

Project Manual

**MODERNIZATION OF
HEMET SERVICE CENTER**

749 N. State Street
Hemet, CA 92543
for

RIVERSIDE COUNTY ECONOMIC DEVELOPMENT AGENCY

3403 10th Street, Suite 200
Riverside, CA 92501



WESTBERG + WHITE, INC.
ARCHITECTS AND PLANNERS

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W+W Project No. 8053

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**HEMET SERVICE CENTER
RIVERSIDE COUNTY ECONOMIC DEVELOPMENT AGENCY**

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Not Used

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NOTICE INVITING BIDS

Notice is hereby given that the County of Riverside, herein after referred to as "Owner," will receive sealed bids for the project listed below and described in the Project Manual. The project is known as the Hemet Service Center Project located at 749 State St., Hemet, California.

1. **Bids will be received at the Clerk of the Board, County of Riverside, 4080 Lemon Street, 1st Floor Annex, Riverside, California 92501 until 2:00 P.M. on Wednesday, January 26, 2011.**
2. Overall coordination of the project will be the responsibility of the County of Riverside located at the address noted above. All administrative inquiries regarding the project are to be directed to Gabriel Martin, Riverside County Economic Development Agency (951) 955-1918. All technical inquires regarding the project is to be directed to Mark Gilbert, Westberg & White, Inc (714) 508-1780.
3. Each bid shall conform to the requirements of the Documents, all of which may be examined, and copies can be obtained at the County of Riverside at the above address. Documents will be provided to each Bidder for a non-refundable charge of approximately \$300 per hard copy set or \$75 for a CD. These sets/CDs may be purchased from OCB Reprographics-Riverside (Formerly Riverside Blueprint), 4295 Main Street, Riverside California 92501 (951-686-0530). Bidders may also examine the documents at plan rooms. **A MANDATORY Pre-bid job walk/inspection shall be held at the Project Site, at 10:00 a.m. on Wednesday, January 12, 2011.**
4. The successful Bidder will enter into a direct prime contract with the County of Riverside. All project procedures and documents are designed to facilitate delivery of the Project through a single-prime Construction contract. The Owner's forms shall be used for all documents. Bidders shall read and review the Documents carefully, and shall familiarize themselves thoroughly with all requirements and existing site conditions.
5. No bid shall be considered unless it is made on a form provided by the Owner and is accompanied by a Cashier's Check, Certified Check or Bid Bond for ten percent (10%) of the total amount of the bid made payable to the Owner. The above-mentioned check or bid bond shall be given as a guarantee that the Bidder shall, if selected by the Owner, execute the Contract, in conformity with the Documents.
6. Within five (5) days after notification of the Owners' Intent to Award the Contract, the successful Bidder shall be required to furnish a labor and materials bond in an amount equal to 100% of the bid price, Performance Bonds in an amount equal to 100% of the construction cost, and other documents as stated. Said bonds shall be secured from a surety company satisfactory to the Owner.
7. Responses shall not expire for a period of ninety (90) days from the bid date.
8. The Contractor will be required, per Public Contract Code Section 3300 and for this contract, to have a Classified State License Type "B".

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9. In accordance with the provisions of Sections 1770 and 1773 of the Labor Code, the Director of the Department of Industrial Relations has determined the general prevailing rate of wages applicable to the work to be done. These rates are set forth in a schedule located at the State Department of Industrial Relations, Director of Industrial Relations, (415) 703-4781. This schedule is available to any interested party on request. Attention is directed to the provisions of Sections 1777.5 and 1777.6 of the Labor Code of the State of California concerning employment of apprentices by the Contractor or a subcontractor. Each prime contractor and all subcontractors are responsible for compliance with the requirements of Section 1777.5 and each prime contractor and all subcontractors shall comply with the requirements of Section 1777.6. A copy is on file at the principal office of the Owner and will be made available to any interested party, upon request.
10. Pursuant to Public Contract Code Section 22300, the contract will contain provisions permitting the successful bidder to substitute securities for any moneys withheld by the Owner to ensure performance under the contract.
11. The Redevelopment Agency encourages the participation of MBE\WBE\DVBE businesses. All interested MBE/WBE/DVBE are encouraged to contact General Contractors regarding your interest.
12. FEDERAL FUNDING: This project is being financed with the Community Development Block Grant (CDBG) funds from the U.S. Department of Housing and Urban Development (24 CFR Part 570) and subject to certain requirements including: compliance with Section 3 (24 CFR Part 135) Economic Opportunities requirements; payment of Federal Davis-Bacon prevailing wages; Federal Labor Standard Provisions (HUD 4010); Executive Order # 11246; and others. Information pertaining to the Federal requirements is on file with the County of Riverside Economic Development Agency (EDA).
13. PREVAILING WAGES: Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates, including the per diem wages applicable to the work, and the for the holiday and overtime work, including employer payments for health and welfare, pension, vacation, and similar purposes, in the County of Riverside in which the work is to be done, have been determined by the Director of the Department of Industrial Relations, State of California. These wages are set forth in the General Prevailing Wage Rate for this project, available from the California Department of Industrial Relations' web site at www.dir.ca.gov. Future effective prevailing wage rates which have been predetermined, and are on file with the California Department of Industrial Relations, are referenced but not printed in the general prevailing wage rates.

The Federal minimum wage rare requirements, as predetermined by the Secretary of Labor, are set forth in the books issued for bidding purposes, referred to herein as Project Bid Documents (Special Federal Provisions), and in copies of this book which may be examined at the office describe above where the project plans, special provisions, and proposal forms may be seen. Addenda to modify the minimum wage rates, if necessary, will be issued to holders of the Project Bid Documents.

INSTRUCTIONS TO BIDDERS

1. **Form of Bid:** The bid must be made on the Bid Form, which is included in the documents and must be filled out completely, dated and signed.
2. **Bid Bond:** The bid must be accompanied by a 10% Bid Bond, using the form provided herein, or by a certified or cashier's check payable to the order of the County of Riverside in an amount not less than 10% of the amount proposed.
3. **Submission of Bids:**
 - A. Bids shall be submitted to the Owner in writing, on the forms provided, no later than the time and dated stated in the Notice Inviting Bids. Telephone and faxed bids will not be accepted.
 - B. Bids may be hand-delivered, mailed, or express-mailed to the following address:

Clerk of the Board
County of Riverside
4080 Lemon Street, 1st Floor Annex
Riverside, CA 92501
 - C. Bidders shall bear full responsibility to see that their Bid is received prior to the time and date established for receipt of Bids. No Bids will be accepted after the time stated in the Notice Inviting Bids.
 - D. The Bid Forms shall be filled in by typewriter or manually printed in ink.
 - E. Where indicated, all amounts shall be expressed in words and in figures. In case of discrepancy, the words shall govern.
 - F. Each Bid shall include the legal name of the Bidder and a statement regarding whether the Bidder is a sole proprietor, a partnership, a corporation or other type of legal entity. Bids submitted by corporations shall have the state of incorporation noted, and shall have corporate seals affixed. Any Bidder submitted by an agent shall have a current Power of Attorney attached, certifying the agent's power to bind the Bidder.
 - G. All requested Alternates must be filled-in or the Bid may be considered incomplete.
 - H. All requested unit prices shall be entered.
 - I. Bidders shall not make unsolicited notations or statements on the Bid Forms. Alteration of the Bid Forms is not permitted.

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- J. All changes to and erasures of the Bidder's entries shall be initialed by the signer of the Bid.
- K. Under the bidding items listed on the Bid Form, bidders shall state prices for each basis for bid given hereinafter.
 - 1. Total Lump Sum Base Bid shall be the entire work complete in accordance with the contract documents, but not including work indicated or specified to be provided under any of the other bid items.

The basis for award will be the qualified bidder with the lowest total of the Total Lump Sum Base Bid. Alternates may be accepted in any order after award of the base bid and will be added to the contract amount.

- L. Bids must be submitted in a sealed envelope addressed to the Owner. On the face of the envelope clearly write:

DO NOT OPEN

BID ENCLOSED FOR
THE HEMET SERVICE CENTER
HEMET, CALIFORNIA

- 4. Documents: The complete Documents are identified in the Agreement. Potential Bidders are cautioned that the successful Bidder incurs duties and obligations under all of the Documents and that they should not merely examine the Documents in making their Bid. The Bid Documents include:
 - A. Construction Documents - dated August 31, 2010
 - B. Project Manual / Technical Specifications - dated August 31, 2010
 - C. Addendums
- 5. License: To be considered, a potential bidder must have the current type of license required under provisions of the California Business and Professions Code for the work covered in this bid when his/her bid is submitted. This includes a joint venture formed to submit a Bid.
- 6. Quantities: The County reserves the right to increase or decrease or to entirely eliminate certain items from the work or materials to be furnished if such action is found to be desirable or expedient.

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7. Interpretation of Documents: Discrepancies, omissions, ambiguities, requirement likely to cause disputes between trades and similar matters, shall be written and promptly brought to the attention of the County of Riverside, c/o Mr. Gabriel Martin fax (951) 955-6686. No communication by anyone as to such matter except by an Addendum affects the meaning or requirements of the Documents.
8. Addenda: The County of Riverside reserves the right to issue Addenda to the Documents at any time prior to the time set to receive Bids. Each potential Bidder shall leave with the County his name and address for the purpose of receiving Addenda to be mailed or delivered to such names at such addresses. To be considered, a Bid must list and take into account all issued Addenda.
9. Inspection of Site: Bidders must examine the site and acquaint themselves with all conditions affecting the work. By making a Bid the Bidder warrants that he has made such site examination as he deems necessary as to the condition of the site, its accessibility for materials, workmen and utilities, and ability to protect existing surface and subsurface improvements. No claim for allowance - time or money - will be allowed as to such matters.
10. Bonds: In addition to the statutory Payment Bond, the County requires a 100% Performance Bond for the entire amount of the Bid including construction amounts from the successful bidder. All Bonds must be on County forms contained in the Documents.
11. Bids: Bids are required for the entire work. The amount of the Bid for comparison purposes will be the total of all items.
12. Award of Contract: The Bidders shall execute the contract within ten (10) days after being notified in writing of the award, and shall commence the work within fifteen (15) days after he has been notified in writing to proceed and shall complete all the work and improvements within the time allotted in contract.
13. Return of Guarantee: Bonds or checks of unsuccessful Bidders will be returned by mail when the executed Agreement and bonds are received by the County. The Bond of the successful Bidder will not be returned but is exonerated by its execution and delivery of the Agreement and the bonds. If the guarantee of the successful Bidder is a check, it will be returned at the time and a Bid Bond would be exonerated.
14. Qualification of Bidders: No award will be made to any Bidder who cannot give satisfactory assurance to the County of Riverside as to his own ability to carry out the contract, both from his financial standing and by reason of his previous experience as a contractor on work of the nature contemplated in the contract. The Bidder may be required to submit his record of work of similar nature to that proposed under these specifications, and unfamiliarity with the type may be sufficient cause for rejection of Bid.

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15. Owner's Reservation of Rights: The County of Riverside reserves the right to reject any or all bids and to waive any informalities in a bid. No bidder may withdraw his bid for a period of ninety (90) days after the time set for the submittal of bids.
16. Subletting and Subcontracting: Bidders are required pursuant to the Subletting and Subcontracting Fair Practices Act (commencing with Section 4100 of the Public Contracts Code) to list in their bid the name and location of business of each subcontractor who specifically fabricates and installs a portion of the work in excess of 1/2 of 1% of this Bidder's total bid. Failure to list a subcontractor for a portion of the work means that the prime Bidder will do that portion of the work. It is the County's intent for the Subletting and Subcontracting Fair Practice Act to apply to all phases of work.
17. Bid Amounts on Bid Form: The bidder shall set forth each item of work in clearly legible figures, an item price and a total for the item in the respective spaces provided for this purpose. In the case of unit basis items, the amount set forth under the "Total" column shall be the extension of the item price bid on the basis of the estimated quantity for the item.

In the case of discrepancy between the item price and the total set forth for the item, the item price shall prevail, provided, however, if the amount set forth as an item price is ambiguous, unintelligible or uncertain for any cause, or is omitted, or in the case of unit basis items, is the same amount as the entry in the "Total" column, then the amount set forth in the "Total" column for the item shall prevail in accordance with the following:

- a. As to lump sum items, the amount set forth in the "Total" column shall be the item price.
- b. As to unit basis items, the amount set forth in the "Total" column shall be divided by the estimated quantity for the item and the price thus obtained shall be the item price.

HEMET SERVICE CENTER
HEMET, CALIFORNIA

BID FORM

SECTION I - BID FORMS

BID FOR THE
HEMET SERVICE CENTER,
HEMET, CALIFORNIA

TO THE COUNTY OF RIVERSIDE Date _____

FOR THE COUNTY OF RIVERSIDE Bidder _____

The undersigned, having carefully examined the proposed site and the Notice Inviting Bids, Instructions to Bidders, Bid Form, Bid Bond, Agreement, Letter of Intent, Notice to Proceed & Commencement of Work, Performance Bond, Payment Bond, General Conditions of the Contract, Supplementary General Conditions of the Contract, Summary of Work/Project Description, General Requirements, the Plans and Specifications plus any Addenda, for the Construction of the **Hemet Service Center, Hemet, California**, hereby proposes and agrees to furnish all tools, equipment, services, apparatus, facilities, transportation, labor and materials necessary to complete the construction in strict conformity with the Specifications and Construction Documents, including all work specified in Addenda numbered and dated:

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

AND;

1. For the total sum including all applicable taxes, permits and licenses as follows:

\$ _____
(Total Lump Sum Base Bid)

(Total Lump Sum Base Bid in Words)

(Cost for Course of Construction Insurance)

Contract Duration: _____ 120 _____ calendar days.

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Bids must be submitted on all Items. Failure to Bid on all Items may result in the Bid being rejected as non-responsive.

Designation of subcontractors in compliance with section 4104 of the government code, the undersigned submits the following list of each subcontractor who will perform work or labor or render services as part in or about the construction in an amount in excess of 1/2 of 1% of said total bid.

WORK

SUBCONTRACTOR

LOCATION

HEMET SERVICE CENTER
HEMET, CALIFORNIA

SECTION II - BID FORMS

AWARD OF CONTRACT

The undersigned fully understands that a Contract is formed upon the acceptance of this bid by the Owner, and the undersigned further agrees that upon request he will promptly execute and deliver to Owner a written memorial of the contract together with the required labor, material and performance bonds, and insurance policies.

BID GUARANTEE

The enclosed certified or cashier's check or bid bond on approved form, made payable to the Owner in the amount of ten percent (10%) of the total bid including all additive alternates submitted herewith, is hereby given as a guarantee that the Bidder will execute and deliver the above mentioned written memorial and required bonds if awarded the contract, and in the event that the undersigned fails or refuses to execute and deliver said documents, such check or bond is to be charged with the costs of the damages experienced by the Owner as a result of such failure or refusal, including but not limited to publication costs, the difference in money between the amount of the bid of the said Principal and the amount for which obligee may legally contract with another party to perform the said work if such amount be in excess of the former, building lease or rental costs, transportation costs and additional salary costs that result from the delay due to the Principal's default on the awarded contract. In no event, however, shall the Surety's liability exceed the penal sum hereof.

Name of Bidder _____

Type of Organization _____

Signed By _____

Title of Signer _____

Address of Bidder _____

Telephone Number (____) _____ Fax Number (____) _____

Contractor's License Number _____ Classification _____

Expiration Date _____. (Bidder certifies under penalty of perjury that the license information herein is true.)

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If Bidder is a corporation, and signer is not President or Secretary, attach certified copy of By-laws or resolution authorizing execution. If Bidder is a corporation, affix corporate seal. If signer is an agent, attach Power of Attorney. If Bidder is not an individual, list names of other persons authorized to bind the organization.

SECTION III -- BID FORMS

BID FOR Hemet Service Center, Hemet, California

TO THE COUNTY OF RIVERSIDE FOR THE COUNTY OF RIVERSIDE,

In accordance with The Owner's NOTICE INVITING BIDDERS, the undersigned BIDDER hereby proposes to furnish all materials, equipment, tools, labor and incidentals required for the above stated project as set forth in the Plans, Specifications and contract documents and any addenda thereto, and to perform all work in the manner and time prescribed therein.

BIDDER declares that this bid is based upon careful examination of the site, Project Manual, Exhibits and Addendum(s) _____, INSTRUCTIONS TO BIDDERS, and all other contract documents. If this bid is accepted for award, BIDDER agrees to enter into a contract with Owner at the lump sum prices set forth in the following BID SCHEDULE. BIDDER understands that failure to enter into a contract in the manner and time prescribed will result in forfeiture to Owner of the BID BOND accompanying this bid.

BIDDER understands that a bid is required for the entire work. It is agreed that the lump sum prices bid include all appurtenant expenses, bonds, taxes, royalties, transportation and fees.

If awarded the Contract, the undersigned further agrees that in the event of the BIDDER'S default in executing the required contract and filing the necessary bonds and insurance certificates within four (4) calendar days after the date of the Owner's notice of award of contract to the BIDDER, the proceeds of the security accompanying this bid shall become the property of the Owner and this bid and the acceptance hereof may, at the Owner's option, be considered null and void.

The County of Riverside reserves the right, after opening bids, to reject all bids or to make an award to the lowest responsive, responsible Bidder.

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BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____
_____, as Principal, and
_____ as Surety are hereby held and firmly bound unto the County,
hereinafter called the "Owner", in the sum of _____ dollars
(\$_____) for the payment of which sum, well and truly to be made, were
hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and
assigns.

WHEREAS, the said Principal is herewith submitting its bid for the construction of the
Hemet Service Center in Hemet, California.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that if the aforesaid Principal shall
be awarded the contract upon said bid and shall, within the required number of days after the
notice of such award, execute a written memorial of the awarded contract and submit the
required labor and material and faithful performance bond, then this obligation shall be null
and void; and in the event that the Principal fails and/or refuses to execute and deliver said
documents this bond will be charged with the costs of the damages experienced by the Owner
as a result of such refusal, including but not limited to, publication costs, the difference in
money between the amount of the bid of said Principal and the amount for which the obligee
may legally contract with another party to perform the said work if such amount be in excess of
the former, building lease or rental costs, transportation costs, and additional salary costs that
result from the delay due to the Principal's default on the awarded contract. In no event,
however, shall the surety's liability exceed the penal sum hereof.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety
and its bond shall be in no way impaired or affected by any extension of the time within which
the Owner may accept such bid; and said Surety does hereby waive notice of any such
extension.

HEMET SERVICE CENTER
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IN WITNESS WHEREOF, the above-bounded parties have executed this instrument under their several seals this _____ day of _____, 2010, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of:

Individual Principal (Seal)

Address Business Address

Individual Principal (Seal)

Business Address

Attest:

Surety

Business Address

By (Affix Corporate Seal)

**NON-COLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER
AND SUBMITTED WITH BID**

State of California)

ss.

County of Riverside)

_____, being first duly sworn, deposes
and says:

That he or she is _____ of
_____ the party making the foregoing bid; 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 has 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 his or her 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
or agent thereof to effectuate a collusive or sham bid.

Signature

Subscribed and sworn to before me this _____ day of _____, 2010.

Signature of officer administering oath

HEMET SERVICE CENTER
HEMET, CALIFORNIA

AGREEMENT, LETTER OF INTENT,
NOTICE TO PROCEED & COMMENCEMENT OF WORK

1.01 NOTICE OF INTENT TO AWARD

- A. The County of Riverside may elect to issue a Notice of Intent to Award prior to the execution of Agreements.
- B. Should a Notice of Intent be issued, the Bidder shall submit all required post-bid documents by the fifth (5) day following the date of issue of the Notice of Intent. The post-bid documents include:
 - 1. Payment Bond
 - 2. Performance Bond
 - 3. Certificates of Insurance
 - 4. Schedule of Values

1.02 AGREEMENT

- A. The Agreement between the Owner and the Contractor will be written on the County of Riverside's standard Agreement Form (see attached Draft.)
- B. The Agreement Form will be completed by the County of Riverside, as appropriate, and will be sent to the selected Bidder.
- C. The executed Agreement, along with all other contract documents as defined, will be the entire, integrated Contract between the Owner and the Bidder.
- D. Upon receipt of an Agreement, the Successful Bidder shall review it for completeness and accuracy, execute it, and return it to the County of Riverside.
- E. The successful Bidder shall submit all required post-bid documents.
- F. The Owner will execute the Agreement after the Bidder has properly executed it, and after all required post-bid documents have been submitted.

1.03 NOTICE TO PROCEED

- A. The County of Riverside shall issue the Notice to Proceed prior to the commencement of work under the Agreement.
- B. Upon receipt of the Notice to Proceed, Bidder shall commence work in accord with the conditions contained in the Notice to Proceed.
- C. Bidder shall not commence work until all required bonds and insurance have been submitted to the County of Riverside.

HEMET SERVICE CENTER
HEMET, CALIFORNIA

AGREEMENT FORM

THIS AGREEMENT entered into this ____ day of _____ month, 2010, by and between _____, hereinafter called the "Contractor" and the County of Riverside, hereinafter called the "Owner".

WITNESSETH

That the parties hereto have mutually covenanted and agreed as follows:

CONTRACT: The complete Contract includes all of the Contract Documents, to wit: the Notice Inviting Bids; the Instructions to Bidders; the Contractor's Proposal; the Payment and Performance Bonds; the Plans and Specifications plus any Addenda thereto, the General Conditions, Specific Conditions, Supplementary Conditions, and Special Federal Provisions; and this Agreement. All contract documents are intended to cooperate and be complementary so that any work called for in one and not mentioned in the other, or vice versa, is to be executed the same as if mentioned in all contract documents.

STATEMENT OF WORK: The Contractor hereby agrees to furnish all tools, equipment, services, apparatus, facilities, transportation, labor, and materials for the construction of: **The Hemet Service Center Project** in strict accordance with the plans and specifications dated, May 19, 2009, prepared by **Westberg & White, Inc**, hereinafter called the "Architect", including Addenda thereto as listed in the Contractor's Proposal, all of which are made a part hereof.

TIME FOR COMPLETION: The work shall be commenced on a date to be specified in a written order of the Engineer and shall be completed within one hundred twenty (120) calendar days from and after said date. It is expressly agreed that except for extensions of time duly granted in the manner and for the reasons specified in the General Conditions, time shall be of the essence.

COMPENSATION TO BE PAID TO CONTRACTOR: The Owner agrees to pay and the Contractor agrees to accept in full consideration for the performance of the Contract, subject to additions and deductions as provided in the Conditions of the Contract, such as the General Conditions, Supplementary Conditions, and Special Federal Provisions, the sum of **Contract Amount** _____
(\$ _____), being the total of the Base Bid.

Pursuant to Labor Code Section 1861, the Contractor gives the following certifications: I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Workmen's' 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.

