSPC Paint 20 – Zinc Rich Primers.

1.3 SYSTEM DESCRIPTION

- A. Interior Walls: Metal stud framing system with batt type acoustic insulation and interior gypsum board
- B. Maximum Allowable Deflection:
  - 1. 1:120 span at gypsum board finish.
  - 2. 1:240 span ceramic tile finishes.
- C. Wall and Ceiling Systems:
  - 1. Design to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. Indicate component details, stud layout, framed openings, anchorage to structure, type and location of fasteners and accessories or items required of other related work.
  - 2. Describe method for securing studs to tracks, splicing and for blocking and reinforcement to framing connections.



- B. Product Data: Submit data describing standard framing member materials and finish, product criteria, load charts and limitations.
- C. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C754.
- B. Comply with 2016 CBC, Chapter 22A, Section 2210A.
- C. Form, fabricate, install, and connect components in accordance with ML/SFA 540.

#### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section.
- B. Installer: Company specializing in performing Work of this Section.

### **PART 2 PRODUCTS**

#### 2.1 METAL FRAMING SYSTEM

- A. Manufacturers:
  - 1. Clark Dietrich Building Systems
  - 2. Marino/Ware
  - 3. CEMCO
  - 4. Or accepted equal.

#### 2.2 COMPONENTS

- A. Framing System Components: ASTM C645.
  - 1. 16 Gauge and heavier,  $F_y = 50$  ksi
  - 2. 18 Gauge and lighter,  $F_y = 33$  ksi Minimum.
- B. Studs and Joists: ASTM A653/A653M non-load bearing rolled steel, channel shaped, punched for utility access, depths and gauges and spacing as indicated on the drawings.
- C. Tracks and Headers: Same material and thickness as studs, bent leg retainer notched to receive studs. Ceiling Runners: With extended leg retainer.
- D. Slotted Track: Slotted track system for positive attachment of metal studs to track, for Head of Wall expansion joint movement (cyclic) and static Joint System in fire-rated construction, as detailed and required on Drawings, in compliance with UL 2079 cyclical movement  $\pm 1/2$  inch overall 1" movement: Slp-Trk as manufactured by Dietrich Industries, Inc.
  - 1. Forming Steel shall conform to ASTM A653, Grade 33 with a minimum yield point of 33,000 psi.
  - 2. Formed Steel shall be galvanized in accordance with ASTM A924 for a Class G60 by the hot dip process.
  - 3. Slotted track shall be provided in standard widths and gauges, as required, and indicated on Drawings. Down standing legs shall be nominally 2-1/2" and shall be provided with 1-1/2" slots at 1" on center.

4. Fasteners:
  - a. For attachment of studs to slotted track, minimum No. 8 corrosion resistant by 1/2-inch waferhead screws.
  - b. For attachment of Slotted Track to overhead structural element, as provided for the structural details affecting the work.
- E. Furring and Bracing Members: Minimum 18-gauge steel in sizes and shapes as indicated on Drawings and to suit application.
- F. Fasteners: ASTM C1513, self-drilling, self-tapping corrosion resistant screws.
- G. Sheet Metal Backing: As indicated on the drawings.
- H. Anchorage Devices: As indicated on the drawings.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type II Organic zinc rich.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Coordination and project conditions.
- B. Verify rough-in utilities are in proper location.

#### **3.2 INSTALLATION**

- A. Align and secure top and bottom runners as indicated on Drawings.
- B. Place two beads of acoustic sealant between runners and substrate, studs, and adjacent construction, to achieve acoustic seal.
- C. Place two beads of acoustic sealant between studs and adjacent vertical surfaces to achieve acoustic seal.
- D. Framing at openings shall be as shown on Drawings. Install intermediate studs at same spacing as wall studs.
- E. Install studs vertically at 16" unless otherwise noted on drawings.
- F. Install joists horizontally at 16" unless otherwise noted on drawings.
- G. Align stud web openings horizontally.
- H. Secure studs to tracks as indicated on Drawings.
- I. Stud splicing not permissible.
- J. Fabricate corners using minimum of three studs.
- K. Double stud at wall openings and door and window jambs, not more than 2" from each side of openings.
- L. Brace stud framing system rigid.
- M. Coordinate erection of studs with requirements of door frames and window frames; install supports and attachments.

- N. Backing/Blocking: Shall be provided for all wall and ceiling finishes and for the supporting and anchorage of products, fixtures, and equipment for all trades, including, but not limited to, casework, mirrors, trim, applied wall finishes, artwork, wall bumpers, downspout straps, plumbing and electrical fixtures, etc. Coordinate size, type, and location of backing and supports with manufacturer or supplier of items requiring backing/blocking.
- O. Refer to Drawings for indication of partitions extending stud framing through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Install extended leg ceiling runners.
- P. Coordinate placement of insulation in stud spaces after stud frame erection.

3.3 ERECTION TOLERANCES

- A. Maximum Variation from Indicated Position: 1/8" in 10' (non-cumulative).
- B. Maximum Variation from Plumb: 1/8" in 10' (non-cumulative).

**END OF SECTION**

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ACOUSTIC CEILINGS

SECTION 09 51 13

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes: Provide acoustical ceiling systems with exposed suspended metal grid system, trim, and accessories as required for complete finished installation.

1.2 SYSTEM DESCRIPTION

- A. Seismic Design Requirements: Comply with California Building Code requirements for seismic bracing of ceiling suspension system, and with ASTM E580.
  - 1. Ceiling Struts: Provide struts as detailed on Drawings and as required by code, placed maximum 12'-0" on center in both directions and within 6'-0" of each wall.
  - 2. Slack Wires: Provide safety slack wires, two per fluorescent fixture on diagonally opposite corners and a single wire for each recessed down light.
- B. Fire Performance Characteristics: Provide products listed by Underwriters Laboratories (UL) or other independent testing laboratory acceptable to applicable authorities.
  - 1. Flame Spread/Smoke Density: Provide products meeting code requirements for maximum 25 flame spread and maximum 25 smoke density.

1.3 REFERENCES

- A. ASTM C635: Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- B. ASTM C636: Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- C. ASTM E580: Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.

1.4 SUBMITTALS

- A. Product Data: Furnish manufacturers' literature.
- B. Shop Drawings: Clearly indicate grid layout and related dimensioning, junctions with other work and ceiling finishes, and inter-relation of mechanical and electrical items related to system.
- C. Samples: Furnish samples of exposed grid finish and each type of ceiling unit.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Firm with minimum three years successful experience in projects of similar type and scope; acceptable to manufacturer of acoustical units.

## 1.6 SITE CONDITIONS

- A. Do not install ceilings until building is enclosed, sufficient heat is provided, dust-generating activities have terminated, and overhead mechanical work is completed, tested and approved.
  - 1. Do not allow acoustical ceiling units to be exposed to moisture; immediately remove acoustical ceiling units with stains, units with signs of mold, and units with mildew.
- B. Allow wet work to dry prior to commencement of installation.
- C. Maintain uniform temperatures of minimum 60 degrees F and humidity of 20% to 40% prior to, during and after installation.

## 1.7 EXTRA STOCK

- A. Provide 5% cartons of extra tile of each type used for the Owners maintenance use at no additional cost

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Suspension System: Comply with ASTM C635, as applicable to type of suspension system required for type of ceiling units indicated.
  - 1. Manufacturers:
    - a. Armstrong World Industries, Inc.
    - b. Chicago Metallic Corp.
    - c. USG, Interiors, Inc./Donn.
    - d. Substitutions: Refer to Section 01 25 13.
  - 2. Exposed Grid System: 15/16" nominal face width, direct hung aluminum or steel 'T' exposed grid system.
  - 3. Attachment Devices: Size for 5 times design load indicated in ASTM C635, Table 1, Direct Hung.
  - 4. Hanger Wires: 12 gauge.
  - 5. Straps, Tubes and Angles: Provide galvanized steel as required to meet state and local requirements for seismic design loads.
  - 6. Structural Class: intermediate-duty system, minimum.
  - 7. Edge Molding: Manufacturer's standard angle molding for edges and penetrations of ceiling, with single flange of molding exposed.
  - 8. Finish of Exposed Items: Match Armstrong, Blizzard White ZW.
  - 9. Maximum Allowable Deflection: L/360.

- B. Lay-In Panels: ASTM E1264 type and form as indicated on Drawings.
  - 1. Manufacturers:
    - a. Armstrong World Industries, Inc.
    - b. USG Interiors, Inc.
    - c. Or accepted equal.
  - 2. Typical Throughout Building where it is shown on drawings.
    - a. Typical Field Lay-In Panels: Armstrong. ULTIMA HIGH NRC. 15/16" Beveled Tedular. Color white. Or accepted equal.
    - b. Size: 2'-0" x 2'-0" x 3/4".
    - c. Finish: Standard washable white painted finish.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Furnish layouts for inserts, clips and other supports required to be installed by other trades for support of acoustical ceilings.
  - 1. Install inserts, clips, and supports where not previously installed and where additional supports are required for complete installation.
- B. Measure ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling; do not use less than half width units at borders.
- C. Coordinate with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment and partition systems.

#### **3.2 INSTALLATION**

- A. Installation of all suspended acoustical ceilings shall comply with installation requirements outlined in CBC (Title 24 Part 2), Chapter 25A.
- B. Install acoustical ceiling systems in accordance with manufacturer's recommendations and ASTM C636.
  - 1. Finished Ceilings: True to lines and levels and free from warped, soiled or damaged grid or acoustical units.
- C. Install ceiling systems in a manner capable of supporting superimposed loads, with maximum permissible deflection of 1/8" in 10'-0".
- D. Install after major above-ceiling work is complete, coordinate location of hangers with other work.
  - 1. Ensure suspension system is located to accommodate fittings and units of equipment that is to be placed after installation of ceiling grid.

- E. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest adjacent hangers, and related carrying channels as required to span required distance.
- F. Install ceiling suspension system to resist seismic loads as required by state and local codes, including extra hanger wires and compression supports for ceilings and light fixtures.
- G. Hang system independently of walls, columns, ducts, pipes and conduit. Where suspension system members are spliced, avoid visible displacement of the longitudinal axis or face plane of adjacent members.
- H. Do not support lighting fixtures from or on main runners or cross runners if weight of fixture causes total dead load to exceed deflection capability.
  - 1. Support fixture loads independently or provide supplementary hangers located within 6" of each corner.
- I. Do not install fixtures so main runners and cross runners are eccentrically loaded; where fixture installation would produce rotation of runners, provide stabilizer bars.
- J. Install edge moldings at intersection of ceiling and vertical surfaces, using maximum lengths, straight, true to line and level, miter corners.
  - 1. Provide edge moldings at junctions with other ceiling finishes.
- K. Where required form expansion joints to accommodate movement and maintain visual closure without distorting system.
- L. Fit acoustic units in place, free from damaged edges or defects detrimental to appearance and function.
  - 1. Lay directionally patterned units one way with pattern as directed.
  - 2. Fit border units neatly against abutting surfaces.
- M. Install system level, in uniform plane and free from twist, warp and dents.
- N. Install hold-down clips where required by applicable codes and where ceiling is within 20'-0" of an exterior door.
- O. Adjustment: Adjust sags or twists that develop in ceiling system and replace any part that is damaged or faulty.

**END OF SECTION**

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SECTION 09 65 00  
RESILIENT TILE FLOORING

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes: Provide resilient tile flooring and accessories as required for complete finished installation.

1. Luxury Vinyl Tile (LVT)

1.2 SYSTEM DESCRIPTION / PERFORMANCE REQUIREMENTS

- A. Resilient Tile Flammability: Provide materials tested under ASTM E648, Flooring Radiant Panel Test, with results of 0.45 watts/cm<sup>2</sup> or higher.
- B. Resilient Tile Slip Resistance: Provide materials tested under ASTM D2047, James Slip Test with minimum 0.6 rating for floors.

1.3 SUBMITTAL ITEMS

- A. Product Data: Furnish manufacturer's product literature and installation instructions **including the manufacturer's maximum acceptable relative humidity (RH) percentage(s) and maximum pH level for each type and style of resilient flooring to be installed.**
- B. Samples: Furnish samples of each type of flooring color and pattern.

1.4 PROJECT CONDITIONS

- A. Ensure floor surfaces are smooth and flat with maximum variation of 1/8" in 10'-0".
- B. Maintain minimum 70-degree F air temperature at flooring installation area for three days prior to, during, and for 24 hours after installation.
1. Store flooring materials in area of application; allow three days for material to reach same temperature as area.
- C. Perform Vapor emission and pH testing prior to installation of flooring.

**PART 2 - PRODUCTS**

2.1 MATERIALS (FLOORING)

- A. Luxury Vinyl Tile (LVT):
1. Manufacturers: See Finish Schedule and Legend.
- a. Or accepted equal.



2. Color and Pattern: As selected by Architect from manufacturer's full range of available colors based on Mannington –Amtico Collection
- B. Edge Strips: Homogeneous vinyl or rubber, tapered or bullnose edge, color as selected by Architect.
- C. Sub-Floor Leveling Filler: Portland base cement Web-Crete 95 (as manufactured by Bostik or equal) designed for providing thin solid surface for leveling and minor ramping of subsurface to adjacent floor finishes.
  1. Use material capable of being applied and feathered out to adjacent floor without spalling.
- D. Primer: As recommended by flooring manufacturer for specified material application.
- E. Sealer and Wax: Type recommended by flooring manufacturer for material type and location.
- F. Adhesives: Waterproof nontoxic types as recommended by flooring manufacturer for specified material and application.

### **PART 3 – EXECUTION**

#### **3.1 PREPARATION**

- A. Conform to manufacturer's recommendations for preparation and to ASTM F710. Remove ALL defective materials, and foreign matter such as dust, adhesives, leveling compounds, paint, dirt, floor hardeners, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, etc.
- B. Remove sub-floor ridges and bumps; Repair all cracks, expansion joint, control Joints, and open surface honeycombs and fill in accordance with Manufacturers recommendations.
- C. Clean floor and apply, trowel and float filler to leave a smooth, flat hard surface; prohibit traffic until filler is cured.
- D. The existing space has in-floor duct runs for conduit with raised “tombstone” style electrical outlets. These outlets are to be removed with conduits denergized and terminated below the floor line. Flooring contractor is responsible for preparing floor for clean and even installation. Conduits shall be ground down and floor shall be prepped by the contractor appropriately at these locations with floor leveler.

#### **3.2 INSTALLATION – FLOORING**

- A. Flooring Installation: Conform to manufacturer's recommendations and installation instructions.
- B. Open floor tile cartons, enough to cover each area, and mix tile to ensure shade variations do not occur within any one area.
- C. Spread cement evenly in quantity recommended by manufacturer to ensure adhesion over entire area of installation; spread only enough adhesive to permit installation of flooring before initial set.
- D. Set flooring in place and press with heavy roller to ensure full adhesion.
- E. Lay flooring with joints parallel to building lines to produce symmetrical pattern.
- F. Install minimum 1/2 tile at room and area perimeter.

- G. Terminate resilient flooring at centerline of door openings where adjacent floor finish is dissimilar.
- H. Install edge strips at unprotected and exposed edges where flooring terminates.
- I. Scribe flooring to walls, columns, floor outlets and other appurtenances, to produce tight joints.
- J. Consult with Architect for floor pattern desired in each area.
- K. Edge Strips: Install where edge of tile would otherwise be exposed; butt to flooring without gaps; set in adhesive.

### 3.3 CLEAN-UP AND PROTECTION

- A. Remove excess adhesive from floor, base, and wall surfaces without causing damage.
- B. Clean, seal and wax floor surfaces in accordance with manufacturer's recommendations.
  - a. Prohibit traffic from floor for 48 hours after installation.

**END OF SECTION**

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RESILIENT BASE

09 65 13

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes: Provide contoured resilient base, and accessories as required for complete installation.

1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide materials tested under ASTM E648, Flooring Radiant Panel Test, with results of 0.45 watts/cm<sup>2</sup> or higher.

1.3 SUBMITTALS

- A. Product Data: Furnish manufacturer's product literature.
- B. Samples: Furnish samples of each base color and type.

1.4 PROJECT CONDITIONS

- A. Maintain minimum 70-degree F air temperature at installation area for 3 days prior to, during, and for 24 hours after installation.
- B. Store materials in area of application; allow three days for material to reach same temperature as area.

**PART 2 - PRODUCTS**

2.1 MATERIALS

- A. Resilient Base: Meeting performance requirements of ASTM F 1861 Standard Specification for Resilient Wall Base, Type TP Group 1.
  - 1. Type: Extruded rubber.
  - 2. Manufacturers: See Finish Schedule and Legend.
    - a. Or accepted equal.
- B. Primers and Adhesives: Water-resistant nontoxic types recommended by base manufacturer for specified material and application.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Apply to walls, columns, pilasters, casework, and other permanent fixtures in rooms and areas where base is required.
  - 1. Fit joints tight and vertical; maintain minimum measurement of 18" between joints.

- B. Miter internal corners; use molded sections for external corners and exposed ends.
- C. Install the base on solid backing, adhere tightly to wall and floor surfaces, fill voids along top edge of base with manufacturer's recommended adhesive filler.
- D. Scribe and fit to door frames and other obstructions.
- E. Install straight and level to variation of plus or minus 1/8" over 10'-0".

### 3.2 CLEAN-UP

- A. Remove excess adhesive from floor, base and wall surfaces without causing damage.
- B. Clean surfaces in accordance with manufacturer's recommendations.

**END OF SECTION**

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WOOD WALL COVERINGS

SECTION 09 74 13

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Wood veneer and laminate wall panel.
  - 2. Accessories for wall installation.
  
- B. References:
  - 1. The publications listed below form a subsection of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 "References" for definitions, acronyms, and abbreviations.
  - 2. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
  - 3. American Society of Testing Materials International (ASTM):
    - a. ASTM E84-16 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.2 SUBMITTALS

- A. Product Data:
  - 1. Provide manufacturer's technical data sheet and installation instructions for each type of wall panel required and/or specified.
  
- B. Samples:
  - 1. Provide three (3) samples, 12-inches long minimum, of each panel type and veneer type required and/or specified.
  
- C. Shop Drawings:
  - 1. Submit shop drawings, including details, for all walls. Coordinate wall layout, installation, and components with construction elements that penetrate walls or are supported by them. Show overall layout with dimensions and details for penetrations and intersections with other materials or building components.

1.3 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Manufacturers: Provide wood wall panels from a single manufacturer with a minimum of five (5) years manufacturing panels.
  - 2. Installers: Utilize an installer having demonstrated minimum of three (3) years' experience on projects of comparable size and complexity.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in unopened factory packages labeled with manufacturer's name and identification of elements.
- B. Store wall covering in clean and dry area where temperatures are maintained at not less than 40 degrees F with normal humidity.
  - 1. Do not store in upright position.
- C. Take precautionary measures with adhesives and solvents to prevent fire hazards.

#### 1.5 PROJECT CONDITIONS

- A. Ambient Conditions:
  - 1. Allow panels to reach room temperature, 50 to 86 degrees Fahrenheit. Stabilize moisture content, 25 to 55 percent relative humidity, for at least 72 hours before installation.
  - 2. Maintain ambient temperature and humidity conditions at levels indicated for the project when occupied for its intended use.
  - 3. Do not install products under environmental conditions outside manufacturer's recommended limits.
- B. Existing Conditions: Do not install wood wall panels until space is enclosed and weather proofed, wet work is completely dry, and work on walls is complete.

#### 1.6 WARRANTY

- A. Provide manufacturer's standard written product warranty.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Basis of Design manufacturer: Acoustical Art Concepts, 391 Hickory Street, Mount Airy, NC 27030; Ph: (336) 786-6254, E-Mail: [marketing@interlam-design.com](mailto:marketing@interlam-design.com), Web: <https://acousticalartconcepts.com/>.
- B. Substitutions will be considered in accordance with the provisions in Section 01 62 00 Product Options.

#### 2.2 MATERIALS

- A. Akupanel 3x1, resonance acoustic panel for sound absorption with real wood veneer (optional high-pressure laminate) including natural variations in color, grain, and texture.
  - 1. PET (polyethylene terephthalate) polyester fiber panels made from minimum 50-percent recycled plastic and 100-percent recyclable.
  - 2. Composed of Black PET Polyester Fiber, black thru-colored MDF and real wood veneer.
  - 3. Dimensions: 23.5/8-inches by 94.1/2-inches by 13/16-inch (600mm x 2400mm x 20mm).
  - 4. Materials: PET Polyester Fiber, MDF, Wood Veneer.
  - 5. Colors: See Finish Schedule and Legend.
  - 6. Noise Reduction Coefficient of 0.52 at a frequency of 1000Hz.

B. FIRE RATING

1. Test material in accordance with Standard ANSI/UL723 that determines the Surface Burning Characteristics of the material, specifically the flame spread, and smoke developed indices when exposed to fire.
2. The core material of the PET and the wooden substrate materials are rated Class A.
3. Akupanel 3x1 has a Flame Spread of 65 and a Smoke Index of 522 rating as Class B.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Ensure surfaces to receive wall covering are clean, true, and free of irregularities.
  1. Do not commence with work until surfaces are satisfactory.
  2. Proceeding with work is an indication of acceptance of the work surfaces.
- B. Ensure wall surface flatness tolerance does not vary more than 1/8 inch in 10 feet, nor vary at a rate greater than 1/16 inch per running foot.
- C. Schedule installation of wall covering as late in construction schedule as possible to prevent damage during construction.

3.2 INSTALLATION

- A. Panels may be installed on walls and/or ceilings as indicated on the drawings.
- B. Comply with manufacturer's instructions, recommendations, and industry standards for installation of wall panels.
- C. Coordinate the exact size, location, and sequencing of penetrations of wall panels by all building components.
- D. Lay out wall pattern per approved shop drawings if required. Where otherwise not indicated, lay out panels so margins on opposite sides of rooms are equal or greater than half (1/2) the panel width.
- E. Direct Application:
  1. Install panels on metal or wood furring channels installed directly to the wall or ceiling at 24-inches on center (609 mm), perpendicular to the panels. Attach panels to furring strips using 1/8-inch by 1.1/2-inch self-drilling screws between the strips through the PET fiber backing into the studs.
    - a. Optional: Install wall/ceiling panels directly to a gypsum board substrate.
  2. Provide a minimum of fifteen (15) black-anodized screws per panel.

3.3 CLEANING

- A. Clean surfaces of wall panels per manufacturer's instructions.
  1. PET: Spot clean using a mild water-free solvent, or dry-cleaning product.
  2. Slats/Facing: Wipe with a clean cloth and standard (non-chlorine and non-ammonia based) cleaner.

- B. Clean only in a well-ventilated room and avoid any product containing Carbon Tetra-chloride or other toxic materials. Do not use anything more abrasive than a cotton cloth on any part of the panel.

#### 3.4 PROTECTION

- A. Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so work will be without damage and deterioration at the time of acceptance by the owner.
- B. Remove and replace damaged or discolored material and material that cannot be properly cleaned at no additional expense to the owner.

**END OF SECTION**



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PAINTING AND COATING

SECTION 09 91 00

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**PART 1 GENERAL**

1.1 WORK INCLUDED

- A. Provide painting and finishing of exposed items and surfaces.
  - a. Specified surface preparation, priming and coats of paint are in addition to shop-priming and surface treatment specified under other sections of work.
  - b. Painting and finishing includes field finishing of all exterior and interior items not listed as "Surfaces not to be Painted" unless clearly indicated otherwise.
  - c. Painting and finishing includes field finishing of select shop finished items where it is indicated as required to match adjacent surfaces, such as mechanical grilles and registers.
  - d. Field paint exposed bare and covered pipes, ducts, and hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work in occupied spaces.

1.2 SURFACES NOT TO BE PAINTED

- A. Gaskets and Hardware at doors.
- B. Prefinished items including finished metal surfaces, unless noted otherwise.
- C. Walls and ceiling in concealed areas and generally inaccessible areas.
- D. Moving parts of operating mechanical and electrical units
- E. Code-required Labels: Keep equipment identification and fire rating labels free of paint.
- F. Plastic smoke stops and weather stripping at doors.