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The work under this Construction Agreement Form is subject to all applicable Federal, State, and local laws and regulations, including but not limited to the regulations pertaining to the Community Development Block Grant (24 CFR Part 570).

Contractor shall maintain and keep books and records on a current basis, recording all transactions pertaining to this agreement in a form in accordance with generally acceptable accounting principles. Said books and records shall be made available to the County, the State of California, the Federal government, and to any authorized representative thereof for the purposes of audit at all reasonable times and places. All such books and records shall be retained for such periods of time as required by law, provided, however, notwithstanding any shorter periods of retention, all books, records, and supporting detail shall be retained for a period of at least three (3) years after the expiration of the term of this Agreement.

Contractor shall comply with the Davis-Bacon Fair Labor Standards Act (40 USC a-276, a-5) and the implementation regulations thereof. Contractor shall comply with the U.S. Department of Housing and Urban Development's Federal Labor Standards Provisions (HUD 4010).

IN WITNESS WHEREOF, the parties hereto on the day and year first above written have executed this agreement.

Type of Contractor's organization

If other than individual or corporation, list names of all members who have authority to bind firm.

IF OTHER THAN CORPORATION EXECUTE HERE

HEMET SERVICE CENTER
HEMET, CALIFORNIA

Attest: _____ Firm Name: _____

Signature: _____

Address: _____

Contractor's License No: _____

IF CORPORATION, FILL OUT FOLLOWING AND EXECUTE

Name of President of Corporation: _____
Name of Secretary of Corporation: _____
Corporation is organized under the laws of the state of: _____

AFFIX SEAL

Firm Name: _____
Signature: _____
Address: _____
Contractor's License No: _____

Attest: _____
Deputy County Counsel _____ Owner

Seal _____ Chairman, Board of Directors

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HEMET SERVICE CENTER
HEMET, CALIFORNIA

PAYMENT BOND

(Public Work - Civil Code Section 3247 et seq.)

The makers of this bond are _____, as Principal and Original Contractor and _____, a corporation, authorized to issue Surety Bonds in California, as Surety, and this bond is issued in conjunction with that certain public works contract dated _____, 2010 between Principal and the County of Riverside, a public entity, as Owner, for \$ _____, the total amount payable. THE AMOUNT OF THIS BOND IS 100% OF SAID SUM. Said contract is for public work of the Hemet Service Center, Hemet, CA.

The beneficiaries of this Bond are as is stated in 3248 of the Civil Code and the requirements and conditions of this Bond are as is set forth in Sections 3248, 3249, 3250, and 3252 of said Code. Without notice, Surety consents to extension of time for performance, change in requirements, amount of compensation, or prepayment under said contract.

Signed and sealed this _____ Day of _____ 2010.

(Firm Name - Principal)

(Business Address)

By: _____
(Signature - Attach Notary's Acknowledgment)

(Title)

Affix Seal
if
Corporation

(Corporation Name - Surety)

(Business Address)

By: _____
(Signature - Attached Notary's Acknowledgment)

Affix
Corporate
Seal

ATTORNEY-IN-FACT
(Title-Attach Power of Attorney)

HEMET SERVICE CENTER
HEMET, CALIFORNIA

PERFORMANCE BOND

The makers of this bond, _____
as Principal, and _____
as Surety, are held and firmly bound unto the County of Riverside, hereinafter called the
Owner, in the sum of \$ _____ dollars for the
payment of which sum well and truly to be made, we bind ourselves, our heirs, executors,
administrators, and successors, jointly and severally, firmly by these presents.

The condition of this obligation is such; that whereas the Principal entered into a certain
contract, hereto attached, with the Owner, dated _____, 2010, for the
construction of the **Hemet Service Center, Hemet, California** in accordance with contract
documents and scope of work.

Now, therefore, if the Principal shall well and truly perform and fulfill all the undertakings,
covenants, terms, conditions and agreements of said contract during the original term of said
contract and any extension thereof that may be granted by the Owner, with or without notice to
the Surety, and during the life of any guaranty required under the contract, and shall also well
and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements
of any and all duly authorized modifications of said contract that may hereafter be made, then
this obligation to be void, otherwise to remain in full force and virtue. Without notice, Surety
consents to extension of time for performance, change in requirements; change in compensation
or prepayment under said contract.

Dated:

PRINCIPAL

SURETY

By _____

By _____
Attorney in Fact

Title _____
(If corporation, affix seal)

Note: This bond must be executed by both parties with corporate seal affixed. All signatures
must be acknowledged. (Attached acknowledgments).

**CONTRACTOR'S CERTIFICATE
REGARDING WORKERS' COMPENSATION**

Labor Code Section 3700

Every employer, except the State and all political subdivisions or institutions thereof, shall secure the payment of compensation in one or more of the following 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, 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 his 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 I will comply with such provisions before commencing the performance of this Contract.

Principal

Principal

Title

(In accordance with Article 5 [commencing at Section 1860], Chapter, Part 7, Division 2 of the Labor Code, the above Certificate must be signed and filed with the Owner prior to performing any work under this Contract.)

County of Riverside
Economic Development Agency

SPECIAL FEDERAL PROVISIONS
CONSTRUCTION BID DOCUMENT

Community Development Block Grant
Construction Activities

Last Date of Revision: October 25, 2010

BID DOCUMENT INDEX

EXHIBITS

CDBG Forms

1. General Summary
2. B-1 Federal Labor Standards Provisions (HUD 4010)
3. B-2 Federal Prevailing Wage Decision (CA _____ Mod. _____)
4. B-3 Project Sign

Bid Forms – MUST BE SUBMITTED DURING THE BID PROCESS

5. B-4 Certification of Bidder Regarding Non-segregated Facilities
6. B-5 County of Riverside Section 3 Affirmative Action Program
7. B-6 Bidder's Certification for Section 3 Compliance
8. B-6 Subcontractor Certification for Section 3 Compliance
9. B-7 Bidder's Certification on Federal Contract Requirements
10. B-8 Questionnaire Regarding Bidders
11. B-9 List of Sub-Contractors and Suppliers

Post-Award Forms

12. PA-1 Performance Bond (100% of contract price)
13. PA-2 Payment Bond
14. PA-3 Subcontractor Questionnaire
15. PA-4 Sub-Contractor Certification Regarding Non-segregated Facilities
16. PA-5 Section 3 Summary Report
17. PA-6 Davis-Bacon Classifications and Pay Rates

GENERAL SUMMARY

The following Federal Provisions and the attached exhibits herewith become binding on the contractor(s) and incorporated in the Bid Document in entirety.

1. The Contractor and the Sub-contractor(s) shall perform all work in accordance with the project plans and specifications, including all stipulations designed to meet diversified Federal Environmental Architectural, the Architectural Barrier Act of 1968, as amended; the Americans with Disabilities Act of 1990, Public Law 101-336, as amended.
2. The Contractor and the Sub-contractor(s) shall allow all authorized Federal State and/or County officials access to the work area, fiscal, payroll, materials and other relevant contract records. All relevant records must be retained for at least five years.
3. The Contractor and the Sub-contractor(s) shall comply with the Lead Based Paint Poisoning Prevention Act and the Implementation Regulations (24 CFR 35) issued pursuant thereto and any amendments thereof.
4. The Contractor and the Sub-contractor(s) shall comply with Section 503 of the Rehabilitation Act of 1973 (P.L. 93-112) and the Implementation Regulations (41 CFR 60-741) issued pursuant thereto and any amendments thereof.
5. The Contractor and the Sub-contractor(s) shall comply with Section 40-2, Vietnam Era Veterans Adjustment Assistance Act of 1974 and the Implementation Regulations (41 CFR 60-250) issued pursuant there to any amendment thereof.
6. The Contractor and the Sub-contractor(s) shall comply with the Title IV of the Civil Rights Act of 1964 and the Title VIII of the Civil Rights Act of 1963 and any amendment thereof.
7. For projects \$100,000 or over the Contractor and the Sub-contractor(s) shall comply with Clean Air Act of 1963 (P.L. 90-148) and the Federal Water Pollution Act (P.L. 52-500), as amended and all applicable standards or regulations (40 CFR Part 15 and 61) issued pursuant to the said acts.
8. For projects \$2,000 or over, the Contractor and the Sub-contractor(s) shall comply with the Davis-Bacon Fair Labor Standards Act (40 USC a-276 a-5), and the implementation regulations issued pursuant thereto (29 CFR Section 1, 5) and any amendments thereof. Pursuant to the said regulations, **Exhibit B-1 and B-2** entitled “Federal Labor Standards Provisions” and “Federal Prevailing Wage Decision” respectively are herewith attached.
9. The Contractor and Sub-contractor(s) shall comply with the Copeland Anti Kickback Act (40 USC 276 C) and the Implementation regulations (29 CFR 3) issued pursuant thereto and any amendments thereof. **Exhibit B-1** contains the key provisions of the said act.

10. For construction projects \$2,000 or over, or other projects \$2,500 or more which utilize mechanics or laborers the Contractor and the Sub-contractor(s) shall comply with the Contract Work Hours and Safety Standards Act (40 USC 327-332) and the Implementation Regulations (29 CFR 5) issued pursuant thereto and any amendments thereof. **Exhibit B-1** contains the key provisions of the said act.
11. For projects \$25,000 or over the Contractor shall provide one sign board to be located as directed by the owner. The sign board shall be mounted in an acceptable manner and constructed as shown and specified in **Exhibit B-3**. Additional information can be added to the project sign at the request of the project sponsor.
12. The Contractor shall comply with all laws, ordinances and regulations applicable to the work. If the Contractor ascertains at any time that any of the requirements of the contract are at variance with applicable law, ordinances, regulations or building code requirements, he shall promptly notify the owner and the Executive Director of Riverside County's Economic Development Agency and shall not proceed with the work in question, except at his own risk, until the owner and the said Director has had an opportunity to determine the extent of the responsibility for the variance and the appropriate corrective actions undertaken.
13. The Contractor shall complete and execute the attached Certification of Bidder Regarding Segregated Facilities **Exhibit B-4**.
14. Wherever applicable, the Contractor and the Sub-contractor(s) shall comply with, Uniform Administrative Requirements for Grants and Cooperative Agreements to State, Local and Federally Recognized Indian Tribal Governments, 24 CFR Part 85 or Uniform Requirements for Assistance to State and Local Governments, Circular A-102; Whichever is applicable.
15. For projects \$100,000 or over the Contractor shall furnish to the owner, a Performance bond, a Payment bond, and Materials Bond executed as surety by a corporation acceptable to the owner and authorized to issue surety bonds in the State of California. Such a performance bond and a payment bond and materials bond shall be for one hundred percent (100%) of the total contract price. (Attached herewith are recommended formats for said bonds, **Exhibits PA-1 and PA-2**).
16. The Contractor and the Sub-contractor(s) shall comply with Section 3 of The Housing and Community Development Act of 1968 and the regulations (24 CFR 125) issued pursuant thereto and amendments thereof. Pursuant to the said act, the Contractor and the Sub-contractor(s) shall comply with the attached County of Riverside Section 3 Policy and Requirements **Exhibits B-5, B-6, and PA-6**.
17. Along with the bid, the Contractor shall submit the attached, **Exhibit B-7**, certification that "he fully understands the diversified Federal requirements imposed on the Contractor(s) of HUD funded construction projects."

18. Wherever applicable, the Contractor and the Sub-contractor(s) shall comply with Section 109 of The Housing and Community Development Act of 1974 and the Implementation Regulations (24 CFR570.601) issued pursuant thereto and any amendments thereof.
19. For projects \$100,000 or over the Contractor shall submit a Bid Guarantee Bond in an amount no less than 5% of the total contract price, along with the bid.
20. The Contractor and Sub-contractor(s) shall comply with the Affirmative Action Reporting Requirements by completing the attachment **Exhibit B-6 and B-6Sub** entitled, "Contractor Certification for Affirmative Action."
21. Federal Employee Benefit Clause: No member of or delegate to the congress of the United States, and no Resident Commissioner shall be admitted to any share or part of this agreement or to any benefit to arise from the same.
22. The Questionnaire Regarding Bidders **Exhibit B-8** and List of Sub-contractors **Exhibit B-9** are considered part of the Federal Contracting Requirements and are included in the bid document. Both documents are required to be completed by the Prime Contractor.

Federal Labor Standards Provisions

U.S. Department of Housing and Urban Development - Office of Labor Relations.

Previous editions are obsolete Page 1 of 5 form **HUD-4010** (06/2009) ref. Handbook 1344.1 **Applicability**

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of

the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part Previous editions are obsolete Page 2 of 5 form **HUD-4010** (06/2009) ref. Handbook 1344.1 of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section I(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section I(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i) except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Department of Labor Wage and Hour Division Web site: www.dol.gov/esa/whd/forms, or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete; Previous editions are obsolete Page 3 of 5 form HUD-4010 (06/2009) ref. Handbook 1344.1

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or

indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship

program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in sub paragraph (1) of this paragraph. Previous editions are obsolete Page 5 of 5 form **HUD-4010** (06/2009) ref. Handbook 1344.1

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and

liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

Form HUD-4010 (June 2009)

<p style="text-align: center;">FEDERAL PREVAILING WAGE DECISION</p>
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(CA _____ mod. _____)
Insert most recent (10 days prior to bid opening) wage decision at this point.

2-1 LABOR STANDARDS REQUIREMENTS - PRECONSTRUCTION PHASE. A construction project covered by Federal labor standards requires a series of specific actions . . . prior to the actual start of construction. Those actions are:

- a. obtaining an applicable wage determination for the project;
- b. including that wage determination (and any modifications) in the bid documents (where there is competitive bidding or in invitations for proposals . . .
- c. including appropriate labor standards provisions and the wage determination in the construction contract; ...

2-2 CONSTRUCTION WAGE DETERMINATION - DEFINITION. All construction bid documents and contracts or analogous instruments covered by Federal labor standards must contain a current and applicable wage determination issued by the Department of Labor. The term "wage determination" includes the original decision and any subsequent decisions modifying, superseding, correcting, or otherwise changing the provisions of the original decision.

Reference: Handbook 1344.1 Federal Labor Standards Compliance in Housing and Community Development Programs'; paragraph 2-1, section 1 paragraph 1-1.

OBTAINING WAGE DETERMINATIONS

Project wage determinations are obtained through the submission of Standard Form SF-308 to the Department of Labor (DOL) by the:

County of Riverside Economic Development Agency

The Agency will submit the appropriate form to the HUD Field Office Labor Relations Staff for the most current wage decision effective 10 days before the opening of bids. Project wage determinations initially issued shall be effective for 180 calendar days from the date of such determinations. If an effective wage determination is not used in the period of its effectiveness it is void. Initial endorsement or start of construction, whichever occurs first, will serve to "lock in" the wage determination. Allow a least 30 days for processing such requests to HUD.

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General Decision Number: CA100036 10/08/2010 CA36

Superseded General Decision Number: CA20080036

State: California

Construction Types: Building, Heavy (Heavy and Dredging) and Highway

County: Riverside County in California.

BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	03/12/2010
1	03/26/2010
2	04/02/2010
3	04/16/2010
4	06/25/2010
5	07/02/2010
6	07/23/2010
7	08/06/2010
8	08/13/2010
9	08/27/2010
10	09/03/2010
11	09/10/2010
12	09/24/2010
13	10/08/2010

ASBE0005-002 01/01/2010

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems).....	\$ 32.93	15.32
Fire Stop Technician (Application of Firestopping Materials for wall openings and penetrations in walls, floors, ceilings and curtain walls).....	\$ 24.21	13.76

ASBE0005-004 01/01/2010

	Rates	Fringes
Asbestos Removal worker/hazardous material handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether		

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they contain asbestos or not)....\$ 18.85 8.03

BOIL0092-003 10/01/2009

	Rates	Fringes
BOILERMAKER.....	\$ 40.22	22.26

BRCA0004-011 05/01/2010

	Rates	Fringes
BRICKLAYER; MARBLE SETTER.....	\$ 35.25	10.62

BRCA0018-004 06/01/2008

	Rates	Fringes
MARBLE FINISHER.....	\$ 25.52	9.08
TILE FINISHER.....	\$ 21.07	7.88
TILE LAYER.....	\$ 32.05	11.99

BRCA0018-010 09/01/2009

	Rates	Fringes
TERRAZZO FINISHER.....	\$ 26.59	9.62
TERRAZZO WORKER/SETTER.....	\$ 33.63	10.46

CARP0409-001 07/01/2010

	Rates	Fringes
CARPENTER		
(1) Carpenter, Cabinet Installer, Insulation Installer, Hardwood Floor Worker and acoustical installer.....	\$ 37.35	11.08
(2) Millwright.....	\$ 37.85	11.08
(3) Piledriver/Derrick Bargeman, Bridge or Dock Carpenter, Heavy Framer, Rock Bargeman or Scowman, Rockslinger, Shingler (Commercial).....	\$ 37.48	11.08
(4) Pneumatic Nailer, Power Stapler.....	\$ 37.60	11.08
(5) Sawfiler.....	\$ 37.44	11.08
(6) Scaffold Builder.....	\$ 28.55	11.08
(7) Table Power Saw Operator.....	\$ 37.45	11.08

FOOTNOTE: Work of forming in the construction of open cut sewers or storm drains, on operations in which horizontal lagging is used in conjunction with steel H-Beams driven or placed in pre- drilled holes, for that portion of a lagged trench against which concrete is poured, namely, as a substitute for back forms (which work is performed by piledrivers): \$0.13 per hour additional. Certified Welder - \$1.00 per hour premium.

CARP0409-002 07/01/2008

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	Rates	Fringes
Diver		
(1) Wet.....	\$ 663.68	9.82
(2) Standby.....	\$ 331.84	9.82
(3) Tender.....	\$ 323.84	9.82
(4) Assistant Tender.....	\$ 299.84	9.82

Amounts in "Rates" column are per day

 CARP0409-005 07/01/2010

	Rates	Fringes
Drywall		
DRYWALL INSTALLER/LATHER....	\$ 37.35	11.08
STOCKER/SCRAPPER.....	\$ 10.00	6.67

 CARP0409-008 07/01/2008

	Rates	Fringes
Modular Furniture Installer.....	\$ 19.00	7.41

 ELEC0011-002 02/01/2010

COMMUNICATIONS AND SYSTEMS WORK

	Rates	Fringes
Communications System		
Installer.....	\$ 26.99	3%+8.64
Technician.....	\$ 28.79	3%+8.64

SCOPE OF WORK:

Installation, testing, service and maintenance of systems utilizing the transmission and/or transference of voice, sound, vision and digital for commercial, educational, security and entertainment purposes for the following: TV monitoring and surveillance, background-foreground music, intercom and telephone interconnect, inventory control systems, microwave transmission, multi-media, multiplex, nurse call systems, radio page, school intercom and sound, burglar alarms, fire alarm (see last paragraph below) and low voltage master clock systems in commercial buildings. Communication Systems that transmit or receive information and/or control systems that are intrinsic to the above listed systems; inclusion or exclusion of terminations and testings of conductors determined by their function; excluding all other data systems or multiple systems which include control function or power supply; excluding installation of raceway systems, conduit systems, line voltage work, and energy management systems. Does not cover work performed at China Lake Naval Ordnance Test Station. Fire alarm work shall be performed at the current inside wireman total cost package.

 ELEC0440-001 06/01/2010

	Rates	Fringes
ELECTRICIAN		
INSIDE ELECTRICIAN.....	\$ 35.70	3%+16.54
INTELLIGENT TRANSPORTATION		

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SYSTEMS

Electrician.....	\$ 35.00	3%+15.14
Technician.....	\$ 26.25	3%+15.14

ZONE PAY: Zone A: Free travel zone for all contractors performing work in Zone A.
 Zone B: Any work performed in Zone (B) shall add \$8.00 per hour to the current wage scale. Zone (B) shall be the area from the eastern perimeter of Zone (A) to a line which runs north and south beginning at Little Morongo Canyon (San Bernardino/Riverside County Line), Southeast along the Coachella Tunnels, Colorado River Aqueduct and Mecca Tunnels to Pinkham Wash then South to Box Canyon Road, then southwest along Box Canyon Road to Highway 195 west onto 195 south to Highway 86 to Riverside/Imperial County Line.

ELEC1245-001 06/01/2010

	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer..	\$ 46.14	13.41
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution line equipment).....	\$ 36.85	12.36
(3) Groundman.....	\$ 28.19	12.10
(4) Powderman.....	\$ 41.20	12.53

HOLIDAYS: New Year's Day, M.L. King Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and day after Thanksgiving, Christmas Day

ELEV0018-001 01/01/2010

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 45.33	20.035

FOOTNOTE:

PAID VACATION: Employer contributes 8% of regular hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.
 PAID HOLIDAYS: New Years Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

ENGI0012-003 07/01/2009

	Rates	Fringes
OPERATOR: Power Equipment (All Other Work)		
GROUP 1.....	\$ 36.83	17.22
GROUP 2.....	\$ 37.61	17.22
GROUP 3.....	\$ 37.90	17.22
GROUP 4.....	\$ 39.39	17.22
GROUP 5.....	\$ 40.49	17.22
GROUP 6.....	\$ 39.61	17.22
GROUP 7.....	\$ 40.71	17.22

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GROUP 8.....	\$ 39.72	17.22
GROUP 9.....	\$ 40.82	17.22
GROUP 10.....	\$ 39.84	17.22
GROUP 11.....	\$ 40.94	17.22
GROUP 12.....	\$ 40.01	17.22
GROUP 13.....	\$ 40.11	17.22
GROUP 14.....	\$ 40.14	17.22
GROUP 15.....	\$ 40.22	17.22
GROUP 16.....	\$ 40.34	17.22
GROUP 17.....	\$ 40.51	17.22
GROUP 18.....	\$ 40.61	17.22
GROUP 19.....	\$ 40.72	17.22
GROUP 20.....	\$ 40.84	17.22
GROUP 21.....	\$ 41.01	17.22
GROUP 22.....	\$ 41.11	17.22
GROUP 23.....	\$ 41.22	17.22
GROUP 24.....	\$ 41.34	17.22
GROUP 25.....	\$ 41.51	17.22

OPERATOR: Power Equipment
(Cranes, Piledriving &
Hoisting)

GROUP 1.....	\$ 38.18	17.22
GROUP 2.....	\$ 38.96	17.22
GROUP 3.....	\$ 39.25	17.22
GROUP 4.....	\$ 39.39	17.22
GROUP 5.....	\$ 39.61	17.22
GROUP 6.....	\$ 39.72	17.22
GROUP 7.....	\$ 39.84	17.22
GROUP 8.....	\$ 40.01	17.22
GROUP 9.....	\$ 40.18	17.22
GROUP 10.....	\$ 41.18	17.22
GROUP 11.....	\$ 42.18	17.22
GROUP 12.....	\$ 43.18	17.22
GROUP 13.....	\$ 44.18	17.22

OPERATOR: Power Equipment
(Tunnel Work)

GROUP 1.....	\$ 38.68	17.22
GROUP 2.....	\$ 39.46	17.22
GROUP 3.....	\$ 39.75	17.22
GROUP 4.....	\$ 39.89	17.22
GROUP 5.....	\$ 40.11	17.22
GROUP 6.....	\$ 40.22	17.22
GROUP 7.....	\$ 40.34	17.22

PREMIUM PAY:

\$3.75 per hour shall be paid on all Power Equipment Operator work on the following Military Bases: China Lake Naval Reserve, Vandenberg AFB, Point Arguello, Seely Naval Base, Fort Irwin, Nebo Annex Marine Base, Marine Corp Logistics Base Yermo, Edwards AFB, 29 Palms Marine Base and Camp Pendleton

Workers required to suit up and work in a hazardous material environment: \$2.00 per hour additional. Combination mixer and compressor operator on gunite work shall be classified as a concrete mobile mixer operator.

SEE ZONE DEFINITIONS AFTER CLASSIFICATIONS

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Bargeman; Brakeman; Compressor operator; Ditch Witch, with seat or similar type equipment; Elevator operator-inside; Engineer Oiler; Forklift operator

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(includes loed, lull or similar types under 5 tons;
Generator operator; Generator, pump or compressor plant
operator; Pump operator; Signalman; Switchman

GROUP 2: Asphalt-rubber plant operator (nurse tank operator);
Concrete mixer operator-skip type; Conveyor operator;
Fireman; Forklift operator (includes loed, lull or similar
types over 5 tons; Hydrostatic pump operator; oiler crusher
(asphalt or concrete plant); Petromat laydown machine; PJU
side dum jack; Screening and conveyor machine operator (or
similar types); Skiploader (wheel type up to 3/4 yd.
without attachment); Tar pot fireman; Temporary heating
plant operator; Trenching machine oiler

GROUP 3: Asphalt-rubber blend operator; Bobcat or similar
type (Skid steer); Equipment greaser (rack); Ford Ferguson
(with dragtype attachments); Helicopter radioman (ground);
Stationary pipe wrapping and cleaning machine operator

GROUP 4: Asphalt plant fireman; Backhoe operator (mini-max or
similar type); Boring machine operator; Boxman or mixerman
(asphalt or concrete); Chip spreading machine operator;
Concrete cleaning decontamination machine operator;
Concrete Pump Operator (small portable); Drilling machine
operator, small auger types (Texoma super economatic or
similar types - Hughes 100 or 200 or similar types -
drilling depth of 30' maximum); Equipment greaser (grease
truck); Guard rail post driver operator; Highline cableway
signalman; Horizontal Directional Drilling Machine;
Hydra-hammer-aero stomper; Micro Tunneling (above ground
tunnel); Power concrete curing machine operator; Power
concrete saw operator; Power-driven jumbo form setter
operator; Power sweeper operator; Rock Wheel Saw/Trencher;
Roller operator (compacting); Screed operator (asphalt or
concrete); Trenching machine operator (up to 6 ft.); Vacuum
or much truck

GROUP 5: Equipment Greaser (Grease Truck/Multi Shift).

GROUP 6: Articulating material hauler; Asphalt plant
engineer; Batch plant operator; Bit sharpener; Concrete
joint machine operator (canal and similar type); Concrete
planer operator; Dandy digger; Deck engine operator;
Derrickman (oilfield type); Drilling machine operator,
bucket or auger types (Calweld 100 bucket or similar types
- Watson 1000 auger or similar types - Texoma 330, 500 or
600 auger or similar types - drilling depth of 45'
maximum); Drilling machine operator; Hydrographic seeder
machine operator (straw, pulp or seed), Jackson track
maintainer, or similar type; Kalamazoo Switch tamper, or
similar type; Machine tool operator; Maginnis internal full
slab vibrator, Mechanical berm, curb or gutter (concrete or
asphalt); Mechanical finisher operator (concrete,
Clary-Johnson-Bidwell or similar); Micro tunnel system
(below ground); Pavement breaker operator (truck mounted);
Road oil mixing machine operator; Roller operator (asphalt
or finish), rubber-tired earth moving equipment (single
engine, up to and including 25 yds. struck); Self-propelled
tar pipelining machine operator; Skiploader operator
(crawler and wheel type, over 3/4 yd. and up to and
including 1-1/2 yds.); Slip form pump operator (power
driven hydraulic lifting device for concrete forms);
Tractor operator-bulldozer, tamper-scraper (single engine,
up to 100 h.p. flywheel and similar types, up to and

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including D-5 and similar types); Tugger hoist operator (1 drum); Ultra high pressure waterjet cutting tool system operator; Vacuum blasting machine operator

GROUP 7: Welder - General

GROUP 8: Asphalt or concrete spreading operator (tamping or finishing); Asphalt paving machine operator (Barber Greene or similar type); Asphalt-rubber distribution operator; Backhoe operator (up to and including 3/4 yd.), small ford, Case or similar; Cast-in-place pipe laying machine operator; Combination mixer and compressor operator (guniting work); Compactor operator (self-propelled); Concrete mixer operator (paving); Crushing plant operator; Drill Doctor; Drilling machine operator, Bucket or auger types (Calweld 150 bucket or similar types - Watson 1500, 2000 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum); Elevating grader operator; Grade checker; Gradall operator; Grouting machine operator; Heavy-duty repairman; Heavy equipment robotics operator; Kalamazoo balliste regulator or similar type; Kolman belt loader and similar type; Le Tourneau blob compactor or similar type; Loader operator (Athey, Euclid, Sierra and similar types); Mobark Chipper or similar; Ozzie padder or similar types; P.C. slot saw; Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pumpcrete gun operator; Rock Drill or similar types; Rotary drill operator (excluding caisson type); Rubber-tired earth-moving equipment operator (single engine, caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator (multiple engine up to and including 25 yds. struck); Rubber-tired scraper operator (self-loading paddle wheel type-John Deere, 1040 and similar single unit); Self-propelled curb and gutter machine operator; Shuttle buggy; Skiploader operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.); Soil remediation plant operator; Surface heaters and planer operator; Tractor compressor drill combination operator; Tractor operator (any type larger than D-5 - 100 flywheel h.p. and over, or similar-bulldozer, tamper, scraper and push tractor single engine); Tractor operator (boom attachments), Traveling pipe wrapping, cleaning and bending machine operator; Trenching machine operator (over 6 ft. depth capacity, manufacturer's rating); trenching Machine with Road Miner attachment (over 6 ft depth capacity); Ultra high pressure waterjet cutting tool system mechanic; Water pull (compaction) operator

GROUP 9: Heavy Duty Repairman

GROUP 10: Drilling machine operator, Bucket or auger types (Calweld 200 B bucket or similar types-Watson 3000 or 5000 auger or similar types-Texoma 900 auger or similar types-drilling depth of 105' maximum); Dual drum mixer, dynamic compactor LDC350 (or similar types); Monorail locomotive operator (diesel, gas or electric); Motor patrol-blade operator (single engine); Multiple engine tractor operator (Euclid and similar type-except Quad 9 cat.); Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Pneumatic pipe ramming tool and similar types; Prestressed wrapping machine operator; Rubber-tired earth-moving equipment operator (single

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engine, over 50 yds. struck); Rubber tired earth moving equipment operator (multiple engine, Euclid, caterpillar and similar over 25 yds. and up to 50 yds. struck), Tower crane repairman; Tractor loader operator (crawler and wheel type over 6-1/2 yds.); Woods mixer operator (and similar Pugmill equipment)

GROUP 11: Heavy Duty Repairman - Welder Combination, Welder - Certified.

GROUP 12: Auto grader operator; Automatic slip form operator; Drilling machine operator, bucket or auger types (Calweld, auger 200 CA or similar types - Watson, auger 6000 or similar types - Hughes Super Duty, auger 200 or similar types - drilling depth of 175' maximum); Hoe ram or similar with compressor; Mass excavator operator less tha 750 cu. yards; Mechanical finishing machine operator; Mobile form traveler operator; Motor patrol operator (multi-engine); Pipe mobile machine operator; Rubber-tired earth- moving equipment operator (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck); Rubber-tired self- loading scraper operator (paddle-wheel-auger type self-loading - two (2) or more units)

GROUP 13: Rubber-tired earth-moving equipment operator operating equipment with push-pull system (single engine, up to and including 25 yds. struck)

GROUP 14: Canal liner operator; Canal trimmer operator; Remote- control earth-moving equipment operator (operating a second piece of equipment: \$1.00 per hour additional); Wheel excavator operator (over 750 cu. yds.)

GROUP 15: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine-up to and including 25 yds. struck)

GROUP 16: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 17: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck); Tandem tractor operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 18: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 19: Rotex concrete belt operator (or similar types); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, Caterpillar, Euclid, Athey Wagon and similar types with any

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and all attachments over 25 yds. and up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck)

GROUP 20: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 21: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

GROUP 22: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, up to and including 25 yds. struck)

GROUP 23: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating with the tandem push-pull system (multiple engine, up to and including 25 yds. struck)

GROUP 24: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 25: Concrete pump operator-truck mounted; Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

CRANES, PILEDIVING AND HOISTING EQUIPMENT CLASSIFICATIONS

GROUP 1: Engineer oiler; Fork lift operator (includes loed, lull or similar types)

GROUP 2: Truck crane oiler

GROUP 3: A-frame or winch truck operator; Ross carrier operator (jobsite)

GROUP 4: Bridge-type unloader and turntable operator; Helicopter hoist operator

GROUP 5: Hydraulic boom truck; Stinger crane (Austin-Western or similar type); Tugger hoist operator (1 drum)

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GROUP 6: Bridge crane operator; Cretor crane operator; Hoist operator (Chicago boom and similar type); Lift mobile operator; Lift slab machine operator (Vagtborg and similar types); Material hoist and/or manlift operator; Polar gantry crane operator; Self Climbing scaffold (or similar type); Shovel, backhoe, dragline, clamshell operator (over 3/4 yd. and up to 5 cu. yds. mrc); Tugger hoist operator

GROUP 7: Pedestal crane operator; Shovel, backhoe, dragline, clamshell operator (over 5 cu. yds. mrc); Tower crane repair; Tugger hoist operator (3 drum)

GROUP 8: Crane operator (up to and including 25 ton capacity); Crawler transporter operator; Derrick barge operator (up to and including 25 ton capacity); Hoist operator, stiff legs, Guy derrick or similar type (up to and including 25 ton capacity); Shovel, backhoe, dragline, clamshell operator (over 7 cu. yds., M.R.C.)

GROUP 9: Crane operator (over 25 tons and up to and including 50 tons mrc); Derrick barge operator (over 25 tons up to and including 50 tons mrc); Highline cableway operator; Hoist operator, stiff legs, Guy derrick or similar type (over 25 tons up to and including 50 tons mrc); K-crane operator; Polar crane operator; Self erecting tower crane operator maximum lifting capacity ten tons

GROUP 10: Crane operator (over 50 tons and up to and including 100 tons mrc); Derrick barge operator (over 50 tons up to and including 100 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 50 tons up to and including 100 tons mrc), Mobile tower crane operator (over 50 tons, up to and including 100 tons M.R.C.); Tower crane operator and tower gantry

GROUP 11: Crane operator (over 100 tons and up to and including 200 tons mrc); Derrick barge operator (over 100 tons up to and including 200 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 100 tons up to and including 200 tons mrc); Mobile tower crane operator (over 100 tons up to and including 200 tons mrc)

GROUP 12: Crane operator (over 200 tons up to and including 300 tons mrc); Derrick barge operator (over 200 tons up to and including 300 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 200 tons, up to and including 300 tons mrc); Mobile tower crane operator (over 200 tons, up to and including 300 tons mrc)

GROUP 13: Crane operator (over 300 tons); Derrick barge operator (over 300 tons); Helicopter pilot; Hoist operator, stiff legs, Guy derrick or similar type (over 300 tons); Mobile tower crane operator (over 300 tons)

TUNNEL CLASSIFICATIONS

GROUP 1: Skiploader (wheel type up to 3/4 yd. without attachment)

GROUP 2: Power-driven jumbo form setter operator

GROUP 3: Dinkey locomotive or motorperson (up to and including 10 tons)

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GROUP 4: Bit sharpener; Equipment greaser (grease truck); Slip form pump operator (power-driven hydraulic lifting device for concrete forms); Tugger hoist operator (1 drum); Tunnel locomotive operator (over 10 and up to and including 30 tons)

GROUP 5: Backhoe operator (up to and including 3/4 yd.); Small Ford, Case or similar; Drill doctor; Grouting machine operator; Heading shield operator; Heavy-duty repairperson; Loader operator (Athey, Euclid, Sierra and similar types); Mucking machine operator (1/4 yd., rubber-tired, rail or track type); Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pneumatic heading shield (tunnel); Pumpcrete gun operator; Tractor compressor drill combination operator; Tugger hoist operator (2 drum); Tunnel locomotive operator (over 30 tons)

GROUP 6: Heavy Duty Repairman

GROUP 7: Tunnel mole boring machine operator

ENGINEERS ZONES

\$1.00 additional per hour for all of IMPERIAL County and the portions of KERN, RIVERSIDE & SAN BERNARDINO Counties as defined below:

That area within the following Boundary: Begin in San Bernardino County, approximately 3 miles NE of the intersection of I-15 and the California State line at that point which is the NW corner of Section 1, T17N,m R14E, San Bernardino Meridian. Continue W in a straight line to that point which is the SW corner of the northwest quarter of Section 6, T27S, R42E, Mt. Diablo Meridian. Continue North to the intersection with the Inyo County Boundary at that point which is the NE corner of the western half of the northern quarter of Section 6, T25S, R42E, MDM. Continue W along the Inyo and San Bernardino County boundary until the intersection with Kern County, as that point which is the SE corner of Section 34, T24S, R40E, MDM. Continue W along the Inyo and Kern County boundary until the intersection with Tulare County, at that point which is the SW corner of the SE quarter of Section 32, T24S, R37E, MDM. Continue W along the Kern and Tulare County boundary, until that point which is the NW corner of T25S, R32E, MDM. Continue S following R32E lines to the NW corner of T31S, R32E, MDM. Continue W to the NW corner of T31S, R31E, MDM. Continue S to the SW corner of T32S, R31E, MDM. Continue W to SW corner of SE quarter of Section 34, T32S, R30E, MDM. Continue S to SW corner of T11N, R17W, SBM. Continue E along south boundary of T11N, SBM to SW corner of T11N, R7W, SBM. Continue S to SW corner of T9N, R7W, SBM. Continue E along south boundary of T9N, SBM to SW corner of T9N, R1E, SBM. Continue S along west boundary of R1E, SMB to Riverside County line at the SW corner of T1S, R1E, SBM. Continue E along south boundary of T1s, SBM (Riverside County Line) to SW corner of T1S, R10E, SBM. Continue S along west boundary of R10E, SBM to Imperial County line at the SW corner of T8S, R10E, SBM. Continue W along Imperial and Riverside county line to NW corner of T9S, R9E, SBM. Continue S along the boundary between Imperial and San Diego Counties, along the west edge of R9E, SBM to the south boundary of Imperial County/California state line. Follow the California state line west to Arizona state line, then north to Nevada state line, then continuing NW back to start at the point which is the NW corner of Section 1,

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T17N, R14E, SBM

\$1.00 additional per hour for portions of SAN LUIS OBISPO, KERN, SANTA BARBARA & VENTURA as defined below:

That area within the following Boundary: Begin approximately 5 miles north of the community of Cholame, on the Monterey County and San Luis Obispo County boundary at the NW corner of T25S, R16E, Mt. Diablo Meridian. Continue south along the west side of R16E to the SW corner of T30S, R16E, MDM. Continue E to SW corner of T30S, R17E, MDM. Continue S to SW corner of T31S, R17E, MDM. Continue E to SW corner of T31S, R18E, MDM. Continue S along West side of R18E, MDM as it crosses into San Bernardino Meridian numbering area and becomes R30W. Follow the west side of R30W, SBM to the SW corner of T9N, R30W, SBM. Continue E along the south edge of T9N, SBM to the Santa Barbara County and Ventura County boundary at that point which is the SW corner of Section 34, T9N, R24W, SBM, continue S along the Ventura County line to that point which is the SW corner of the SE quarter of Section 32, T7N, R24W, SBM. Continue E along the south edge of T7N, SBM to the SE corner to T7N, R21W, SBM. Continue N along East side of R21W, SBM to Ventura County and Kern County boundary at the NE corner of T8N, R21W. Continue W along the Ventura County and Kern County boundary to the SE corner of T9N, R21W. Continue North along the East edge of R21W, SBM to the NE corner of T12N, R21W, SBM. Continue West along the north edge of T12N, SBM to the SE corner of T32S, R21E, MDM. [T12N SBM is a thin strip between T11N SBM and T32S MDM]. Continue North along the East side of R21E, MDM to the Kings County and Kern County border at the NE corner of T25S, R21E, MDM, continue West along the Kings County and Kern County Boundary until the intersection of San Luis Obispo County. Continue west along the Kings County and San Luis Obispo County boundary until the intersection with Monterey County. Continue West along the Monterey County and San Luis Obispo County boundary to the beginning point at the NW corner of T25S, R16E, MDM.

\$2.00 additional per hour for INYO and MONO Counties and the Northern portion of SAN BERNARDINO County as defined below:

That area within the following Boundary: Begin at the intersection of the northern boundary of Mono County and the California state line at the point which is the center of Section 17, T10N, R22E, Mt. Diablo Meridian. Continue S then SE along the entire western boundary of Mono County, until it reaches Inyo County at the point which is the NE corner of the Western half of the NW quarter of Section 2, T8S, R29E, MDM. Continue SSE along the entire western boundary of Inyo County, until the intersection with Kern County at the point which is the SW corner of the SE $\frac{1}{2}$ of Section 32, T24S, R37E, MDM. Continue E along the Inyo and Kern County boundary until the intersection with San Bernardino County at that point which is the SE corner of section 34, T24S, R40E, MDM. Continue E along the Inyo and San Bernardino County boundary until the point which is the NE corner of the Western half of the NW quarter of Section 6, T25S, R42E, MDM. Continue S to that point which is the SW corner of the NW quarter of Section 6, T27S, R42E, MDM. Continue E in a straight line to the California and Nevada state border at the point which is the NW corner of Section 1, T17N, R14E, San Bernardino Meridian. Then continue NW along the state line to the starting point, which is the center of Section 18, T10N, R22E, MDM.

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REMAINING AREA NOT DEFINED ABOVE RECIEVES BASE RATE

 ENGI0012-004 08/01/2009

	Rates	Fringes
OPERATOR: Power Equipment		
(DREDGING)		
(1) Leverman.....	\$ 44.83	17.22
(2) Dredge dozer.....	\$ 40.36	17.22
(3) Deckmate.....	\$ 40.25	17.22
(4) Winch operator (stern winch on dredge).....	\$ 39.70	17.22
(5) Fireman-Oiler, Deckhand, Bargeman, Leveehand.....	\$ 39.16	17.22
(6) Barge Mate.....	\$ 39.77	17.22

 IRON0002-004 07/01/2010

	Rates	Fringes
Ironworkers:		
Fence Erector.....	\$ 26.58	15.26
Ornamental, Reinforcing and Structural.....	\$ 33.00	23.73

PREMIUM PAY:

\$6.00 additional per hour at the following locations:

China Lake Naval Test Station, Chocolate Mountains Naval Reserve-Niland, Edwards AFB, Fort Irwin Military Station, Fort Irwin Training Center-Goldstone, San Clemente Island, San Nicholas Island, Susanville Federal Prison, 29 Palms - Marine Corps, U.S. Marine Base - Barstow, U.S. Naval Air Facility - Sealey, Vandenberg AFB

\$4.00 additional per hour at the following locations:

Army Defense Language Institute - Monterey, Fallon Air Base, Naval Post Graduate School - Monterey, Yermo Marine Corps Logistics Center

\$2.00 additional per hour at the following locations:

Port Hueneme, Port Mugu, U.S. Coast Guard Station - Two Rock

 LABO0300-001 09/01/2010

	Rates	Fringes
Brick Tender.....	\$ 27.17	14.72

 LABO0300-003 07/01/2010

	Rates	Fringes
LABORER (GUNITE)		
GROUP 1.....	\$ 30.04	17.37
GROUP 2.....	\$ 29.09	17.37

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GROUP 3.....	\$ 25.55	17.37
LABORER (TUNNEL)		
GROUP 1.....	\$ 31.24	14.98
GROUP 2.....	\$ 31.56	14.98
GROUP 3.....	\$ 32.02	14.98
GROUP 4.....	\$ 32.71	14.98
LABORER		
GROUP 1.....	\$ 26.33	14.75
GROUP 2.....	\$ 26.88	14.75
GROUP 3.....	\$ 27.43	14.75
GROUP 4.....	\$ 28.98	14.75
GROUP 5.....	\$ 29.33	14.75

FOOTNOTE: GUNITE PREMIUM PAY: Workers working from a Bosn'n's Chair or suspended from a rope or cable shall receive 40 cents per hour above the foregoing applicable classification rates. Workers doing gunite and/or shotcrete work in a tunnel shall receive 35 cents per hour above the foregoing applicable classification rates, paid on a portal-to-portal basis. Any work performed on, in or above any smoke stack, silo, storage elevator or similar type of structure, when such structure is in excess of 75'-0" above base level and which work must be performed in whole or in part more than 75'-0" above base level, that work performed above the 75'-0" level shall be compensated for at 35 cents per hour above the applicable classification wage rate.