1.3 SUBMITTALS

- A. Product Data: Submit product data on all finishing products.
- B. Safety Data Sheets: Submit Safety Data Sheets for all painting materials.
- C. Samples for Verification:
  - 1. Submit two samples 8-1/2 x 11 inch in size illustrating range of colors, textures, and level of gloss finish for each surface-finishing product scheduled.
  - 2. Submit manufacturer's application instructions.
  - 3. Submit color charts in duplicate for all paints, stains, and special coatings.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Furnish materials approved for use by applicable air quality management district for limitations of volatile organic compounds for architectural or special coatings as applicable.
- B. Products shall meet or exceed the following Federal Specifications:
  - 1. Alkyd Enamel – TT-E-489 QPL
  - 2. Zinc Oxide Primer – TT-P-641
- C. Provide manufacturers 5-year written performance guarantee for elastomeric paint and application error (materials and labor).

1.5 REGULATORY REQUIREMENTS

- 1. Conform to code for flame/fuel/smoke rating requirements for finishes.
- 2. Conform to requirements of the Environmental Protection Agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in original, new, and unopened packages and containers bearing manufacturer's name and label, with:
  - 1. Name of material, color, and sheen.
  - 2. Manufacturer's name, stock number and date of manufacture.
  - 3. Contents by volume, for major pigment and vehicle constituents.
  - 4. Thinning and application instructions.

1.7 SITE CONDITIONS

- A. Apply water-base paints when temperature of surfaces and surrounding air are between 50- and 90-degrees F.
- B. Apply solvent-thinned paints when temperature of surfaces and surrounding air are between 45- and 95-degrees F.
- C. Do not apply paint in rain, fog, or mist; or when relative humidity exceeds 85 percent; or to damp or wet surfaces.
- D. Painting may be continued during inclement weather if areas to be painted are enclosed and heated within temperature limits specified.
- E. Provide additional temporary ventilation during interior application of paints to eliminate volatile organic compound (VOC) emissions from interior spaces as quickly as possible.

1.8 EXTRA STOCK

- A. Provide a one-gallon container of each color and surface texture to the Owner.
- B. Label each container with color, texture, and room locations, in addition to the manufacturer's label.

**PART 2 - PRODUCTS**

2.1 ACCEPTABLE MANUFACTURERS

- A. Kelly-Moore.

- B. Fuller-O'Brien Corp.
- C. Sherwin-Williams Co.
- D. Dunn-Edwards Corp.
- E. Or Accepted Equal

## 2.2 MATERIALS

- A. Definition: "Paint" as used herein means coating systems including primers, emulsions, enamels, stains, sealers, and fillers, whether used as prime, intermediate or finish coats.
  - 1. Provide top line quality commercial grade paints.
- B. Colors and Finishes:
  - 1. Prior to commencement of painting work, Architect will furnish color numbers or chips for surfaces to be painted.
    - a. Multiple brush-out samples will be required for each paint finish.
  - 2. Final acceptance of colors will be on wall samples applied on site.
  - 3. Color pigments: Pure, non-fading, applicable types to suit substrates and service indicated; no lead content permitted.
  - 1. Finish Coat Coordination: Provide finish coats which are compatible with prime paints used.
    - a. Review other Specification sections in which prime paints are provided; ensure compatibility of total coatings systems.
    - b. Upon request from other trades furnish information on characteristics of finish materials proposed for use.
    - c. Provide barrier coats over incompatible primers or remove and re-prime as required.
    - d. Notify Architect in writing of any anticipated problems in use of specified coating systems with substrates primed by others.
- C. Material Quality: Materials not bearing manufacturer's identification as a best-grade product shall not be acceptable.
  - 1. Use of proprietary names in color selection is not intended to imply exclusion of equivalent products of other manufacturers.
  - 2. Provide undercoat paints produced by same manufacturer as finish coats; use only thinners approved by paint manufacturer and use only within recommended limits.
  - 3. Provide finish coats capable of being washed with mild detergent without loss of color, sheen, or pigments.
- D. Volatile Organic Compound (VOC) Emissions: Select materials that generate least amount of pollution; consider pollution and volatile organic compound (VOC) emissions generated during manufacturing, transport, installation, use, and disposal.

1. Avoid materials that contain ozone depleting chemicals and that emit potentially harmful volatile organic compound (VOC) emissions.
2. Avoid materials that can leach harmful chemicals into ground water; do not allow potentially harmful chemicals to enter sewers nor storm drains.
3. Select materials that can be reused or recycled and materials with significant percentage of recycled content; set specific recycled content percentages for individual materials; avoid materials difficult to recycle.

### **PART 3 – EXECUTION**

#### **3.1 PREPARATION**

- A. Inspection: Examine areas and conditions under which painting work is to be applied.
  1. Start of painting work indicates acceptance of surfaces and conditions of surfaces and conditions within any area.
  2. Where exposed items or surfaces are not specifically mentioned in Schedules, paint same as adjacent similar materials or areas.
  3. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to a durable paint film.
- B. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as specified for substrate condition.
- C. Correct minor defects and clean surfaces which affect work of this Section.
- D. Remove hardware, accessories, and items in place and not to be painted, or provide protection prior to surface preparation and painting; after painting reinstall removed items.
- E. Clean surfaces before applying paint; remove oil and grease prior to mechanical cleaning; program cleaning so contaminants from cleaning process do not fall onto wet, newly painted surfaces.
- F. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.
- G. Cementitious Materials: Prepare by removing efflorescence, chalk, dirt, grease, oils, and by roughening as required to remove glaze.
  1. Determine alkalinity and moisture content of surfaces to be painted.
  2. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, neutralize before application of paint.
  3. Do not paint over surfaces where moisture content exceeds manufacturer's printed directions.
- H. Wood: Clean wood surfaces of dirt, oil, and other foreign substances; sandpaper smooth surfaces exposed to view and dust off.
  1. Scrape and clean seasoned knots and apply thin coat of recommended knot sealer, before application of priming coat.

2. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job, prime edges, ends, faces, undersides, and backsides of wood.
  3. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler, sandpaper smooth when dry.
- I. Ferrous Metals: Touch up shop-applied prime coats wherever damaged using same type of primer as applied in shop or barrier coat compatible with finish paint.
1. Bare Surfaces: Clean surfaces that are not galvanized or shop-coated, of oil, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
  2. Galvanized Surfaces: Clean free of oil and surface contaminants, using non-petroleum-based solvent; primer and touch-up primer to be zinc-rich primer.
- J. Mix painting materials in accordance with manufacturer's directions.
- K. Store materials in tightly covered containers; maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
- L. Stir materials before application to produce mixture of uniform density and stir as required during application; do not stir surface film into material, if necessary, strain material before using.

### 3.2 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.

### 3.3 APPLICATION

- A. Apply paint in accordance with manufacturer's directions; use applicators and techniques best suited for substrate and type of material being applied.
  1. Apply additional coats when stains or blemishes show through final coat, until paint is a uniform finish, color and appearance.
  2. Provide extra attention to assure dry film thickness at corners and crevices is equivalent to that of flat surfaces.
  3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces; paint surfaces behind permanently fixed equipment and furniture with prime coat only.
  4. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
  5. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  6. Finish doors on tops, bottoms, and side edges same as faces.
  7. Sand lightly between each succeeding enamel coat and each varnish coat.

- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or prepared for painting as soon as practicable after preparation.
  - 1. Allow time between successive coatings to permit proper drying.
  - 2. Do not recoat until paint feels firm and does not deform or feel sticky under moderate thumb pressure.
- C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as recommended by coating manufacturer.
- D. Prime Coats: Apply to items not previously primed; recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat.
- E. Finish Coats: Provide even texture; leave no laps, irregularity in texture, skid marks, or other surface imperfections.
- F. Completed Work: Match approved samples for color, texture, and coverage; remove, refinish, or repaint work not accepted.

3.4 PAINTING SYSTEMS

- A. Interior Work: Provide the following paint systems:
  - 1. Gypsum Board – Eggshell sheen.
    - a. One Coat "Hamilton Prep-Coat Plus" prior to application of gypsum board texture.
    - b. One coat PVA primer
    - c. Two coats acrylic latex.
  - 2. Steel - Unprimed: Semigloss sheen.
    - a. One coat rust inhibitive primer.
    - b. Two coats acrylic latex enamel, semi-gloss.
  - 3. Steel - Primed: Semigloss sheen.
    - a. One additional coat of rust inhibitive primer.
    - b. Two coats acrylic latex enamel, semi-gloss.
  - 4. Steel - Galvanized: Semigloss sheen.
    - a. One coat galvanized metal primer.
    - b. Two coats acrylic latex enamel, semi-gloss.
- B. Sheens: Comply with ASTM D523, reflectance of paint.
  - 1. Flat: 1-10.
  - 2. Satin: 15-30.
  - 3. Eggshell: 30-45.
  - 4. Semigloss: 45-75.
  - 5. Gloss: 75-100.

APPLICATION	TYPE	MPI Gloss Level	Dunn Edwards	Glidden Professio nal/Devoe	Sherwin Williams	Kelly Moore
<b>PRIMERS</b>						
Interior Gypsum Board	PVA	G1	W101	1030	B28W40 0	971
Interior Ferrous Metal	Alkyd	G1	BRPR00	4160	B66-310	1711

Interior Galvanized Metal	Acrylic	G1	UGPR00 or W8	4020	B66W1	1722
<b>FINISHES</b>						
Interior Gypsum Board, Ferrous Metal, and Galvanized Metal	Latex Enamel	G5	SPMA50	1406	B31W25 1	1650
Interior Gypsum Board	Latex Enamel	G3	SPMA30	1402	B20W25 1	1686

### 3.5 CLEAN-UP, PROTECTION AND REPAIR

Clean-Up: During progress of work, remove discarded paint materials, rubbish, cans and rags from site at end of each workday.

1. Clean glass and paint-spattered surfaces immediately by proper methods of washing and scraping, using care not to scratch or damage finished surfaces.
- B. Protection: Protect work of other trades, whether to be painted or not; correct damage by cleaning, repairing or replacing, and repainting, as acceptable to the County.
  1. Provide "Wet Paint" signs to protect newly-painted finishes.
  2. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
- C. Repair: At completion of work of other trades, touch-up and restore damaged surfaces or defaced painted surfaces.

### 3.6 FIELD QUALITY CONTROL

- A. Owner reserves right to invoke material testing procedure at any time during field painting.
- B. If test results show material being used does not comply with specified requirement, Contractor may be directed to remove non-complying work, pay for testing, and repaint surfaces.

**END OF SECTION**

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SIGNAGE

SECTION 10 14 00

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes: Provide general signage as indicated complete with attachment devices and accessories as required for complete installation.
- B. Provide signage for all concealed items requiring maintenance or operation.

1.2 QUALITY ASSURANCE

- A. Access for Persons with Disabilities: Provide signs for assuring access for persons with disabilities in accordance with state and federal regulations.
  - 1. California Regulations: Comply with California Code of Regulations, Title 24, Part 2.
  - 2. Federal Regulations: Comply with Americans with Disabilities Act Accessibility Guidelines (ADAAG).

1.3 SUBMITTALS

- A. Shop Drawings: Furnish listing of sign types, lettering, and locations, along with overall dimension of each sign.
- B. Product Data: Furnish manufacturer's literature, indicate each sign type, style, available colors, and method of attachment.
- C. Samples: Provide one typical restroom sign in style, type, and finishes selected.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Package separately or in like groups of names, labeled as to names enclosed; include installation template, attachment system and installation instructions.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. ASI Sign Systems Inc.
- B. Mohawk Engraving Company, Incorporated.
- C. Best Sign Systems Inc.
- D. Cameo, California Metal Enameling Co.
- E. Vomar Products, Inc.



- F. Impact Architectural Signs, Inc. (Exterior Building Identification).
- G. Or Accepted Equal.

## 2.2 MATERIALS

- A. Sign Type: Sub-surface process with dimensional letters.
- B. 1/8" non-glare acrylic with solid, custom/color printed on the second surface.
- C. 1/32" thick dimensional characters and symbols chemically welded to acrylic signage.
  - 1. Character Type: Raised characters on signs shall be 1/32-inch (0.8mm) minimum above their background. Characters shall be sans serif uppercase, and shall not be italic, oblique, script, highly decorative, or of other unusual forms.
  - 2. Character Size: Character height measured vertically from the baseline of the character shall be 5/8-inch (15.9 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase letter "I".
  - 3. Finish and Contrast: Contrast between characters, symbols and their background must be 70% minimum and have a non-glare finish. 1143A.5.1.
  - 4. Proportions: Raised characters on signs shall be selected from fonts when the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I".
  - 5. Braille: California Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Braille signage parameters to follow CBC 2016 1143A.7 and Table 1143A.7.1.

## 2.3 SIGNAGE TYPES

- A. Braille Exit Door Signs: Conforming to ADAAG requirements for signs for permanent rooms, with raised and Braille characters; concealed mounting system.
  - 1. Colors: As selected by Architect.
  - 2. Size and Style: As indicated on Drawings.
- B. Emergency Evacuation Signs: Silk-screened polycarbonate with screening on back and with Braille information conforming to ADAAG and California requirements.
  - 1. Information: Provide sign system with information as required by applicable authorities for emergency egress.
  - 2. Silk-Screen Colors: As selected by Architect.
    - a. Silk-screen Lacquer: Like Advanced Screen Products/Industrial Gloss Lacquer Silk-screen Ink; colors as selected by Architect.
  - 3. Size and Style: As indicated on Drawings and acceptable to applicable authorities.
  - 4. Attachment: Method subject to Architect approval.

- C. Concealed item signs: Laminated colored plastic core color contrasting to exterior face color; total thickness 0.125"
  - 1. Lettering: Engraved through face material to expose core.
  - 2. Colors: As selected by Architect.
  - 3. Size and Style: Typical room sign 1/2"x1 1/2".
  - 4. Location: Provide one sign for item conceal within walls, floors, or ceilings that will require maintenance.

### **PART 3 – EXECUTION**

#### **3.1 INSTALLATION**

- A. General: Install signs in accordance with manufacturer recommendations and installation instructions, free from distortions and defects.
- B. Entry Signs: Install per Drawings.

**END OF SECTION**

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FIRE EXTINGUISHERS & CABINETS

SECTION 10 44 16

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**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes: Provide portable fire extinguishers and cabinets for portable fire extinguishers with accessories as required for complete installation.

1.2 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature.

1.3 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

**PART 2 - PRODUCTS**

2.1 MATERIALS

- A. Fire Extinguishers:
  - 1. Typical: Provide 2A-10BC multi-purpose dry chemical type fire extinguisher.
- B. Fire Extinguisher Cabinets: Provide semi recessed mounting.
  - 1. Manufacturers:
    - a. J.L. Industries/Ambassador Series.
    - b. Larsen's Mfg. Co./Architectural Series.
    - c. Potter-Roemer/Alta Series.
    - d. Or Accepted Equal.
  - 2. Cabinet Depth: Provide cabinets designed for space available in walls with fire extinguisher cabinets, and of sufficient depth to house 2A-10BC multi-purpose dry chemical type fire extinguisher.
  - 3. Trim: Manufacturer's standard edge trim for specified models.
  - 4. Metal Gages: Provide manufacturer's standard gages for cabinets specified.
  - 5. Construction: Mitered and welded one-piece tubular door frames; weld joints and grind smooth; manufacturer's standard steel box with white baked enamel interior finish and primed exterior finish.
    - a. Steel Doors and Trim: Vertical Duo style, prime coat finished.
    - b. Door Hardware: Manufacturer's standard; door to open 180 degrees.

**PART 3 - EXECUTION**

3.1 PREPARATION

- A. Examine substrates and conditions under which fire extinguisher cabinets are to be installed.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install cabinets in locations and at mounting height to comply with requirements of governing authorities; prepare recesses in walls as required.
- B. Securely fasten to structure, square and plumb, in accordance with manufacturer's instructions.
  - 1. Wherever exact location of units is not shown, locate as directed by the County.
- C. Install appropriate fire extinguisher in each cabinet.

3.3 IDENTIFICATION

- A. After installation and finishing is completed, silk screen or apply decal letters spelling "FIRE EXTINGUISHER" as applicable.
- B. Letter size, style and location as selected by Architect.

**END OF SECTION**

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WINDOW SHADES

SECTION 12 24 00

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**PART 1 - GENERAL**

1.1 DESCRIPTION

- A. Cloth shades, manual and electrically operated, are specified in this section. Window shades shall be furnished complete, including brackets, fittings and hardware.

1.2 QUALITY CONTROL

- A. Manufacturer's Qualification: Window shade manufacturer shall provide evidence that the manufacture of shades are a major product, and that the shades have performed satisfactorily on similar installations.

1.3 SUBMITTALS

- A. Samples:
  - 1. Shade cloth, each type, 600 mm (24 inch) square, including cord and ring, showing color, finish and texture.
- B. Manufacturer's literature and data; showing details of construction and hardware for:
  - 1. Cloth and window shades

1.4 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):
  - AA-V-00200B Venetian Blinds, Shade, Roller, Window, Roller, Slat, Cord, and Accessories
- C. American Society for Testing and Materials (ASTM):
  - A167-99(R2009) Stainless and heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
  - B221/B221M-08 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
  - D635-10 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position

## PART 2 - PRODUCTS

### A. MANUFACTURERS

#### 1. Basis of Design:

- a. Mecho; 42-03 35<sup>th</sup> St.,  
Long Island City, NY  
11101; PH; (718) 729-2941  
Web: [www.mechoshade.com](http://www.mechoshade.com)
- b. Substitutions will be considered in accordance with the provisions in Section 01 62 00 Product Options.

### 2.2 MATERIALS

- A. Systems: Provide all shades, manual operated, as complete units produced by one manufacturer, including hardware, accessory items, mounting brackets, fastenings AND fascia.
- B. Manual Shade Operating System: Manual type chain operated roller shade system with adjustable slip clutch.
- C. Fabrics: Manufacturer's standard fire resistant glass cloth fabrics meeting applicable federal and state fire resistance requirements. Color and pattern as indicated, as selected by Architect from manufacturer's full range of colors and patterns where not otherwise indicated.

### 2.3 FABRICATION

- A. Fabricate shades to fit measurements of finished openings obtained at site.
- B. Ceiling Pockets: Manual premanufactured metal shade pocket with removable closure panel for access mounting in acoustical tile or drywall ceilings. Size and configuration as indicated on drawings.

### 2.4 SHADE FABRIC

- A. Cloth Window Shades: SOHO 1600 Series. 3% Openness. Rolling type, constructed of shade cloth mounted on rollers. Shade cloth shall have plain sides, and with hem at bottom to accommodate wood slat. Separate shades are required for each individual sash within opening. Length of shades shall exceed height of window approximately 300 mm (12 inches) measured from ceiling to sill, in addition to material required to make up hem:
  1. Provide rollers with spindles, nylon bearings, tempered steel springs, and all other related accessories required for positive action. Provide rollers of diameter recommended by shade manufacturer. Staple shade cloth to wood rollers to prevent wrinkling or folding, and on line parallel to axis of rollers so that shade will hang plumb. Space staples not over 90 mm (3-1/2 inches) on centers. Use of tacks is prohibited.
  2. Cords shall be of sufficient length to permit shades to be drawn to bottom of opening with ends looped and held with cord rings. Attach cords to hems through metal eyelets in center of slats in bottom hems.

- B. Color: See Finish Schedule and Legend.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Cloth Window Shades: Mount window shades on end of face brackets, set on metal gussets, or casing of windows as required. Provide extension face brackets where necessary at mullions.
1. Locate rollers in level position as high as practicable at heads of windows to prevent infiltration of light over rollers.
  2. Where extension brackets are necessary, on mullions or elsewhere, for alignment of shades, provide metal lugs, and rigidly anchor lugs and brackets.
  3. Place brackets and rollers so that shades will not interfere with window and screen hardware.

**END OF SECTION**

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PLUMBING

SECTION 22 00 00

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**PART 1 – GENERAL**

1.1 INCLUDED

- A. This Specification establishes the required standards for all labor, materials, equipment, and workmanship in connection with the furnishing, fabrication, and installation of "Plumbing." Plumbing work includes, but is not limited to, the following items of work:
1. A complete system of soil, waste, vent, and sanitary sewer piping and structures, including provisions for mechanical equipment drainage; and connection of same to public sanitary sewers, located as indicated on the Drawings.
  2. Cold water distribution system, complete, from points of contact with site domestic water systems (located approximately as indicated on the Drawings) to all plumbing fixtures, mechanical equipment, building specialties, and Owner supplied equipment scheduled for service on the Drawings.
  3. Hot water distribution system, complete, from serving water heaters and/or points of contact with site domestic hot water, to all plumbing fixtures, mechanical equipment, building specialties, and Owner supplied equipment schedule for service on the Drawings.
  4. All plumbing fixtures and trim as scheduled on the Drawings, inclusive of setting of Fixtures and connections to drainage and water supply systems.
  5. Flashing of all plumbing pipe penetrations through exterior walls, roofs, and foundations. Sheet metal and lead flashings for pipe penetrations through roofs shall be furnished by the Plumbing Contractor and installed by the appropriate Roofing Contractor.
  6. Excavation and backfill as required for the work of this Section in conformity with Earthwork Section of the Specifications.
  7. Rough in and connection of all fixtures and equipment furnished by the Owner and/or Tenant.
  8. Final connection of water and natural gas to equipment furnished under other Sections.
  9. Protection of all piping specified herein and/or shown on the Drawings, from freezing. Buried piping shall be a minimum 12" below the local front line. Piping above grade in unconditioned areas shall be insulated.
  10. Testing and adjusting of all piping systems and equipment herein specified.
  11. Sterilization of domestic water systems.
  12. Pipe wrapping and insulation.



- B. The bidding requirements and contract forms, including General Conditions and Supplemental General Conditions, all Division 01 Sections apply to all work herein.
- C. Should any work or material not be included in the Drawings or Specifications but it nevertheless necessary for the proper execution of the stated scope therefore for full compliance with codes, laws, rules, and regulations, the Contractor shall understand such work and material is required, and shall perform all such work.

#### 1.2 LICENSES, PERMITS, AND FEES

- A. The Contractor shall provide, procure, and pay for all licenses, permits, fees, etc. as required to carry on and complete their work.

#### 1.3 CODES AND STANDARDS

- A. All work shall be done in code with all applicable local, state, and federal building safety codes, ordinances, and regulations. Additionally, all work shall conform to the latest editions of the following standards:
  - 1. National Fire Protection Association.
  - 2. California Mechanical Code.
  - 3. California Plumbing Code.
  - 4. Underwriters Laboratories.
  - 5. Titles 8, 17, 19, 21, 24 of the California Code of Regulations.
  - 6. California Electric Code.
- B. When the Contract Documents call for materials or construction of a higher standard than is required by the above, the Contract Document requirements shall take precedence over the requirements of the applicable laws, ordinances, rules, or regulations. Nothing in the Contract Documents shall be interpreted as permitting work in violation of said laws, rules, and/or regulations.
- C. The Contractor for this work shall furnish, without extra charge, any additional materials and/or labor as may be required for compliance with these laws, rules, and/or regulations though such materials and/or labor are not specially set forth in the Contract Documents.

#### 1.4 LICENSING REQUIREMENTS

- A. All plumbing systems shall be installed by a C-36 Plumbing Contractor. Plumbing systems include: waste removal and connection of on-site waste disposal systems; piping, storage tanks, and venting for supply of gases and liquids for any purpose; all gas appliances, flues, and gas connections; water and gas piping from the Owner's side of utility meter to the structure or fixed works, installation of any type of equipment to heat water or fluids to a suitable temperature; and maintenance and replacement of the items described above, including health and safety devices.
- B. All hydronic piping systems shall be installed by a C-4 – Boiler, Hot Water Heating and Steam Fitting Contractor.
- C. All plumbing and hydronic piping insulation shall be performed by a C-2 – Insulation and Acoustical Contractor.