LABORER CLASSIFICATIONS

GROUP 1: Cleaning and handling of panel forms; Concrete screeding for rough strike-off; Concrete, water curing; Demolition laborer, the cleaning of brick if performed by a worker performing any other phase of demolition work, and the cleaning of lumber; Fire watcher, limber, brush loader, piler and debris handler; Flag person; Gas, oil and/or water pipeline laborer; Laborer, asphalt-rubber material loader; Laborer, general or construction; Laborer, general clean-up; Laborer, landscaping; Laborer, jetting; Laborer, temporary water and air lines; Material hose operator (walls, slabs, floors and decks); Plugging, filling of shee bolt holes; Dry packing of concrete; Railroad maintenance, repair track person and road beds; Streetcar and railroad construction track laborers; Rigging and signaling; Scaler; Slip form raiser; Tar and mortar; Tool crib or tool house laborer; Traffic control by any method; Window cleaner; Wire mesh pulling - all concrete pouring operations

GROUP 2: Asphalt shoveler; Cement dumper (on 1 yd. or larger mixer and handling bulk cement); Cesspool digger and installer; Chucktender; Chute handler, pouring concrete, the handling of the chute from readymix trucks, such as walls, slabs, decks, floors, foundation, footings, curbs, gutters and sidewalks; Concrete curer, impervious membrane and form oiler; Cutting torch operator (demolition); Fine grader, highways and street paving, airport, runways and similar type heavy construction; Gas, oil and/or water pipeline wrapper - pot tender and form person; Guinea chaser; Headerboard person - asphalt; Laborer, packing rod steel and pans; Membrane vapor barrier installer; Power broom sweeper (small); Riprap stonepaver, placing stone or wet sacked concrete; Roto scraper and tiller; Sandblaster (pot tender); Septic tank digger and installer(lead); Tank scaler and cleaner; Tree climber, faller, chain saw

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operator, Pittsburgh chipper and similar type brush shredder; Underground laborer, including caisson bellow

GROUP 3: Buggymobile person; Concrete cutting torch; Concrete pile cutter; Driller, jackhammer, 2-1/2 ft. drill steel or longer; Dri-pak-it machine; Gas, oil and/or water pipeline wrapper, 6-in. pipe and over, by any method, inside and out; High scaler (including drilling of same); Hydro seeder and similar type; Impact wrench multi-plate; Kettle person, pot person and workers applying asphalt, lay-kold, creosote, lime caustic and similar type materials ("applying" means applying, dipping, brushing or handling of such materials for pipe wrapping and waterproofing); Operator of pneumatic, gas, electric tools, vibrating machine, pavement breaker, air blasting, come-alongs, and similar mechanical tools not separately classified herein; Pipelayer's backup person, coating, grouting, making of joints, sealing, caulking, diapering and including rubber gasket joints, pointing and any and all other services; Rock slinger; Rotary scarifier or multiple head concrete chipping scarifier; Steel headerboard and guideline setter; Tamper, Barko, Wacker and similar type; Trenching machine, hand-propelled

GROUP 4: Asphalt raker, lute person, ironer, asphalt dump person, and asphalt spreader boxes (all types); Concrete core cutter (walls, floors or ceilings), grinder or sander; Concrete saw person, cutting walls or flat work, scoring old or new concrete; Cribber, shorer, lagging, sheeting and trench bracing, hand-guided lagging hammer; Head rock slinger; Laborer, asphalt- rubber distributor boot person; Laser beam in connection with laborers' work; Oversize concrete vibrator operator, 70 lbs. and over; Pipelayer performing all services in the laying and installation of pipe from the point of receiving pipe in the ditch until completion of operation, including any and all forms of tubular material, whether pipe, metallic or non-metallic, conduit and any other stationary type of tubular device used for the conveying of any substance or element, whether water, sewage, solid gas, air, or other product whatsoever and without regard to the nature of material from which the tubular material is fabricated; No-joint pipe and stripping of same; Prefabricated manhole installer; Sandblaster (nozzle person), water blasting, Porta Shot-Blast

GROUP 5: Blaster powder, all work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Driller: All power drills, excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and any and all other types of mechanical drills without regard to the form of motive power; Toxic waste removal

TUNNEL LABORER CLASSIFICATIONS

GROUP 1: Batch plant laborer; Bull gang mucker, track person; Changehouse person; Concrete crew, including rodder and spreader; Dump person; Dump person (outside); Swamper (brake person and switch person on tunnel work); Tunnel materials handling person

GROUP 2: Chucktender, cabletender; Loading and unloading agitator cars; Nipper; Pot tender, using mastic or other materials (for example, but not by way of limitation,

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shotcrete, etc.); Vibrator person, jack hammer, pneumatic tools (except driller)

GROUP 3: Blaster, driller, powder person; Chemical grout jet person; Cherry picker person; Grout gun person; Grout mixer person; Grout pump person; Jackleg miner; Jumbo person; Kemper and other pneumatic concrete placer operator; Miner, tunnel (hand or machine); Nozzle person; Operating of troweling and/or grouting machines; Powder person (primer house); Primer person; Sandblaster; Shotcrete person; Steel form raiser and setter; Timber person, retimber person, wood or steel; Tunnel Concrete finisher

GROUP 4: Diamond driller; Sandblaster; Shaft and raise work

GUNITE LABORER CLASSIFICATIONS

GROUP 1: Rodmen, Nozzlemen

GROUP 2: Gunmen

GROUP 3: Reboundmen

LABO0300-005 08/05/2009

	Rates	Fringes
LABORER		
PLASTER CLEAN-UP LABORER....	\$ 26.65	14.70
PLASTER TENDER.....	\$ 29.20	14.70

LABO0882-002 01/01/2010

	Rates	Fringes
Asbestos Removal Laborer.....	\$ 26.15	14.25

SCOPE OF WORK: Includes site mobilization, initial site cleanup, site preparation, removal of asbestos-containing material and toxic waste, encapsulation, enclosure and disposal of asbestos- containing materials and toxic waste by hand or with equipment or machinery; scaffolding, fabrication of temporary wooden barriers and assembly of decontamination stations.

LABO1184-001 07/01/2010

	Rates	Fringes
Laborers: (HORIZONTAL DIRECTIONAL DRILLING)		
(1) Drilling Crew Laborer...	\$ 27.05	11.65
(2) Vehicle Operator/Hauler.	\$ 27.22	11.65
(3) Horizontal Directional Drill Operator.....	\$ 29.07	11.65
(4) Electronic Tracking Locator.....	\$ 31.07	11.65
Laborers: (STRIPING/SLURRY SEAL)		
GROUP 1.....	\$ 28.50	14.56
GROUP 2.....	\$ 29.80	14.56
GROUP 3.....	\$ 31.81	14.56
GROUP 4.....	\$ 33.55	14.56

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LABORERS - STRIPING CLASSIFICATIONS

GROUP 1: Protective coating, pavement sealing, including repair and filling of cracks by any method on any surface in parking lots, game courts and playgrounds; carstops; operation of all related machinery and equipment; equipment repair technician

GROUP 2: Traffic surface abrasive blaster; pot tender - removal of all traffic lines and markings by any method (sandblasting, waterblasting, grinding, etc.) and preparation of surface for coatings. Traffic control person: controlling and directing traffic through both conventional and moving lane closures; operation of all related machinery and equipment

GROUP 3: Traffic delineating device applicator: Layout and application of pavement markers, delineating signs, rumble and traffic bars, adhesives, guide markers, other traffic delineating devices including traffic control. This category includes all traffic related surface preparation (sandblasting, waterblasting, grinding) as part of the application process. Traffic protective delineating system installer: removes, relocates, installs, permanently affixed roadside and parking delineation barricades, fencing, cable anchor, guard rail, reference signs, monument markers; operation of all related machinery and equipment; power broom sweeper

GROUP 4: Striper: layout and application of traffic stripes and markings; hot thermo plastic; tape traffic stripes and markings, including traffic control; operation of all related machinery and equipment

* PAIN0036-001 08/01/2010

	Rates	Fringes
Painters: (Including Lead Abatement)		
(1) Repaint.....	\$ 26.05	9.68
(2) All Other Work.....	\$ 29.32	9.68

REPAINT of any previously painted structure. Exceptions: work involving the aerospace industry, breweries, commercial recreational facilities, hotels which operate commercial establishments as part of hotel service, and sports facilities.

PAIN0036-008 01/06/2010

	Rates	Fringes
DRYWALL FINISHER/TAPER.....	\$ 33.22	12.19

PAIN0036-015 08/01/2010

	Rates	Fringes
GLAZIER.....	\$ 36.90	20.53

FOOTNOTE: Additional \$1.25 per hour for work in a condor, from the third (3rd) floor and up Additional \$1.25 per

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hour for work on the outside of the building from a swing stage or any suspended contrivance, from the ground up

 PAIN1247-002 01/01/2010

	Rates	Fringes
SOFT FLOOR LAYER.....	\$ 30.85	10.54

 PLAS0200-009 08/04/2010

	Rates	Fringes
PLASTERER.....	\$ 30.21	14.23

 PLAS0500-002 07/01/2010

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER....	\$ 29.50	19.85

 PLUM0016-001 07/01/2009

	Rates	Fringes
PLUMBER/PIPEFITTER		
(1) Work on strip malls, light commercial, tenant improvement and remodel work.....	\$ 28.84	14.47
(2) Work on new additions and remodeling of bars, restaurant, stores and commercial buildings not to exceed 5,000 sq. ft. of floor space.....	\$ 35.97	15.86
(3) All other work.....	\$ 37.10	16.84

 PLUM0345-001 07/01/2009

	Rates	Fringes
PLUMBER		
Landscape/Irrigation Fitter.....	\$ 26.70	13.84
Sewer & Storm Drain Work....	\$ 25.18	15.67

 ROOF0036-002 08/01/2010

	Rates	Fringes
ROOFER.....	\$ 34.65	9.07

FOOTNOTE: Pitch premium: Work on which employees are exposed to pitch fumes or required to handle pitch, pitch base or pitch impregnated products, or any material containing coal tar pitch, the entire roofing crew shall receive \$1.75 per hour "pitch premium" pay.

 SFCA0669-002 04/01/2010

	Rates	Fringes
SPRINKLER FITTER.....	\$ 33.35	17.60

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SHEE0105-003 07/01/2010

LOS ANGELES (South of a straight line drawn between Gorman and Big Pines) and Catalina Island, INYO, KERN (Northeast part, East of Hwy 395), MONO ORANGE, RIVERSIDE, AND SAN BERNARDINO COUNTIES

	Rates	Fringes
SHEET METAL WORKER		
(1) Commercial - New Construction and Remodel work.....	\$ 42.54	17.72
(2) Industrial work including air pollution control systems, noise abatement, hand rails, guard rails, excluding aritechtrual sheet metal work, excluding A-C, heating, ventilating systems for human comfort...	\$ 35.56	22.90

TEAM0011-002 07/01/2008

	Rates	Fringes
TRUCK DRIVER		
GROUP 1.....	\$ 26.44	18.24
GROUP 2.....	\$ 26.59	18.24
GROUP 3.....	\$ 26.72	18.24
GROUP 4.....	\$ 26.91	18.24
GROUP 5.....	\$ 26.94	18.24
GROUP 6.....	\$ 26.97	18.24
GROUP 7.....	\$ 27.22	18.24
GROUP 8.....	\$ 27.47	18.24
GROUP 9.....	\$ 27.67	18.24
GROUP 10.....	\$ 27.97	18.24
GROUP 11.....	\$ 28.47	18.24
GROUP 12.....	\$ 28.90	18.24

WORK ON ALL MILITARY BASES:

PREMIUM PAY: \$3.00 per hour additional.

[29 palms Marine Base, Camp Roberts, China Lake, Edwards AFB, El Centro Naval Facility, Fort Irwin, Marine Corps Logistics Base at Nebo & Yermo, Mountain Warfare Training Center, Bridgeport, Point Arguello, Point Conception, Vandenberg AFB]

TRUCK DRIVERS CLASSIFICATIONS

GROUP 1: Truck driver

GROUP 2: Driver of vehicle or combination of vehicles - 2 axles; Traffic control pilot car excluding moving heavy equipment permit load; Truck mounted broom

GROUP 3: Driver of vehicle or combination of vehicles - 3 axles; Boot person; Cement mason distribution truck; Fuel truck driver; Water truck - 2 axle; Dump truck, less than 16 yds. water level; Erosion control driver

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GROUP 4: Driver of transit mix truck, under 3 yds.; Dumpcrete truck, less than 6-1/2 yds. water level

GROUP 5: Water truck, 3 or more axles; Truck greaser and tire person (\$0.50 additional for tire person); Pipeline and utility working truck driver, including winch truck and plastic fusion, limited to pipeline and utility work; Slurry truck driver

GROUP 6: Transit mix truck, 3 yds. or more; Dumpcrete truck, 6-1/2 yds. water level and over; Vehicle or combination of vehicles - 4 or more axles; Oil spreader truck; Dump truck, 16 yds. to 25 yds. water level

GROUP 7: A Frame, Swedish crane or similar; Forklift driver; Ross carrier driver

GROUP 8: Dump truck, 25 yds. to 49 yds. water level; Truck repair person; Water pull - single engine; Welder

GROUP 9: Truck repair person/welder; Low bed driver, 9 axles or over

GROUP 10: Dump truck - 50 yds. or more water level; Water pull - single engine with attachment

GROUP 11: Water pull - twin engine; Water pull - twin engine with attachments; Winch truck driver - \$1.25 additional when operating winch or similar special attachments

GROUP 12: Boom Truck 17K and above

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests

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for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====
END OF GENERAL DECISION

PROJECT SIGN
(For Community Development Block Grant Funded Projects)
(4' X 8')

COUNTY OF RIVERSIDE
ECONOMIC DEVELOPMENT AGENCY
(White letters on red background)

SUPERVISOR'S NAME

DISTRICT

PROJECT NAME

PROJECT COST

SPONSOR

CONTRACTOR

ARCHITECT/ENGINEER

(Blue letters on white background)

FUNDED BY: U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM
EQUAL OPPORTUNITY - AFFIRMATIVE ACTION EMPLOYER
EXECUTIVE ORDER 11246 AND SECTION 3 OF HOUSING AND URBAN
DEVELOPMENT ACT OF 1968, AS AMENDED

(White letters on blue background)

BID CONTRACT AWARD FORMS
Forms must be submitted during the bid opening

**CERTIFICATION OF BIDDER
REGARDING NONSEGREGATED FACILITIES**

Project Name: _____

Name of Bidder: _____

The above named Bidder hereby certifies that:

I do not maintain or provide for my employees any segregated facilities at any of my establishments, and that I do not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. As used in this certification, the term “segregated facilities” means any waiting rooms, work areas, rest rooms, wash rooms, restaurants and other eating areas, time clocks, locker rooms or other dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, national origin, or because of habits, local customs, or otherwise.

I further agree to obtain identical certifications from all proposed subcontractors prior to the award of subcontracts exceeding \$10,000.

Signature: _____

Name (Print): _____

Title: _____

Date: _____

**COUNTY OF RIVERSIDE
AFFIRMATIVE ACTION PROGRAM**

**ECONOMIC OPPORTUNITIES FOR SECTION 3 RESIDENTS
AND
SECTION 3 BUSINESS CONCERNS**

The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD Assistance for housing.

AFFIRMATIVE ACTION POLICY STATEMENT

The County of Riverside, as the Community Development Block Grant Administrator, shall take Affirmative Action to insure to the greatest extent feasible that:

1. Contracts for work (involving both construction and non-construction projects) funded from Community Development moneys be awarded to business located in and/or owned in substantial part by persons residing within the Section 3 covered project area.
2. That lower income residents of said project area are to be provided, to the greatest extent feasible, employment and training opportunities emanating from such contracts.

It will be established policy to:

1. Enlist the support of community agencies, schools and unions in the recruitment, hiring and training of low income persons residing within Section 3 project areas.
2. To insure that project area business are afforded a maximum feasible opportunity to bid on contracts.
3. To insure that contractors understand and comply with their obligations under the *Act (24 CFR Part 135)*.
4. To provide a system to periodically monitor and evaluate that effectiveness with which the plan is being carried out.

To insure that we continue to meet our obligations and commitments we have developed a *Section 3 Affirmative Action Program*. All contractors and sub-contractors are expected to demonstrate a spirit of support and cooperation in the implementation of this program.

The Executive Director of the Community Development Agency will be responsible for the implementation, administration, and monitoring of our policy and program.

Date: February 8, 1988

Supervisor Walt P. Abraham Chairman, Board of Supervisors

II DEFINITION OF TERMS

1. Business concerns located within the Section 3 covered project area: Means those individuals or firms located within the relevant Section 3 covered project area as determined, pursuant to 24 CFR 135.15.
2. Business concerns owned in substantial part by persons residing in the Section 3 covered project area: Means those business concerns which are five (5) percent or more owned by persons residing within the relevant Section 3 covered project as determined pursuant to 24 CFR 135.15.
3. Contracting party: Means any entity which contracts with a contractor for the performance of work in connection with a Section 3 covered project.
4. Contractor: Means any entity which performs work in connection with a Section covered project.
5. Lower income resident of the area: A person residing in the Community Development Block Grant project area of the County of Riverside whose annual family income does not exceed eighty (80) percent of the median income. (Calculations are to be based on the median income level as reported by HUD).
6. Project area: In most cases the project area will be bounded by the County limits (or participants' City limits as applicable). However, priority shall be given to persons living within the County's Impact Areas.

III SPECIFIC AFFIRMATIVE ACTION STEPS

In order to comply with Section 3 regulations affirmative action must be taken. This affirmative action will be at least extensive and specific as the following:

- Each contractor and sub-contractor shall incorporate in all contracts for work in connection with a Section 3 covered project the following Section 3 Clause:
- Every applicant, recipient, contracting party, contractor, and sub-contractor shall incorporate, or cause to be incorporated, in all contracts for work in connection with Section 3 covered project, the following clause (referred to as a Section 3 Clause):

The work to be performed under this contract is on a project assisted under a program providing direct Federal financial assistance from the Department of Housing and Urban Development, and is subject to the requirements of Section 3 of the Housing and Urban Development act of 1968, as amended, 12 U.S.C. 176. Section 3 requires that to the greatest extent feasible opportunities for training and employment be given to lower income residents of the project area and contracts for work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the project.

The parties to this contract will comply with the provisions of said Section 3 and the regulations issued pursuant thereto by the Secretary of Housing and Urban Development set forth in 24 CFR 570, and all applicable rules and orders of the Department issued hereunder prior to the execution of this contract. The parties to this contract certify and agree that they are under no contractual or other disability which would prevent them from complying with these requirements.

The contractor will send to each labor organization, or representative or workers, with which he has collective bargaining agreement or other contract, or understanding, if any, a notice advising the said labor organization or workers; representative of his commitments under this Section 3 Clause and shall post copies of the notice in a conspicuous place available to employees and applicants for employment or training.

The contractor will include this Section 3 Clause in every sub-tier contract for work in connection with the project and will, at the direction of the applicant for or recipient of Federal financial assistance, that appropriate action pursuant to the sub-tier contract upon finding that the sub-contractor is in violation of the regulations issued by the Secretary of Housing, and Urban Development, 24 CFR 570. The contractor will not enter into any sub-tier contract with any sub contractor where it has notice or knowledge that the latter has been found in violation of regulations under 24 CFR 570 and will not let any sub-contract unless the sub-contractor has first provided it with a preliminary statement of ability to comply with the requirements of these regulations.

Compliance with the provisions of Section 3, the regulations set forth in 24 CFR 570, and all applicable rules and orders of the Department issued thereunder prior to the execution of the contract, shall be a condition of the Federal financial assistance provided to the project binding upon the applicant or recipient for such assistance, its successors, and assigns. Failure to fulfill these requirements shall subject the applicant or recipient, its contractors and sub-contractors, its successors, and assigns to those sanctions specified by the grant or loan agreement or contract through which Federal assistance is provided, and to such sanctions as are specified by 24 CFR 135.

2. All contractors and their sub-contractors shall include as part of their bid proposal a copy of their Section 3 Affirmative Action Plan. The Program should include the following:
 1. A preliminary statement of workforce needs (skilled, semi-skilled, unskilled labor and trainees by category).
 2. Goals (in percentage) relative to utilization of lower income persons in project area.
 3. Goals relative to the project dollar amount of sub-contractors to be awarded to project area business

IV DISSEMINATION OF SECTION 3 PROGRAM POLICY

In order that all contractors of the County of Riverside have a full understanding of the County's position regarding this Section 3 Affirmative Action Plan the following procedures will be initiated:

1. All advertisements and invitations to bid will include the County's Section 3 Affirmative Action Plan requirements.
 2. All Community Development Block Grant contracts will include the County's Section 3 Affirmative Action Plan.
 3. The Section 3 Grievance Procedure and signs shall be placed at construction sites identifying the project as a Section 3 covered project.
-

V PROGRAM EVALUATION

Pursuant to Section 3 requirements (24 CFR 1325.20) the County of Riverside, as Block Grant Administrator, shall assist and actively cooperate with the Department of Housing and Urban Development in insuring the compliance of our contractors and sub-contractors.

All contractors shall:

1. Maintain a list of all lower income area residents who have applied whether on their own or on referral from any source.
 2. Set forth evidence, acceptable to the Executive Director or the Community Development Agency that its actions were not an attempt to circumvent program requirements, if vacant apprentice or trainee positions in its organization are filled immediately prior to undertaking work pursuant to a Section 3 covered project.
-

VI COMPLAINT PROCEDURE

Any low income resident of a project area for him/herself or as a representative of persons similarly situated, seeking employment or training opportunities with a contractor or sub-contractor, or any business concern located in, or owned in substantial part by persons residing within a project area seeking contract opportunities from any contractor or sub-contractor for personally or by an authorized representative file a grievance alleging non-compliance with Section 3, these regulations, or obligations undertaken pursuant thereto.

A grievance must be filed not later than ninety (90) days from the date of the action (or omission) upon which the grievance is based. Complaints or questions regarding compliance relative to these regulations should be addressed to:

CDBG Program Administrator
Economic Development Agency
1325 Spruce St., Suite 400, Riverside, CA 92507
(951) 955-8916

BIDDER CERTIFICATION FOR SECTION 3 COMPLIANCE
(Housing and Community Development Act of 1968)

Project Title: _____ Amount of Bid: _____

The undersigned hereby certifies that he/she has read and understands Riverside County's Section 3 Affirmative Action Program as well as Section 3 of the *Housing and Community Development Act of 1968*, and further certifies adoption of, and adherence to, said program, and certifies understanding of the following for all construction contracts over \$100,000:

I understand and agree that in the event that I am awarded this contract, and in the event that any new employment opportunities are created as a result of this CDBG-funded project, I will forward to the Economic Development Agency all detailed job descriptions and Section 3 reports, in a form, at a place, and at a time as directed by the Economic Development Agency. _____

Complete your proposed workforce plan for this project below:

Initial Here

JOB CATEGORY	CURRENT POSITIONS	NUMBER OF NEW HIRES IF AWARDED BID	NUMBER OF NEW HIRES PROPOSED TO BE SECTION 3 RESIDENTS	% OF NEW HIRES TO BE SECTION 3
PROFESSIONALS				
TECHNICIANS				
OFFICE/CLERICAL				
CONSTRUCTION BY TRADE				
TRADE				
TRADE				
TRADE				
TRADE				
TRADE				
TRADE				
APPRENTICE				
TRAINING				
OTHER				
TOTAL				

BIDDER CERTIFICATION FOR SECTION 3 COMPLIANCE

I understand and agree that for any and all subcontracting opportunities that may result from this CDBG-funded project, I will request and review the County of Riverside Section 3 Sub-contractor Database prior to selecting any sub-contractor for my bid submittal. _____

Initial Here

I understand and agree that any and all sub-contracts and sub-tier agreements resulting from this CDBG-funded project are also subject to Section 3 compliance, and therefore, as the General/Prime Contractor, I am responsible to ensure compliance from all sub-contractors. _____

Initial Here

Complete your Subcontracting Plan for this project below:

TRADE	AMOUNT OF SUBCONTRACT(\$)	IS THE SUBCONTRACTOR SECTION 3 ELIGIBLE? YES OR NO	IF SUBCONTRACTOR IS SECTION 3, INDICATE ELIGIBLE STATUS. 51% OWNER / 30% EMPLOYEE	

Bidder (Company) Name: _____

Authorized Representative (Type Name): _____

Signature: _____

Date: _____

SUBCONTRACTOR CERTIFICATION FOR SECTION 3 COMPLIANCE
(Housing and Community Development Act of 1968)

Project Title: _____ Amount of Subcontract: _____

The undersigned hereby certifies that he/she has read and understands Riverside County's Section 3 Affirmative Action Program as well as Section 3 of the *Housing and Community Development Act of 1968*, and further certifies adoption of, and adherence to, said program, and certifies understanding of the following for all construction contracts over \$100,000:

I understand and agree that in the event that I am awarded this contract, and in the event that any new employment opportunities are created as a result of this CDBG-funded project, I will forward to the Economic Development Agency all detailed job descriptions and Section 3 reports, in a form, at a place, and at a time as directed by the Economic Development Agency. _____

Initial Here

Complete your proposed workforce plan for this project below:

JOB CATEGORY	CURRENT POSITIONS	NUMBER OF NEW HIRES IF AWARDED BID	NUMBER OF NEW HIRES PROPOSED TO BE SECTION 3 RESIDENTS	% OF NEW HIRES TO BE SECTION 3
PROFESSIONALS				
TECHNICIANS				
OFFICE/CLERICAL				
CONSTRUCTION BY TRADE				
TRADE				
TRADE				
TRADE				
TRADE				
TRADE				
TRADE				
APPRENTICE				
TRAINING				
OTHER				
TOTAL				

SUBCONTRACTOR CERTIFICATION FOR SECTION 3 COMPLIANCE

Bidder (Company) Name: _____

Authorized Representative (Type Name): _____

Signature: _____

Date: _____

COUNTY OF RIVERSIDE
CDBG PROGRAM

**BIDDER CERTIFICATION ON
FEDERAL CONTRACT REQUIREMENTS**

PROJECT NAME: _____

CERTIFICATION:

I hereby certify that I have reviewed and understand the diversified Federal construction contract related requirements imposed on the Contractor(s) of HUD-funded construction projects, including but not limited to the following:

1. The subject project is being financed with Community Development Block Grant funds (*24 CFR Part 570*);
2. The subject project and all related construction contracts are subject to the U.S. Department of Housing and Urban Development's Federal Labor Standards Provisions (HUD 4010 – revised 06/2009); and
3. The subject project and all related contracts are subject to the Special Federal Provisions including Section 3.

CONTRACTOR'S NAME: _____

CONTRACTOR'S LICENSE NO.: _____

ADDRESS: _____

AUTHORIZED REPRESENTATIVE: _____ (Type Name)

SIGNATURE: _____

DATE: _____

QUESTIONNAIRE REGARDING BIDDERS

Engaged in the contracting business under the present name of _____
_____, since _____ (Date).

Present business address is: _____

Federal Tax ID: _____ **Amount of Contract \$** _____

State of California Contractor's License No.: _____

Expiration Date: _____

Because this project is Federally-funded, it is necessary to obtain information concerning minority and other group participation for statistical purposes. The U.S. Department of Housing and Urban Development (HUD) uses this information to determine the degree to which its programs are being utilized by minority business enterprises and targeted group contractors.

A minority enterprise is defined by the Federal Government as a business that is fifty-percent (50%) or more "minority-owned". Please check applicable box concerning the ownership of your business:

- American Indian or Native Alaskan
- Asian or Pacific Islander/Native Hawaiian
- Black/African American
- Hispanic
- White
- Hasidic Jews
- Other _____

A woman-owned enterprise is defined by the Federal Government as a business that is fifty-percent (50%) or more woman-owned. Please check applicable box concerning the ownership of your business:

- Woman/Female owned
- Male owned

A Section 3 Contractor or Subcontractor is a business concern that is more than fifty-percent (50%) owned by a low or very low-income person, or a business concern that provides economic opportunities to low and very low-income residents. Please check applicable box concerning the ownership of your business:

- Section 3 Business concern
- Non-Section 3 Business concern

The United States Department of Housing and Urban Development (HUD) is authorized to solicit the information requested in this form by virtue of Title 12, United States Code, Section 1701 et seq., and other regulations. It will not be disclosed or released outside of HUD without your consent, except as required or permitted by law.

LIST OF SUBCONTRACTORS

SUBCONTRACTOR	FED. I.D.#	AMOUNT	ADDRESS/PHONE NO.
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

SUPPLIERS

NAME OF SUPPLIER	ADDRESS/PHONE NO.	CONTRACT AMOUNT
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

This form is to be completed and submitted with the bid package.

POST CONTRACT AWARD FORMS

Forms will be submitted after bid opening/award of contract

PERFORMANCE BOND

Recitals: 1. _____
(contractor)
has entered into an Agreement dated _____ with _____
_____ for construction of public work known as

(Project)

2. _____, a

_____ corporation (Surety), is the Surety under this Bond

Agreement:

We, Contractor, as Principal, and Surety, jointly and severally agree, state, and are bound unto Owner, as obligee, as follows:

1. The amount of the obligation of this Bond is 100% of the estimated contract price for the project of \$ _____ and insures to the benefit of Owner.

2. This Bond is exonerated by Contractor doing all things to be kept and performed by it in strict conformance with the. Contract Documents for the Project, otherwise it remains in full force and effect for the recovery of loss, damage and expense of Owner resulting from failure of Contractor to so act. All of said Contract documents are incorporated herein.

3. This obligation is binding on our successors and assigns.

4. For value received. Surety stipulates and agrees that no change, time extension, prepayment to Contractor, alteration or addition to the terms and requirements of the Contract Document or the work to be performed thereunder shall affect its obligations hereunder and waives notice as to such matters, except the total contract price cannot be increased by more than 10% without approval of Surety.

THIS BOND is executed as of _____
Date

By _____ By _____

By _____ Type Name _____
Its Attorney in Fact "Surety"

Title _____
Contractor

Note: This Bond must be executed by both parties with corporate seal affected. All signatures must be acknowledged. (Attach acknowledgements)

PAYMENT BOND
(Public Work - Civil Code 3247 et seq.)

The makers of this Bond are _____ as

Principal and Original Contractor and _____, a

corporation, authorized to issue Surety Bonds in California, as Surety, and this Bond is issued in

conjunction with that certain public works contract dated _____

between Principal and _____ a

public entity, as Owner; for the BOND is one hundred percent (100%) of said sum. Said contract is

for public work generally consisting of _____

The beneficiaries of this Bond are as is stated in 3248 of Civil Code and the requirements and conditions of this Bond are as is set forth in 3248, 3249, 3250 and 3252 of said Code. Without notice, Surety consents to extension of time for performance, change in requirements, amount of compensation, prepayment under said contract

Dated _____

Original Contractor - Principal

_____ By _____

Surety

By _____ Title _____

(If corporation - affix seal)

(Corporate Seal)

STATE OF CALIFORNIA

COUNTY OF _____) SS SURETY'S ACKNOWLEDGMENT

On _____ before me personally appeared _____

known to me to be the person whose name is subscribed to the within the instrument as attorney in

fact of _____, a corporation, and acknowledged that

he subscribed the name of said corporation thereto, and his own name is its attorney in fact.

Notary Public

(Seal)

Riverside County Counsel

Approved Form 1-9-74

SUBCONTRACTOR QUESTIONNAIRE

Engaged in the contracting business under the present name of _____
_____, since _____ (Date).

Present business address is: _____

Federal Tax ID: _____ **Amount of Sub-Contractor \$** _____

State of California Contractor's License No.: _____

Expiration Date: _____

Because this project is Federally-funded, it is necessary to obtain information concerning minority and other group participation for statistical purposes. The U.S. Department of Housing and Urban Development (HUD) uses this information to determine the degree to which its programs are being utilized by minority business enterprises and targeted group contractors.

A minority enterprise is defined by the Federal Government as a business that is fifty-percent (50%) or more "minority-owned". Please check applicable box concerning the ownership of your business:

- American Indian or Native Alaskan
- Asian or Pacific Islander/Native Hawaiian
- Black/African American
- Hispanic
- White
- Hasidic Jews
- Other _____

A woman-owned enterprise is defined by the Federal Government as a business that is fifty-percent (50%) or more woman-owned. Please check applicable box concerning the ownership of your business:

- Woman/Female owned Male owned

A Section 3 Contractor or Subcontractor is a business concern that is more than fifty-percent (50%) owned by a low or very low-income person, or a business concern that provides economic opportunities to low and very low-income residents. Please check applicable box concerning the ownership of your business:

- Section 3 Business concern Non-Section 3 Business concern

The United States Department of Housing and Urban Development (HUD) is authorized to solicit the information requested in this form by virtue of Title 12, United States Code, Section 1701 et seq., and other regulations. It will not be disclosed or released outside of HUD without your consent, except as required or permitted by law.

EXHIBIT PA-3 (Cumulative)

**ECONOMIC DEVELOPMENT AGENCY
COMMUNITY SERVICES DIVISION**

**CDBG / ESG / HOME PROGRAMS
Contractor / Sub-Contractor Questionnaire**

EDA Use Only

Project Name: _____

File # _____

Note: The information requested is used to compile data required by HUD for Federally funded projects. The information is used by HUD to monitor and evaluate Minority Business Enterprise activities against the total program activity and the designated minority business enterprise (MBE) goals.

Privacy Act Notice = The United States Department of Housing and Urban Development, Federal Housing Administration, is authorized to solicit the information requested in this form by virtue of Title 12, United States Code, Section 1701 et seq., and regulation. It will not be disclosed or released outside the United States Department of Housing and Urban Development without your consent, except as required or permitted by law.

Project Name: _____

Amount of Contract or Subcontract	Contractor or Subcontractor Business Racial / Ethnic (see below)	Type of Business 1-9	Woman Owned Business (Y or N)	Prime Contractor Identification (ID) Number	Sub-Contractor Identification (ID) Number	Sec. 3 (Y or N)	Contact Person	Contractor / Subcontractor Name and Address		
								Name	Street	City
								State		

Racial / Ethnic Codes:

- 1 = White Americans
- 2 = Black Americans
- 3 = Native Americans
- 4 = Hispanic Americans
- 5 = Asian / Pacific Americans
- 6 = Hasidic Jews

Type of Business / Trade Codes

- 1 = New Construction
- 2 = Substantial Rehab
- 3 = Repair
- 4 = Repair
- 5 = Project Management
- 6 = Professional
- 7 = Tenant Services
- 8 = Education Training
- 9 = Arch / Eng Appraisal
- 0 = Other

Section 3: Yes / No

A Section 3 Contractor or subcontractor is a business concern that provides economic opportunities to low and very low-income residents of the metropolitan area (or non-metropolitan county), including a business concern that is 51 percent or more owned by low-income residents.

PRINT NAME: _____

SIGNATURE: _____

DATE: _____

**CERTIFICATION OF SUBCONTRACTOR
REGARDING NONSEGREGATED FACILITIES**

Project Name: _____

Name of Subcontractor: _____

Name of General Contractor: _____

The above named Subcontractor hereby certifies that:

I do not maintain or provide for my employees any segregated facilities at any of my establishments, and that I do not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. As used in this certification, the term “segregated facilities” means any waiting rooms, work areas, rest rooms, wash rooms, restaurants and other eating areas, time clocks, locker rooms or other dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, national origin, or because of habits, local customs, or otherwise.

Signature: _____

Name (Print): _____

Title: _____

Date: _____

SECTION 3 SUMMARY REPORT
ECONOMIC OPPORTUNITIES FOR LOW AND VERY LOW-INCOME PERSONS

EXHIBIT PA-5

PROJECT NAME: _____

DATE _____

CONTRACTOR: _____

SUBCONTRACTOR: _____

JOB CATEGORY	NUMBER OF NEW HIRES	NUMBER OF NEW HIRES THAT ARE SECTION 3 RESIDENTS	% OF AGGREGATE NUMBER OF STAFF HOURS OF NEW HIRES THAT ARE SECTION 3	% OF TOTAL STAFF HOURS FOR SECTION 3 EMPLOYEES
PROFESSIONALS				
TECHNICIANS				
OFFICE / CLERICAL				
CONSTRUCTION BY TRADE				
TRADE				
TRADE				
TRADE				
TRADE				
TRADE				
TRADE				
OTHERS				
TOTAL				

NAME OF PERSON COMPLETING FORM: _____

SIGNATURE: _____

Section 3 "New Hires" refers to a person who is not on the Contractor's payroll for employment at the time of Contract award.

Recipients and contractors subject to Section 3 requirements must maintain appropriate documentation to establish that HUD financial assistance for CDBG-funded projects was directed to low-income and very low-income persons. Low-income persons means families (including single people) whose incomes do not exceed 80% of the area median household income, as established by HUD, with adjustments for family size. Very low-income persons means families (including single people) whose incomes do not exceed 50% of the area median household income, as established by HUD, with adjustments for family size.

CDBG PROJECT LABOR CLASSIFICATION SURVEY

PROJECT NAME: _____ CONTRACTOR: _____

PROJECT NUMBER: _____ SUBCONTRACTOR: _____

CLASSIFICATIONS

BRICKLAYER _____ LABORERS: GROUP 1 _____

CARPENTERS _____ GROUP 2 _____

CEMENT MASONS _____ GROUP 3 _____

DRYWALL HANGERS _____ GROUP 4 _____

ELECTRICIANS _____ GROUP 5 _____

IRON WORKERS _____ POWER EQUIPMENT OPERATORS

PAINTERS _____ GROUPS 1 – 21 _____

PLUMBERS _____ _____

ROOFERS _____ _____

SHEET METAL WORKERS _____ TRUCK DRIVERS
GROUPS 1-11 _____

SOFT FLOOR LAYERS _____ _____

TILE LAYERS _____ _____

LANDSCAPE / IRRIGATION
FITTERS _____

LABORERS – STRIPPING _____

PLASTERER _____

OTHERS _____

**ADDITIONAL CLASSIFICATIONS
(Must be approved by HUD and DOL)**

CLASSIFICATIONS

PA-6 (Continued)

PROJECT NAME:			WAGE DECISION NUMBER/MODIFICATION NUMBER:			
PROJECT NUMBER:			PROJECT COUNTY:			
WORK CLASSIFICATION	BASIC HOURLY RATE (BHR)	FRINGE BENEFITS	TOTAL HOURLY WAGE RATE	LABORERS FRINGE BENEFITS:		\$ TOTAL WAGE
				GROUP #	BHR	
Bricklayers			\$			
Carpenters			\$			\$
Cement Masons			\$			\$
Drywall Hangers			\$			\$
Electricians			\$			\$
Iron Workers			\$			\$
Painters			align="center">\$	OPERATORS FRINGE BENEFITS:		\$ TOTAL WAGE
				GROUP #	BHR	
Plumbers			\$			
Roofers			\$			\$
Sheet Metal Workers			\$			\$
Soft Floor Layers			\$			\$
Tapers			\$			\$
Tile Setters			align="center">\$	TRUCK DRIVERS FRINGE BENEFITS:		\$ TOTAL WAGE
				GROUP #	BHR	
OTHER CLASSIFICATIONS						
			\$			\$
			\$			\$
			\$			\$
ADDITIONAL CLASSIFICATIONS (HUD Form 4230-A)						
WORK CLASSIFICATION	BASIC HOURLY RATE	FRINGE BENEFITS	TOTAL HOURLY WAGE RATE	DATE OF HUD SUBMISSION TO DOL	DATE OF DOL APPROVAL	
			\$			
			\$			
			\$			
			\$			

HEMET SERVICE CENTER
HEMET, CALIFORNIA

GENERAL REQUIREMENTS

DUTIES OF THE PROPOSER

- A. It is the responsibility of the Proposer to schedule and coordinate the construction within his work scope.
- B. Before submitting his proposal to the County, and continuously after the execution of this agreement, the Proposer shall carefully study and compare the Documents and shall at once report to the County any error, inconsistency or omission he may discover including any requirement which may be contrary to any law, ordinance, rule, regulation or other requirement of any public authority bearing on the performance of the work. By submitting his proposal for this agreement and the Work under it, the Proposer agrees that the Documents, along with any supplementary written instructions that have become a part of the Documents, appear accurate, consistent and complete insofar as can reasonably be determined. The Proposer shall do no work without Documents and, when required, approved shop drawings, product data or samples for such portions of the work.
- C. The Proposer shall coordinate the work of all his Subcontractors.
- D. The Proposer shall consult with the others on the project regarding the installation of such other work before starting the various phases of his work, in order to avoid the possibility of the removal of his work to permit others to install their work.
- E. Project Manager

The Proposer shall employ a competent superintendent and necessary assistants who shall be in attendance at the project site during the progress of the Work. The Project Manager shall represent the Proposer and all communications given to the Project Manager shall be as binding as if given to the Proposer. Should it be necessary for the Proposer to replace the Project Manager during the progress of the work, he shall request prior approval of the County.

- F. Communications

The Proposer shall forward all communications to the County.

- G. Use of site

The Proposer shall:

1. Confine operations at the site to areas permitted by law, ordinances, permits and the Documents and shall not unreasonably encumber the site with any materials or equipment.
2. Coordinate all of his operations with and secure approval from the County before using any portion of the site.
3. Allocate space for each subcontractor within the construction area.
4. Administer traffic controls where construction operations infringe upon the normal flow of traffic about the site.

HEMET SERVICE CENTER
HEMET, CALIFORNIA

H. Conditions affecting the work

The Proposer shall be responsible for having taken all steps necessary to review conditions which can affect the work or the cost thereof, including but not limited to conditions relating to transportation, handling, storage of materials, availability of labor, water, roads, weather, topographic and subsurface condition. The County assumes no responsibility for any understanding or representations concerning conditions made by any of its officers or agents or employees prior to the execution of this contract, unless such understanding of representations are expressly stated in Documents.

I. Contractor shall maintain the following reports and records at site:

1. Daily log of progress of work, available to County and County Inspector.
2. Records:
 - a. Contracts
 - b. Purchases
 - c. Materials and equipment records.
 - d. Applicable handbooks, codes and standards.
 - e. Safety plan and safety meeting log.

J. Verify that specified cleaning is done during progress of the work and at completion of project.

K. Do not unreasonably encumber site with materials or equipment.

L. Do not load structure with weight that will endanger it.

M. Assume full responsibility for protection and safekeeping of materials and equipment stored on premises.

MUTUAL RESPONSIBILITY

A. If any part of the work depends, for proper execution, or results, upon the work of the County the Proposer shall, prior to proceeding with the work, promptly report to the County any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure to report such conditions shall constitute and acceptance of the County's work as fit and proper to receive his work except as to defects which may subsequently become apparent in such work by others.

B. Any costs caused by defective or ill timed work shall be borne by the party responsible.

C. When there is more than one Contractor engaged on the project, each Contractor shall be responsible to the other for damages to the work, injury to any person or persons or any loss, cost, claims or damages arising out of or in connection with the work required by this Contract or any loss, cost, expense or damage caused by Contractor's neglect or failure to finish or satisfactorily complete its part of the work within the time prescribed.

PRE-CONSTRUCTION CONFERENCE

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- A. The County shall schedule a preconstruction conference after Notice of Award.
- B. Agenda may include discussion of the following items:
 - 1. Submission of list of Subcontractors, list of products, Schedule of Values, and progress schedule.
 - 2. Designation of personnel representing the parties in Contract.
 - 3. Procedures for processing of field decisions, submittals, substitutions, applications for payments, proposal requests, Change Orders and Contract close-out procedures.
 - 4. Scheduling.
 - 5. Use of premises by County and Proposer.
 - 6. Construction facilities and controls provided by County.
 - 7. Survey and layout.
 - 8. Security and housekeeping procedures.
 - 9. Procedures for maintaining record documents.
 - 10. Procedures for testing.

PROGRESS MEETINGS

- A. The County shall schedule and run weekly meetings throughout the project. It is the duty of the Proposer to attend, participate in and comply with the agreement reached and direction set at these meetings.
- B. The Proposer shall make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distributes copies to participants, and those affected by decisions made.
- C. Attendance Required: Project Manager, major Subcontractors and suppliers.

FIELD ENGINEERING REQUIREMENTS

- A. Provide and pay for field engineering services required for the execution of work, including, but not limited to:
 - 1. Survey Work required in execution of the work scope.
- B. Provide field staking of site improvements; identify existing survey reference points and property line corner stakes.
- C. Locate and be aware of all existing on-site utility lines and improvements.

QUALIFICATIONS OF SURVEYOR OR ENGINEER

- A. Qualified California Registered Professional Engineer or Registered Land Surveyor, acceptable to County.
- B. Registered professional engineer of discipline required for specific service on Project, licensed in State of California.

SURVEY REFERENCE POINTS

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- A. Locate and protect survey reference points prior to starting site work, and preserve all permanent reference points during construction.
 - 1. Make no changes or relocations without prior written notice to County for review and interpretation.
 - 2. Report to County when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades of location.
 - 3. Replace project survey reference points which may be lost or destroyed. Establish replacements based on original survey control.

SURVEY REQUIREMENTS

- A. Establish and maintain lines and levels to locate and layout entire scope of work.
- B. Preserve and protect all on-site underground utilities lines and existing on-site improvements in the area of construction.

RECORDS

- A. Maintain complete, accurate log of all control and survey work as it progresses.
- B. On completion of site improvements, prepare certified survey and as-built drawing record documents) including the following information:
 - 1. All boundary dimensions at perimeter of site, building pads, and parking lots.
 - 2. Locations and elevations of all underground utilities and site drainage piping and structure, including manholes and drain inlets, and locations of stubouts of building services for each individual building.
 - 3. Elevations of entire site, shown on a maximum 25' grid, but in any event the distance between survey points should be no more than is necessary to accurately portray as-built conditions.
 - 4. Submit record survey and drawings for review by the County, including certificate signed by registered engineer or surveyor certifying that elevations and location of improvements are in conformance, or non-conformance, with Documents.

REGULATORY REQUIREMENTS

- A. This Section sets forth certain codes and standards and relevant requirements applicable to the work required under this contract.

STATUTORY AND JURISDICTIONAL REGULATIONS

- A. State of California code of Regulation and Amendments
 - 1. Title 8: Industrial Relations; Safety Orders.
 - 2. Title 19: Public Safety.
 - 3. Title 21: Public Works.
 - 4. Title 24: Building Standards.
 - 5. Current ADA Regulations

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- B. Building and Safety Regulations (Editions listed or most current edition adopted by jurisdiction)
 - 1. California Building code: 1997 UBC, with Amendments.
 - 2. National Electrical Code, 1993 Edition, with Amendments.
 - 3. Uniform Plumbing Code, 1994 Edition, with Amendments.
 - 4. Uniform Mechanical Code, 1994 Edition, with Amendments.
 - 5. National Electrical Safety Code (ANSI-C2) 1993 Edition.
 - 6. Regulations and Standards of the local utility companies or districts serving the project, when applicable.
 - 7. Requirements of the California Energy Commission.