## 1.5 SUBMITTALS

- A. All fixtures, materials, and equipment equal in quality and utility to these herein mentioned will be accepted. When specific names are used in describing fixtures, materials, and equipment they are mentioned as standards only, but this implies no right on the part of the Contractor to use other fixtures, material, and equipment or methods, unless approved as equal in quality and utility by the Architect.
- B. Before any fixtures, materials, or equipment are purchased, the Contractor shall submit to the Architect for approval, a complete list of materials, fixtures, and equipment, giving the manufacturer's names, model numbers, and catalog sheets.
- C. The Contractor shall submit for the approval of the Architect, shop drawings of proposed material and equipment that differ from the specified materials and equipment, and of any specified materials and equipment with special conditions and/or arrangements. These drawings shall show necessary modifications of owner, plumbing, electrical, and mechanical work required by the proposed materials and equipment.
- D. Submittal lists and drawings shall include identifying marks assigned by the Drawings and Specifications.
- E. Review of drawings and other material submitted shall not be construed as complete check or constitute a waiver of the requirements of the Drawings and Specifications, but will indicate that the material submitted is acceptable in quality and utility. This review shall not relieve the Contractor of the responsibility to fit the proposed materials to the spaces provided, and to effect necessary rearrangements or construction of other work.

## 1.6 COOPERATION WITH OTHER TRADES

- A. Cooperate fully with other trades doing work on the project as may be necessary for the proper completion of the project. Refer to the Structural, Mechanical, and Electrical Drawings for details of the building structure and equipment installation that will tend to overlap, conflict with or require coordination with the work of this Section, and schedule this work accordingly.
- B. Any work done without regard for other trades shall be moved, replaced, or redone as required, without extra charges to Owner.

## 1.7 AS-BUILT DRAWINGS

- A. A complete set of Contract Drawings shall be maintained at the work site, and all changes in the work shall be recorded on this set, on a daily basis. The final as-built drawings shall be submitted to the Owner's Representative for approval.

## 1.8 DRAWINGS

- A. The drawings indicate diagrammatically the general layout of the plumbing systems and other related work. Field verification of scaled dimensions taken from the Drawings is required.
- B. The Contractor shall review and compare the Architectural, Structural, Plumbing, Mechanical, and Electrical Drawings and all Owner supplied equipment Drawings, and adjust their work to be in conformity with the conditions indicated thereon. Discrepancies between drawings, between drawings and actual field conditions, or between Drawings and Specifications, shall promptly be brought to the attention of the Architect for a determination of the modifications to be effected. In the event that a major modification is required, a Change Order will be prepared.

1.9 VERIFICATION OF EXISTING CONDITIONS AND DEMOLITION

- A. Before installation of any new work, verify the location, size, and other conditions at all points of connection to services or other existing piping, and at all locations where new work will cross or pass near existing piping, electrical, or other facilities.
- B. Patch, cap, or repair existing works affected by this demolition in concealed spaces within six (6) inches of a live main or branch.
- C. Deliver removed material to the Owner as directed by the Architect. Dispose of all other removed material offsite.
- D. Information shown relative to existing services is based upon available records and data during preparation of the Drawings, but shall be verified. Make reasonable deviations found necessary to conform to actual locations and conditions, without extra charge.
- E. The data given herein and on the Drawings are as exact as could be reasonably secured, but absolute accuracy is not guaranteed. Exact locations, distances, elevations, etc. will be governed by shop drawings, the building itself, and actual field conditions.

1.10 DAMAGE BY LEAKS

- A. Contractor shall be responsible for any damage to work of other Contractors that is caused by leaks in any temporary or permanent piping systems due to pipe rupture, disconnected pipes or fittings, or by overflow of equipment.

1.11 SEISMIC FORCE RESISTANCE: MECHANICAL, PLUMBING, FIRE PROTECTION SYSTEMS

- A. All mechanical systems and plumbing piping systems shall adhere to the SMACNA "Seismic Restraint Manual: Guidelines for Mechanical Systems," Third Edition, dated March 2008.
- B. Equipment:
  - 1. Each piece of equipment installed shall be constructed and anchored to structural supports to resist a seismic force of 150% of the equipment's operating weight in any direction. Supports, anchors, and braces shown shall be minimum.
  - 2. Equipment manufacturer shall design, construct, and certify that his equipment satisfies the special minimum seismic resistance requirements and shall submit calculations or test results supporting his certification.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall be responsible for delivery, storage, protection, and placing of all equipment and materials.
  - 1. Contractor shall protect the work and materials from damage during construction. Equipment stored at the job site shall be protected from dust, water, or other damage, and be covered if equipment is exposed to weather. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
  - 2. Any items damaged shall be repaired or replaced, at no additional cost to the Owner.

B. Cleanliness of Piping and Equipment Systems

1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading, and welding of piping.
2. Piping systems shall be flushed, blown, or pigged as necessary to deliver clean systems.
3. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.13 WARRANTIES

- A. Equipment warranties shall be provided for all equipment, with all necessary information filled in, except purchase date, in favor of the Owner.
- B. The contractor shall guarantee that all work under this Section is free from defects in material and workmanship for a period of one year from the date of filing the Notice of Completion. Replacement of defective work and damage caused to work of other trades as a result of such defective work shall be the responsibility of the Contractor, and shall be made at no cost to the Owner.

1.14 ALTERNATIVE MATERIALS AND METHODS

- A. These plans and specifications describe the general scope of the mechanical systems. These plans and specifications do not preclude the submittal of alternative methods or materials. Manufacturer's names and catalog numbers are stated to identify the type and quality of the equipment or materials required for the project.
- B. The contractor may submit shop drawings and/or technical information on alternative equipment, materials or installation details to accomplish the intent of the plans and specifications. Approval of the alternative equipment, materials or installation details shall not relieve the contractor of any responsibility for complying with the intent of the plans and specifications. Submit the manufacturers' technical information, shop drawings, and/or written description of alternative methods for each item described by manufacturer's name and catalog number and for each component, equipment, material, or installation detail required.

1.15 SITE EXAMINATION

- A. Thoroughly examine the site and verify the actual work conditions. No extra compensation will be allowed for expenses due to failure to discover site conditions which affect the work.

**PART 2 – PRODUCTS**

2.1 GENERAL

- A. Only specified material shall be utilized in the work of this Section unless substitutions have been approved in accordance with the General Conditions and Division 1 Sections of the Specifications.
- B. All materials shall be new and unused, of the best quality for the intended use, and shall be listed by the ASA, AGA, and UL as meeting their requirements and bearing their label wherever standards have been established and label services are regularly furnished by them.

## 2.2 PIPE AND FITTINGS

### A. Sanitary Soil, Waste, and Vent Piping:

#### 1. Below Ground

- a. Lines 2" and larger shall be service weight, hub-less cast-iron soil pipe and fittings, and shall conform to the requirements of ASTM A 888 and CISPI Standard 301. Approved manufacturers: Charlotte, Tyler, or AB&I.
- b. Joints: Couplings shall conform to the requirements of ASTM C1540 and shall be heavy duty type 304 stainless steel shielded, having 4 sealing clamps for pipe sizes 1 1/2" thru 4", and 6 sealing clamps for pipe sizes 5" thru 10". Gaskets shall comply with ASTM C-564. Anaco, Tyler, or equal.

#### 2. Above Ground

- a. Lines 2" and larger shall be standard weight, hub-less cast-iron soil pipe and fittings, and shall conform to the requirements of ASTM A 888 and CISPI Standard 301. Approved manufacturers: Charlotte, Tyler, or AB&I.
- b. Joints: Couplings shall conform to the requirements of ASTM C1540 and shall be heavy duty type 304 stainless steel shielded, having 4 sealing clamps for pipe sizes 1 1/2" thru 4", and 6 sealing clamps for pipe sizes 5" thru 10". Gaskets shall comply with ASTM C-564. Anaco, Tyler, or equal.

### D. Cold and Hot Water Piping

1. All domestic cold water piping 3" and smaller shall be Type L, hard temper, copper pipe with wrought copper or cast brass solder joint fittings. All joints shall be made up with "Stay-Safe 50" lead free solder. A suitable non-corrosive flux shall be used at all joints.
2. Pipes below grade inside buildings shall be soft drawn, Type L or K copper with no joints below slabs. Pipes shall be installed in a PVC conduit not less than Schedule 40. The interior diameter of the conduit shall not be less than 1/2 inch larger than the outside diameter of the water piping.

## 2.3 UNIONS

- A. Steel pipe unions shall be malleable iron, 150lb., ground joint, Grinnell Fig. 463.
- B. Copper pipe unions shall be soldered joint, Nibco series 633 or 733, Mueller, or equal.
- C. Dielectric unions shall be EPCO or equal.

## 2.4 VALVES, SPECIALTIES

- A. Ball Valves, Potable Water up to 2": Nibco T-585-80-LF, lead-free silicon bronze body, "Ring Ball," full port, two-piece, lever handle, 125 lb.
- B. Ball Valves, Potable Water over 2": Nibco T-580-80-LF, lead-free silicon bronze body, "Ring Ball," conventional port, two-piece, lever handle, 125 lb.

- C. Check Valves, Potable Water:
  - 1. Nibco T-480-LF, lead-free silicon bronze body, inline lift type, Teflon seat, and discs, spring actuated, 125 lb.
  - 2. Nibco T-413-Y-LF, lead-free silicon bronze body, Y-pattern lift type, Class 200.
- D. Gate Valves: 3" and smaller shall be NIBCO T134 or Stockham B-120 or B-124, bronze body, union bonnet, rising stem, solid wedge, 150 lb. with wheel handle.
- E. Relief Valves: Water heater temperature/pressure relief valve, Watts, M&M, or equal with ASME rating, and AGA certified design. Set at 125 psi and 210°F.
- F. Backflow Preventers (where shown on the Drawings or required by local code):
  - 1. Atmospheric type; Wilkins #35 series.
  - 2. Pressure type: Wilkins #720A series.
  - 3. Reduced pressure type:
    - a. ¼" to 2" – Wilkins #975-XLMS series.
    - b. 2 ½" to 10" – Wilkins #375 series.
- G. Water Pressure Regulating Valves: Wilkins 500 YSBR series. Install where pressure to building exceeds 70 psi.

2.5 HANGERS, SUPPORTS

- A. Installation of piping shall be such that damage cannot result through loading, expansion, or contraction of piping. Anchors shall be installed to obtain uniformity of pipe movement.
- B. Pipe supports shall be spaced sufficiently close to support pipes properly without formation of pockets. Supports and hangers shall be installed at ends of mains and branches and maximum intermediate spacing shall be as follows:

	MAXIMUM SPACING, (FT.)		MINIMUM ROD DIAMETER	
	Pipe Diameter, Inches 1" & Less	1-1/4" & More	Pipe Dia. Inches	Rod Dia. Inches
Steel	8	10	2 & Less	3/8
Copper	6	8	2-1/2 to 3	½
Cast Iron	5 (One min. per length & fitting)		4 & Larger	5/8

- C. Pipe hangers shall be Superstrut, B-Line, or equivalent Grinnell. All hangers shall be electrochromate finished. Hanger rods shall have electro-galvanized finish.
- D. Steel pipe, cast iron soil pipe: C-711 pipe hangers.
- E. Copper tubing: C-711 pipe hanger complete with C-716 isolator.
- F. Insulated pipe: C-711 pipe hanger fitted to outside of insulation with C-790 galvanized shields.

- G. Trapeze Hangers
  - 1. Grouped pipes may be supported by A-1200 channel bolted to rods.
  - 2. Copper and steel pipe shall be attached to channels with A-716 "Cush-A-Clamp."
- H. Cast iron soil pipe shall be supported with C-711 pipe hangers with rods attached to the bottom of channels.
- I. Point of Support Connectors
  - 1. Wood Construction
    - a. 540 side beam hanger for stationary pipes.
    - b. S-541 for pipes subject to movement.
  - 2. Vertical Pipe Risers: Vertical pipes risers shall be securely supported with C-720 pipe clamps (C-720P for bare cold water pipe) anchored to construction.
- J. Provide resilient mounting for domestic water piping. Thermal insulation may serve as resilient mounting for insulated piping.
- K. Suspended water piping shall be anchored with steel struts installed at midpoint of each run.
- L. No valve or piece of equipment shall be used to support piping.

## 2.6 CLEANOUTS

- A. Cleanouts in membrane damp-proofed floors shall have flashing flange and membrane clamps. Plugs shall be bronze, with cast iron body ferrule for cast iron pipe.
- B. Floor Cleanouts (FCO): Zurn ZN 1400-HD, "Level-trol" adjustable cleanouts, dura-coated cast iron with gas and water-tight ABS tapered thread plug, and round scoriated top, adjustable to finished floor .
- C. Grade Cleanouts (GCO): Zurn Z-1474-IN or equal JR Smith. Housing to be dura-coated cast iron body with integral anchor flange and scoriated cover with lifting device. Cleanouts in unpaved areas shall be set in 18" x 18" x 4" concrete pads.
- D. Wall Cleanouts (WCO):
  - 1. Copper tubing: Nibco Figure 816 or 817, with Zurn Z-1462, 6" x 6" polished chrome-plated bronze wall plate and frame.
  - 2. Cast iron pipe: Zurn Z-1441, dura-coated with gas and water-tight bronze, taper thread plug and round smooth stainless steel access cover with securing screw.
  - 3. Steel pipe: Zurn Z-1468, round stainless steel wall access cover, complete with securing screw and bronze raised hex head plug for steel pipe.
- E. Acid Resistant Floor Cleanouts (AFCO): ORION FCO corrosion resistant finished floor cleanout. Manufactured from fire retardant polypropylene material conforming to ASTM D4101, ferrule supplied with countersunk plug and adjustable top with square nickel bronze cover, with AWCO (Acid Waste Cleanout) cast in cover.

- F. Acid Resistant Wall Cleanouts (AWCO): ORION Blueline FRPP SF corrosion resistant Cleanout Tee. Manufactured from fire retardant polypropylene material conforming to ASTM D4101. Fitting layouts to conform to ASTM D3311 and ASTM F1412.

## 2.7 SLEEVES, WALL PLATES

- A. Service pipe through exterior wall, roofs: Crane Style BC wall and ceiling plates; chrome plated at finished rooms.
- B. Pipes through, under footings: 18 gauge iron sleeves two diameters larger than pipe, cast in concrete, annular space filled with mastic or plastic bituminous cement.
- C. Pipes through fire rated walls shall be protected with fire retardant mastic as detailed on the Drawings. Installation shall be in full accordance with the requirements of the UL system number. Hilti or approved equal.
- D. Wall and ceiling plates: Crane Style BC or equal; chrome plated at finished rooms.
- E. Pipes through floors, interior concrete walls, and through fire rated wall and smoke stop partitions: 18 gauge iron sleeves, two diameters large than pipe, annular space filled with 3M Brand Fire Barrier CP-25 caulk.
- F. Pipes through 1-hour walls shall be protected with fire retardant mastic as detailed on the Drawings. Installation shall be in full accordance with the requirements of the UL system number. Hilti or approved equal.

## 2.8 ACCESS DOORS

- A. Where construction is not inherently accessible, provide adequately sized and conveniently located access doors in ceiling, walls, and furring for servicing valves, equipment, and appurtenances etc.
- B. Access doors shall be Karp, Milcor, or equal, prime coated steel for all surfaces except ceramic tile, 12" x12" minimum size as required. Locks shall be flush, screwdriver operated.
  - 1. Style KDW for gypsum board surfaces.
  - 2. Style PL for plaster surfaces.
  - 3. Style 210 for acoustic tile surfaces.
  - 4. Style DSC 214-M satin finish stainless steel at ceramic tile surfaces.
  - 5. Style "Fire Rated" at rated ceilings and walls.

## 2.9 PIPE INSULATION

- A. Insulate all hot water supply piping, all hot water return piping, all cold water supply piping in exterior walls or unconditioned spaces, and all primary roof drain piping in conditioned spaces with John Manville "Micro-Lok" 650, Fiberglass, Certainteed, or equal, rigid fiberglass one-piece pipe insulation with and all-purpose jacket. Jackets shall be constructed of high density, white kraft bonded to aluminum foil with fiberglass yarn, with a pressure sensitive closure system.



- B. All insulation shall have composite (insulation, jacket, and adhesive used to adhere the jacket to the insulation) Fire and Smoke Hazard ratings as tested under procedure ASTM E-84, NFPA 255 or UL 723, not exceeding: Flame Spread – 25, Smoke Developed – 50.
- C. Inserts shall be installed at outside hangers. Inserts between the pipe and pipe hangers shall consist of rigid pipe insulation of thickness equal to the adjoining insulation. Inserts shall not be less than 10" long for pipe sizes through 2 ½" and not less than 12" long for pipes larger than 2 ½".
- D. Metal shields shall be applied between hangers or supports and the pipe insulation. Shields shall be formed to fit the insulation and shall extend up to the centerline of the pipe and the length specified for hanger inserts.
- E. Insulation thickness shall be as follows:
  - 1. All cold water piping: 1"
  - 2. All hot water piping 1" and smaller: 1"
  - 3. All hot water piping 1 ¼" and larger: 1 ½"
  - 4. All primary roof drain piping: 1"

## 2.10 PIPE LABELS

- A. All new domestic cold water, hot water, and hot water recirculation piping shall be clearly labelled.
- B. Industrial safety solutions piping labels shall be rated for indoor and outdoor use and be attached with permanent adhesive.
- C. Labels shall show the direction of flow and indicate the process media. Pipe labeling color and text size shall conform to ANSI/ASME A13.1-2007. Process piping shall be labeled a minimum of twice per room in locations designated by the Engineer.

## 2.11 FIXTURES

- A. The quantity and location of fixtures shall be taken from the Architectural and Plumbing Drawings. Provide adequate supports and all standard trim normally furnished for fixtures. All enamel shall be acid resisting. Traps, unless otherwise noted shall be 17 gauge brass tubing, chrome plated when exposed.
- B. Except as otherwise shown, provide ¼" steel backing plates, 36" wide by 12" high minimum size, secured to a minimum of three studs by welding, or with ¼" x 2 ½" lag screws for all wall hung fixtures for which no other means of support is specified.
- C. Stops and supplies: Provide stops for all fixtures. Unless otherwise specified, stops exposed at lavatories and similar fixtures shall be Chicago #1016-ABCP, chrome plated, loose key. Concealed stops shall be Chicago #1771.
- D. All fixtures shall meet or exceed the requirements of the California Administrative Code, Title 24, Part 5.

### **PART 3 – EXECUTION**

#### **3.1 SURFACE CONDITIONS**

- A. This Contractor shall be held to have examined the site and compared it with the Contract Documents, and to adequately understand the conditions under which the work is to be performed. In the event of discrepancy, this Contractor shall notify the Architect and proceed as directed. This Contractor shall be held responsible for all existing conditions, whether or not accurately described, and no allowance shall subsequently be made on his behalf for any error, omission, or extra expense due to failure or neglect to make such examination and notification.
- B. Prior to commencing the work of this Section, this Contractor shall inspect the installed work of other trades and verify that their work is sufficiently complete to permit the start of work under this Section and that the completed work will be in complete accordance with the original design. In the event of discrepancy immediately notify the Architect and proceed as directed.

#### **3.2 ACCESSIBILITY**

- A. Equipment shall be placed and piping connections made in such a manner that all routine adjustments and maintenance operations may be carried out without inconvenience and so that all code requirements for clearances are maintained.

#### **3.3 VIBRATION AND SOUND CONTROL**

- A. Make all necessary provisions to prevent the transmission of vibration to the building structure, including flexible pipe connections to motor driven equipment, resilient mounting for piping, and sealing off pipe and duct penetrations of walls and roof.

#### **3.4 INSULATION**

- A. Insulation shall be applied in complete accordance with the manufacturer's published installation instructions. All insulation shall be applied on clean, dry surfaces and shall be continuous through wall and ceiling opening and sleeves. All joints shall be firmly butted together and longitudinal jacket laps and butt strips shall be smoothly secured. Specified adhesives, mastics, and coatings shall be applied at the manufacturer's recommended minimum coverage per gallon.

#### **3.5 PIPING INSTALLATION – GENERAL**

- A. Rough in shall proceed as rapidly as general construction will permit. All rough-in shall be complete, at locations verified by Architect and Owner, and tested and inspected prior to installation of concrete, lath, plaster, gypsum wallboard, or other finishes.
- B. All piping shall be concealed in finished rooms, installed in furred walls and partitions. Where furred or suspended ceilings occur, piping shall be installed in the concealed space at points adjacent to beams and/or other structural members, and coordinated with ductwork and equipment. Where exposed piping occurs, it shall be installed parallel to or at right angles to building walls, unless specifically shown otherwise on the Drawings.
- C. Installation of piping shall be such that damage cannot result, through thermal expansion or contraction, to piping, building, or pipe hangers and supports. Anchors shall be installed at midpoints of all runs in main piping for the purpose of localizing pipe expansion or prevention of creepage.

- D. All pipe lines shall be installed free from traps and air pockets, true to line and grade, with suitable supports properly space. All piping shall be installed without undue stresses and with provision for expansion and contraction.
- E. All piping shall be new and free from foreign substances. American standard pipe threads shall be used for IPS threaded work. Joints in threaded piping shall be made up with Teflon tape applied to the male threads only. No screwed pipe joints shall be caulked or packed with rope or other packing materials. Pipe shall be free from tool marks, threads cut accurately with not more than two (2) threads showing beyond fitting. Friction wrenches shall not be used with plated, polished, or soft metal piping. All changes in pipe size shall be made with reducing fitting. Bushings will not be permitted.
- F. Protect unattended openings in piping during construction.
- G. No water or drainage piping shall pass over electrical equipment unless adequate protection is provided to prevent damage by leaks or condensation.
- H. All copper tubing shall be formed in a workmanlike manner, in accordance with the Pipe and Tube Bending Handbook of the Copper and Brass Research Association. A tube bender giving support to the periphery of the tube shall be used. The tubing shall be protected against flattening or other injury.
- I. All copper connections and joints shall be made in accordance with the Copper Tube Handbook, Copper and Brass Research Association. No swaged connections will be permitted. All valves, pumps, and similar equipment shall be connected to copper piping through union or flange adapter fittings.
- J. Valves, cocks, etc., shall be installed to allow convenient accessibility and operation.
- K. Unions and flanges shall be installed to allow convenient replacement of all equipment and clearing tubes.
- L. A union connection shall be installed downstream from all valves, at equipment connections and at other locations as required or directed.
- M. Shut off valves shall be provided in all main services, and where required to permit proper servicing of equipment. Valves of one type shall be of one manufacturer.
- N. All valves shall be of the same size as the pipelines in which they are installed, unless specifically sized on the Drawings. All hand controlled line valves shall be ball valves, except where throttling control or frequent operation is required, in which case globe or angle valves shall be used. Globe valves in horizontal lines shall be installed with stem in horizontal to permit line draining. All globe and angle valves shall be installed to close against pressure. Disc valves shall have discs suitable for the services for which they are to be used.
- O. All valves shall be accessible and shall not be installed with the stems below the horizontal plane. Provide access panels at walls, ceilings, or floors.
- P. Provide prime coated escutcheon plates at all points where exposed piping penetrates finished wall ceilings or floors.
- Q. Cutting or boring of joists or other structural members shall be done only when alternative routing is impossible and only upon written approval of the Architect or Owner.

### 3.6 INSTALLATION, PIPING

#### A. Soil, Waste, Vent, Drain Piping

1. Soil, waste, and vent piping occurring within the building shall be installed to a uniform minimum grade of  $\frac{1}{4}$ " per foot unless otherwise noted. Vent piping shall be graded so that all condensation shall flow directly to a soil or waste line.
2. Changes in direction of drainage piping shall be accomplished by the use of appropriate drainage and sanitary fittings.
3. Protection against breakage of piping passing under or through walls shall be provided using specified sleeves and caulking.
4. Adapters shall be installed between threaded iron and soil pipe.
5. Test tees shall be installed at the foot of all soil, waste, and storm water stacks.
6. Cleanouts shall be located where indicated on the Drawings; at all horizontal offsets; at ends of waste or sewer branches more the 5' in length; at intervals of 100' in straight runs of piping, or at closer intervals if directed or required by local code. Location of cleanouts in finished spaces shall be approved by the Architect prior to installation.

#### B. Hot and Cold Water Systems

1. Di-electric unions shall be installed where copper pipe is connected to galvanized steel piping or stub outs.
2. Connections from copper pipe to fixture supply fittings shall be made with copper or brass nipples.
3. All domestic water piping shall be kept clear of the building structure. Where it is within 1" of the building structure, it shall be wrapped with felt ( $\frac{3}{16}$ " minimum thickness).
4. To the greatest extent possible, domestic cold water piping shall be kept separated from hot piping and where there is a choice shall be run in the coolest portion of the available space.