- C. Construction Safety
 - 1. Statutory and jurisdictional requirements as applicable to temporary work, including California Construction Safety Orders.
 - 2. OSHA, Occupational Safety and Health Agencies requirement.

GENERAL STANDARDS FOR WORK AND MATERIALS

- A. Work or materials specified by reference to a number, symbol or title of a specific standard -- such as ASTM, U.L., F.S., or other standards -- shall comply with requirements thereof, except as limited to type, class, grade or modification shown or specified.

- B. Referenced standards shall have full force and effect as though printed herein and are not repeated for reason that manufacturers and Contractors are assumed to be familiar with requirements governing or applicable to their work.

- C. Materials or trade associations, societies, or other bodies regularly publishing standards most widely used under these documents are listed herein together with reference symbols.

- D. Individual standards which may be referred to under Individual Sections by said reference symbol followed by designation number.

Reference:

<u>Symbol</u>	<u>Association Name or Title</u>
A.A	The Aluminum Association
AASHO	American Association of the State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AISC	American Institute for Steel Construction
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CS	Commercial Standards, U.S. Department of Commerce

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FGMA	Flat Glass Marketing Society
FML	Factory Mutual Laboratories
F.S.	Federal Specifications
GA	Gypsum Association
IEEE	Institute of Electrical and Electronic Engineers
MFMA	Maple Flooring Manufacturer's Association
M.S.	Military Specifications, U.S. GSA
NAAMM	National Association of Architectural Metal Manufacturers
NBS	National Bureau of Standards
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
PCA	Portland Cement Association
PS	Product Standard, U.S. Department of Commerce
RIS	Redwood Inspection Service
SDI	Steel Door Inspections
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
TCA	Tile council of America
UL	Underwriter's Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WIC	Wood Work Institute of California
WWPA	Western Wood Products Association

E. Books of Standards

1. State of California, Business and Transportation Agency, Department of Transportation
 - a. CALIFORNIA STANDARD SPECIFICATIONS: Standards Specifications, January 1988, specific parts referred to by Section number.
 - b. CALIF. TEST METHOD: Methods and Research Dept., Materials manual, 1988: specific tests referred to by Calif. number.
2. APWA Standard Specifications: American Public Works Association, No. Calif. Chapter, Standard Specifications for Public Works Construction, 1979; specific parts referred to by APWA Section number 3 U.L.: Underwriters' Laboratories, Inc.; Building Materials List, 1991; and others regularly published; specific parts referred to by U.L. Classification Title and number.

FIRE RATED WORK OR MATERIAL

- A. Applicable to materials, construction or fabrication specified or required to have limited fire hazard characteristics.
- B. Materials or assemblies shall be tested and classified per applicable ASTM Test Methods; or comparable scientific testing establishing like valuations, under sponsorship of manufacturer and conducted by U.L. or other established testing agency regularly performing tests of the type required.
 1. Flame spread of materials used, when installed under the conditions shown or specified, shall not exceed characteristic values specified.
 2. Compliance shall be substantiated by written certificate, labeling or both as specified.

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- C. ASTM Tests not otherwise identified shall be listed under ASTM publication titles 1989 Annual Book of ASTM Standards, Section 00 under section of Subject Index, and under subject heading Fire Tests, and Flammability Tests.

MANUFACTURER'S STANDARDS

- A. Applicable to type of items and products.
- B. Instructions not otherwise shown or specified shall be those of producer, as applicable, covering:
 - 1. Primary materials, auxiliary materials and accessories.
 - 2. Conditions of handling and for storage and protection
 - 3. Preparation of backup surfaces.
 - 4. Installation, cleaning and maintenance procedures.
- C. Publications of producers shall apply as particularly referred to, otherwise as regularly provided by producer, and shall include generalized installation publications or instructions.

SUBMITTALS INCLUDES

- A. Definitions.
- B. Submittal Schedule.
- C. Shop Drawings.
- D. Samples.
- E. Product data.
- F. Review and Re-submission Requirements.
- G. Substitutions.
- H. Manufacturer Instructions.
- I. Deferred Approval.

DEFINITIONS

- A. Shop Drawings and Product Data include but are not limited to, fabrication, erection, layout and setting drawings, form-work and false-work drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams, all other drawings and descriptive data pertaining to materials, equipment, piping, and duct and conduit systems as may be required to show that the materials, equipment, piping, and duct and conduit systems as may be required to show that the materials, equipment or systems and the positions conform to the Contract.
- B. Manufactured applies to standard units usually mass produced; fabricated means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicating proper relationship to adjoining work and amplifying design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.
- C. Manufacturer's Instructions: Where any item of Work is required to be furnished, installed or performed in accordance with a specified product manufacturer's instruction,

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procure and distribute the necessary copies of such to the County, Inspector, and all other concerned parties and shall furnish, install or perform the Work in accordance with those instructions.

SUBMITTAL SCHEDULE

- A. Prepare a submittal schedule, coordinate it with the approved contract schedule and submit it to the County within fourteen (14) days of the Notice to Proceed.
- B. In preparing the submittal schedule, determine from the approved contract schedule the date the particular item is needed for installation. Working back from the installation date, add the number of days required for shipment, fabrication, review and similar items, to determine the latest possible date of submittal.
- C. Submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such shop drawings, information and samples.
- D. Allow sufficient time so that no delay occurs due to required lead time in ordering or delivery to job site. The Contractor will be held responsible for any delay in progress of Work due to his failure to observe these requirements.
- E. Time for completion of the Contract will not be extended on account of the failure to promptly submit shop drawings, product data and samples.
- F. When the magnitude or complexity of the submittal material precludes processing in its entirety within the prescribed period, incremental processing will be utilized to the extent possible to avoid delays.

SHOP DRAWINGS

- A. Submit to the County one reproducible transparency (which will be returned) The County will review and then return the reproducible.
- B. Before proceeding with installation of any work, the Proposer shall receive review of such drawings, descriptive data and material list as required accomplishing the Work.
 - 1. Review of Shop Drawings is regarded as a service to assist the Proposer and in all cases original Documents shall take precedence as outlined under General Conditions.
 - 2. No claim for an extra shall be based on Work shown on Shop Drawings unless such claim is noted on transmittal letter accompanying Shop Drawings and appropriate written review is secured.
 - 3. Shop Drawings are not reviewed for quantities of materials, dimensions, or number of items supplied. Be responsible for determining the accuracy of such information.
- C. Shop drawing review does not relieve responsibility for accuracy, proper fitting, construction of work, furnishing of materials, or work required by the Documents and not indicated on the shop drawings. Shop drawing review is not to be construed as approving

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departures from Documents unless specifically noted and counted as such on the shop drawings.

- D. Review of Shop Drawings and Schedules does not relieve the responsibility for any violation indicated on such Drawings or Schedules of local, county, state or federal laws, rules, ordinances, or rules and regulations of commissions, boards or other authorities or utilities having jurisdiction.
1. Before submitting shop drawings for review, check shop drawings of subcontractors and suppliers for accuracy; ascertain that all work contiguous with and having bearing on other work shown on shop drawings is accurately drawn and in conformance with Documents. Whenever it is evident that drawings have not been checked, they will be returned for re-submission and will not be considered. In such event, it will be deemed that Proposer has not complied with this provision and shall bear risk of all delays to same extent as if no drawings or details had been submitted.
 2. Submission and/or re-submission of shop drawings constitutes evidence that Contract has checked all information thereon and that he accepts and is willing to perform the work as shown.
 3. Shop Drawings must clearly delineate the following information:
 - a. Project Name and address.
 - b. Drawing title, number, date and scale.
 - c. Names of Proposer, Subcontractor and fabricator.
 - d. Working and erection dimensions.
 - e. Arrangements and sectional views.
 - f. Necessary details, including completion information for making connection with other Work.
 - g. Kinds of materials and finished.
 - h. Descriptive names of materials and equipment, classified item number, and locations at which materials or equipment are to be installed in the Work.
 4. Prepare composite Drawings and installation layouts, when required to solve tight field conditions.
 - a. Drawings to consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences., etc.
 - b. These composite Drawings and installation layouts to be coordinated in field by Contractor and his Subcontractors for proper relationship to work of other trades, based on field conditions, and must be checked and approved by them before submissions for final review.

SAMPLES

- A. Submit samples for review at least 30 days prior to usage. Materials such as mortar, concrete, etc. which require on-site testing will be taken at the project site.

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1. Submit samples in duplicate, except where greater or lesser number is specifically required by Documents.
 - a. Must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.
 - b. Show full range of color and texture.
 2. Submittal to be made only by Contractor, unless he has authorized Subcontractor to submit.
 3. Ship samples prepaid or hand deliver to County.
 4. Mark samples to show name of Project, Proposer, Contractor name, and segment of work where representative Sample will be used and ASTM or FS reference, if applicable.
 5. Deliver no material to the site prior to receipt of completed written review.
 6. Review and acceptance of samples will not preclude rejections of any materials discovery of defects in same prior to final acceptance of completed Work.
 7. After a material has been reviewed, no change in brand or make will be permitted unless satisfactory written evidence is presented and reviewed.
 8. Submit samples of materials requiring laboratory tests to specified laboratory for testing not less than 90 days before such materials are required to be used in the Work.
 9. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other required information.
- B. Field Samples and Mock-ups are to be erected/constructed at Project Site as required in the specifications and drawings.
1. Size: As specified.
 2. Furnish catalog numbers and similar data as requested.

PRODUCT DATA OR NON-REPRODUCIBLE SUBMITTALS

- A. Submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Provide a minimum of 3 each; 2 for review and documentation and one to be returned to the Contractor.
- B. Submit 4 copies of a complete list of all major items of mechanical, plumbing and electrical equipment and materials. Other items specified are to be submitted as soon as possible after award. Submit items of like kind on time in a neat and orderly manner. Partial lists will not be acceptable.

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- C. Submittals shall include manufacturer's specifications, physical dimensions and ratings of all equipment. Furnish performance curves for all pumps and fans. Where printed literature describes items in addition to items being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out.
- D. Equipment submittals to be complete including space requirements, weight, electrical, and mechanical requirements, performance data and supplemental information that may be requested.

MANUFACTURER'S INSTRUCTION

- A. When specified in individual specification sections, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting and finishing, in quantities specified for product data.
- B. Identify conflicts between manufacturers' instruction and documents.

MANUFACTURER'S CERTIFICATION

- A. When specified in individual specification sections, submit manufacturer's certification to County for review.
- B. Indicate material or product which conforms to or exceed specified requirements. Submit supporting reference data, affidavits, and certifications appropriate.
- C. Certificates may be recent or previous test results on materials or products, but must be acceptable to the County.

REVIEW AND RE-SUBMISSION REQUIREMENTS

- A. The County will arrange for review and return after receipt thereof, of all related information necessary for such review.
- B. One reproducible transparency and at least one copy of product or materials data will be returned with the review status marked "No Exception Taken", "Make Corrections Noted", "Revise and Resubmit" or "Not Reviewed". "Not Reviewed" will be used if the Contractor did not issue enough copies or other information required for the review to begin.
- C. Samples to be incorporated into the Work will be returned, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review. Other Samples will not be returned, but the same notice will be given with respect thereto, and such notice shall be considered a return of the Sample.
- D. Revise and resubmit any Shop Drawings or Data designated "Revise and Resubmit", or "Rejected". Such re-submits will be reviewed and returned in the same manner as original Drawings, Data and Samples, within 21 days after receipt thereof or within 21 days after receipt of all related information necessary for such review. Any revised drawing or data designated "Revise and Resubmit" or "Rejected" and any corrected Sample so designated shall be further revised or corrected in accordance with the foregoing procedures.

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- E. Proceed with any work covered by a Shop Drawing, Product Data, or a Sample designated "No Exception Taken" upon its return. Contractor may also proceed with the Work covered by a Shop Drawing, Product Data, or a Sample designated "Make Corrections Noted" provided the Contractor proceeds in accordance with notes and comments.
- F. Do not begin any work covered by a Shop Drawing, Product Data, or a Sample designated "Revised and Resubmit", "Not Reviewed", or "Rejected" until a revision or correction thereof has been reviewed and returned.
- G. A Drawing, Sample or Data designated "Revise and Resubmit" or "Rejected" and requiring re-submittal shall be revised or corrected and resubmitted to the County within fourteen (14) Calendar days after its return to Contractor.
- H. Neither the review nor the lack of review of any Shop Drawing, Data or Sample shall waive any of the requirements of the Contract, or relive any obligation there under. It is the Contractor's responsibility to submit all required information in a timely manner to prevent schedule slippage.

SUBSTITUTIONS

- A. County's review required:
 - 1. Contract is based on materials, equipment and methods described in Documents. County will consider requests for Substitutions only within 35 days after date of Agreement signing. Substitutions will also be considered when a product becomes unavailable through no fault of the Proposer.
 - 2. County will consider proposals for substitution of materials, equipment and methods only when such proposals are accompanied by full and complete technical data and all other information required evaluating proposed substitution. A request constitutes a representation that the Proposer:
 - a. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - b. Will provide the same warranty for the substitution as for the specified product.
 - c. Will coordinate installation and make changes to other work which may be required for the Work to be complete with no additional cost to County.
 - d. Waives claims for additional costs or time extension which may subsequently become apparent.
 - e. Will reimburse County for services associated with re-approval by authorities.
 - f. Limit of one substitution request per product.
 - 3. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request.
 - 4. Do not substitute materials, equipment or methods unless such substitution has been specifically reviewed for this work.

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5. Submittal procedure:
 - a. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - b. Submit shop drawings, product, and certified test results attesting to the equivalence of the proposed product.
 - c. The Proposer will receive written notice of decision to accept or reject the request.

SCHEDULES INCLUDES

- A. Preliminary Schedules.
- B. Other Schedules.
- C. Revision of Schedules.

PRELIMINARY SCHEDULE

- A. Develop a Preliminary Construction Schedule. The major milestone dates shown on this preliminary schedule are the dates by which the Contractors are required to substantially complete each item of work listed. Items of work which are not specifically listed shall be executed and completed in a time and manner which will allow for adequate coordination with all other work and which will allow for completion of the milestone activities.

OTHER SCHEDULES

- A. Short Interval Scheduling will be used throughout the on-site construction process.
 1. The interval will be three weeks and will include the week submitted and two weeks thereafter.
 2. The schedules will be in sufficient detail to evaluate daily milestones and will correspond to the Project Schedule.
 3. The short interval schedule will be discussed and drawn up at each weekly job site meeting and distributed to all contractors present.

DELAYS AND EXTENSIONS OF TIME

- A. Delays and extensions of time are addressed in the General Conditions of the Contract.

PROJECT SCHEDULE

- A. Within 14 days after Notice of Intent to Award, furnish the County with three (3) copies of a schedule that addresses the work. This schedule must be in CPM format and, as a minimum, shall include the following.
 1. Detail of activities for mobilization and start of construction.
 2. Activities which must be complete for succeeding activities to start their work.
 3. Long lead procurement requirements.

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4. Submittals and shop drawings required.
 5. The plan for completion of work shall be in the sufficient detail to allow observation and monitoring by the County. Activities should be broken down by building or area, by trade, and by observation sequence of work. In general, any activity longer than two or three weeks should be broken down into phases two weeks or less in length.
- B. The schedule as submitted must reflect completion within the milestones established in the Preliminary Schedule. It is the Contractor's responsibility to provide adequate crew and sequence work in a way to meet these pre-established durations.

MONTHLY UPDATES

- A. The Schedule shall be updated monthly to reflect any changes and progress. The most current updated schedule will be used as the basis for determining schedule compliance.

QUALITY CONTROL GENERAL

- A. The work is governed by the requirements of Title 24, California Code of Regulations (CCR).
- B. Definitions:
1. Soils Engineer: A civil engineer, licensed in the State of California, who is retained and paid by the County to perform services related to soils testing, inspection and observation.
 2. Testing Laboratory: An independent commercial testing organization, retained and paid by the County to perform tests and report on Work performed under the Documents, and as otherwise required.
 3. On Site Project Inspector: An individual person employed by the County observing the on-site construction Work in accordance with the Documents.

OBSERVATION AND SUPERVISION

- A. The County or its appointed representatives will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review.
- B. Soils Engineer and Testing Laboratory:
1. Services of a Soils Engineer and testing laboratory are required for Work in various individual areas. The County will provide these services at its expense.
 2. Contractor's Responsibilities:
 - a. Cooperate with Soils Engineer and Testing Laboratory personnel
 - b. Furnish copies of product test reports as required.
 - c. Furnish incidental labor and facilities:
 - (1) To provide access to Work to be tested.

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- (2) To obtain and handle samples at the Project site or at the source of the product to be tested.
- (3) To facilitate inspections and tests.
- (4) For storage and curing of test samples.
- d. Notify the County Inspector and County sufficiently in advance of operations to allow for Testing Laboratory assignment of personnel and scheduling of tests.
 - (1) If tests or inspections cannot be performed after such notice, reimburse the County for the "Testing Laboratory personnel and travel expenses incurred.

TESTS AND INSPECTIONS

- A. The Contractor shall be responsible for scheduling all required in plant and on site tests and inspection. Notify the Site inspector, and the County 48 hours in advance of performing any work requiring on site testing or inspection.
- B. The Contractor shall provide access to Work to be tested, facilitate inspections and tests and furnish incidental labor and facilities.
- C. The County will pay for first inspections and tests required by California Code of Regulations Title 24, and others which the County may direct to have made.

RE-TESTING

- A. The County shall pay for and back-charge Contractor for all re-tests, including:
 - 1. Re-tests or re-inspections, if required, and tests or inspections required due to established Contractor error or missing test data required.
 - 2. Additional tests directed by the County Inspector or County which establish that materials and installation do not comply with the Documents.

TESTING AND INSPECTION REPORTS AND CERTIFICATIONS

- A. A copy of laboratory report of each test or inspection or certification shall be provided to each of the following:
 - 1) The County.
 - 2) The County Inspector.
 - 3) The Contractor.
 - 4) The Architect and Engineer of Record for the Work.

NORMAL CONTRACTOR COSTS IN CONNECTION WITH ORIGINAL TESTING

- A. The Contractor shall pay for:
 - 1. In plant inspection costs.
 - 2. Testing, adjusting, and balancing of equipment and mechanical systems required by the Documents.

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TEMPORARY FACILITIES SUMMARY

- A. General: Includes administrative and procedural requirements for temporary services and facilities, including such items as temporary utility services, temporary construction and support facilities, for Contractor's use, and County's use during construction of this contract.
 - 1. Use Charges: No cost or usage charges for any temporary services including long distance telephone service or facilities shall be chargeable to the County. Cost or use charges for temporary services or facilities will not be accepted as a basis of claims for a change order extra.

- B. Work Included: The work includes, but is not necessarily limited to, the following:
 - 1. Temporary utility services required for use at the project site, including the following:
 - a. Temporary water service and distribution.
 - b. Temporary electric power and light.
 - c. Temporary telephone service.
 - d. Temporary storm and sanitary sewer.
 - e. Adequate utility capacity at each stage of contract operations. Prior to availability of temporary utilities at the site, provide trucked-in services, as required for start-up of operations.
 - f. Obtaining and paying for temporary easements required to bring temporary utilities to the project site, where the County's permanent easement cannot be utilized for that purpose.

 - 2. Temporary construction and support facilities required for the project, including the following:
 - a. Storage and fabrication areas.
 - b. Sanitary facilities, including drinking water.
 - c. Dewatering facilities and drains.
 - d. Temporary enclosures.
 - e. First aid station.
 - f. Project identification, bulletin boards and signs.
 - g. Waste disposal services.
 - h. Construction aids and miscellaneous general services and facilities.
 - i. Field offices.

 - 3. Security and protection facilities and services required for the project, including the following:
 - a. Barricades, warning signs, lights.
 - b. Enclosure fencing.
 - c. Temporary walkways.

QUALITY ASSURANCE

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- A. Regulations: Comply with requirements of all local codes and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities, including but not limited to the following:
 - 1. Codes, requirements for permits, testing, inspections and Haul Route acceptance.
 - 2. Health and safety regulations.
 - 3. Utility company regulations and recommendations governing temporary utility services.
 - 4. Police and Fire Department rules and recommendations.
 - 5. Environmental protection regulations governing use of water and energy, and the control of dust, noise, erosion and other nuisances.
- B. Inspections: Arrange for required inspections and tests by governing authorities, and obtain required certifications and permits for use.

JOB CONDITIONS

- A. General: Provide each temporary service and facility ready for use at each location when the service or facility is first needed to avoid delay in performance of the work. Maintain, expand as required and modify temporary services and facilities as needed throughout the progress of the work.
- B. Conditions of Use: Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.
 - 1. Temporary Construction and Support Facilities: Take necessary fire prevention measures. Maintain temporary support facilities in a sanitary manner so as to avoid health problems and other deleterious effects.
 - 2. Security and Protection: Maintain site security and protection facilities in a safe, lawful and publicly acceptable manner 24 hours per day. Take necessary measures to prevent erosion of the site.

MATERIALS AND EQUIPMENT

- A. General: Provide new or like new materials and equipment only for temporary services and facilities. Provide only materials and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards.
- B. Electrical Services: Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service.
 - 1. Voltage Differences: Provide identification warning signs at power outlets which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets.

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2. Ground-Fault Protection: Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for plug-in connection of power tools and equipment.
 3. Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas of work.
- C. Temporary Construction and Support Facilities: Provide facilities that can be maintained properly throughout their use at the project site.
1. First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.
 2. Sign Materials: For signs and directory boards, provide exterior type, exterior Grade A-C Marine Plywood conforming to PS-1, of sizes and thicknesses indicated. Provide exterior grade acrylic-latex-base enamel for painting panels and applying graphics.

INSTALLATION

- A. General: Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.
1. Relocate, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.

TEMPORARY UTILITY INSTALLATION

- A. Engage the local utility company to install temporary service to the project. Arrange with the companies for an acceptable time when service can be interrupted, where necessary, to make connections for temporary services.
- B. Water Service
1. General: Install water services and distribution piping including but not limited to the following uses:
 - a. Construction processes.
 - b. Drinking water.
 - c. Sanitary facilities.
 - d. Cleaning.
 - e. County and contractor field offices.
 2. Pay water service use charges.

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- C. Temporary Electric Power Service
 - 1. Engage the local utility company to install temporary service to the project.
 - 2. Contractor shall request, pay necessary fees, provide necessary information and or design, and obtain all the necessary permits to install and energize the temporary service.

- D. Temporary Telephones
 - 1. Arrange for the local telephone company to install temporary service to the project field offices.
 - 2. The County's field trailer shall be provided with two (2) telephone lines and two (2) phones.

- E. Temporary Sanitary Facilities
 - 1. Install temporary sanitary sewer lines and make connection to the County's field office.
 - 2. Provide and maintain adequate portable, enclosed unisex toilets for the use of employees and inspection personnel involved with the project. Toilets shall be handicapped accessible. Adequate toilet supplies shall be maintained.

TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. General: Provide a reasonably neat and uniform appearance in temporary construction and support facilities.
 - 1. Maintain field offices, storage, fabrication areas, temporary sanitary facilities, waste collection and disposal systems, and project identification and temporary signs until near completion. Immediately prior to completion remove these facilities other than those to remain and become the property of the County, as directed.

- B. County Field Offices
 - 1. Provide, install and maintain for the duration of the construction project a new or like new 12'0" x 40'0" mobile field office on the site as further detailed in this section.
 - 2. Field office shall be weatherproof and secure and shall be provided with adequate lighting, heat, ducted air conditioning and toilet facilities. Two private offices, toilet room, and center meeting area.
 - 3. Provide the following furnishings:
 - a. 1 FAX machine (plain paper)
 - b. Hot and cold water dispenser and paper cup dispenser
 - c. Dead bolt door locks with steel bolt shield
 - d. Handicapped accessible ramp
 - e. Window - exterior security screens & interior blinds

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- f. Plan table
 - g. Telephone answering machine
 - h. Table for Fax machine
 - i. 36" x 48" white dry marker board
- C. Contractor's Field Offices
- 1. Provide and maintain for the duration of the construction project suitable field offices for the contractor's needs, including sized and furnished to provide project weekly meetings.
- D. Janitorial Services
- 1. Provide janitorial services for all temporary offices, first aid stations, toilets, and similar areas.
- E. Dewatering Facilities and Drains
- 1. Dispose of rainwater in a lawful manner which will not result in flooding the project or adjoining property, nor endanger either permanent work or temporary facilities.
- F. Project Sign
- 1. Provide one painted sign of 8-foot x 6-foot x 3/4 inch thick Marine, exterior A-C grade plywood on 4" x 4" posts as follows:
 - a. Background: Two colors in high-gloss enamel.
 - b. Graphics: Professional quality hand painted or silk screened.
 - 2. Sign design style of lettering and colors shall be as approved by the County and shall include, but not be limited to, the following information:
 - a. Project name.
 - b. Owner's name, including Board of Supervisors.
 - c. Proposer's name.
 - d. Architect's and Engineer's names
 - e. Contractor's name & address.
- G. Collection and Disposal of Wastes
- 1. Establish a system for collection and disposal of waste materials from construction areas and elsewhere on the site. Enforce requirements strictly. Do not hold collected materials at the site longer than 7 days during normal weather or 3 days when the daily temperature is expected to rise above 80 degrees. Handle waste materials that are hazardous, dangerous, or unsanitary separately from other inert waste by containerizing appropriately. Dispose of waste material in a lawful manner; using only approved Haul Routes.

PROTECTION FACILITIES INSTALLATION

- A. Barricades, Warning Signs and Lights

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1. Comply with recognized standards and code requirements for the erection of substantial, structurally adequate barricades where needed to prevent accidents and losses. Paint with appropriate colors, warning sign to inform personnel at the site and the public, of the hazard being protected against. Provide lighting where appropriate and needed, including flashing red lights where appropriate.

OPERATION AND REMOVAL

- A. Removal: Remove each temporary service and facility promptly when the need for it or a substantial portion of it has ended, or not later than completion.
 1. Materials and facilities that constitute temporary services and facilities except as noted above, are and remain the property of the Contractor. The County reserves the right to take possession of the project identification signs.

SITE SECURITY

- A. Provide protection for materials, tools and equipment being employed on the Project. The County shall not be held to have incurred any liability for loss of, and damage to, materials, tools and equipment of the Contractor, or of those employed by him, by contract or otherwise.
- B. The Contractor shall employ such security services as he may deem necessary to properly protect and safeguard the work. The County shall not in any way be liable or responsible for the damage or loss to the work due to trespass or theft.
- C. The County reserves the right to require that the Contractor provide site security at levels and certain means

PROTECTION

- A. Continuously maintain protection as necessary as a whole and in part, and adjacent property and improvements from accidents, injuries or damage.
- B. Protect the work:
 1. With lights, guard rails, temporary covers, and barricades.
 2. Enclose excavations with barricades.
 3. Brace and secure all parts of the work against storm and accident.
- C. Provide and maintain all protective measures required to adequately protect the public from hazards resulting from the work and to exclude unauthorized persons from the work. When regulated by the County, the State of California Code of Regulations, Building and Safety Regulations, OSHA or other authority, such legal requirements for protection shall be considered as minimum requirements and be responsible for the protection in excess of such minimum requirements as required or directed by the County.

CONTROL OF SITE

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- A. Ensure that no alcohol, firearm, weapon or controlled substance enters or is used at the Project site. The Contractor shall immediately remove from the site and terminate the employment on this project of any employee found in violation of this provision.

SAFETY PROGRAM

- A. Prepare a Safety Program which includes all applicable Federal, State, and local regulation codes, rules, laws and ordinances.
- B. Indemnify and hold the County harmless for, of and from any loss including but not limited to fines, legal fees, penalties and corrective measures. The County may sustain by reason of the Contractor's failure to comply with said laws, rules and regulations in connection with the performance of this Contract.
- C. Implement an effective and vigorous Safety and Health Program to cover the work. It shall be understood that the full responsibility for providing a safe place to work with respect to his portion of the work areas rests with the contractor.
- D. The wearing of hard hats will be mandatory at all times for personnel on this site. Supply sufficient hard hats to properly equip all employees and visitors.

SAFETY REQUIREMENTS

- A. Standards: Maintain the Project in accordance with State, County and local safety and insurance standards.
- B. Hazardous Control:
 - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
 - 2. Prevent accumulation of wastes which create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on Project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of waste into streams or waterways.
- D. Provide accident information to the County. This information will be provided on the same day as the occurrence of said incident.

PROJECT CLOSEOUT

- A. When the work is complete, submit the following to the County:
 - 1. A written notice that the work is complete.
 - 2. A detailed, complete, and comprehensive list of items to be completed or corrected.
 - 3. Provide certification that all mechanical, electrical, plumbing, communications, and hardware equipment has been tested and is operational. Provide copies of all

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test results and reports including binders by division, fully indexed, and outlining all equipment and performance tests.

- B. After receipt of the above items, the County shall set up an inspection to determine whether or not the Project, or portion of the Project, is ready for Punch List Inspection.
- C. Should the County determine that the work is so incomplete it does not warrant a punch list inspection, the County will:
 - 1. Within a reasonable amount of time, notify the Contractor in writing that the work is incomplete. Monetary charges may be assessed for re-inspection.
 - 2. Instruct the Contractor to promptly remedy the deficiencies in the work.

ACHIEVING COMPLETION

- A. When it is determined that the work is ready for the Punch List Inspection, arrangements will be made for the inspection by the County as necessary.
- B. The County's Inspector shall prepare a coordinated Punch List and will determine which items shall be completed by the Contractor to achieve Completion.
- C. The County will transmit the Punch List to the Contractor and will advise the Contractor as to the items that he must complete to achieve Completion.

COMPLETION

- A. When the specific Punch List items have been completed, the County will prepare a letter acknowledging Completion and will attach a list of the balance of the punch list items to be completed for final completion. Other items which do not conform to the Documents may be added to the list at any time.
- B. At completion, the County has the right to take occupancy and to move in furnishings and equipment. Any delay associated with this process is part of the base Contract and will not be considered as an extra cost under the Contract.

FINAL COMPLETION

- A. When the Contractor considers the work to be complete for final inspection, he shall submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been inspected for compliance with the Contract Documents.
 - 3. Work has been completed in accordance with the Contract Documents.
 - 4. Work is completed and ready for final inspection.
 - 5. Submit certified copy of final Punch List of itemized work to be completed or otherwise resolved for acceptance, endorsed and dated.
- B. After receipt of the above, the County will set up an inspection to determine whether or not the Project is ready for final inspection. The review shall consist of verifying that the remaining Punch List items from the Completion inspection have been completed.

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- C. Should the County find the work to be incomplete, the County shall advise the Contractor in writing that the work is not acceptable. The Contractor may be assessed for additional inspection costs.
- D. The contractor shall send another Certificate when the work is complete.
- E. After the County has completed the final inspection and when the County finds that the work is complete, the County shall determine the date of beneficial occupancy and shall notify the Contractor. The Contractor shall proceed to prepare for final closeout/acceptance and shall make final closeout submittals.

CLOSEOUT/ACCEPTANCE

- A. Prior to acceptance by the County, the Contractor shall:
 - 1. Submit a statement showing accounting of changes to the contract Sum.
 - 2. Submit warranties, maintenance agreements, final certifications, and similar documents required.
 - 3. Advise the County of pending insurance change-over requirements.
 - 4. Obtain and submit releases enabling the County's full and unrestricted use of the work and access to services and utilities, operating certificates, and similar releases. Provide all releases of liens from subcontractors and suppliers.
 - 5. Submit final record documents, maintenance manuals, damage or settlement surveys, property surveys, and similar final record information as required by Documents.
 - 6. Remove temporary facilities and services, along with construction tools and equipment, mock-ups, and similar elements.
 - 7. Prepare final Application for Payment in accordance with the General Conditions.
 - 8. Provide unconditional lien releases for all payments to date.
 - 9. Provide conditional lien release for final retention billing.
- B. Provide Owner "Team" training on the operation and maintenance of all installed systems.
- C. After acceptance of the work by the County and Notice of Completion has been filed by the County, and the proper time has elapsed, the final payment will be made.

GUARANTEES/WARRANTIES AND BONDS

- A. Requirements Included:
 - 1. Compile guarantees, warranties, and bonds.
 - 2. Compile specified service and maintenance contracts.
 - 3. Review submittals to verify compliance with Documents.
 - 4. Submit to County for review.
- B. Provide list and assemble all guarantees/warranties, bonds and service and maintenance contracts, executed by the Contractor and each of the respective manufacturers, suppliers, and subcontractors. Submit within 10-days after Final Acceptance.
- C. Number of original signed copies required: Three each.

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- D. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
1. Product or work item.
 2. Firm, with name of principal, address and telephone number.
 3. Type and duration of guarantee or warranty.

FORM

- A. In addition to other requirements of the Documents regarding the general one-year warranty, as a condition preceding certifying final payment, the Proposer shall provide extended guarantees/warranties for certain work, as specified in the Documents, in the following form written on the Contractors letterhead. The guarantees/warranties shall commence on the Date of the filing of the Notice of Completion.

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"Guaranty/Warranty (for portion of work under warranty identified by Specification Section)

Project: _____

Address: _____

Date: _____

We hereby warrant and the Contractor guarantees that the _____ which we have installed in the _____ has been performed in accordance with the Drawings and Specifications and that the work as installed will fulfill the requirements of the guarantee/warranty included in the Specifications.

We agree to repair or replace any or all of our work, together with any or all other work which may be damaged or displace by so doing, that may prove to be defective in its workmanship, materials, or failure to conform to Contract provisions and requirements within a period of _____ years from the Date of Substantial Completion of the above named structure by the Owner without expenses whatever to the said Owner, ordinary wear and tear and unusual abuse or neglect excepted.

Signed: _____ Date: _____
(Contractor)

or

Signed: _____ Date: _____
(Subcontractor)

Countersigned: _____ Date: _____
(Contractor)

Include the following if Specified:

Countersigned: _____ Date: _____
(Manufacturer)

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CORRECTION OF GUARANTEED/WARRANTED WORK

- A. Unless repair is agreed to by County, correct failed work by removal and replacement of the failed portions with new materials.
- B. In connection with Contractor's correction of warranted work which has failed, remove and replace other work of Project which has been damaged as a result of such failure, or which must be removed and replaced to provide access for correction of warranted work.
- C. Except as otherwise indicated or required by governing regulation, special Project warranties and product warranties are not extended to cover damage to building contents (other than work of Contract) which occurs as a result of failure of warranted work.
- D. Except as otherwise indicated, when covered by a special Project warranty or product warranty, when a portion of the Work has failed and has been corrected by replacement or restoration, the warranty shall be reinstated by written endorsement for the specified time period, starting on date of acceptance of replaced or restored work.
- E. Except as otherwise indicated, costs of replacing or restoring failing warranted units or products is Proposer's obligation, without regard for whether County has already benefited from use through a portion of anticipated useful service lives.
- F. Do not purchase, subcontract for, or allow others to purchase or sub-subcontract for materials or units of work for Project where a special Project warranty, specified product warranty, certification or similar commitment is required, until it has been determined by the Proposer that entities required to countersign such commitments are willing to do so.

PROJECT RECORD DOCUMENTS

- A. This describes the requirements for maintaining records of actual conditions in the field and for changes in the work.
- B. The purpose of final Project Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modifications of the work to proceed without lengthy and expensive site measurement, investigation, and examination.

DOCUMENTS REQUIRED

- A. Maintain at the site the following record documents:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Change Orders and other modifications to the contract.
 - 4. Field Instructions and other written instructions from the County.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Test Reports.
 - 7. Requests for Information.

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MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store record documents and samples in Contractor's field offices apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinets or secure storage space for storage of samples.
- B. File documents and samples in a manner acceptable to the County.
- C. Make documents and samples available at all times for inspection by the County.
- D. Update the documents within 24-hours after receiving information that a change has occurred or clarification has been issued.

RECORDING

- A. Label each document "PROJECT RECORD" in neat, large, printed letters.
- B. Record information concurrently with the construction process.
 - 1. Do not conceal any work until required information is recorded.
 - 2. Completely, accurately, and legibly record, to the satisfaction of the County, all deviations in construction, especially pipe and conduit locations, and any deviations caused by approved changes and/or clarifications to the work.
 - 3. Use additional copies of prints, if necessary, to insure legible recording of data.
 - 4. Date all entries.
 - 5. Call attention to the entry by drawing a "cloud" around the area affected.
 - 6. In the event of overlapping changes, use different colors for each change.
- C. Legibly mark drawings to record actual construction:
 - 1. Depths of various elements of foundation in relation to finish first floor datum.
 - 2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to visible and accessible features of the structure.
 - 3. Locations of internal utilities and appurtenances concealed in the construction, reference to visible and accessible features of the structure.
 - 4. Field changes of dimension and detail.
 - 5. Changes made reflecting approved changes to the work.
 - 6. Details not on original contract drawings.
- D. Legibly mark each Section of the Specifications to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment installed.
 - 2. Changes made reflecting approved changes to the work.
- E. Maintain shop drawings as record drawings. Legibly annotate shop drawings to record changes made after approval.

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- F. Prior to submitting each request for payment, secure approval from the County of the current status of record documents.
- G. Periodic payments or portions thereof may be withheld until the County verifies that all as-built information to date has been properly recorded on project record documents.

FINAL PROJECT RECORD DOCUMENTS

- A. At a time nearing Completion of the work, prepare one complete set of mylar transparencies of all drawings in the Contract for use in preparing Project Record Documents.
- B. Obtain approval from the County of all items recorded on the record set of prints.
- C. After Completion, carefully transfer all data shown on the job set of Record Drawings to the corresponding transparencies, coordinating the information as required. Drafting quality, at a minimum shall be equal to original Contract Documents.
- D. Clearly indicate at each affected detail and other drawings a full description of changes made during construction, and the actual location of items as previously specified.
- E. "Cloud" all affected areas.
- F. Stamp each record drawing with the following information:
 - 1. Project Record Document.
 - 2. Prepared by: Contractor's name, permanent address.
 - 3. Date prepared:
 - 4. Contractor's signature.

SUBMITTALS

- A. Submit the complete mylar reproducible set and two blueprint copies of Project Record Documents to the County 10-days after final inspection.
- B. Participate in review meetings with the County as required.
- C. Make the required changes and promptly deliver the final Project Record Documents to the County.
- D. Include a signed certification that each document, as submitted, is complete and accurate.

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GENERAL CONDITIONS OF THE CONTRACT

ARTICLE 1 GENERAL PROVISIONS

1.1 **DEFINITIONS**

THE CONTRACT DOCUMENTS - The Contract Documents consist of the Contract, the Performance Bond and Payment Bond and any other bond required by the Contract, the drawings, the specifications, addenda issued prior to execution of the Contract, and all modifications thereto.

THE CONTRACT - The Contract Documents form the Contract. The Contract represents the entire and integrated agreement between the parties hereto, and supersedes all prior negotiation, representations, or agreements, either written or oral, including the bidding documents.

ACT OF GOD - An Act of God is an earthquake of magnitude 4.5 or greater on the Richter scale, flood, tornado, or other cataclysmic phenomenon of nature, or rain, snowstorm, windstorm, high water, or other natural phenomenon in excess of the normal as established by National Oceanic and Atmospheric Administration weather data.

ACCEPTANCE - Acceptance is when the County determines all of the Contract requirements have been completed. Execution of the Notice of Completion will signify acceptance. A copy of the Notice of Completion will be sent to the Contractor after execution by the County. Upon receipt of the Notice of Completion, the Contractor will be relieved of the duty of protecting the work, and the County will initiate final settlement and payment.

ARCHITECT - The use of the term Architect shall mean the individual, partnership, corporation, association or joint venture contracted by the County for the design of this Work, as designated on the title sheet of these specifications and Contract Documents.

BENEFICIAL OCCUPANCY - The right of the County to occupy all or any portion of the project prior to final Acceptance of the Work. Such occupancy does not constitute acceptance or completion by the Contractor of the Work or any portion thereof, nor will it relieve the Contractor of the responsibility for correcting defective work or materials found at any time before Acceptance of the Work.

COUNTY - The term County when used herein shall mean the Board of Supervisors of the County of Riverside, a political subdivision of the State of California.

CHANGE ORDER - A Change Order is the document issued by the County authorizing any change or adjustment to the Contract Documents in accordance with Article 19 of this Contract.

CONTRACT DRAWINGS - "Contract drawings" or "drawings" means and includes (a) all drawings which have been prepared on behalf of the County and are included in the Contract Documents and all clarification drawings issued by notice to the bidders thereto; (b) all drawings submitted pursuant to the terms of the Contract by the Contractor to the County during the progress of the Work, which are accepted by the County.

CONTRACTOR'S AGENT - The representative of the Contractor, approved by the County, who shall be present at the Work and be authorized to receive and act upon instructions from the County and to execute and direct the Work on behalf of the Contractor.

CONTRACTOR - When used herein, Contractor means the prime or principal Contractor licensed to perform work in the State of California, including all joint ventures. References to subcontractor or others are only for convenience and all such references shall be considered to refer to the Contractor. The prime or principal Contractor shall be responsible for all subcontractors, and all subcontractors shall require their subcontractors to comply with the relevant provisions of the prime or principal contract.

CRITICAL PATH METHOD (CPM) - "Critical Path Method" is a schedule technique.

DAY - The use of "day" herein means calendar day and shall include every day including Saturdays, Sundays, and legal holidays.

DIRECTOR - The use of "Director" shall mean the Director of Department of Facilities Management of the County or his designated representative.

INSTALL - When used herein, "install" shall mean the complete installation, in place, of any item, equipment or material.

MATERIAL - Material shall be construed to include machinery, equipment, manufactured articles, or construction such as form work, fasteners, etc., and any other classes of material to be furnished in connection with the Contract. All materials shall be new.

NOTICE OF COMPLETION - The Notice of Completion ("NOC") shall be issued at that point in the Contract when the Contractor has completed all Work required in the Contract Documents. The time for issuance shall be determined by the County through a final inspection. The NOC shall be issued by the Board of Supervisors.

NOTICE TO PROCEED - The Notice to Proceed is the written notification from the County giving the Contractor notice to commence with the Work. The Notice to Proceed will specify the start date for the Work and the completion date.

REQUEST FOR INFORMATION - (RFI) The form and procedure established for communication between the Contractor and the County to clarify or interpret the Contract Documents.

REQUEST FOR QUOTATION - (RFQ) a document consisting of supplemental details, instruction, or information issued by the Architect, through the County, for the purpose of obtaining price quotations for possible changes in the Work.

SHALL - When used herein, "shall" means anything, which is mandatory to be performed by the Contractor.

SPECIFICATIONS - The term "Specifications" means that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the Work.

SUBCONTRACTOR - The term "Subcontractor" means a person or firm that has a contract with Contractor or with another subcontractor to perform a portion of the Work. Unless otherwise specifically provided, the term Subcontractor includes Subcontractors of any tier, suppliers, manufacturers, and distributors. The term Subcontractor is referred to throughout the Contract Documents as if singular in number.

WORK - The term "Work" comprises the services and materials required by the Contract Documents, as may be amended, and includes all labor necessary to produce the construction required by the Contract Documents, and all materials and equipment incorporated or to be incorporated in such construction.

1.2 AUTHORITIES AND LIMITATIONS

1.2.1 The Board of Supervisors alone has the power to bind the County and to exercise the rights, responsibilities, authorities, and functions vested therein by the Contract Documents, except that they shall have the right to designate authorized representatives to act for them.

1.2.2 Neither the Contract, nor any part thereof, nor moneys due or to become due there under may be assigned by the Contractor without the prior written approval of the County; with the exception of the assignments to County which may be required under the terms of this Contract.

1.3 LEGAL REQUIREMENTS

1.3.1 Contractor shall keep informed of, and comply with, all federal, state and county laws, ordinances, rules, and regulations applicable to the Work or to those engaged or employed in the Work of this Contract, especially (but not limited to) those laws relating to hours of employment, prevailing wages, payment of wages, sanitary and safety conditions for workers, workers' compensation insurance, type and kind of materials that can be used, non-discrimination in employment and affirmative action programs. Failure to identify a specific provision in these Contract Documents shall not excuse the Contractor from complying with such applicable statutory requirements.

1.3.2 If conflict arises between provisions of the Contract Documents and any such laws, rules, or regulations, the Contractor shall notify the County at once in writing. If, before receiving clarification, Contractor performs any portion of the Work affected by such apparent conflict, such performance shall be at Contractor's own risk. Contractor shall not be entitled to any additional compensation or time by reason of the conflict or its later correction.

1.3.3 All work and materials shall be in full accordance with the latest applicable (or otherwise noted) codes, rules, and regulations including, but not limited to, the following:

- .Uniform Building Code
- .Uniform Plumbing Code
- .Uniform Mechanical Code
- .Uniform Fire Code
- .State Fire Marshal
- .State Industrial Accident Commission's Safety Orders
- .Rules of Local Utilities

1.3.4 Nothing in the specifications is to be construed to permit work not conforming to the above, and expense incurred complying with the above shall be borne by the Contractor. Whenever the specifications and working details require higher standards than those required by the ordinances, codes and statutes, the specifications and working details shall take priority over the ordinances, codes and statutes.