#### F. Plumbing Fixtures

1. Space between wall mounted fixtures and wall surface shall be neatly pointed up with silicone rubber compound of color matching fixture.
2. All exposed bolt heads and nuts used to secure fixtures shall be concealed with vitreous china caps.

### 3.7 INSTALLATION, HANGERS & SUPPORTS

- A. Installation of piping shall be such that damage cannot result through loading, expansion, or contraction of piping. Anchors shall be installed to obtain uniformity of pipe movement.
- B. Hanger rod sizes shall be no smaller than  $\frac{3}{8}$ -inch for pipe and tube sizes  $\frac{1}{2}$  to 4 inches and  $\frac{1}{2}$  inch for sizes 5-8 inches.

- C. Pipe supports shall be spaced sufficiently close to support pipes properly without formation of pockets. Hangers shall be installed at ends of mains and branches. Maximum horizontal support spacing shall be as follows:
  - 1. Steel Pipe for Water or DWV: 10 feet for pipe sizes  $\frac{3}{4}$  inch and smaller and 12 feet for sizes 1 inch and larger.
  - 2. Steel and Tinned Copper Pipe for Gas: 6 feet for  $\frac{1}{2}$  inch pipe; 8 feet for sizes  $\frac{3}{4}$  to 1 inch, and 10 feet for sizes 1  $\frac{1}{4}$  inch and larger.
  - 3. Copper Tube and Pipe, soldered or brazed: 6 feet for pipe sizes 1  $\frac{1}{2}$  inches and smaller and 10 feet for sizes 2 inches and larger.
  - 4. Hubless Cast-Iron shall be supported at every other joint, unless over 4 feet, then support each joint. Support adjacent to joint, not to exceed 18 inches, brace at not more than 40 foot intervals to prevent horizontal movement. Support at each horizontal branch connection. Hangers shall not be placed on the coupling.
- D. Provide resilient mounting for domestic water piping. Thermal insulation may serve as resilient mounting for insulated piping.
- E. Suspended water piping shall be anchored with steel struts installed at midpoint of each run.
- F. No valve or piece of equipment shall be used to support piping.
- G. Pipes through studs or joists shall be isolated from structure with properly sized Hubbard "Hole-Rite" suspension clamps.

### 3.8 TESTING, INSPECTIONS

#### A. General

- 1. This Contractor shall not allow or cause any work of this Section to be covered or enclosed until it has been inspected, tested, and approved by the Architect and the authorities having jurisdictions over the work. Should any of this work be enclosed or covered up before such inspection, testing, and approval, this Contractor shall uncover the work, have the necessary inspections, tests, and approvals made and, at no expense to the Owner, make all repairs necessary to restore both his work and that of other contractors that may have been damaged, to be in conformity with the Contract Documents.

#### B. Tests

- 1. This Contractor shall make all tests required by all local, state, and federal laws, codes, ordinances, and regulations having jurisdiction over this work.
- 2. Furnish all necessary labor, materials, and equipment for conducting tests, and pay all expenses in connection therewith. Should leaks develop while testing, repairs shall be made, and tests shall be repeated until a satisfactory test is obtained.
- 3. Water Piping shall be hydrostatically tested for 6 hours at 150 psi. All equipment shall be tested water tight at utility pressure.
- 4. Drainage and Vent Piping shall be tested for 1 hour by plugging all outlets and filling the pipes with water to the top of vertical sections of pipes. No loss of water shall be permitted.

5. For pressures above 14 inches water column, contractor shall test all new gas piping with air at a minimum pressure of 60 psi for a duration of four hours with no discernible reduction in pressure. Shutoff valves may not be used for isolation of piping during testing, unless the valve and valve-closing mechanism are rated for the test pressure.
6. For pressures below 14 inches water column, contractor shall test all new gas piping with air at a minimum pressure of 15 psi for a duration of four hours with no discernible reduction in pressure. Shutoff valves may not be used for isolation of piping during testing, unless the valve and valve-closing mechanism are rated for the test pressure.
7. Upon completion of the installation, the gas utility provider shall test entire piping system, including both new and existing piping, to ensure that the system is safe to be placed in service. Contractor shall be responsible for being familiar with gas utility provider testing requirements and assisting with gas utility provider test procedures. Any leaks or deficiencies shall be repaired at no additional cost to the owner.

### 3.9 DOMESTIC WATER SYSTEM STERILIZATION

- A. Upon completion of this work, the domestic water system shall be thoroughly flushed, sterilized, and reflushed. Sterilization and reflushing shall be performed using the following procedure.
  1. All work shall be performed in the presence of the inspector.
  2. Introduce chlorine or a solution of sodium hypochlorite, filling the lines slowly and supplying the sterilization agent at a rate of 50 parts of chlorine per million, as determined by residual chlorine tests at the ends of all branches. Open and close all valves while the system is being chlorinated to insure uniform distribution.
  3. After the sterilizing agent has been applied for 24 hours, test for residual chlorine at the ends of the branches. If less than 5 ppm is indicated, repeat the sterilization procedure.
  4. When tests show at least 5 ppm of residual chlorine, flush out the system until all traces of the chemical are removed.
- B. After a period of 48 hours minimum, bacteriological tests, using samples from at least 3 representative points shall be made by recognized testing agency, who shall certify to the Architect that the system is bacteriologically safe and at least equal in safety to that of the principal water supply. The laboratory report and certification shall be transmitted to the Architect and Owner.

### 3.10 ADJUSTING

- A. Properly adjust all stops, and controls, and demonstrate safe and satisfactory operation of all equipment.

### 3.11 CLEANING

- A. Flush all water piping systems. Remove, clean, and replace all strainer baskets prior to final inspection.
- B. Blow out all compressible fluid piping with compressed air before connecting with regulators or equipment.

3.12 CLEANUP

- A. Upon completion of the work of this Section, remove all surplus material, debris, and equipment associated with or used in the performance of this work.

**END OF SECTION**

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HVAC

SECTION 23 00 00

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**PART 1 – GENERAL**

1.1 INCLUDED

- A. This section covers mechanical work, complete. Work includes furnishing, installing, calibrating, adjusting, testing, documenting, and starting up equipment in accordance with these Specifications, the accompanying Plans, and the directions of the Engineer.

1.2 LICENSES, PERMITS, AND FEES

- A. The Contractor shall provide, procure, and pay for all licenses, permits, fees, etc. as required to carry on and complete their work.

1.3 CODES AND STANDARDS

- A. All work shall be done in code with all applicable local, state, and federal building safety codes, ordinances, and regulations. Additionally, all work shall conform to the latest editions of the following standards:
  - 1. National Fire Protection Association.
  - 2. California Mechanical Code.
  - 3. California Plumbing Code.
  - 4. Underwriters Laboratories.
  - 5. Titles 8, 17, 19, 21, 24 of the California Code of Regulations.
  - 6. California Electric Code.
  - 7. SMACNA Standards.
  - 8. ASHRAE Standards 55 and 62.1.
- B. When the Contract Documents call for materials or construction of a higher standard than is required by the above, the Contract Document requirements shall take precedence over the requirements of the applicable laws, ordinances, rules, or regulations. Nothing in the Contract Documents shall be interpreted as permitting work in violation of said laws, rules, and/or regulations.
- C. The Contractor for this work shall furnish, without extra charge, any additional materials and/or labor as may be required for compliance with these laws, rules, and/or regulations though such materials and/or labor are not specially set forth in the Contract Documents.



#### 1.4 LICENSING REQUIREMENTS

- A. All work of Division 22 and 23 shall be performed by an appropriately licensed contractor. The licenses shall be current, valid through the term of the contract and in the name of the contractor.
1. All HVAC work, which includes warm air heating systems and water heating pumps, ventilating systems, air conditioning systems, and ductwork, registers, flues, humidity, and thermostatic controls in connection with these systems, shall be performed by a C-20 – Warm-Air Heating, Ventilating and Air-Conditioning Contractor.
  2. All hydronic piping systems shall be performed by a C-4 – Boiler, Hot Water Heating and Steam Fitting Contractor.
  3. All hydronic piping insulation shall be performed by a C-2 – Insulation and Acoustical Contractor.

#### 1.5 SUBMITTALS

A. General Requirements

1. Submittal lists and drawings shall include identifying marks assigned by the Drawings and Specifications.
2. Review of drawings and other material submitted shall not be construed as complete check or constitute a waiver of the requirements of the Drawings and Specifications, but will indicate that the material submitted is acceptable in quality and utility. This review shall not relieve the Contractor of the responsibility to fit the proposed materials to the spaces provided, and to effect necessary rearrangements or construction of other work.
3. All fixtures, materials, and equipment equal in quality and utility to these herein mentioned will be accepted. When specific names are used in describing fixtures, materials, and equipment they are mentioned as standards only, but this implies no right on the part of the Contractor to use other fixtures, material, and equipment or methods, unless approved as equal in quality and utility by the Architect.
4. Before any fixtures, materials, or equipment are purchased, the Contractor shall submit to the Architect for approval, a complete list of materials, fixtures, and equipment, giving the manufacturer's names, catalog number, capacity, size, power requirements, etc.
5. The Contractor shall submit for the approval of the Architect, shop drawings of proposed material and equipment that differ from the specified materials and equipment, and of any specified materials and equipment with special conditions and/or arrangements. These drawings shall show necessary modifications of owner, plumbing, electrical, and mechanical work required by the proposed materials and equipment.

B. Submittal – Product Data

1. Submit manufacturer's product data for all HVAC equipment, in compliance with specifications.

#### 1.6 COOPERATION WITH OTHER TRADES

- A. Cooperate fully with other trades doing work on the project as may be necessary for the proper completion of the project. Refer to the Structural, Plumbing, and Electrical Drawings

for details of the building structure and equipment installation that will tend to overlap, conflict with or require coordination with the work of this Section, and schedule this work accordingly.

- B. Any work done without regard for other trades shall be moved, replaced, or redone as required, without extra charges to Owner.

#### 1.7 DIVISION OF WORK BETWEEN DIVISIONS 23 AND 26

- A. Close coordination between the electrical and mechanical trades is a part of the work that is required by this contract. No allowance will be made for omissions based on incorrectly assuming another trade will be performing your work. Confirm your scope of work with the general contractor.
- B. The division of responsibilities between trades supplying equipment in other Divisions may be different. For instance, Division 26 contractor may be required to supply disconnect switches and starters for non-HVAC mechanical equipment supplied under other Divisions.
- C. Division 23 Responsibilities
  1. Assume responsibility for the proper functioning of the HVAC systems in their entirety.
  2. Furnish and install all conductors and conduit required for control of HVAC equipment.
  3. Make all terminations with the exception of power conductors.
  4. Furnish and install all control panels and devices to provide a complete and functional controls system, including all controls transformers.
  5. Furnish and install motor starters for all equipment specified in Division 23.
  6. Install duct smoke detectors furnished by fire alarm contractor in buildings with fire alarm systems.
  7. Furnish and install duct smoke detectors in buildings without fire alarm systems.
  8. Furnish and install all control conductors and conduit connecting duct smoke detectors to smoke dampers and fan start controls.
  9. All electrical work performed under Division 23 shall conform to the requirements of Division 26.
- D. Division 26 Responsibilities
  1. Furnish and install all raceways, conduit, disconnect switches, and conductors necessary for electrical power supply.
  2. Make all power supply terminations to motors, starters, disconnect switches, control transformers, and other mechanical devices.
  3. Fire alarm contractor to furnish duct smoke detectors in buildings with fire alarm systems.
  4. Provide power to all duct smoke detectors and smoke dampers.
  5. Coordinate all work with mechanical contractors.

#### 1.8 AS-BUILT DRAWINGS

- A. A complete set of Contract Drawings shall be maintained at the work site, and all changes in the work shall be recorded on this set, on a daily basis. The final as-built drawings shall be submitted to the Architect for approval.

#### 1.9 DESIGN DRAWINGS

- A. The drawings indicate diagrammatically the general layout of the mechanical systems and other related work. Field verification of scaled dimensions taken from the Drawings is required.
- B. The Contractor shall review and compare the Architectural, Structural, Plumbing, Mechanical, and Electrical Drawings and all Owner supplied equipment Drawings, and adjust their work to be in conformity with the conditions indicated thereon. Discrepancies between drawings, between drawings and actual field conditions, or between Drawings and Specifications, shall promptly be brought to the attention of the Architect for a determination of the modifications to be effected. In the event that a major modification is required, a Change Order will be prepared.

#### 1.10 VERIFICATION OF EXISTING CONDITIONS AND DEMOLITION

- A. Before installation of any new work, verify the location, size, and other conditions at all points of connection to services or other existing piping, and at all locations where new work will cross or pass near existing piping, electrical, or other facilities.
- B. Remove ductwork, piping, controls, fixtures, and equipment that is not to remain in service as shown on the Drawings or as required. This included the removal of associated appurtenances and supports.
- C. Patch, cap, or repair existing works affected by this demolition in concealed spaces within six (6) inches of a live main or branch.
- D. Deliver removed material to the Owner as directed by the Architect. Dispose of all other removed material offsite.
- E. Information shown relative to existing services is based upon available records and data during preparation of the Drawings, but shall be verified. Make reasonable deviations found necessary to conform to actual locations and conditions, without extra charge.

#### 1.11 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Furnish three sets of typewritten instructions covering maintenance, adjustment, and operation of each piece of apparatus, bound in a hard cover loose-leaf binder. Neatly obscure or cross out inapplicable data from manufacturer's literature. Submit data to the Architect.
- B. Operating instructions shall show sequence of operations, lubrication, care, and maintenance requirements of all equipment. Final acceptance of the work will not be made until a satisfactory submission of this material is received and approved by the Architect.
- C. The Owner's authorized representative shall be instructed in the operation and servicing of all HVAC & plumbing systems.

1.12 ACCURACY OF DATA

- A. The data given herein and on the Drawings are as exact as could be reasonably secured, but absolute accuracy is not guaranteed. Exact locations, distances, elevations, etc. will be governed by shop drawings, the building itself, and actual field conditions.

1.13 DAMAGE BY LEAKS

- A. Contractor shall be responsible for any damage to work of other Contractors that is caused by leaks in any temporary or permanent piping systems due to pipe rupture, disconnected pipes or fittings, or by overflow of equipment.

1.14 SEISMIC FORCE RESISTANCE: MECHANICAL, PLUMBING, FIRE PROTECTION SYSTEMS

- A. All mechanical systems and plumbing piping systems shall adhere to the SMACNA "Seismic Restraint Manual: Guidelines for Mechanical Systems," Third Edition dated March 2008.

1.15 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall be responsible for delivery, storage, protection, and placing of all equipment and materials.
  - 1. Contractor shall protect the work and materials from damage during construction. Equipment stored at the job site shall be protected from dust, water, or other damage, and be covered if equipment is exposed to weather. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
  - 2. Any items damaged shall be repaired or replaced, at no additional cost to the Owner.
- B. Cleanliness of Piping and Equipment Systems
  - 1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading, and welding of piping.
  - 2. Piping systems shall be flushed, blown, or pigged as necessary to deliver clean systems.
  - 3. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.16 WARRANTIES

- A. Equipment warranties shall be provided for all equipment, with all necessary information filled in, except purchase date, in favor of the Owner.
- B. The contractor shall guarantee that all work under this Section is free from defects in material and workmanship for a period of one year from the date of filing the Notice of Completion. Replacement of defective work and damage caused to work of other trades as a result of such defective work shall be the responsibility of the Contractor, and shall be made at no cost to the Owner.

1.17 ALTERNATIVE MATERIALS AND METHODS

- A. These plans and specifications describe the general scope of the mechanical systems. These plans and specifications do not preclude the submittal of alternative methods or materials.

Manufacturer's names and catalog numbers are stated to identify the type and quality of the equipment or materials required for the project.

- B. The contractor may submit shop drawings and/or technical information on alternative equipment, materials or installation details to accomplish the intent of the plans and specifications. Approval of the alternative equipment, materials or installation details shall not relieve the contractor of any responsibility for complying with the intent of the plans and specifications. Submit the manufacturers' technical information, shop drawings, and/or written description of alternative methods for each item described by manufacturer's name and catalog number and for each component, equipment, material, or installation detail required.

#### 1.18 SITE EXAMINATION

- A. Thoroughly examine the site and verify the actual work conditions. No extra compensation will be allowed for expenses due to failure to discover site conditions which affect the work.

### **PART 2 – PRODUCTS**

#### 2.1 GENERAL

- A. All materials, appliances, and equipment shall be new and best of their respective kinds, free from defects, and of the make, brand, or quality specified or as accepted by the Architect.
- B. When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
- C. Apply and install all items in accordance with manufacturer's written instructions. Refer conflicts between manufacturer's instructions and the contract drawings and specifications to the Architect for resolution.

#### 2.2 DUCTWORK

- A. Sheet Metal Ductwork - Rectangular
  - 1. Ducts and plenums shall be fabricated and installed in conformance with the latest editions of: NFPA Pamphlet No. 90A; California Building Code; California Mechanical Code and the SMACNA HVAC Duct Construction Standards (Metal and Flexible). Ducts and plenums shall be constructed of hot dipped galvanized mild steel and shall have airtight Class "B" seals at all transverse joints and longitudinal seams. Tables and figures hereinafter referenced are from the 2005 edition of the SMACNA HVAC Duct Construction Standards (Metal and Flexible).
  - 2. Rectangular duct construction shall conform to Table 2-3. All transverse joints shall be flanged per Table 2-32, with corner closures or "Duct Mate" flanged connections with corner closures per Figure 2-17. Elbows shall be standard radius (Type RE 1) or square throat with vanes (Type RE 2) per Figure 4-2, with double thickness turning vanes per Figures 4-3 and 4-4. Offsets and transitions shall be per Figure 4-7. Supply, return, and exhaust branch connections shall be per Figure 4-5 or 4-6. Splitters shall not be used.
  - 3. Lined ducts shall be fabricated such that the net inside dimensions equals the duct sizes shown on the Drawings.

B. Sheet Metal Ductwork - Spiral

1. Round ducts shall be spiral, United McGill or equal. All transverse joints and longitudinal seams shall have Class "B" seals. All branches in round duct systems shall be made with factory fabricated reducing wye branches. Duct turns shall be made with standard, factory fabricated, three-piece elbows.

C. Flexible Ductwork

1. Flexible ducts shall be Flexmaster "8M" or approved equal. Flexible ducts shall be used only where it is shown on the Drawings, and maximum length of any given flexible duct shall not exceed 5 ft. Galvanized sheet metal elbows shall be used for turns greater the 45° on flexible ducts 10" and larger. Connections to rectangular ducts shall be made with "spin-in" fittings with air scoops. The installation of flexible ducts shall conform to Figure 3-10, with the exceptions noted herein.

D. Supports

1. Supports for horizontal ducts and plenums shall be fabricated per Figures 5-5 and 5-6 and Tables 5-1, 5-2, and 5-3. The maximum distance between hangers shall be eight feet for rectangular ducts and twelve feet for round ducts. Attachments to the structure shall be made with adequately sized lag bolts for straphangers and adequately sized machine bolts and side beam brackets for rod hangers. Supports for vertical ducts shall be band iron strap or angle bracket type per Figure 5-8 and 5-9.

E. Specialties:

1. Duct Access Doors: Including those for removing filters, duct access doors shall be as detailed in Figure 7-2 with sash locks, piano hinges, and gaskets. Access doors shall have an unobstructed full swing.

2.3 DUCTWORK ACCESSORIES

A. Flexible Duct Connections

1. Duro-Dyne "Metal-Fab" with Duroion, Ventfabrics "Ventglass," or approved equal.
2. Install at each point where a blower unit is connected to a duct. A minimum clearance of three inches between the duct and the source of vibration shall be maintained. Install per Figure 2-17.

B. Screens

1. Install removable bird screens at all outside intakes and exhaust air discharges. Screens shall be fabricated from 1/2" x 14 gauge mesh secured in full frames. Screens and frames shall be constructed of the same material as the duct, hood, or equipment to which attached.

C. Joints

1. Tape all joints airtight using Hardcast type "DT" pressureless tape and "HD-20" adhesive, per manufacturer's directions.

D. Dampers

1. Provide butterfly or multi-blade dampers where indicated on the Drawings or as required for balancing air quantities to values shown without generating excessive noise. Provide Duro-Dyne "KS-385," or approved equal, locking quadrants on each manual damper. Locate dampers in furred ceilings near access panels where possible.
  - a. Butterfly dampers shall be constructed as per Figure 7-4, Figure A, B, and C in the duct manual.
  - b. Multi-blade dampers shall conform to Figure 7-5.
  - c. Back-draft dampers shall be Air Balance "Air Dynamic" model DY-1002-V, or equal.

2.4 INSULATION

A. Exterior of Ductwork:

1. Unless specified to be lined, all sheet metal supply and return ducts in indirectly conditioned spaces shall be insulated on the outside with Johns Manville "Microlite XG" flexible fiberglass blanket-type duct wrap, with factory applied FSK aluminum foil facing, with a composite UL rating of 25/50, minimum R-6 installed.
2. Unless specified to be lined, all sheet metal supply and return ducts in unconditioned spaces shall be insulated on the outside with Johns Manville "Microlite XG" flexible fiberglass blanket-type duct wrap, with factory applied FSK aluminum foil facing, with a composite UL rating of 25/50, minimum R-8 installed.

B. Interior of Ductwork:

1. Duct lining shall be installed in supply and return ducts and plenums where noted on the Drawings. Lining shall be Johns Manville "PermacoteLinacoustic R" rigid fiberglass board for plenums and "PermacoteLinacoustic HP" fiberglass duct liner for ducts, 1" thick, unless otherwise noted, with fire resistant coating. Duct liner shall meet ASTM C 1071, with air surface coated with acrylic coating treated with EPA registered anti-microbial agent prove to resist microbial growth as determined by ASTM G 21 and G 22. Insulation with torn or broken coating shall be removed and replaced. Loose corners, edges, and butt joints will not be accepted.
2. All exposed exterior supply and return ductwork shall have minimum 2" interior insulation, as specified in this section.
3. Maximum velocity: 5,000 ft/min.
4. Fasteners: duct liner galvanized steel pins, welded or mechanically fastened.
5. Developed smoke density shall not exceed 50. Flame spread rating shall not exceed 25.

2.5 REGISTERS, GRILLES, AND DIFFUSERS

- A. Air terminals shall be Titus, equivalent Nailor, or approved equal, as scheduled on the Drawings.
- B. All terminals shall be steel and shall be factory painted "off-white," unless otherwise noted. Air terminals for installation in gypsum board shall have a 1" border for surface mounting.

## 2.6 ACCESS PANELS

- A. Where construction is not inherently accessible, provide adequately sized and conveniently located access doors in ceilings, walls, and furring for servicing valves, equipment, etc. Doors shall be delivered to the General Contractor for installation.
- B. Fire Rated: Inryco/Milcor, U.L. listed, "B" label, 1 ½ hour rating. Minimum size shall be 12" x 12". Provide larger sizes where required. Locks shall be flush screwdriver operated.
- C. Drywalled Surfaces: Inryco/Milcor, Style DW, prime coated steel. Minimum size shall be 12" x 12". Provide larger sizes where required. Locks shall be flush screwdriver operated.
- D. Concrete and Tiled Surfaces: Inryco/Milcor, Style M, prime coated steel, except access panels installed in tiled surfaces shall be stain finish stainless steel. Minimum size shall be 12" x 12". Provide larger sizes where required. Locks shall be flush screwdriver operated.
- E. Plastered Surfaces: Inryco/Milcor, Style K, prime coated steel. Minimum size shall be 12" x 12". Provide larger sizes where required. Locks shall be flush screwdriver operated.

## PART 3 – EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Provide all necessary cutting in connection with the work of the Section. No cutting shall be done without the approval of the Architect. Comply with requirements specified in Cutting and Patching Section.
- B. No structural members shall be drilled, bored, or notched in a manner that will impair their structural capacity.
- C. All penetrations of concrete or masonry shall be made with core drills.

### 3.2 EQUIPMENT STARTUP

- A. Notify the Owner's representative a minimum of two weeks prior to equipment startup date to allow for Owner's personnel to be present during startup.
- B. Manufacturer must provide a service technician to supervise rigging of the units to ensure proper fit.
- C. Unit must be checked out, tested and placed into operation by the installing contractor under the supervision of an authorized representative of the factory.
- D. Controls contractor must be present during startup to ensure that factory-installed controls have been adequately installed, wired, and integrated into the building managements system.
- E. Provide minimum eight (8) hours of training time with Owner's maintenance personnel to thoroughly review new equipment, maintenance requirements, and equipment controls.
- F. During startup, the full functionality of the equipment shall be demonstrated to the satisfaction of the Owner's representative, including heating, mechanical cooling, economizer cooling, zone modulation, and all emergency shutdown features.



### 3.3 EQUIPMENT, GENERAL REQUIREMENTS

- A. Equipment shall operate quietly and without objectionable vibration. Such problems, other than from equipment operating at optimum conditions, shall be the Contractor's responsibility and shall be eliminated at the direction of the Architect.
- B. Install equipment to provide good appearance, easy access, and adequate space to allow replacement and maintenance. Provide bases, supports, anchor bolts, and other items required to achieve this. Installation shall be level, above moisture level, and adequately braced.
- C. Thoroughly lubricate equipment before operating. Repair of damage resulting from failure to comply with this requirement shall be the Contractor's responsibility.
- D. Connections to piping shall be secured and properly aligned and all utility and control connections shall be properly isolated from the building structure by means of vibration isolators and flexible connections. Any equipment not meeting this requirement will be modified and reinstalled at no expense to the Owner.
- E. Move equipment into building through available openings. Dismantle equipment where necessary to accomplish this. After reassembly, test equipment to verify its satisfactory operating condition.

### 3.4 DUCTWORK

- A. All ductwork shall be installed within spaces provided where possible. Ducts shall be installed true to line and grade, fully secured to structural framing with specified hangers and supports, insulated, and vibration isolated, where required.
- B. Each section of supply air ductwork shall be cleaned at the shop, dust and oil free, using a degreasing agent and detergent and sealed airtight at both ends with visqueen and tape. Supply ducts shall be additionally cleaned with a disinfecting solution. Ends of all supply and internally insulated exhaust ducts shall be kept sealed until the time they are jointed. When duct sections are joined, wipe down all interior surfaces with a clean tack cloth. If tack cloth shows any dust, then re-clean duct as described above. The intent is that no foreign matter be allowed to enter the ductwork at any time after factory cleaning and during construction.

### 3.5 CONTROLS

- A. This Contractor shall provide all required control components, including but not limited to thermostats, temperature sensors, static pressure sensors, humidity sensors, damper actuators, valve actuators, unitary controllers, relays, and low-voltage wiring, such that the Owner is provided with a fully functional control system.
- B. Where work is performed in an existing building, this Contractor shall integrate all control modifications into the existing building control system, if applicable. Specific requirements shall be coordinated with Owner and approved by Architect prior to installation.
- C. Installation of the system shall be made under the supervision of the manufacturer of the equipment, or his factory authorized representative.

- D. In addition to the submittals required above, and those set forth in "Submittals," the following items shall be furnished.
  - 1. In an existing building, this Contractor shall furnish a document that describes the proposed materials methods for integration into the existing building management system, if applicable.
  - 2. Prior to final inspection, the system contractor shall furnish a letter stating that the entire control system and all interlock wiring is installed and operating in a satisfactory manner.

### 3.6 THERMOSTAT

- A. Room thermostats shall be installed in the locations indicated on the Contract Drawings. Final locations shall be coordinated with Owner's maintenance personnel and shall be installed in locations which shall provide representative temperatures for the adjacent areas.
- B. Existing pneumatic thermostats shall be relocated from existing walls to new walls as required by demolition and new work.
- C. Low voltage control wiring and conduit shall be installed in accordance with requirements of Division 26.

### 3.7 INSULATION

- A. Exterior Ductwork:
  - 1. The insulation shall be cut longer than the perimeter of the duct to provide 2" staple lap and minimum compression at the corners. All joints shall be lapped 2' and stapled with outward clinching staples 2" on center. The insulation shall be mechanically fastened to the underside of all ducts 24" wide or more using cup-head pins, weld pins, or stick pins with speed clips 18" on center. All joints and penetrations of the vapor barrier jacket shall be sealed with a minimum 3" wide matching pressure sensitive tape. Pressure-sensitive tape shall be firmly rubbed in place immediately after application using a "squeegee" type tool.
  - 2. When a vapor seal is required, two coats of vapor retarder mastic reinforced with one layer of 4" wide, open weave glass fabric may be used in lieu of pressure-sensitive tape. Mastic shall be brushed onto joint and glass fabric until the fabric is filled. Mastics shall be applied in accordance with application instructions on the container.
- B. Interior Duct Liner
  - 1. Apply to the inside face of ducts, coated side facing air stream, fasten using fire retardant adhesive meeting ASTM C 9169, and secure with mechanical liner fasteners at 24" maximum o.c., both directions. Pin length should be such as to limit compression of liner.
  - 2. Exposed edges must be factory or field coated. For systems operating at 4000 fpm or higher, a metal nosing must be installed on all liner leading edges. Insulation with torn or broken coatings shall be removed or replaced. Loose corners, edges, and butt joints will not be accepted.

### 3.8 SUPPORTS AND HANGERS

- A. All hangers, supports, and attachments to the structure must be capable of withstanding three times the anticipated load.

### 3.9 TEST, INSPECTIONS

- A. Make all necessary control adjustments and balancing of air and water flows. Operate the entire system for a period of time not less than three (3) working days for the purpose of proving satisfactory performance. During this period, instruct such persons as the Owner and/or Architect may designate in the proper operation of the systems. Should further adjustment prove necessary, operating tests shall be repeated until a satisfactory test is obtained.
- B. This Contractor shall not allow or cause any work of this Section to be covered or enclosed until it has been inspected, tested, and approved by the Architect and the authorities having jurisdiction over the work. Should any of this work be enclosed or covered up before such inspection, testing, and approval, this Contractor shall uncover the work, have the necessary inspections, tests, and approvals made and, at no expense to the Owner, make all repairs necessary to restore both his work and that of other contractors which may have been damaged to be in conformity with the Contract Documents.

### 3.10 CLEANUP

- A. Upon completion of the work of this Section, remove all material, debris, and equipment associated with or used in the performance of this work.

**END OF SECTION**

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TESTING ADJUSTING AND BALANCING FOR HVAC

SECTION 23 05 93

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**PART 1 GENERAL**

1.1 SCOPE

- A. Provide all supervision, personnel, instruments, calibration, equipment, and all other materials necessary to perform balancing and testing, and compile test data including calculations and services necessary for the heating, ventilating, and air conditioning systems for this project, all in accordance with the project Drawings and Specifications and as specified herein.

1.2 GENERAL

- A. Mechanical Contractor will employ a Testing, Adjusting, and Balancing (TAB) Agency that is certified by Associated Air Balancing Council (AABC), National Environmental Balancing Bureau (NEBB), or Testing, Adjusting, and Balancing Bureau (TABB).
- B. The TAB Agency shall be responsible for inspecting, balancing, adjusting, testing, and logging the data of the performance of fans, all dampers in the duct systems, all air distribution devices, and the flows of water through all coils.
- C. Existing equipment, unless specifically mentioned otherwise, shall not in the scope of the TAB work.
- D. A completely operable system shall be placed into operation each day during testing and balancing.
- E. The TAB Agency shall utilize instrumentation which meets the requirements of ASHRAE 111, Section 5, "Instrumentation".
- F. The Mechanical Contractor shall be responsible for certifying in writing that the system, as scheduled for balancing, is operational and complete. Completeness shall include not only the physical installation, but the Mechanical Contractor's certification that the prime movers are installed in good working order, and that full load performance has been preliminary tested under the certification of the Mechanical Contractor. Before any testing and balancing is started, a complete report shall be sent to the TAB Agency by the Mechanical Contractor.
- G. The Mechanical Contractor shall be responsible for making all modifications to recertify discrepancies reported by the TAB Contractor as indicating non-compliance with the Contract Documents. By completing the work on time, the Mechanical Contractor shall provide sufficient time before the completion date so that balancing can be accomplished.
- H. If construction deficiencies are encountered which preclude obtaining optimum conditions, the deficiencies will be recorded and given to the Owner's representative. The TAB Agency is advised that deficiencies in the HVAC construction are often encountered during final TAB services and should include in the bid an amount deemed advisable to compensate for time in identifying the deficiencies.

### 1.3 SERVICES

- A. The TAB Agency will balance, test, and adjust the systemic components to obtain optimum conditions in each conditioned space in the building. If construction deficiencies are encountered which preclude obtaining optimum conditions, the deficiencies will be recorded and given to the Owner's representative. The TAB Agency is advised that deficiencies in the HVAC construction are often encountered during final TAB services, and should include in the bid an amount deemed advisable to compensate for time in identifying the deficiencies.
- B. The report shall be complete with logs, data, and records as required herein and all logs, data, and records shall be typed, produced, on white bond paper, and bound. Transmit four copies directly to the Owner's Representative to be distributed to the Mechanical Contractor, Controls Contractor, Engineer, and record file.
- C. The report shall contain the following general data in a format selected by the TAB Agency for clarity and ease of reference.
  - 1. Project Title.
  - 2. Project Location.
  - 3. Project Architect (Firm name and address).
  - 4. Project Mechanical Engineer (Name).
  - 5. TAB Field Test Engineer (Name).
  - 6. TAB Agency (Firm name and address).
  - 7. Inclusive dates tests were performed and date of report.
  - 8. Calibration Certificates of each instrument used along with specific ID numbers (i.e., serial numbers).

### 1.4 SUBMITTALS

- A. Submittal No. 15950 (1) – TAB Agenda
  - 1. The TAB Contractor shall submit a complete agenda, which shall outline in full the testing methods and locations for each HVAC system and/or device that is within the scope of the TAB work. The agenda shall represent the total system balance report, less field test data. Areas of intended field test inputs shall be represented by fully labeled blank spaces.
  - 2. The TAB Agenda shall also indicate the proposed test methods, instrumentation devices and all applicable calibration certificates.
- B. Submittal No 15950 (2) – TAB Report
  - 1. Provide Test and Balance Report as indicated herein.

### 1.5 AIR SYSTEMS REQUIREMENTS

- A. In addition to the above data in its appropriate format, the Test and Balance Report shall include the following data:

1. Existing Air Handling Units
  - a. Manufacturer and model.
  - b. Size.
  - c. Motor hp, voltage, phase, cycles, full load amps.
  - d. Location and local identification data.
  - e. Identification tag listed in schedules on drawings and specifications.
  - f. Supply airflow (cfm) and exhaust airflow (cfm), where applicable.
  - g. Fan RPM.
  - h. Motor current readings at each fan.
  - i. Inlet and outlet static pressure from supply fan and exhaust fan (if applicable). These readings shall be related to the fan curve.
  - j. Static pressure differential across each coil and filter section.
  - k. Entering air and leaving air temperatures (DB/WB) in 100% cooling mode.
  - l. Entering air and leaving air temperatures (DB) in 100% heating mode.
  - m. Outdoor air percentage setting.
  - n. Outdoor airflow in economizer mode (if applicable).
  - o. Outdoor airflow in demand control ventilation mode (if applicable).
2. Existing Exhaust Fans
  - a. Manufacturer and model.
  - b. Size.
  - c. Motor hp, voltage, phase, cycles, full load amps.
  - d. Location and local identification data.
  - e. Identification tag listed in schedules on drawings and specifications.
  - f. Exhaust airflow (cfm).
  - g. Fan RPM.
  - h. Motor current readings at each fan.

**PART 2 – PRODUCTS (not used)**

### **PART 3 – EXECUTION**

#### **3.1 GENERAL PROCEDURES**

- A. During the balancing, the temperature regulation shall be adjusted for proper relationship between controlling instruments and calibrated. The correctness of the final setting shall be proved by taking hourly readings for a period of one successive 8-hour day, in a typical room on each separately controlled zone, after tenant moves in. The total variation shall not exceed 2 degrees from the preset medium temperature during the temperature survey period. (This will be done only on systems that are totally operational).

#### **3.2 AIR SYSTEMS PROCEDURES**

- A. The TAB Agency shall perform the following tests and balance the air systems in accordance with the following requirements:
  - 1. Test and adjust blower and motor rpm to design requirements.
  - 2. Test and record motor full load amperes and corresponding voltage.
  - 3. Make pitot tube traverse of main supply ducts and obtain design cfm at fans.
  - 4. Test and record system static pressures, suction and discharge.
  - 5. Test and adjust system for design cfm of outside air.
  - 6. Test and record entering and leaving air dry bulb temperatures of all heating and cooling coils.
  - 7. Test and record entering and leaving wet bulb temperatures of all cooling coils.
  - 8. Adjust all main supply and return air ducts to proper design cfm. System supply airflow, system return airflow, and system outdoor airflow shall be balanced to within 5% of the design requirement.
  - 9. Adjust all zones to proper design cfm, supply and return.
  - 10. Test and adjust each diffuser, grille, and register to within 10% of design requirement.
  - 11. Each grille, diffuser, and register shall be identified as to location and area.
  - 12. Size, type, and manufacturer of diffusers, grilles, registers, and all tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations.
  - 13. Readings and test of diffusers, grilles, and registers shall include required fpm velocity and test resultant velocity, required cfm and test resultant cfm after adjustments.
  - 14. TAB Agency shall check all controls to ensure they are operating as specified. Provide the control contractor with specific set points.

#### **3.3 TEMPERATURE CONTROL SYSTEM**

- A. In the progress of performing the TAB work, the TAB Agency shall:

1. Work with the Controls Contractor to ensure the most effective total system operation within the design limitations, and to obtain mutual understanding of intended control performance.
  2. Verify that all control devices are properly connected.
  3. Verify that all dampers, valves, and other controlled devices are operated by the intended controller.
  4. Verify that all dampers and valves are in the position indicated by the controller (open, closed, or modulating).
  5. Verify that the integrity of valves and dampers in terms of tightness of close-off and full-open position. This includes dampers in multi-zone units.
  6. Check that all valves are properly installed in the piping system in relation to direction of flow and location.
  7. Verify the calibration of all controllers.
  8. Verify the proper application of all normally open and normally closed valves.
  9. Check the locations of all thermostats and humidistats for potential erratic operation from outside influences such as sunlight, drafts, or cold walls.
  10. Check the locations of all sensors to determine whether their position will allow them to sense only the intended temperatures or pressures of the media. Controls Contractor will relocate as deemed necessary by the TAB Agency.
  11. Check the sequence of operation for any control mode is in accordance with approved shop drawings. Verify that only minimum simultaneous heating and cooling occurs. Observe that heating cannot take place until the cooling zone of valve is completely closed.
  12. Verify that all controller set points meet the design intent.
  13. Check all dampers for free travel.
  14. Verify the operation of all interlock systems.
  15. Perform all system verification to assure the safety of the system and its components.
- B. A systematic check of the above requirements shall be included in the final TAB report.

### 3.4 TEST AND BALANCE REPORT

- A. The report shall contain the following data:
1. A listing of the measured air quantities at each outlet corresponding to the temperature tabulation specified above.
  2. Air quantities at each return and exhaust air handling device (only if ducted return systems).



3. Static pressure readings entering and leaving each supply, return and exhaust fan, filter, and coil of the system. These readings shall be related to fan curves in terms of cfm handled.
4. Water pressure readings at gauge connections. Pressure readings at coils and pumps shall be related to coils and pump curves in terms of gpm handled.
5. Motor current readings at each fan and pump. The voltages at the time of the readings shall be listed.

### 3.5 FINAL ACCEPTANCE

- A. At the time of final inspection, the Balancing Agency shall recheck, in the presence of the Owner's Representative, specific and random selections of data, i.e., water and air quantities, recorded in the Certified Report.
- B. Points and areas for recheck shall be selected by the Owner's Representative.
- C. Measurement and test procedures shall be the same as approved for work forming basis of Certified Report.
- D. Selections for recheck, specific plus random, will not normally exceed 25% of the total number tabulated in the report, except that special air systems may require a complete recheck for safety reasons.
- E. If random tests elicit a measured flow deviation of 10% or more from that recorded in the Certified Report on 10% or more of the selected recheck stations, the report shall be automatically rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, new Certified Report submitted, and new inspection tests made, all at no additional cost to the Owner.
- F. Following final acceptance of the Certified Report by the Owner's Representative, the settings of all valves, splitter, dampers, and other adjustment devices shall be permanently marked by the TAB Agency, so that adjustment can be restored if disturbed at any time. Devices shall not be marked until after final acceptance.

**END OF SECTION**

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LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

SECTION 26 05 19

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**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. Section Includes:

1. Copper building wire rated 600 V or less.
2. Aluminum building wire rated 600 V or less.
3. Metal-clad cable, Type MC, rated 600 V or less.
4. Armored cable, Type AC, rated 600 V or less.
5. Photovoltaic cable, Type PV, rated 2000 V or less.
6. Mineral-insulated cable, Type MI, rated 600 V or less.
7. Tray cable, Type TC, rated 600 V or less.
8. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

- A. RoHS: Restriction of Hazardous Substances.
- B. VFC: Variable-frequency controller.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member Company of NETA.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

**PART 2 - PRODUCTS**

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Alpha Wire Company.
  - 2. American Bare Conductor.
  - 3. Belden Inc.
  - 4. Cerro Wire LLC.
  - 5. Encore Wire Corporation.
  - 6. General Cable Technologies Corporation.
  - 7. Okonite Company (The).
  - 8. Service Wire Co.
  - 9. Southwire Company.
- C. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. RoHS compliant.
  - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation:
  - 1. Type NM: Comply with UL 83 and UL 719.
  - 2. Type RHH and Type RHW-2: Comply with UL 44.
  - 3. Type USE-2 and Type SE: Comply with UL 854.

4. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
5. Type THHN and Type THWN-2: Comply with UL 83.
6. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
7. Type UF: Comply with UL 83 and UL 493.
8. Type XHHW-2: Comply with UL 44.

F. Shield:

1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire, and sunlight- and oil-resistant outer PVC jacket.

2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. AFC Cable.
  2. American Bare Conductor.
  3. Belden Inc.
  4. Cerro Wire LLC.
  5. Encore Wire Corporation.
  6. General Cable Technologies Corporation.
  7. Okonite Company (The).
  8. Service Wire Co.
  9. Southwire Company.
- C. Standards:
  1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  2. Comply with UL 1569.
  3. RoHS compliant.
  4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

- D. Circuits:
  - 1. Single circuit with color-coded conductors.
  - 2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.
- E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- F. Ground Conductor: Insulated
- G. Conductor Insulation:
  - 1. Type TFN/THHN/THWN-2: Comply with UL 83.
  - 2. Type XHHW-2: Comply with UL 44.
- H. Armor: Aluminum, interlocked.
- I. Jacket: PVC applied over armor.

### 2.3 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. 3M Electrical Products.
  - 2. AFC Cable Systems; a part of Atkore International.
  - 3. Gardner Bender.
  - 4. Hubbell Power Systems, Inc.
  - 5. Ideal Industries, Inc.
  - 6. ILSCO.
  - 7. NSi Industries LLC.
  - 8. O-Z/Gedney; a brand of Emerson Industrial Automation.
  - 9. Service Wire Co.
  - 10. TE Connectivity Ltd.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
  - 1. Material: Copper.
  - 2. Type: Two hole with standard barrels.
  - 3. Termination: Compression.

### **PART 3 – EXECUTION**

#### **3.1 CONDUCTOR MATERIAL APPLICATIONS**

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Feeders: Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors shall be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- D. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- E. VFC Output Circuits Cable: Extra-flexible stranded for all sizes.
- F. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

#### **3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS**

- A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
- E. Feeders Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.
- F. Feeders in Cable Tray: Type THHN/THWN-2, single conductors in raceway.
- G. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

- J. Branch Circuits Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.
- K. Branch Circuits in Cable Tray: Type THHN/THWN-2, single conductors in raceway.
- L. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- M. VFC Output Circuits: Type XHHW-2 in metal conduit.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."
- G. Complete cable tray systems installation according to Section 26 05 36 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

### 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

### 3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

### 3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

### 3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration Firestopping."

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections with the assistance of a factory-authorized service representative.
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
  - 2. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements:
  - 3. Perform each of the following visual and electrical tests:
    - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    - b. Test bolted connections for high resistance using one of the following:
      - i. A low-resistance ohmmeter.
      - ii. Calibrated torque wrench.
      - iii. Thermographic survey.
    - c. Inspect compression-applied connectors for correct cable match and indentation.
    - d. Inspect for correct identification.
    - e. Inspect cable jacket and condition.
    - f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
    - g. Continuity test on each conductor and cable.
    - h. Uniform resistance of parallel conductors.



4. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
    - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    - b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
  5. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
- E. Cables will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports to record the following:
1. Procedures used.
  2. Results that comply with requirements.
  3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

**END OF SECTION**

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GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

SECTION 26 05 26

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**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. Section includes grounding and bonding systems and equipment, plus the following special applications:
  - 1. Underground distribution grounding.
  - 2. Ground bonding common with lightning protection system.
  - 3. Foundation steel electrodes.

1.3 GROUNDING ELECTRODES

- A. General: Provide a grounding electrode system, as described in NEC 250, as specified herein and as indicated on plans.
- B. Ground Field / Ground Rods: The ground field shall consist of three 20 ft long vertically driven ground rods arranged in a triangular pattern spaced 20 feet apart. Additional ground rods shall be added as necessary to achieve the desired resistance.
- C. Main Metallic Water Pipe: The building's main metallic underground water piping shall be utilized as a grounding electrode, provided the metal pipe is installed in direct contact with the earth for a minimum of 10 feet. Bond the main metallic water service within 5 ft. of the entrance of the water pipe into the building.
- D. Building Steel: The building steel shall be utilized as a grounding electrode, provided the steel is in direct contact with the earth or is otherwise effectively grounded.
- E. Rebar: In concrete buildings, provide a bond to rebar in concrete.
- F. Resistance: Grounding electrode resistance shall not exceed 10 ohms. The overall resistance of the entire grounding electrode system shall not exceed 5 ohms. Provide additional grounding electrodes as required to meet this value.

1.4 GROUNDING ELECTRODE CONDUCTOR

- A. Grounding Electrode Conductor: A main grounding electrode conductor, bare copper, sized per NEC (minimum size #1/0 AWG), shall be run in PVC conduit from the main service equipment to the grounding electrodes. This conductor shall also be bonded to the following:
  - 1. Telecommunications service ground within 20' of the electrical service

2. Lightning protection system.
3. Gas and other interior metal piping – refer to NEC.

#### 1.5 SEPARATELY DERIVED GROUNDING SYSTEMS

- A. Description: Provide a separately derived grounding system where indicated herein and as required by the National Electrical Code. Bond neutral and ground busses together.
- B. Services: Provide a separately derived grounding system for all building electrical services and step-down transformers.
- C. Emergency Generator: Provide a separately derived grounding system for the emergency system where 4-pole transfer switches are used (neutral and phase conductors switched).
- D. Multiple Buildings: Multiple buildings fed from the same electrical service shall be provided with separate grounding electrode systems, as required by the NEC and specified herein.

#### 1.6 BONDING AND EQUIPMENT GROUNDING

- A. Description of System: In general, all electrical equipment (metallic conduit, motor frames, panelboards, etc.) shall be bonded together with a green insulated copper system grounding conductor in accordance with specific rules of Article 250 of the NEC. Equipment grounding conductors through the raceway system shall be continuous from main switch ground bus to panel ground bar of each panelboard, and from panel grounding bar of each panelboard to branch circuit equipment and devices.
- B. Equipment Grounding Conductors: All raceways shall have an insulated copper system ground conductor run throughout the entire length of the circuit installed within conduit in strict accordance with NEC. Grounding conductor shall be included in total conduit fill when determining conduit sizes, even though not included or shown on drawings.
- C. Redundant Grounding: In general all branch circuits shall be provided with a redundant grounding system through the use of grounding conductors and metallic conduit.
- D. Bonding: In addition to connections to grounding electrodes, the main service ground shall be bonded to the lightning protection system and other underground metal piping.
- E. Light Poles: All exterior light poles shall have their enclosures grounded directly to a separate driven ground at the light pole in addition to the building ground connection, via the circuit equipment ground conductor.
- F. Bushings: Provide insulated grounding bushings on all metallic feeder conduits terminated within panelboards, switchboards or enclosed overcurrent devices. Provide insulated grounding bushings on all branch circuit conduits where concentric knockouts are used.
- G. Connection to Other Systems: Provide all required grounding and bonding connections as specified herein and as required by the National Electrical Code.

#### 1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

## 1.8 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
  - 1. Test wells.
  - 2. Ground rods.
  - 3. Ground rings.
  - 4. Grounding arrangements and connections for separately derived systems.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

## 1.9 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
    - a. Plans showing as-built, dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
      - i. Test wells.
      - ii. Ground rods.
      - iii. Ground rings.
      - iv. Grounding arrangements and connections for separately derived systems.
    - b. Instructions for periodic testing and inspection of grounding features at test wells ground rings grounding connections for separately derived systems based on NETA MTS.
      - i. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
      - ii. Include recommended testing intervals.

## 1.10 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by NETA.

## **PART 2 - PRODUCTS**

### 2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

## 2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Advanced Lightning Technology, Ltd.
  2. Burndy; Part of Hubbell Electrical Systems.
  3. Dossert; AFL Telecommunications LLC.
  4. ERICO International Corporation.
  5. Fushi Copperweld Inc.
  6. Galvan Industries, Inc.; Electrical Products Division, LLC.
  7. Harger Lightning & Grounding.
  8. ILSCO.
  9. O-Z/Gedney; a brand of Emerson Industrial Automation.
  10. Robbins Lightning, Inc.
  11. Siemens Industry, Inc., Energy Management Division.

## 2.3 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
1. Solid Conductors: ASTM B 3.
  2. Stranded Conductors: ASTM B 8.
  3. Tinned Conductors: ASTM B 33.
  4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
  7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.
- D. Lead Content: Less than 300 parts per million.

## 2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to the ground bus bar.
- D. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.
- E. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated, or silicon bronze bolts.
- F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- G. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
- H. Conduit Hubs: Mechanical type, terminal with threaded hub.
- I. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- J. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- K. Lay-in Lug Connector: Mechanical type, aluminum terminal with set screw.
- L. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.
- M. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- N. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.
- O. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal two-piece clamp.
- P. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- Q. Water Pipe Clamps:
  - 1. Mechanical type, two pieces with stainless-steel bolts.
    - a. Material: Tin-plated aluminum.
    - b. Listed for direct burial.
  - 2. U-bolt type with malleable-iron clamp and copper ground connector.
- R. Lead Content: Less than 300 parts per million.

## 2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet.
- B. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
  - 1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches long.
  - 2. Backfill Material: Electrode manufacturer's recommended material.
- C. Ground Plates: 1/4 inch thick, hot-dip galvanized.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
  - 1. Bury at least 24 inches below grade.
  - 2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
  - 1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
  - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- E. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

### 3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

### 3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

### 3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, non-shrink grout.
- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors' level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.
- D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned- copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation. Installation of pad shall be in compliance with utility company's grounding standard.

### 3.5 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.
  - 5. Three-phase motor and appliance branch circuits.
  - 6. Flexible raceway runs.



7. Armored and metal-clad cable runs.
  8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Water Heater, Heat-Tracing, and Anti-frost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- G. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.
- H. Metallic Fences: Comply with requirements of IEEE C2.
1. Grounding Conductor: Bare, tinned copper, not less than No. 8 AWG.
  2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
  3. Barbed Wire: Strands shall be bonded to the grounding conductor.

### 3.6 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor and install in conduit.

- C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
  - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
  - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 26 05 43 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.
  - 1. Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- F. Grounding and Bonding for Piping:
  - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
  - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
  - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
- H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.

- I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
  - 1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
  - 2. Bury ground ring not less than 24 inches from building's foundation.
- J. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG.
  - 1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.
  - 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.
- K. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 feet long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.

### 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections with the assistance of a factory-authorized service representative.
- E. Tests and Inspections:
  - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
  - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
    - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    - b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- F. Grounding system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Report measured ground resistances that exceed the following values:
  1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
  2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
  3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
  4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
  5. Substations and Pad-Mounted Equipment: 5 ohms.
  6. Manhole Grounds: 10 ohms.
- I. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

**END OF SECTION**

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HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

SECTION 26 05 29

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**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. Section Includes:

1. Steel slotted support systems.
2. Aluminum slotted support systems.
3. Nonmetallic slotted support systems.
4. Conduit and cable support devices.
5. Support for conductors in vertical conduit.
6. Structural steel for fabricated supports and restraints.
7. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
8. Fabricated metal equipment support assemblies.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  1. Suspended ceiling components.
  2. Ductwork, piping, fittings, and supports.
  3. Structural members to which hangers and supports will be attached.
  4. Size and location of initial access modules for acoustical tile.
  5. Items penetrating finished ceiling, including the following:
    - a. Luminaires.
    - b. Air outlets and inlets.

- c. Speakers.
  - d. Sprinklers.
  - e. Access panels.
  - f. Projectors.
- B. Welding certificates.

#### 1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
- 1. AWS D1.1/D1.1M.
  - 2. AWS D1.2/D1.2M.

### **PART 2 - PRODUCTS**

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design hanger and support system.
- B. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- 1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the supported equipment and systems will be fully operational after the seismic event."
  - 2. Component Importance Factor: 1.5.
- C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- 1. Flame Rating: Class 1.
  - 2. Self-extinguishing according to ASTM D 635.

#### 2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- diameter holes at a maximum of 8 inches o.c. in at least one surface.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit; a part of Atkore International.
    - b. B-line, an Eaton business.

- c. ERICO International Corporation.
  - d. Flex-Strut Inc.
  - e. Gripple Inc.
  - f. GS Metals Corp.
  - g. G-Strut.
  - h. Haydon Corporation.
  - i. Metal Ties Innovation.
  - j. Thomas & Betts Corporation; A Member of the ABB Group.
  - k. Unistrut; Part of Atkore International.
  - l. Wesanco, Inc.
2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
  3. Material for Channel, Fittings, and Accessories: Stainless steel, Type 316.
  4. Channel Width: Selected for applicable load criteria.
  5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cooper Industries, Inc.
    - b. Flex-Strut Inc.
    - c. Haydon Corporation.
    - d. MKT Metal Manufacturing.
    - e. Thomas & Betts Corporation; A Member of the ABB Group.
    - f. Unistrut; Part of Atkore International.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
  3. Channel Material: 6063-T5 aluminum alloy.
  4. Fittings and Accessories Material: 5052-H32 aluminum alloy.
  5. Channel Width: Selected for applicable load criteria.
  6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. 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 made of malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- F. 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - i. Hilti, Inc.
      - ii. ITW Ramset/Red Head; Illinois Tool Works, Inc.
      - iii. MKT Fastening, LLC.
      - iv. Simpson Strong-Tie Co., Inc.
  2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - i. B-line, an Eaton business.
      - ii. Empire Tool and Manufacturing Co., Inc.
      - iii. Hilti, Inc.
      - iv. ITW Ramset/Red Head; Illinois Tool Works, Inc.
      - v. MKT Fastening, LLC.



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

### 2.3 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 Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
  1. NECA 1.
  2. NECA 101.
  3. NECA 105.
- B. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted 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 two-bolt conduit clamps.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

- B. 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.
- C. 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. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
  - 6. To Light Steel: Sheet metal screws.
  - 7. 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.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

### 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 05 50 00 "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, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base as follows:
  - 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: Comply with requirements in Section 09 91 13 "Exterior Painting" and Section 099600 "High-Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

**END OF SECTION**

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RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

SECTION 26 05 33

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**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. Section Includes:
  - 1. Metal conduits and fittings.
  - 2. Nonmetallic conduits and fittings.
  - 3. Metal wireways and auxiliary gutters.
  - 4. Nonmetal wireways and auxiliary gutters.
  - 5. Surface raceways.
  - 6. Boxes, enclosures, and cabinets.
  - 7. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
- C. Samples: For wireways and for each color and texture specified, 12 inches long.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
  - 1. Structural members in paths of conduit groups with common supports.

2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Seismic Qualification Data: Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
  4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
- C. Source quality-control reports.

## **PART 2 - PRODUCTS**

### **2.1 METAL CONDUITS AND FITTINGS**

- A. Metal Conduit:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. AFC Cable Systems; a part of Atkore International.
    - b. Allied Tube & Conduit; a part of Atkore International.
    - c. Anamet Electrical, Inc.
    - d. Calconduit.
    - e. Electri-Flex Company.
    - f. FSR Inc.
    - g. Korkap.
    - h. NEC, Inc.
    - i. Opti-Com Manufacturing Network, Inc (OMNI).
    - j. O-Z/Gedney; a brand of Emerson Industrial Automation.
    - k. Patriot Aluminum Products, LLC.
    - l. Perma-Cote.
    - m. Picoma Industries, Inc.

- n. Plasti-Bond.
  - o. Republic Conduit.
  - p. Southwire Company.
  - q. Thomas & Betts Corporation; A Member of the ABB Group.
  - r. Topaz Electric; a division of Topaz Lighting Corp.
  - s. Western Tube and Conduit Corporation.
- 2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 3. GRC: Comply with ANSI C80.1 and UL 6.
  - 4. IMC: Comply with ANSI C80.6 and UL 1242.
  - 5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
    - a. Comply with NEMA RN 1.
    - b. Coating Thickness: 0.040 inch, minimum.
  - 6. EMT: Comply with ANSI C80.3 and UL 797.
  - 7. FMC: Comply with UL 1; zinc-coated steel.
  - 8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AFC Cable Systems; a part of Atkore International.
    - b. Allied Tube & Conduit; a part of Atkore International.
    - c. Anamet Electrical, Inc.
    - d. Calconduit.
    - e. Electri-Flex Company.
    - f. FSR Inc.
    - g. Korkap.
    - h. NEC, Inc.
    - i. NewBasis.
    - j. Opti-Com Manufacturing Network, Inc (OMNI).

- k. O-Z/Gedney; a brand of Emerson Industrial Automation.
  - l. Patriot Aluminum Products, LLC.
  - m. Perma-Cote.
  - n. Picoma Industries, Inc.
  - o. Plasti-Bond.
  - p. Republic Conduit.
  - q. Southwire Company.
  - r. Thomas & Betts Corporation; A Member of the ABB Group.
  - s. Topaz Electric; a division of Topaz Lighting Corp.
  - t. Western Tube and Conduit Corporation.
- 2. Comply with NEMA FB 1 and UL 514B.
  - 3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 4. Fittings, General: Listed and labeled for type of conduit, location, and use.
  - 5. Fittings for EMT:
    - a. Material: Steel.
    - b. Type: Setscrew.
  - 6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
  - 7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:
- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. AFC Cable Systems; a part of Atkore International.
    - b. Anamet Electrical, Inc.

- c. Arnco Corporation.
  - d. CANTEX INC.
  - e. CertainTeed Corporation.
  - f. Champion Fiberglass, Inc.
  - g. Condux International, Inc.
  - h. Electri-Flex Company.
  - i. FRE Composites.
  - j. Kraloy.
  - k. Lamson & Sessions.
  - l. Niedax Inc.
  - m. RACO; Hubbell.
  - n. Thomas & Betts Corporation; A Member of the ABB Group.
  - o. Topaz Electric; a division of Topaz Lighting Corp.
2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  3. Fiberglass:
    - a. Comply with NEMA TC 14.
    - b. Comply with UL 2515 for aboveground raceways.
    - c. Comply with UL 2420 for belowground raceways.
  4. ENT: Comply with NEMA TC 13 and UL 1653.
  5. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
  6. LFNC: Comply with UL 1660.
  7. Rigid HDPE: Comply with UL 651A.
  8. Continuous HDPE: Comply with UL 651A.
  9. RTRC: Comply with UL 2515A and NEMA TC 14.
- B. Nonmetallic Fittings:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:



- a. AFC Cable Systems; a part of Atkore International.
  - b. Anamet Electrical, Inc.
  - c. Arnco Corporation.
  - d. CANTEX INC.
  - e. CertainTeed Corporation.
  - f. Champion Fiberglass, Inc.
  - g. Condux International, Inc.
  - h. Electri-Flex Company.
  - i. FRE Composites.
  - j. Kraloy.
  - k. Lamson & Sessions.
  - l. Niedax Inc.
  - m. RACO; Hubbell.
  - n. Thomas & Betts Corporation; A Member of the ABB Group.
  - o. Topaz Electric; a division of Topaz Lighting Corp.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.
  3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
    - a. Fittings for LFNC: Comply with UL 514B.
  4. Solvents and Adhesives: As recommended by conduit manufacturer.
  5. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

### 2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. B-line, an Eaton business.
  2. Hoffman; a brand of Pentair Equipment Protection.
  3. MonoSystems, Inc.

- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 Type 3R unless otherwise indicated, and sized according to NFPA 70.
  - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

#### 2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Allied Moulded Products, Inc.
  - 2. Hoffman; a brand of Pentair Equipment Protection.
  - 3. Lamson & Sessions.
- B. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.
- D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.
- E. Solvents and Adhesives: As recommended by conduit manufacturer.
  - 1. VOC Content: 510 g/L or less for PVC conduit and fittings.

#### 2.5 SURFACE RACEWAYS

- A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Hubbell Incorporated; Wiring Device-Kellems.
    - b. MonoSystems, Inc.

- c. Panduit Corp.
- C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Hubbell Incorporated.
    - b. MonoSystems, Inc.
    - c. Panduit Corp.
  - D. Tele-Power Poles:
    - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - a. MonoSystems, Inc.
      - b. Panduit Corp.
    - 2. Material: Galvanized steel with ivory baked-enamel finish.
    - 3. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

## 2.6 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Adalet.
  - 2. Crouse-Hinds, an Eaton business.
  - 3. EGS/Appleton Electric.
  - 4. Erickson Electrical Equipment Company.
  - 5. FSR Inc.
  - 6. Hoffman; a brand of Pentair Equipment Protection.
  - 7. Hubbell Incorporated.
  - 8. Hubbell Incorporated; Wiring Device-Kellems.
  - 9. Kraloy.

10. Milbank Manufacturing Co.
  11. MonoSystems, Inc.
  12. Oldcastle Enclosure Solutions.
  13. O-Z/Gedney; a brand of Emerson Industrial Automation.
  14. Plasti-Bond.
  15. RACO; Hubbell.
  16. Spring City Electrical Manufacturing Company.
  17. Stahlin Non-Metallic Enclosures.
  18. Thomas & Betts Corporation; A Member of the ABB Group
  19. Topaz Electric; a division of Topaz Lighting Corp.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Metal Floor Boxes:
1. Material: Cast metal or sheet metal.
  2. Type: Fully adjustable.
  3. Shape: Rectangular.
  4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Nonmetallic Floor Boxes: Nonadjustable, round.
1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- H. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- I. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.
1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and

application.

- J. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- K. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- L. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- M. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- N. Gangable boxes are allowed.
- O. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Nonmetallic Enclosures: Fiberglass.
  - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- P. Cabinets:
  - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  - 2. Hinged door in front cover with flush latch and concealed hinge.
  - 3. Key latch to match panelboards.
  - 4. Metal barriers to separate wiring of different systems and voltage.
  - 5. Accessory feet where required for freestanding equipment.
  - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.7 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
  - 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
  - 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to,

the following:

- a. Armorcast Products Company.
  - b. NewBasis.
  - c. Oldcastle Enclosure Solutions.
  - d. Oldcastle Precast, Inc.
2. Standard: Comply with SCTE 77.
  3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
  4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
  5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
  6. Cover Legend: Molded lettering, "ELECTRIC."
  7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
  8. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

## 2.8 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
  1. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
  2. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  1. Exposed Conduit: GRC RNC, or Type EPC-40-PVC.
  2. Concealed Conduit, Aboveground: GRC.
  3. Underground Conduit: RNC, Type EPC-40-PVC.
  4. Connection to Vibrating Equipment (Including Transformers and Hydraulic,
  5. Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

6. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
  1. Exposed, Not Subject to Physical Damage: EMT.
  2. Exposed, Not Subject to Severe Physical Damage: EMT.
  3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
    - a. Loading dock.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
    - d. Gymnasiums.
  4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  6. Damp or Wet Locations: GRC.
  7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
  1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
  3. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.
  4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface raceways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

### 3.2 INSTALLATION

- A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Complete raceway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
  - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
- M. Stub-ups to Above Recessed Ceilings:
  - 1. Use EMT, IMC, or RMC for raceways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.



- N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- P. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- Q. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- R. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous groundpath.
- S. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- T. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- U. Surface Raceways:
  - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
  - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- V. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- W. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where an underground service raceway enters a building or structure.
  - 3. Conduit extending from interior to exterior of building.
  - 4. Conduit extending into pressurized duct and equipment.
  - 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.

6. Where otherwise required by NFPA 70.
- X. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- Y. Expansion-Joint Fittings:
  1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has a straight-run length that exceeds 100 feet.
  2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
    - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    - d. Attics: 135 deg F temperature change.
  3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
  4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
  5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
  6. Provide expansion/deflection fitting per NEC 300.4 (H) where raceway crosses structural joint intended for expansion/contraction/deflection to accommodate horizontal and vertical movement.
- Z. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
  1. Use LFMC in damp or wet locations subject to severe physical damage.
  2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- AA. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center or top or bottom of box unless otherwise indicated.
- BB. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat

surface for a rain-tight connection between box and cover plate or supported equipment and box.

- CC. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- DD. Locate boxes so that cover or plate will not span different building finishes.
- EE. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- FF. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- GG. Set metal floor boxes level and flush with finished floor surface.
- HH. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

### 3.3 INSTALLATION OF UNDERGROUND CONDUIT

#### A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 20 00 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 31 20 00 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
  - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.

7. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

### 3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

### 3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

### 3.6 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

### 3.7 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

**END OF SECTION**

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IDENTIFICATION FOR ELECTRICAL SYSTEMS

SECTION 26 05 53

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**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings, Owner's General Conditions of the Contract, and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Color and legend requirements for raceways, conductors, and warning labels and signs.
  - 2. Labels.
  - 3. Bands and tubes.
  - 4. Tapes and stencils.
  - 5. Tags.
  - 6. Signs.
  - 7. Cable ties.
  - 8. Paint for identification.
  - 9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For arc-flash hazard study.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Comply with NFPA 70.
- B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- C. Comply with ANSI Z535.4 for safety signs and labels.
- D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

### **2.2 COLOR AND LEGEND REQUIREMENTS**

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
  - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
  - 2. Colors for 208/120-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
  - 3. Colors for 240-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
  - 4. Colors for 480/277-V Circuits:
    - a. Phase A: Brown.
    - b. Phase B: Orange.
    - c. Phase C: Yellow.
  - 5. Color for Neutral: White.

6. Color for Equipment Grounds: Bare copper.
  7. Colors for Isolated Grounds: Green with white stripe.
- C. Warning Label Colors:
1. Identify system voltage with black letters on an orange background.
- D. Warning labels and signs shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
  2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
- E. Equipment Identification Labels:
1. Black letters on a white field.

## 2.3 LABELS

- A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Champion America.
    - c. emedco.
    - d. Grafoplast Wire Markers.
    - e. HellermannTyton.
    - f. LEM Products Inc.
    - g. Marking Services, Inc.
    - h. Panduit Corp.
- B. Snap-around Labels: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. HellermannTyton.

- c. Marking Services, Inc.
  - d. Panduit Corp.
- C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, polyester flexible label with acrylic pressure-sensitive adhesive.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. A'n D Cable Products.
    - b. Brady Corporation.
    - c. Brother International Corporation.
    - d. emedco.
    - e. Grafoplast Wire Markers.
    - f. Ideal Industries, Inc.
    - g. LEM Products Inc.
    - h. Marking Services, Inc.
    - i. Panduit Corp.
  - 2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
  - 3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.
- D. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. A'n D Cable Products.
    - b. Brady Corporation.
    - c. Brother International Corporation.
    - d. emedco.
    - e. Grafoplast Wire Markers.
    - f. HellermannTyton.



- g. Ideal Industries, Inc.
  - h. LEM Products Inc.
  - i. Marking Services, Inc.
  - j. Panduit Corp.
2. Minimum Nominal Size:
- a. 1-1/2 by 6 inches for raceway and conductors.
  - b. 3-1/2 by 5 inches for equipment.
  - c. As required by authorities having jurisdiction.

#### 2.4 BANDS AND TUBES

- A. Snap-around, Color-Coding Bands: Slit, pre-tensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. HellermannTyton.
    - c. Marking Services, Inc.
- B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.
- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Brady Corporation.

#### 2.5 TAPES AND STENCILS

- A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Carlton Industries, LP.
    - b. Champion America.
    - c. HellermannTyton.
    - d. Ideal Industries, Inc.

- e. Marking Services, Inc.
- B. Self-Adhesive Vinyl Tape: Colored, heavy-duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Carlton Industries, LP.
    - c. emedco.
- C. Tape and Stencil: 4-inch-wide black stripes on 10-inch centers placed diagonally over orange background and are 12 inches wide. Stop stripes at legends.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. HellermannTyton.
    - b. LEM Products Inc.
    - c. Marking Services, Inc.
- D. Floor Marking Tape: 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Carlton Industries, LP.
- E. Underground-Line Warning Tape:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Ideal Industries, Inc.
    - c. LEM Products Inc.
    - d. Marking Services, Inc.
    - e. Reef Industries, Inc.
  - 2. Tape:
    - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.

- b. Printing on tape shall be permanent and shall not be damaged by burial operations.
  - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
3. Color and Printing:
- a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
  - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
  - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
4. Tag: Type I:
- a. Pigmented polyolefin, bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Thickness: 4 mils.
  - d. Weight: 18.5 lb/1000 sq. ft.
  - e. Tensile according to ASTM D 882: 30 lb/f and 2500 psi.
5. Tag: Type II:
- a. Multilayer laminate, consisting of high-density polyethylene scrim coated with pigmented polyolefin; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Thickness: 12 mils.
  - d. Weight: 36.1 lb/1000 sq. ft.
  - e. ensile according to ASTM D 882: 400 lb/f and 11,500 psi.
6. Tag: Type ID:
- a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Overall Thickness: 5 mils.

- d. Foil Core Thickness: 0.35 mil.
  - e. Weight: 28 lb/1000 sq. ft.
  - f. Tensile according to ASTM D 882: 70 lb/f and 4600 psi.
7. Tag: Type IID:
- a. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Overall Thickness: 8 mils.
  - d. Foil Core Thickness: 0.35 mil.
  - e. Weight: 34 lb/1000 sq. ft.
  - f. Tensile according to ASTM D 882: 300 lb/f and 12,500 psi.
- F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

## 2.6 TAGS

- A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Carlton Industries, LP.
    - c. emedco.
    - d. Marking Services, Inc.
- B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch thick, color-coded for phase and voltage level, with factory screened permanent designations; punched for use with self-locking cable tie fastener.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Carlton Industries, LP.
    - c. emedco.

- d. Grafoplast Wire Markers.
- e. LEM Products Inc.
- f. Marking Services, Inc.
- g. Panduit Corp.

C. Write-on Tags:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Carlton Industries, LP.
  - b. LEM Products Inc.
- 2. Polyester Tags: 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment.
- 3. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.7 SIGNS

A. Baked-Enamel Signs:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Carlton Industries, LP.
  - b. Champion America.
  - c. emedco.
- 2. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
- 3. 1/4-inch grommets in corners for mounting.
- 4. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Brady Corporation.
  - b. Champion America.
  - c. emedco.

2. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
  3. 1/4-inch grommets in corners for mounting.
  4. Nominal Size: 10 by 14 inches.
- C. Laminated Acrylic or Melamine Plastic Signs:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Carlton Industries, LP.
    - c. emedco.
  2. Engraved legend.
  3. Thickness:
    - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
    - b. For signs larger than 20 sq. in., 1/8 inch thick.
    - c. Engraved legend with black letters on white face.
    - d. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

## 2.8 CABLE TIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. HellermannTyton.
  2. Ideal Industries, Inc.
  3. Marking Services, Inc.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch.
  2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
  3. Temperature Range: Minus 40 to plus 185 deg F.
  4. Color: Black.

- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
  - 3. UL 94 Flame Rating: 94V-0.
  - 4. Temperature Range: Minus 50 to plus 284 deg F.
  - 5. Color: Black.

## 2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

### 3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
  - 1. Secure tight to surface of conductor, cable, or raceway.

- H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
  - 1. Secure tight to surface of conductor, cable, or raceway.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
  - 1. "EMERGENCY POWER."
  - 2. "POWER."
  - 3. "UPS."
- M. Vinyl Wraparound Labels:
  - 1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
  - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
- N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.
- O. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- P. Self-Adhesive Labels:
  - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
- Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.
- R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.
- S. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.



- T. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
- U. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
- V. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.
- W. Underground Line Warning Tape:
  - 1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
  - 2. Install underground-line warning tape for direct-buried cables and cables in raceways.
- X. Metal Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using UV-stabilized and plenum-rated cable ties.
- Y. Nonmetallic Preprinted Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using UV-stabilized and plenum-rated cable ties.
- Z. Write-on Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using UV-stabilized and plenum-rated cable ties.
- AA. Baked-Enamel Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.
- BB. Metal-Backed Butyrate Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

CC. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

DD. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
  1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
  1. "EMERGENCY POWER."
  2. "POWER."
  3. "UPS."
- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels to identify the phase.
  1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags.
- G. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.

- H. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with the conductor designation.
- I. Auxiliary Electrical Systems Conductor Identification: Marker tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
- J. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- K. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:
  - 1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
  - 2. Wall surfaces directly external to raceways concealed within wall.
  - 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- L. Workspace Indication: Apply floor marking tape or tape and stencil to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- M. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- N. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
  - 1. Apply to exterior of door, cover, or other access.
  - 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
    - a. Power-transfer switches.
    - b. Controls with external control power connections.
- O. Operating Instruction Signs: Self-adhesive labels.
- P. Emergency Operating Instruction Signs: Self-adhesive labels Metal-backed, butyrate warning signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- Q. Equipment Identification Labels:
  - 1. Indoor Equipment: Self-adhesive label.
  - 2. Outdoor Equipment: Laminated acrylic or melamine sign.

3. Equipment to Be Labeled:
  - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a self-adhesive, engraved, laminated acrylic or melamine label.
  - b. Enclosures and electrical cabinets.
  - c. Access doors and panels for concealed electrical items.
  - d. Switchboards.
  - e. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
  - f. Emergency system boxes and enclosures.
  - g. Enclosed switches.
  - h. Enclosed circuit breakers.
  - i. Enclosed controllers.
  - j. Variable-speed controllers.
  - k. Push-button stations.
  - l. Contactors.
  - m. Remote-controlled switches, dimmer modules, and control devices.
  - n. Battery-inverter units.
  - o. Battery racks.
  - p. Power-generating units.
  - q. Monitoring and control equipment.
  - r. UPS equipment.

**END OF SECTION**

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LIGHTING CONTROL DEVICES

SECTION 26 09 23

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**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. Section Includes:
  - 1. Indoor occupancy and vacancy sensors.
  - 2. Switchbox-mounted occupancy sensors.
  - 3. Lighting contactors.
  - 4. Emergency shunt relays.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Show installation details for the following:
    - a. Occupancy sensors.
    - b. Vacancy sensors.
  - 2. Interconnection diagrams showing field-installed wiring.
  - 3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Suspended ceiling components.
  - 2. Structural members to which equipment will be attached.
  - 3. Items penetrating finished ceiling, including the following:
    - a. Luminaires.

- b. Air outlets and inlets.
  - c. Speakers.
  - d. Sprinklers.
  - e. Access panels.
  - f. Control modules.
- B. Field quality-control reports.
- C. Sample Warranty: For manufacturer's warranties.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.
- B. Software and Firmware Operational Documentation:
- 1. Software operating and upgrade manuals.
  - 2. Program Software Backup: On USB media. Provide names, versions, and website addresses for locations of installed software.
  - 3. Device address list.
  - 4. Printout of software application and graphic screens.

#### 1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
- 1. Failures include, but are not limited to, the following:
    - a. Faulty operation of lighting control software.
    - b. Faulty operation of lighting control devices.
  - 2. Warranty Period: Two year(s) from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### 2.1 INDOOR OCCUPANCY AND VACANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 1. Bryant Electric.
  - 2. Cooper Industries, Inc.

3. Hubbell Building Automation, Inc.
4. Intermatic, Inc.
5. Leviton Manufacturing Co., Inc.
6. Lithonia Lighting; Acuity Brands Lighting, Inc.
7. Lutron Electronics Co., Inc.
8. NSi Industries LLC.
9. Philips Lighting Controls.
10. RAB Lighting.
11. Sensor Switch, Inc.
12. Square D.

B. General Requirements for Sensors:

1. Wall or Ceiling-mounted, solid-state indoor occupancy and vacancy sensors.
2. Dual technology.
3. Separate power pack.
4. Hardwired connection to switch; and BAS and lighting control system.
5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. Operation:
  - a. Combination Sensor: Unless otherwise indicated, sensor shall be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
7. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A.
8. Power: Line voltage.
9. Power Pack: Dry contacts rated for 20-A LED load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 HP at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
10. Mounting:
  - a. Sensor: Suitable for mounting in any position on a standard outlet box.
  - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.

- c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
  11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
  12. Bypass Switch: Override the "on" function in case of sensor failure.
  13. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.
- C. Dual-Technology Type: Wall or Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
  2. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
  3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.
  4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 3000 square feet when mounted 48 inches above finished floor.

## 2.2 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Bryant Electric.
  2. Cooper Industries, Inc.
  3. Hubbell Building Automation, Inc.
  4. Intermatic, Inc.
  5. Leviton Manufacturing Co., Inc.
  6. Lithonia Lighting; Acuity Brands Lighting, Inc.
  7. Lutron Electronics Co., Inc.
  8. NSi Industries LLC.
  9. Philips Lighting Controls.
  10. RAB Lighting.



11. Sensor Switch, Inc.
  12. Square D.
- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox, with provisions for connection toBAS.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
  3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
  4. Switch Rating: Not less than 800-VA LED load at 120 V, 1200-VA LED load at 277 V, and 800-W incandescent.
- C. Wall-Switch Sensor Tag WS1:
1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees.
  2. Sensing Technology: Dual technology - PIR and ultrasonic.
  3. Switch Type: SP.
  4. Capable of controlling load in three-way application.
  5. Voltage: Match the circuit voltage Dual voltage - 120 and 277 V.
  6. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
  7. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
  8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
  9. Color: White.
  10. Faceplate: Color matched to switch.

## 2.3 LIGHTING CONTACTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Allen-Bradley/Rockwell Automation.
  2. ASCO: a brand of Vertiv.
  3. Eaton.

4. General Electric Company.
- B. Description: Electrically operated and mechanically held, combination-type lighting contactors with fusible switch, complying with NEMA ICS 2 and UL 508.
    1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less THD of normal load current).
    2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
    3. Enclosure: Comply with NEMA 250.
    4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.
  - C. Interface with DDC System for HVAC: Provide hardware interface to enable the DDC system for HVAC to monitor and control lighting contactors.
    1. Monitoring: On-off status.
    2. Control: On-off operation.

#### 2.4 EMERGENCY SHUNT RELAY

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  1. Lighting Control and Design.
- B. Description: NC, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.
  1. Coil Rating: 120 or 277 V.

#### 2.5 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Plenum Rated.
- C. Class 1 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Plenum Rated.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Examine lighting control devices before installation. Reject lighting control devices that are

wet, moisture damaged, or mold damaged.

- B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 SENSOR INSTALLATION

- A. Comply with NECA 1.
- B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- C. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

### 3.3 CONTACTOR INSTALLATION

- A. Comply with NECA 1.
- B. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

### 3.4 WIRING INSTALLATION

- A. Comply with NECA 1.
- B. Wiring Method: Comply with Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.
- C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.
- D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

### 3.5 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 26 05 53 "Identification for Electrical Systems."
  - 1. Identify controlled circuits in lighting contactors.
  - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Lighting control devices will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

### 3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
  - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
  - 2. For daylighting controls, adjust set points and dead-band controls to suit Owner's operations.
  - 3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

### 3.8 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
  - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

### 3.9 DEMONSTRATION

- A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 26 09 43.16 "Addressable-Luminaire Lighting Controls" and Section 26 09 43.23 "Relay-Based Lighting Controls."

- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

**END OF SECTION**

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WIRING DEVICES

SECTION 26 27 26

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**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. Section Includes:

1. Standard-grade receptacles, 125 V, 20 A.
2. USB receptacles.
3. GFCI receptacles, 125 V, 20 A.
4. SPD receptacles, 125 V, 20 A.
5. Toggle switches, 120/277 V, 20 A.
6. Decorator-style devices, 20 A.
7. Occupancy sensors.
8. Wall-box dimmers.
9. Wall plates.
10. Floor service fittings.
11. Poke-through assemblies.
12. Prefabricated multi-outlet assemblies.
13. Service poles.

1.3 DEFINITIONS

- A. AFCI: Arc-fault circuit interrupter.
- B. BAS: Building automation system.
- C. EMI: Electromagnetic interference.
- D. GFCI: Ground-fault circuit interrupter.
- E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

F. RFI: Radio-frequency interference.

G. SPD: Surge protective device.

#### 1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

#### 1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing- label warnings and instruction manuals that include labeling conditions.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Service/Power Poles: One for every 10, but no fewer than one.

2. Floor Service-Outlet Assemblies: One for every 10, but no fewer than one.

3. Poke-Through, Fire-Rated Closure Plugs: One for every five-floor service outlets installed, but no fewer than two.

4. SPD Receptacles: One for every 10 of each type installed, but no fewer than two of each type.

## **PART 2 - PRODUCTS**

### 2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Comply with NEMA WD 1.

E. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.

2. Devices shall comply with requirements in this Section.

F. Devices for Owner-Furnished Equipment:

1. Receptacles: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

G. Device Color:

1. Wiring Devices Connected to Normal Power System: White unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Essential Electrical System: Red.
3. SPD Devices: Blue.

H. Wall Plate Color: For plastic covers, match device color.

I. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

## 2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
2. Description: Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.

B. Tamper-Resistant Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.

C. Weather-Resistant Duplex Receptacle, 125 V, 20 A:

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



- a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
  3. Configuration: NEMA WD 6, Configuration 5-20R.
  4. Standards: Comply with UL 498.
  5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.
- D. Tamper- and Weather-Resistant Duplex Receptacles, 125 V, 20A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
  2. Configuration: NEMA WD 6, Configuration 5-20R.
  3. Standards: Comply with UL 498.
  4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

## 2.3 USB RECEPTACLES

- A. USB Charging Receptacles:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Single-piece, rivet-less, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.
  3. USB Receptacles: Dual and quad, USB Type A, 5 V dc, and 2.1 A per receptacle (minimum).
  4. Standards: Comply with UL 1310 and USB 3.0 devices.
- B. Tamper-Resistant Duplex and USB Charging Receptacles:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).

- b. Hubbell Incorporated; Wiring Device-Kellems.
- c. Leviton Manufacturing Co., Inc.
- 2. Description: Single-piece, rivet-less, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap. Integral shutters that operate only when a plug is inserted in the line voltage receptacle.
- 3. Line Voltage Receptacles: Two pole, three wire, and self-grounding; NEMA WD 6, Configuration 5-20R.
- 4. USB Receptacles: Dual USB Type A, 5 V dc, and 2.1 A per receptacle (minimum).
- 5. Standards: Comply with UL 498, UL 1310, USB 3.0 devices, and FS W-C-596.

#### 2.4 GFCI RECEPTACLES, 125 V, 20 A

##### A. Duplex GFCI Receptacles, 125 V, 20 A:

- 1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
- 2. Configuration: NEMA WD 6, Configuration 5-20R.
- 3. Type: Feed through.
- 4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

##### B. Tamper-Resistant Duplex GFCI Receptacles, 125 V, 20 A:

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Hubbell Incorporated; Wiring Device-Kellems.
- 2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
- 3. Configuration: NEMA WD 6, Configuration 5-20R.
- 4. Type: Feed through.
- 5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
- 6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

##### C. Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A:

- 1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
- 2. Configuration: NEMA WD 6, Configuration 5-15R.

3. Type: Feed through.
4. Standards: Comply with UL 498 and UL 943 Class A.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.5 SPD RECEPTACLES, 125 V, 20 A

A. Duplex SPD Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
2. Description: Two pole, three wire, and self-grounding. Integral SPD in line to ground, line to neutral, and neutral to ground. LED indicator light.
3. SPD Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
4. Active SPD Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."
5. Configuration: NEMA WD 6, Configuration 5-20R.
6. Standards: Comply with NEMA WD 1, UL 498, UL 1449, and FS W-C-596.

B. Isolated-Ground Duplex SPD Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
2. Description: Two pole, three wire, and self-grounding. Integral SPD in line to ground, line to neutral, and neutral to ground. LED indicator light.
3. SPD Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
4. Active SPD Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

5. Grounding: Equipment grounding contacts shall be connected only to green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
6. Configuration: NEMA WD 6, Configuration 5-20R.
7. Standards: Comply with UL 498, UL 1449, and FS W-C-596.

## 2.6 CORD AND PLUG SETS

- A. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
- B. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
- C. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

## 2.7 TOGGLE SWITCHES, 120/277 V, 20 A

- A. Single-Pole Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Standards: Comply with UL 20 and FS W-S-896.
- B. Antimicrobial, Single-Pole Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Eaton (Arrow Hart).
  2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
  3. Standards: Comply with UL 20 and FS W-S-896.
- C. Two-Pole Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.

- c. Leviton Manufacturing Co., Inc.
2. Comply with UL 20 and FS W-S-896.
- D. Antimicrobial, Double-Pole Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Eaton (Arrow Hart).
  2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
  3. Standards: Comply with UL 20 and FS W-S-896.
- E. Three-Way Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Comply with UL 20 and FS W-S-896.
- F. Antimicrobial, Three-Way Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Eaton (Arrow Hart).
  2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
  3. Standards: Comply with UL 20 and FS W-S-896.
- G. Four-Way Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Standards: Comply with UL 20 and FS W-S-896.

- H. Pilot-Light, Single-Pole Switches: 120/277 V, 20 A:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  - 2. Description: Illuminated when switch is on.
  - 3. Standards: Comply with UL 20 and FS W-S-896.
- I. Lighted Single-Pole Switches, 120/277 V, 20 A:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Premise Wiring.
    - c. Leviton Manufacturing Co., Inc.
  - 2. Description: Handle illuminated when switch is on.
  - 3. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.
- J. Key-Operated, Single-Pole Switches, 120/277 V, 20 A:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  - 2. Description: Factory-supplied key in lieu of switch handle.
  - 3. Standards: Comply with UL 20 and FS W-S-896.
- K. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches, 120/277 V, 20 A:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.

2. Description: For use with mechanically held lighting contactors.
  3. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.
- L. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches, 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: For use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.
  3. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

## 2.8 OCCUPANCY SENSORS

- A. Wall Switch Sensor Light Switch, Dual Technology:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual (ultrasonic and passive infrared) technology.
  3. Standards: Comply with UL 20.
  4. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 HP at 120 V ac.
  5. Adjustable time delay of 20 minutes.
  6. Able to be locked to Automatic-On mode.
  7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.
  8. Connections: Provisions for connection to BAS.
- B. Wall Sensor Light Switch, Passive Infrared:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Cooper Industries.
  - b. Hubbell Premise Wiring.
  - c. Leviton Manufacturing Co., Inc.
2. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using passive infrared technology.
  3. Standards: Comply with UL 20.
  4. Connections: Provisions for connection to BAS.
  5. Integral relay for connection to BAS.
  6. Adjustable time delay of 20 minutes.
  7. Able to be locked to Automatic-On mode.
  8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.
- C. Wall Sensor Light Switch, Ultrasonic:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
  2. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using ultrasonic technology.
  3. Standards: Comply with UL 20.
  4. Connections: Provisions for connection to BAS.
  5. Integral relay for connection to BAS.
  6. Adjustable time delay of 20 minutes.
  7. Able to be locked to Automatic-On mode.
  8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.

## 2.9 DIMMERS

### A. Wall-Box Dimmers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.



- c. Leviton Manufacturing Co., Inc.
- d. Lutron Electronics Co., Inc.
- 2. Description: Modular, full-wave, solid-state dimmer switch with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
- 3. Control: Continuously adjustable slider; with single-pole or three-way switching.
- 4. Standards: Comply with UL 1472.
- 5. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

## 2.10 WALL PLATES

- A. Single Source: Obtain wall plates from same manufacturer of wiring devices.
- B. Single and combination types shall match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
  - 3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
  - 4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover and listed and labeled for use in wet and damp locations.
- C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant thermoplastic with lockable cover.
- D. Antimicrobial Cover Plates:
  - 1. Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
  - 2. Tarnish resistant.

## 2.11 FLOOR SERVICE FITTINGS

- A. Flush-Type Floor Service Fittings:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Premise Wiring.
    - c. Thomas & Betts Power Solutions; ABB Group.
  - 2. Description: Type: Modular, flush-type, dual-service units suitable for wiring method used, with cover flush with finished floor.

3. Compartments: Barrier separates power from voice and data communication cabling.
4. Service Plate and Cover: Rectangular, with satin finish.
5. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

B. Flap-Type Service Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Premise Wiring.
2. Description: Type: Modular, flap-type, dual-service units suitable for wiring method used, with flaps flush with finished floor.
3. Compartments: Barrier separates power from voice and data communication cabling.
4. Flaps: Rectangular, with satin finish.
5. Service Plate: Same finish as flaps.
6. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.
7. Data Communication Outlet: Blank cover with bushed cable opening.

C. Above-Floor Service Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Premise Wiring.
  - c. Thomas & Betts Corporation; A Member of the ABB Group.
2. Description: Type: Modular, above-floor, dual-service units suitable for wiring method used.
3. Compartments: Barrier separates power from voice and data communication cabling.
4. Service Plate: Rectangular, with satin finish.
5. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

## 2.12 POKE-THROUGH ASSEMBLIES

- A. Description: Factory-fabricated and -wired assembly of below-floor junction box with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Hubbell Incorporated; Wiring Device-Kellems.
  - 2. Pass & Seymour/Legrand (Pass & Seymour).
  - 3. Square D; by Schneider Electric.
- C. Standards: Comply with scrub water exclusion requirements in UL 514.
- D. Service-Outlet Assembly: Pedestal type with services indicated, complying with requirements in Section 27 15 13 "Communications Copper Horizontal Cabling."
- E. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.
- F. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
- G. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.
- H. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, four-pair cables that comply with requirements in Section 27 15 13 "Communications Copper Horizontal Cabling."

#### 2.13 PREFABRICATED MULTIOUTLET ASSEMBLIES

- A. Description: Two-piece surface metal raceway, with factory-wired multi-outlet harness.
- B. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Hubbell Incorporated; Wiring Device-Kellems.
- C. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- D. Raceway Material: Metal, with manufacturer's standard finish.
- E. Multi-outlet Harness:
  - 1. Receptacles: 15-A, 125-V, NEMA WD 6 Configuration 5-15R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.
  - 2. Receptacle Spacing: As shown.
  - 3. Wiring: No. 12 AWG solid, Type THHN copper, single circuit.

#### 2.14 SERVICE POLES

- A. Dual-Channel Service Poles:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Hubbell Premise Wiring.
2. Description: Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.
3. Poles: Nominal 2.5-inch-square cross-section, with height adequate to extend from floor to at least 6 inches above ceiling, and with separate channels for power wiring and voice and data communication cabling.
4. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.
5. Material: Aluminum.
6. Finishes: Satin-anodized aluminum.
7. Wiring: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four, balanced twisted pair data communication cables.
8. Power Receptacles: Two duplex, 20-A, straight-blade receptacles complying with requirements in this Section.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
  1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
  2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
  1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
  2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  3. The length of free conductors at outlets for devices shall comply with NFPA 70, Article 300, without pigtails.

4. Existing Conductors:
  - a. Cut back and pigtail, or replace all damaged conductors.
  - b. Straighten conductors that remain and remove corrosion and foreign matter.
  - c. Pig-tailing existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
  1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
  2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
  3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
  4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
  5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
  6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
  7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
  8. Tighten unused terminal screws on the device.
  9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
  1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Dimmers:
  1. Install dimmers within terms of their listing.
  2. Verify that dimmers used for fan-speed control are listed for that application.
  3. Install unshared neutral conductors online and load side of dimmers according to manufacturers' device, listing conditions in the written instructions.

- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

### 3.2 GFCI RECEPTACLES

- A. Install non-feed-through GFCI receptacles where protection of downstream receptacles is not required.

### 3.3 IDENTIFICATION

- A. Comply with Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with white-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
- C. Essential Electrical System: Mark receptacles supplied from the essential electrical system to allow easy identification using a self-adhesive label.

### 3.4 FIELD QUALITY CONTROL

- A. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. In healthcare facilities, prepare reports that comply with NFPA 99.
  - 2. Test Instruments: Use instruments that comply with UL 1436.
  - 3. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- D. Tests for Receptacles:
  - 1. Line Voltage: Acceptable range is 105 to 132 V.
  - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
  - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
  - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
  - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
  - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault-current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new

ones, and retest as specified above.

- E. Test straight-blade convenience outlets in patient-care areas for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz.
- F. Wiring device will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.

**END OF SECTION**

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ENCLOSED SWITCHES AND CIRCUIT BREAKERS

SECTION 26 28 16

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**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings, Owner's General Conditions of the Contract, and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Fusible switches.
  - 2. Non-fusible switches.
  - 3. Receptacle switches.
  - 4. Shunt trip switches.
  - 5. Molded-case circuit breakers (MCCBs).
  - 6. Molded-case switches.
  - 7. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
  - 1. Enclosure types and details for types other than NEMA 250, Type 1.
  - 2. Current and voltage ratings.
  - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
  - 4. Include evidence of a nationally recognized testing laboratory (NRTL) listing for series rating of installed devices.



5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Data: Certificates, for enclosed switches and circuit breakers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
  - a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
  - b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
  - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
  - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
  - 2. Altitude: Not exceeding 6600 feet.

1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: One year(s) from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

## 2.3 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. ABB Inc.
  2. Eaton.
  3. General Electric Company.
  4. Siemens Industry, Inc., Energy Management Division.
  5. Square D
- B. Type HD, Heavy Duty:
1. Single throw.
  2. Three pole.
  3. 600-V ac.
  4. 1200 A and smaller.
  5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.
  6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
  3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
  5. Hook stick Handle: Allows use of a hook stick to operate the handle.
  6. Lugs: Mechanical type, suitable for number, size, and conductor material.
  7. Service-Rated Switches: Labeled for use as service equipment.

## 2.4 NON-FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.
  - 2. General Electric Company.
  - 3. Siemens Industry, Inc., Energy Management Division.
  - 4. Square D
- B. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- D. Type HD, Heavy Duty, Three Pole, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- E. Accessories:
  - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
  - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  - 4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
  - 5. Hook stick Handle: Allows use of a hook stick to operate the handle.
  - 6. Lugs: Mechanical type, suitable for number, size, and conductor material.
  - 7. Service-Rated Switches: Labeled for use as service equipment.

## 2.5 RECEPTACLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.
  - 2. General Electric Company.
  - 3. Siemens Industry, Inc., Energy Management Division.

4. Square D
  - B. Type HD, Heavy-Duty, Three Pole, Single-Throw Fusible Switch: 600-V ac, A; UL 98 and NEMA KS 1; horsepower rated, with clips or bolt pads to accommodate indicated fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
  - C. Type HD, Heavy-Duty, Three Pole, Single-Throw Non-fusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
  - D. Interlocking Linkage: Provided between the receptacle and switch mechanism to prevent inserting or removing plug while switch is in the on position, inserting any plug other than specified, and turning switch on if an incorrect plug is inserted or correct plug has not been fully inserted into the receptacle.
  - E. Receptacle: Polarized, three-phase, four-wire receptacle (fourth wire connected to enclosure ground lug).
  - F. Accessories:
    1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
    2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
    3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
    4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
    5. Hook stick Handle: Allows use of a hook stick to operate the handle.
    6. Lugs: Mechanical type, suitable for number, size, and conductor material.
    7. Service-Rated Switches: Labeled for use as service equipment.

## 2.6 SHUNT TRIP SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Bussmann, an Eaton business.
  2. Littelfuse, Inc.
- B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with Class J fuse block and 200-kA interrupting and short-circuit current rating.
- C. Type HD, Heavy-Duty, Three Pole, Single-Throw Fusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; integral shunt trip mechanism; horsepower rated, with clips or bolt pads to accommodate fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

- D. Type HD, Heavy-Duty, Three Pole, Single-Throw Nonfusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; integral shunt trip mechanism; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- E. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power transformer of enough capacity to operate shunt trip, pilot, indicating and control devices.
- F. Accessories:
  - 1. Oil-tight key switch for key-to-test function.
  - 2. Oil-tight red ON pilot light.
  - 3. Isolated neutral lug; 100 percent rating.
  - 4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
  - 5. Form C alarm contacts that change state when switch is tripped.
  - 6. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
  - 7. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  - 8. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
  - 9. Hook stick Handle: Allows use of a hook stick to operate the handle.
  - 10. Lugs: Mechanical type, suitable for number, size, and conductor material.
  - 11. Service-Rated Switches: Labeled for use as service equipment.

## 2.7 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.
  - 2. General Electric Company.
  - 3. NOARK Electric North America.
  - 4. Siemens Industry, Inc., Energy Management Division.
  - 5. Square D
- B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

- C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.
- D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated.
- E. MCCBs shall be equipped with a device for locking in the isolated position.
- F. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below.
- G. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- I. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- J. Electronic Trip Circuit Breakers: Field-replaceable rating plug, RMS sensing, with the following field-adjustable settings:
  - 1. Instantaneous trip.
  - 2. Long- and short-time pickup levels.
  - 3. Long- and short-time time adjustments.
  - 4. Ground-fault pickup level, time delay, and I-squared t response.
- K. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- L. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
- M. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- N. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).
- O. Features and Accessories:
  - 1. Standard frame sizes, trip ratings, and number of poles.
  - 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.

3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero- sequence current transformer/sensor.
5. Communication Capability: Circuit-breaker-mounted communication module with functions and features compatible with power monitoring and control system, specified in Section 260913 "Electrical Power Monitoring and Control."
6. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
7. Under-voltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
8. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
9. Alarm Switch: One NO contact that operates only when circuit breaker has tripped.
10. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
11. Electrical Operator: Provide remote control for on, off, and reset operations.
12. Accessory Control Power Voltage: Integrally mounted, self-powered.

## 2.8 MOLDED-CASE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Eaton.
  2. General Electric Company.
  3. NOARK Electric North America.
  4. Siemens Industry, Inc., Energy Management Division.
  5. Square D
- B. Description: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- C. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- D. Features and Accessories:
  1. Standard frame sizes and number of poles.



2. Lugs:
  - a. Mechanical type, suitable for number, size, trip ratings, and conductor material.
  - b. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below.
3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
5. Under-voltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
6. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.
7. Alarm Switch: One NO contact that operates only when switch has tripped.
8. Key Interlock Kit: Externally mounted to prohibit switch operation; key shall be removable only when switch is in off position.
9. Zone-Selective Interlocking: Integral with ground-fault shunt trip unit; for interlocking ground-fault protection function.
10. Electrical Operator: Provide remote control for on, off, and reset operations.

## 2.9 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250) Type 1.
- C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both end walls.
- D. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
- E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

- F. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

#### **3.2 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS**

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
  - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  - 2. Outdoor Locations: NEMA 250, Type 4X.
  - 3. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
  - 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.

#### **3.3 INSTALLATION**

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- E. Install fuses in fusible devices.
- F. Comply with NFPA 70 and NECA 1.

#### **3.4 IDENTIFICATION**

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."
  - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.

2. Label each enclosure with engraved metal or laminated-plastic nameplate.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections with the assistance of a factory-authorized service representative.
- D. Tests and Inspections for Switches:
  1. Visual and Mechanical Inspection:
    - a. Inspect physical and mechanical condition.
    - b. Inspect anchorage, alignment, grounding, and clearances.
    - c. Verify that the unit is clean.
    - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
    - e. Verify that fuse sizes and types match the Specifications and Drawings.
    - f. Verify that each fuse has adequate mechanical support and contact integrity.
    - g. Inspect bolted electrical connections for high resistance using one of the two following methods:
      - i. Use a low-resistance ohmmeter.
        - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
      - ii. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
        - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
    - h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
    - i. Verify correct phase barrier installation.
    - j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.
  2. Electrical Tests:
    - a. Perform resistance measurements through bolted connections with a low-

resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

- b. Measure contact resistance across each switchblade fuse holder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
- c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
- d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
- e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

E. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

- a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
- b. Inspect physical and mechanical condition.
- c. Inspect anchorage, alignment, grounding, and clearances.
- d. Verify that the unit is clean.
- e. Operate the circuit breaker to ensure smooth operation.
- f. Inspect bolted electrical connections for high resistance using one of the two following methods:
  - i. Use a low-resistance ohmmeter.
    - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
  - ii. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
    - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
- g. Inspect operating mechanism, contacts, and chutes in unsealed units.

- h. Perform adjustments for final protective device settings in accordance with the coordination study.
2. Electrical Tests:
- a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
  - b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
  - c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
  - d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two meg-ohms.
  - e. Determine the following by primary current injection:
    - i. Long-time pickup and delay. Pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
    - ii. Short-time pickup and delay. Short-time pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
    - iii. Ground-fault pickup and time delay. Ground-fault pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
    - iv. Instantaneous pickup. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances.
  - f. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils shall be as indicated by manufacturer.
  - g. Verify correct operation of auxiliary features such as trip and pickup indicators; zone interlocking; electrical close and trip operation; trip-free, anti-pump function; and trip unit battery condition. Reset all trip logs and indicators. Investigate units that do not function as designed.
  - h. Verify operation of charging mechanism. Investigate units that do not function as

designed.

3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
  4. Perform the following infrared scan tests and inspections and prepare reports:
    - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
    - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
    - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
  5. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- F. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports.
1. Test procedures used.
  2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
  3. List deficiencies detected, remedial action taken, and observations after remedial action.

### 3.6 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as specified in Section "Coordination Studies."

**END OF SECTION**

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LED INTERIOR LIGHTING

SECTION 26 51 19

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**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. Section includes the following types of LED luminaires:

- 1. Cylinder.
- 2. Downlight.
- 3. Linear industrial.
- 4. Recessed, linear.
- 5. Strip light.
- 6. Surface mount, linear.
- 7. Surface mount, nonlinear.
- 8. Suspended, linear.
- 9. Suspended, nonlinear.

- B. Related Requirements:

- 1. Section 26 09 23 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.

- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Arrange in order of luminaire designation.
  - 2. Include data on features, accessories, and finishes.
  - 3. Include physical description and dimensions of luminaires.
  - 4. Include emergency lighting units, including batteries and chargers.
  - 5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
  - 6. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project, IES LM-79, and, IES LM-80.
    - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
    - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
- B. Shop Drawings: For nonstandard or custom luminaires.
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Luminaires.
  - 2. Suspended ceiling components.
  - 3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches (300 mm) of the plane of the luminaires.
  - 4. Structural members to which equipment and or luminaires will be attached.
  - 5. Initial access modules for acoustical tile, including size and locations.



6. Items penetrating finished ceiling, including the following:
  - a. Other luminaires.
  - b. Air outlets and inlets.
  - c. Speakers.
  - d. Sprinklers.
  - e. Access panels.
  - f. Ceiling-mounted projectors.
7. Moldings.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
  1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Product Certificates: For each type of luminaire.
- E. Product Test Reports: For each type of luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.
- F. Sample warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
  1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
  2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.

3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

#### 1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- D. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.
  1. Obtain Architect's approval of luminaires in mockups before starting installations.
  2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

#### 1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five year(s) from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified."
- B. Ambient Temperature: 5 to 104 deg F.
- C. Altitude: Sea level to 1000 feet.

## 2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.
    - b. Lamp diameter, shape, size, wattage, and coating.
    - c. CCT and CRI.
- C. Recessed luminaires shall comply with NEMA LE 4.
- D. California Title 24 compliant.

## 2.3 CYLINDER

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Albeo Technologies, Inc; A GE Company.
  - 2. Amerlux.
  - 3. Architectural Lighting Works.
  - 4. Axis Lighting, Inc.
  - 5. Cooper Lighting, an Eaton business.
  - 6. Edge Lighting.
  - 7. Edison Price Lighting.
  - 8. Eureka.
  - 9. Focal Point.
  - 10. GE Lighting Solutions.
  - 11. Juno Lighting Group by Schneider Electric.
  - 12. Lighting Science Group
  - 13. Lightolier; a Philips group brand.
  - 14. Lithonia Lighting; Acuity Brands Lighting, Inc.
  - 15. MP Lighting.
  - 16. OSRAM SYLVANIA.

17. Pure Lighting.
  18. Sea Gull Lighting.
  19. Selux Corporation.
  20. Specialty Lighting Industries, Inc.
  21. Tech Lighting.
- B. Nominal Operating Voltage: 120 V ac or 277 V ac.
- C. Lamp:
1. Minimum 1000 lm.
  2. Minimum allowable efficacy of 80 lm/W.
  3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
  4. Rated lamp life of 50,000 hours to L70.
  5. Dimmable from 100 percent to 0 percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- D. Housings:
1. Extruded-aluminum housing and heat sink.
  2. Clear finish.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
1. Tempered Fresnel glass.
  2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  3. Glass: Annealed crystal glass unless otherwise indicated.
  4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. With integral mounting provisions.

H. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.

## 2.4 DOWNLIGHT

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Amerlux.
2. Architectural Lighting Works.
3. Cooper Lighting, an Eaton business.
4. Edge Lighting.
5. Edison Price Lighting.
6. Elite Lighting Corporation.
7. Eureka.
8. Focal Point LLC.
9. Gallium Lighting, LLC.
10. GE Lighting Solutions.
11. Juno Lighting Group by Schneider Electric.
12. Lighting Science Group.
13. Lighting Services Inc.
14. Lightolier; a Philips group brand.
15. Lithonia Lighting; Acuity Brands Lighting, Inc.
16. MP Lighting.
17. OSRAM SYLVANIA.
18. Peerless: Acuity Brands Lighting, Inc.
19. Pure Lighting.
20. RAB Lighting.
21. Sea Gull Lighting.

22. Specialty Lighting Industries, Inc.
23. Tech Lighting.
- B. Nominal Operating Voltage: 120 V ac or 277 V ac.
- C. Lamp
  1. Minimum 1000 lm.
  2. Minimum allowable efficacy of 80 lm/W.
  3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
  4. Rated lamp life of 50,000 hours to L70.
  5. Dimmable from 100 percent to 0 percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- D. Housings:
  1. Extruded-aluminum housing and heat sink.
  2. Clear finish.
  3. Universal mounting bracket.
  4. Integral junction box with conduit fittings.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
  1. Adjustable lens.
  2. Wide light distribution.
  3. Tempered Fresnel glass.
  4. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  5. Glass: Annealed crystal glass unless otherwise indicated.
  6. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. Recessed luminaires shall comply with NEMA LE 4.

2.5 LINEAR INDUSTRIAL

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Albeo Technologies, Inc; A GE Company.
2. Axlen LED Lighting.
3. Cooper Lighting, an Eaton business.
4. GE Lighting Solutions.
5. Lighting Science Group.
6. Lithonia Lighting; Acuity Brands Lighting, Inc.
7. OSRAM SYLVANIA.
8. RAB Lighting.

B. Lamp:

1. Minimum 5,000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to 0 percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

C. Housings:

1. Extruded-aluminum housing and heat sink.
2. Clear finish.

D. Housing and Heat Sink Rating:

1. NEMA 4X.
2. IP 54.
3. IP 66.
4. Marine and wet locations.
5. CSA C22.2 No 137.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Tempered Fresnel glass.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. With integral mounting provisions.

H. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.

2.6 RECESSED, LINEAR

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Albeo Technologies, Inc; A GE Company.
2. Architectural Lighting Works.
3. Axis Lighting, Inc.
4. Cooper Lighting, an Eaton business.
5. Elite Lighting Corporation.



6. Finelite.
  7. Focal Point LLC.
  8. GE Lighting Solutions.
  9. Lithonia Lighting; Acuity Brands Lighting, Inc.
  10. Lumen Pulse.
  11. ON-Q Lighting Systems.
  12. OSRAM SYLVANIA.
  13. RAB Lighting.
  14. Selux Corporation.
- B. Nominal Operating Voltage: 120 V ac or 277 V ac.
- C. Lamp:
1. Minimum 3,000 lm.
  2. Minimum allowable efficacy of 85 lm/W.
  3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
  4. Rated lamp life of 50,000 hours to L70.
  5. Dimmable from 100 percent to 0 percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- D. Housings:
1. Extruded-aluminum housing and heat sink.
  2. Clear finish.
  3. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Tempered Fresnel glass.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Glass: Annealed crystal glass unless otherwise indicated.
4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. NEMA LE 4.

2.7 STRIP LIGHT

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Big Ass Fans.
2. Cooper Lighting, an Eaton business.
3. Flexfire LEDs, Inc.
4. GE Lighting Solutions.
5. Lighting Science Group.
6. Lithonia Lighting; Acuity Brands Lighting, Inc.
7. OSRAM SYLVANIA.
8. Philips Lighting Company.
9. Stile Lighting.

B. Nominal Operating Voltage: 120 V ac or 277 V ac.

C. Lamp:

1. Minimum 750 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to 0 percent of maximum light output.

6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- D. Housings:
1. Extruded-aluminum housing and heat sink.
  2. Clear finish.
  3. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping of luminaire without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
1. Tempered Fresnel glass.
  2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  3. Glass: Annealed crystal glass unless otherwise indicated.
  4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- G. Standards:
1. ENERGY STAR certified.
  2. RoHS compliant.
  3. UL Listing: Listed for damp location.

## 2.8 SURFACE MOUNT, LINEAR

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Albeo Technologies, Inc; A GE Company.
  2. Architectural Lighting Works.
  3. Axis Lighting, Inc.
  4. Cooper Lighting, an Eaton business.
  5. Elite Lighting Corporation.

6. Finelite.
  7. Focal Point LLC.
  8. GE Lighting Solutions.
  9. Lighting Science Group.
  10. Lightolier; a Philips group brand.
  11. Lithonia Lighting; Acuity Brands Lighting, Inc.
  12. Lumen Pulse.
  13. MP Lighting.
  14. OSRAM SYLVANIA.
  15. Pure Lighting.
  16. Specialty Lighting Industries, Inc.
  17. Stile Lighting.
  18. Tech Lighting.
  19. The Lighting Quotient.
- B. Nominal Operating Voltage: 120 V ac 277 V ac.
- C. Lamp:
1. Minimum 750 lm.
  2. Minimum allowable efficacy of 80 lm/W.
  3. CRI of 80. CCT of 2700 K 3000 K 4100 K.
  4. Rated lamp life of 50,000 hours to L70.
  5. Dimmable from 100 percent to 0 percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- D. Housings:
1. Extruded-aluminum housing and heat sink.
  2. Clear finish.

3. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
1. Tempered Fresnel glass.
  2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  3. Glass: Annealed crystal glass unless otherwise indicated.
  4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- G. Standards:
1. ENERGY STAR certified.
  2. RoHS compliant.
  3. UL Listing: Listed for damp location.

## 2.9 MATERIALS

- A. Metal Parts:
1. Free of burrs and sharp corners and edges.
  2. Sheet metal components shall be steel unless otherwise indicated.
  3. Form and support to prevent warping and sagging.
- B. Steel:
1. ASTM A 36/A 36M for carbon structural steel.
  2. ASTM A 568/A 568M for sheet steel.
- C. Stainless Steel:
1. 1. Manufacturer's standard grade.
  2. 2. Manufacturer's standard type, ASTM A 240/240 M.
- D. Galvanized Steel: ASTM A 653/A 653M.
- E. Aluminum: ASTM B 209.

## 2.10 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

## 2.11 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

### 3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and relamping.
  - 3. Provide support for luminaire without causing deflection of ceiling or wall.

4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaires:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaires:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

G. Suspended Luminaires:

1. Ceiling Mount:
  - a. Two 5/32-inch- diameter aircraft cable supports adjustable to 10 feet in length.
  - b. Pendant mount with 5/32-inch- diameter aircraft cable supports adjustable to 10 feet in length.
  - c. Hook mount.
2. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
4. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.

- I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

### 3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for

identification specified in Section 260553 "Identification for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

### 3.6 STARTUP SERVICE

- A. Comply with requirements for startup specified in Section 260943.23 "Relay-Based Lighting Controls."

### 3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
  - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 3. Adjust the aim of luminaires in the presence of the Architect.

**END OF SECTION**



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EMERGENCY AND EXIT LIGHTING

SECTION 26 52 13

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**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. Section Includes:
  - 1. Emergency lighting units.
  - 2. Exit signs.
  - 3. Luminaire supports.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.
- D. Fixture: See "Luminaire" Paragraph.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of emergency lighting unit, exit sign, and emergency lighting support.
  - 1. Include data on features, accessories, and finishes.
  - 2. Include physical description of the unit and dimensions.
  - 3. Battery and charger for light units.
  - 4. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.
  - 5. Include photometric data and adjustment factors based on laboratory tests, complying with IES LM-45, for each luminaire type.

- a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Shop Drawings: For nonstandard or custom luminaires.
  1. Include plans, elevations, sections, and mounting and attachment details.
  2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule:
  1. For emergency lighting units. Use same designations indicated on Drawings.
  2. For exit signs. Use same designations indicated on Drawings.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  1. Luminaires.
  2. Suspended ceiling components.
  3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
  4. Structural members to which equipment will be attached.
  5. Size and location of initial access modules for acoustical tile.
  6. Items penetrating finished ceiling including the following:
    - a. Other luminaires.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Ceiling-mounted projectors.
    - e. Sprinklers.
    - f. Access panels.
  7. Moldings.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Product Certificates: For each type of luminaire.
- D. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
  1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
  4. Provide seismic qualification certificate for each piece of equipment.
- E. Product Test Reports: For each luminaire for tests performed by manufacturer and witnessed by a qualified testing agency.
- F. Sample Warranty: For manufacturer's warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in emergency, operation, and maintenance manuals.
1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
  2. Luminaire-mounted, emergency battery pack: One for every 50 emergency lighting units. Furnish at least one of each type.
  3. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
  4. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

#### 1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- B. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- C. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.
1. Obtain Architect's approval of luminaires and signs in mockups before starting installations.

2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

#### 1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: Two year(s) from date of Substantial Completion.
- B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
  1. Warranty Period for Emergency Power Unit Batteries: Five years from date of Substantial Completion. Full warranty shall apply for first year and prorated warranty for the remaining four years.
  2. Warranty Period for Self-Powered Exit Sign Batteries: Five years from date of Substantial Completion. Full warranty shall apply for first year and prorated warranty for the remaining six years.

### **PART 2 - PRODUCTS**

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. Luminaires and lamps shall be labeled vibration and shock resistant.
  1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

#### 2.2 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.

- C. Comply with NFPA 70 and NFPA 101.
- D. Comply with NEMA LE 4 for recessed luminaires.
- E. Comply with UL 1598 for fluorescent luminaires.
- F. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with ballast.
  - 1. Emergency Connection: Operate one lamp(s) continuously at an output of 1100 lumens each upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
  - 2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  - 3. Nightlight Connection: Operate lamp continuously at 40 percent of rated light output.
  - 4. Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.
    - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
  - 5. Battery: Sealed, maintenance-free, nickel-cadmium type.
  - 6. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
  - 7. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
- G. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more lamps, remote mounted from luminaire.
  - 1. Emergency Connection: Operate one LED lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire.
  - 2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  - 3. Nightlight Connection: Operate lamp in a remote luminaire continuously.
  - 4. Battery: Sealed, maintenance-free, nickel-cadmium type.
  - 5. Charger: Fully automatic, solid-state, constant-current type.

6. Housing: NEMA 250, Type 1 enclosure listed for installation inside, on top of, or remote from luminaire. Remote assembly shall be located no less than half the distance recommended by the emergency power unit manufacturer, whichever is less.
7. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
8. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

### 2.3 EMERGENCY LIGHTING

A. General Requirements for Emergency Lighting Units: Self-contained units.

B. Emergency Luminaires:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Amerlux.
  - b. Architectural Lighting Works.
  - c. Cooper Lighting, an Eaton business.
  - d. Dual-Lite.
  - e. GE Lighting Solutions.
  - f. Juno Lighting Group by Schneider Electric.
  - g. Lightolier; a Philips group brand.
  - h. Lithonia Lighting; Acuity Brands Lighting, Inc.
  - i. Philips Lighting Company.
2. Emergency Luminaires: as indicated on Interior Luminaire Schedule Drawings with the following additional features:
  - a. Operating at nominal voltage of 120 V ac or 277 V ac.
  - b. Internal emergency power unit.
  - c. Rated for installation in damp locations, and for sealed and gasketed luminaires in wet locations.
  - d. UL 94 5VA flame rating.

## 2.4 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
  
- B. Internally Lighted Signs:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Amerlux.
    - b. Cooper Lighting, an Eaton business.
    - c. Evenlite, Inc.
    - d. Hubbell Industrial Lighting; Hubbell Incorporated.
    - e. Lithonia Lighting; Acuity Brands Lighting, Inc.
    - f. Philips Lighting Company.
    - g. Ruud Lighting Direct.
  - 2. Operating at nominal voltage of 120 V ac or 277 V ac.
  - 3. Lamps for AC Operation: LEDs; 50,000 hours minimum rated lamp life.
  - 4. Self-Powered Exit Signs (Battery Type): Internal emergency power unit.
  - 5. Master/Remote Sign Configurations:
    - a. Master Unit: Comply with requirements above for self-powered exit signs, and provide additional capacity in LED power supply for power connection to remote unit.
    - b. Remote Unit: Comply with requirements above for self-powered exit signs, except omit power supply, battery, and test features. Arrange to receive full power requirements from master unit. Connect for testing concurrently with master unit as a unified system.
  
- C. Self-Luminous Signs:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Cooper Lighting, an Eaton business.
    - b. Dual-Lite.
    - c. Evenlite, Inc.
    - d. Isolite Corporation.

- e. Lithonia Lighting; Acuity Brands Lighting, Inc.
- f. LSI Industries.
- g. Merit Lighting, LLC.

## 2.5 MATERIALS

### A. Metal Parts:

- 1. Free of burrs and sharp corners and edges.
- 2. Sheet metal components shall be steel unless otherwise indicated.
- 3. Form and support to prevent warping and sagging.

### B. Doors, Frames, and Other Internal Access:

- 1. Smooth operating, free of light leakage under operating conditions.
- 2. Designed to permit relamping without use of tools.
- 3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

### C. Diffusers and Globes:

- 1. Tempered Fresnel glass.
- 2. Glass: Annealed crystal glass unless otherwise indicated.
- 3. Acrylic: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- 4. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

### D. Housings:

- 1. Extruded aluminum housing and heat sink.
- 2. Clear finish.

### E. Conduit: Rigid galvanized steel, minimum 3/4 inch in diameter.

## 2.6 METAL FINISHES

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.7 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.



- B. Support Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

## 2.8 WIREGUARD

- A. Provide wireguard for fixtures in the Gym area.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Ceiling Grid Mounted Luminaires:
  - 1. Secure to any required outlet box.
  - 2. Secure emergency power unit using approved fasteners in a minimum of four locations, spaced near corners of emergency power unit.
  - 3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

### 3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

### 3.5 STARTUP SERVICE

- A. Perform startup service:
  - 1. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test.
  - 2. Charge emergency power units and batteries minimum of 24 hours and conduct one-hour discharge test.

### 3.6 ADJUSTING

- A. Adjustments: Within 12 months of date of Substantial Completion, provide on-site visit to do the following:
  - 1. Inspect all luminaires. Replace lamps, emergency power units, batteries, signs, or luminaires that are defective.
    - a. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 2. Conduct short-duration tests on all emergency lighting.

**END OF SECTION**