1.3.5 In submitting a bid on this public works projects, or any subcontractor agreeing to supply goods, services, or materials, and entering a contract pursuant thereto, the contractor and/or subcontractor do offer and agree to assign the County all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final acknowledgement by the parties.

1.4 STANDARD REFERENCES

1.4.1 All documents and publications (such as, but not limited to, manuals, handbooks, codes, standards, and specifications) which are cited in this Contract for the purpose of establishing technical (non-administrative) requirements applicable to equipment, materials, or workmanship under this Contract, shall be deemed to be incorporated herein as though fully set forth.

1.4.2 Whenever reference is made to any particular document or publication, the Contractor shall comply with the requirements set out in the edition specified in this Contract, or if not specified, the latest edition or revision thereof, in effect on the date of the solicitation of bid on this project, except as modified by, as otherwise provided in, or as limited to type, class, or grade, in the specifications of this Contract.

1.5 PERMITS, LICENSES, FEES & TAXES

1.5.1 COUNTYS RESPONSIBILITIES

a. The County will apply for all plan checks and will apply for and obtain the Building Permit(s), the Grading Permit and Construction Permits required by the County of Riverside, paying all fees in connection therewith.

b. The County will furnish, at no expense to the Contractor, all on-site inspection of the Work and will arrange and pay for off-site inspection only as noted in the Contract Documents.

1.5.2 CONTRACTOR'S RESPONSIBILITIES

a. The Contractor shall obtain and pay for all other permits and licenses required for the Work, including excavation permit and for plumbing, mechanical and electrical work and for operations in or over public streets or right of way under jurisdiction of public agencies other than the County.

b. Exclusive of off-site inspection specified herein to be the County's responsibility, the Contractor shall arrange and pay for all off-site inspection of the Work, including certification, required by the specifications, drawings, or by governing authorities.

c. Before Acceptance of the project by the County, the Contractor shall submit all licenses, permits, and certificates of inspection to the County.

1.6 SEPARATE CONTRACTS

1.6.1 The County reserves the right to perform work related to this project with its own forces, and to award separate contracts in connection with other portions of the project or other work on the site. The Contractor shall cooperate with others in the prosecution of all work and shall not interfere with material, appliances or workmen of the County or any other contractor engaged by the County at the site of the Work. In case of disagreement regarding such use, the matter shall be referred to the County whose decision relative to said use shall govern.

1.6.2 The Contractor shall afford the County and separate contractor's reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall properly connect and coordinate Contractor's Work with theirs.

1.6.3 If any part of the Contractor's Work depends for proper execution or results upon the work of the County or any separate contractor, the Contractor shall inspect and promptly report to the County any discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor to so inspect and report shall constitute an acceptance of the County's or the separate contractor's work as fit and proper to receive the Work, except as to defects which may develop in the other separate contractor's work after the execution of the Contractor's Work.

1.6.4 Should the Contractor cause damage to the work or property of any separate contractor on the Project, the Contractor shall, upon due notice, settle with such other contractor by agreement, if both will so settle. If such separate contractor sues the County because of any damage alleged to have been so sustained, the Contractor agrees to indemnify and defend the County in such proceedings with the County retaining the right to select and hire independent counsel for the County paid by the Contractor.

1.6.5 Any cost caused by defective or ill-timed work shall be borne by the party responsible therefore.

1.7 COUNTY'S AUTHORIZED REPRESENTATIVE, INSPECTOR(S), & ARCHITECT

1.7.1 AUTHORIZED REPRESENTATIVE

The County shall designate a representative during the Work, who shall have the right to be present at the job site during construction and shall supervise any additional representatives appointed by the County.

1.7.2 INSPECTOR(S)

The Inspector(s) shall have the right to observe the installation of all materials and equipment to be incorporated into the Work and the placing of such material and equipment to determine in general if the Work is proceeding in accordance with the Contract Documents. The Inspector(s) is not authorized to make changes in the Contract Documents. On the basis of his observations, he shall keep the County informed as to the progress of the Work. The Inspector shall not be responsible for means, methods, techniques, sequences, or procedures of construction nor for safety precautions and programs in connection with the Work. Nor will the inspector be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents.

1.7.3 ARCHITECT

a. The County has retained an Architect for this project. The Architect will advise and consult with the County, and the County will issue instructions to the Contractor. The Architect will be requested to interpret the requirements of the Contract. When requested by the County, the Architect will, within a reasonable time, render such interpretations as he may deem necessary for the proper execution of the Work.

b. The Architect will make periodic visits to the job site to familiarize himself generally with the progress and quality of the Work and to determine in general whether the work is proceeding in accordance with the Contract Documents. Based on such observations he will recommend approval of applications for progress payments made by Contractor. The Architect shall not be responsible for means, methods, techniques, sequences, or procedures of construction nor for safety precautions and programs in connection with the Work. Nor will the Architect be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents.

ARTICLE 2 BONDS AND INSURANCE

2.1 BIDS OF \$25,000 OR LESS

2.1.1 If the total amount bid on the Work is \$25,000 or less, the payment bond and performance bond are not required, provided that one payment of all compensation shall be made following Acceptance of all work.

2.2 BONDS

2.2.1 GENERAL REQUIREMENTS

a. Before commencing any Work under this Contract, the Contractor shall file four of each bond with the County. These bonds shall be in the amounts and for the purposes specified below. They shall be surety bonds issued by:

- (1) Either a California Admitted Surety OR a current Treasury Listed Surety (Federal Register).

And

- (2) Either a current A.M. Best A VIII rated Surety OR an admitted surety insurer which complies with the provisions of the Code of Civil Procedure, § 995.660.

b. Should any surety or sureties upon said bonds or any of them become insufficient, Contractor shall renew said bond or bonds with good and sufficient sureties within ten (10) calendar days after receiving notice from the County that the surety or sureties are insufficient. Cost of bonds shall be included in the bid price.

2.2.2 PERFORMANCE BOND

The successful bidder shall deliver to the County an executed Performance Bond on the attached form in an amount equal to 100% of the accepted bid as security for the faithful performance of the Contract.

2.2.3 PAYMENT BOND

The successful bidder shall deliver to the County an executed Payment Bond on the attached form in an amount equal to 100% of the accepted bid as security for the payment of all persons performing labor and furnishing materials in connection with the Work.

2.3 INSURANCE

2.3.1 GENERAL REQUIREMENTS

Before commencing this Work under the Contract, and without limiting or diminishing CONTRACTOR'S obligation to indemnify and hold the COUNTY harmless, the Contractor shall procure and maintain, or cause to be maintained at its sole cost and expense, the following insurance coverages during the term of this Contract.

2.3.2 WORKERS' COMPENSATION INSURANCE

Contractor shall secure Workers' Compensation Insurance (Coverage A) as prescribed by the laws of the State of California. Policy shall include Employers' Liability (Coverage B) including Occupational Disease with limits not less than \$1,000,000 per person per accident. Policy shall be endorsed, if applicable, to provide a Borrowed Servant/Alternate Employer Endorsement, and contain a Waiver of Subrogation in favor of the County of *Riverside* Pursuant to Section 3700 of the Labor Code of the State of California, Contractor shall file with the County before commencing the Work the following signed certification:

"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 shall comply with such provisions before commencing the performance of the Work of this Contract."

2.3.3 COMMERCIAL GENERAL LIABILITY:

Commercial General Liability insurance coverage, including but not limited to, premises liability, contractual liability, products/completed operations if applicable, personal and advertising injury – which may arise from or out of CONTRACTOR'S operations, use, and management of the premises, or the performance of its obligations hereunder. Policy shall name the County of Riverside—its Director's, Officers, special Districts, Board of Supervisors, employees, agents or representatives as Additional Insured, and contain a Waiver of Subrogation in favor of the County of Riverside. Policy limits shall not be less than \$1,000,000 per occurrence combined single limits. If such insurance contains a general aggregate limit, it shall apply separately to this agreement or be no less than two (2) times the occurrence limit. Policy shall also contain coverage for \$5,000 Medical Payments coverage per accident, per person, and Fire Legal Liability in an amount not less than \$50,000.

2.3.4 VEHICLE LIABILITY:

If CONTRACTOR'S vehicles or licensed mobile equipment are used on County property, or used in any manner on behalf of the County, CONTRACTOR shall maintain auto liability insurance for all owned, non-owned and hired automobiles in an amount not less than \$1,000,000 per occurrence combined single limit, \$2,000,000 in the aggregate. Policy shall name the County of Riverside, its Director's Officers, Special Districts, Board of Supervisors, employees, agents, or representatives as Additional Insured, and provide a Waiver of Subrogation in favor of the County of Riverside.

2.3.5 PROPERTY (PHYSICAL DAMAGE):

All-Risk property insurance coverage for the full replacement value of all CONTRACTOR'S equipment, improvements/alterations, temporary structures, and systems (Care, Custody, and Control of CONTRACTOR) used on COUNTY property, or used in any way connected with the accomplishment of the Work performed in this contract.

2.3.6 COURSE OF CONSTRUCTION INSURANCE

CONTRACTOR shall provide All Risk Builder's Risk (Course of Construction) insurance, including earthquake and flood if in an earthquake or flood zone (required on financed or bond financing arrangements), covering the COUNTY, the CONTRACTOR and every subcontractor of every tier for the entire project including property to be used in the construction of the project while such property is at off site storage locations or while in transit. Policy shall include coverage for collapse, faulty workmanship, debris removal, expediting expense, Fire Department Service charges, valuable papers and records, trees, grass, shrubbery and plants. If scaffolding, false work and temporary buildings are insured separately by the CONTRACTOR or others, evidence of such separate coverage shall be provided to COUNTY prior to the start of the work. Policy shall be written on a completed value form. Policy shall also provide coverage for temporary structures (onsite offices, etc.), fixtures, machinery and equipment being installed as part of the construction project. (The Base Bid including course of construction insurance shall be used for determination of lowest bid, unless otherwise stated in the bid form.)

CONTRACTOR shall provide a bid price with Course of Construction insurance as outlined herein, and shall also separately provide the cost of the Course of Construction insurance and deductible; and shall declare all terms, conditions, coverage and limits upon request of COUNTY. COUNTY RETAINS THE RIGHT TO CHOOSE TO USE ITS OWN COURSE OF CONSTRUCTION PROGRAM. If the COUNTY program is chosen, CONTRACTOR shall

assume the cost of any and all applicable policy deductibles (currently \$50,000 per occurrence), and shall insure its own machinery, equipment, tools, etc., from any loss of any nature whatever. If COUNTY elects the CONTRACTOR's All Risk Builder's Risk Program, CONTRACTOR shall be responsible for any and all policy deductibles.

2.3.7 GENERAL INSURANCE PROVISION – ALL LINES:

a. Any insurance carrier providing insurance coverage hereunder shall be admitted to the State of California unless waived, in writing, by the County Risk Manager. Carrier(s) shall have an A.M. BEST rating of not less than an A: VIII. Insurance deductibles or self-insured retentions must be declared by the carrier(s), and such deductibles and retentions shall have the prior written consent from the County Risk Manager. At the election of the Risk Manager, carriers shall provide written notification, and shall either 1) reduce or eliminate such deductibles or self-insured retentions, or 2) procure a bond which guarantees payment of losses and related investigations, claims administration, and defense costs and expenses. If no written notice is received from the County Risk Manager within ten (10) days of the acceptance of agreement, then such deductibles or self-insured retentions shall be deemed acceptable.

b. Cause its insurance carrier(s) to furnish the County of Riverside with either 1) a properly executed original Certificate(s) of Insurance and certified original copies of Endorsements effecting coverage as required herein, or 2) if requested to do so in writing by the County Risk Manager, provide original Certified copies of policies including all Endorsements and all attachments thereto, showing such insurance is in full force and effect. The County of Riverside, its Director's and Officers, Special Districts, Board of Supervisors, elected officials, employees, agents or representatives are named as Additional Insureds. Further, said Certificate(s) and policies of insurance shall contain the covenant of the insurance carrier(s) that shall provide no less than thirty (30) days written notice be given to the County of Riverside prior to any material modification or cancellation of such insurance. In the event of a material modification or cancellation of coverage, this Agreement shall terminate forthwith, unless the County of Riverside receives, prior to such effective date, another properly executed original Certificate of Insurance and original copies of endorsements or certified original policies, including all endorsements and attachments thereto evidencing coverages set forth herein and the insurance required herein is in full force and effect. **CONTRACTOR shall not take possession, or use the Premises, or commence operations under this Agreement until the County of Riverside has been furnished original Certificate(s) of Insurance and certified original copies of Endorsements or policies of insurance including all Endorsements and any and all other attachments as required in this Section. The original Endorsements for each policy and the Certificate of Insurance shall be signed by an individual authorized by the insurance carrier to do so on its behalf.**

c. It is understood and agreed to by the parties hereto and the insurance company(s), that the Certificate(s) of Insurance and policies shall so covenant and shall be construed as primary, and the COUNTY'S insurance and/or deductibles and/or self-insured retentions or self-insured programs shall not be construed as contributory.

The County of Riverside's Reserved Rights-Insurance. The County of Riverside reserves the right to adjust the monetary limits of insurance coverage's during the term of this agreement or any extension thereof-if in the County Risk Manager's reasonable judgment, the amount or type of insurance carried by the CONTRACTOR becomes inadequate.

d. CONTRACTOR shall pass down the insurance obligations contained herein to all tiers of sub-consultants working under this Agreement.

2.4 INDEMNITY AND HOLD HARMLESS

2.4.1 CONTRACTOR agrees to and shall indemnify and hold the COUNTY-its officers, employees and agents free and harmless from any and all claims, actions, damages and liabilities of whatsoever kind and nature arising from death, personal injury, property damage or other cause asserted or, based upon any negligent act or omission of CONTRACTOR, its employees, agents, invitees, or any subcontractor of CONTRACTOR relating to or in any way

connected with the accomplishment of the work or performance of services under this Agreement, regardless of the existence or degree of fault or negligence on the part of the COUNTY or any officer or employee of said COUNTY, other than the sole active negligence or willful misconduct of COUNTY-its Directors and Officers, Special Districts, Board of Supervisors, elected officials, employees, agents or representatives. As part hereto of the foregoing indemnity CONTRACTOR agrees to protect and defend at its own expense, including attorneys' fees the COUNTY-its Directors and Officers, Special Districts, Board of Supervisors, elected officials, employees, agents or representatives from any and all legal action based upon any acts or omissions, as stated hereinabove, by any person or persons.

2.4.2 If any such claim, action, or proceeding is brought against County or County's officers, agents, employees, or independent contractors, Contractor, upon notice from County, shall defend the same at Contractor's expense by counsel satisfactory to County.

2.4.3 County shall promptly notify Contractor of any claim, action, or proceeding against County or County's officers, agents, employees, independent contractors, and consultants relating to the performance, or omission to perform, any term or condition of this Contract. County shall cooperate fully in the defense of such claim, action, or proceeding.

2.4.4 County shall not be liable or responsible for any accident, loss or damage occurring to the Work prior to the completion and Acceptance of same, unless otherwise specifically agreed to at the time of occupancy by the County.

ARTICLE 3 SITE CONDITIONS

3.1 DIFFERING SITE CONDITIONS

3.1.1 The Contractor shall have reviewed and ascertained pertinent local conditions such as location, accessibility, and general character of the site and satisfy himself as to the conditions under which the Work is to be performed. No claim for allowances shall be made because of Contractor's error or negligence in acquainting himself with the conditions at the site.

3.1.2 The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by County. The Contractor shall promptly report in writing to County any errors, inconsistencies, or omissions in the Contract Documents or inconsistencies with applicable code requirements observed by Contractor.

3.1.3 If Contractor performs any construction activity which it knows or should know involves an error, inconsistency, or omission without notifying and obtaining the written consent of County, Contractor shall be responsible for the resultant losses, including, without limitation, the costs of correcting defective work.

3.1.4 The County will furnish surveys necessary to properly locate the property and establish the boundaries thereof with general reference points as well as to enable the Contractor to proceed with the Work.

3.1.5 The Contractor shall provide competent engineering services to lay out the Work and all parts thereof and to establish all grades and elevations in accordance with the Contract requirements. He shall verify the figures shown on the survey and approach drawings before undertaking any construction work and shall be responsible for the accuracy of the finished work.

3.1.6 The Contractor shall protect and preserve established bench marks and monuments and shall make no changes in locations without the written approval of the County. Any bench marks or monuments that are lost or destroyed shall be replaced by the Contractor subsequent to notification and approval from County.

3.2 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK

3.2.1 The Contractor acknowledges by submission of his/her bid that he has satisfied himself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including any exploratory work deemed necessary by the Contractor. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating the difficulty and cost of successfully performing the Work, or for proceeding to successfully perform the Work without additional expense to the County.

3.3 DIMENSIONS AND MEASUREMENTS

3.3.1 All dimensions shown for existing conditions and all dimensions required for work that is to connect with work now in place, shall be verified and calculated by the Contractor by actual measurement of the existing work. Any discrepancies between the Contract Documents and the existing conditions shall be referred to the authorized representative of the County before any work affected thereby has been performed. Failure to notify the County before starting work will be considered acceptance by the Contractor. Where doubts as to dimensions exist, County shall determine the correct dimensions.

ARTICLE 4 SPECIFICATIONS AND DRAWINGS

4.1 GENERAL

4.1.1 SUBDIVISIONS

For convenience, the specifications are arranged into several sections, but such separation shall not be considered as the limits of the work required of any separate trade. The terms and conditions of such limitations are wholly between the Contractor and his subcontractors. Requirements contained in any section are required as if contained in all sections and is the responsibility of the Contractor. The Contractor, prior to awarding subcontracts, will assure the Work required as a whole has been coordinated among the subcontracts.

4.1.2 RECORD DOCUMENTS

a. The Contractor shall keep on the Work site a copy of the awarded construction documents (drawings and specifications) and shall at all times give the County and Architect access thereto.

b. The Contractor will be given one set of drawings and specifications which shall be kept at the site of the Work at all times and updated weekly. Payment may be withheld if drawings are not kept current. Exact locations of all pipes and conduits and all changes in construction and details shall be indicated and dimensions provided upon these drawings, and all changes in materials and equipment installed shall be indicated in these specifications. Upon completion and prior to Acceptance of the Work, a final reproducible (transparencies) set of project record documents and specifications shall be submitted to the County by the Contractor. County will furnish a set of reproducibles.

c. The working details will indicate dimensions, position, and kind of construction, and the specifications, qualities, and methods. Any Work indicated on the working details and not mentioned in the specifications, or vice versa, shall be furnished as though fully set forth in both. Work not particularly detailed, marked, or specified shall be the same as similar work that is detailed, marked, or specified.

d. In case of discrepancy in the documents, the matter shall be promptly submitted to the County, who shall make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The County shall furnish from time to time such detailed information as considered necessary to clarify the Work.

e. Where the word "similar" occurs on the drawings, it shall have a general meaning and not be interpreted as meaning identical, and all details shall be worked out in relation to their location and their connection with other parts of the work.

f. Standard details or specification drawings are applicable when listed, bound with specifications, noted on the drawings or referenced elsewhere in the specifications. Where the notes on the drawings indicate modifications, such modifications shall govern.

g. All drawings, specifications and copies thereof furnished to the Contractor are the property of the County and shall not be used on other work without its consent. Upon completion of this project, all copies of the drawings and specifications shall be returned to the County.

4.2 SUMMARY OF THE ORDER OF THE PROCEDURE

4.2.1 In case of conflicts between the Contract Documents, the order of precedence shall be as follows:

- 1) Modifications or changes last in time are first in precedence.
- 2) Addenda.
- 3) County-Contractor agreement.
- 4) General Conditions except for specific modifications thereto stated in the Supplementary Conditions.
- 5) Supplementary Conditions.
- 6) Division One Specifications.
- 7) Division Two through Sixteen Specifications.
- 8) Drawings - as between figured dimensions given on drawings and the scaled measurements, the figured dimension shall govern; as between large-scale drawings and small-scale drawings, the larger scale shall govern.
- 9) Structural drawings
- 10) Architectural drawings.
- 11) As between detailed drawings and typical details bound within the specifications, the detailed drawings govern.
- 12) In the event provisions of codes, safety orders, contract documents, referenced manufacturer's specifications or industry standards are in conflict, the more restrictive and higher quality shall govern.
- 13) Schedules shown on the drawings take precedence over conflicting information given on other drawings.
- 14) Mechanical drawings.
- 15) Electrical drawings.

4.3 CLARIFICATIONS/REQUEST FOR INFORMATION AND ADDITIONAL INSTRUCTIONS

4.3.1 NOTIFICATION BY CONTRACTOR

a. Should Contractor discover what he perceives to be conflicts, omissions, or errors in the Contract Documents, or have any question concerning interpretation or clarification of the Contract Documents, or if it appears that the work to be done or any matters relative thereto are not sufficiently detailed or explained in the Contract Documents, then, before proceeding with the work affected, Contractor shall notify County's authorized representative in writing, and request interpretation, clarification, or additional detailed information concerning the work. The Contractor shall ask for the clarification (Request for Information) immediately upon discovery but no less than 14 calendar days prior to the start date of the activities related to the clarification, based on the latest updated version of the accepted

Progress Schedule. County, whose decision shall be final and conclusive, shall resolve such questions and issue instructions to Contractor. Should Contractor proceed with work affected before receipt of instructions from County, Contractor shall remove and replace or adjust work which is not in accordance with the instructions from County and shall be responsible for resultant damage, defect or added cost. In event of failure to agree as to scope of Contract requirements, Contractor shall follow the procedure set forth in the DISPUTES article.

b. The Contractor shall not be entitled to any compensation for delays, disruptions, inefficiencies or additional administrative effort caused by the Contractor's untimely review of the Contract Documents for potential conflicts, omissions, discrepancies or ambiguities.

c. County may charge back to the Contractor, time and expense associated with RFI's, as may be reasonably determined by the County to be unnecessary.

4.3.2 ADDITIONAL DETAILED INSTRUCTIONS

a. The County may furnish additional detailed written instructions on any Request for Information to further explain the Work. If in the opinion of Contractor, the additional detailed instructions constitute work in excess of the scope of the Contract, he must submit written notice thereof immediately to the County, but no later than seven (7) calendar days following receipt of such instruction(s), and in any event prior to commencement of work thereon. The Contractor shall not be entitled to additional compensation due to any additional instructions unless the Contractor shall have given the appropriate written notice. County will then consider such notice and, if in its judgment it is justified, the County instructions will be revised or extra work shall be authorized by Change Order. In the event of a dispute hereunder, attention is directed to the DISPUTES article.

ARTICLE 5 SHOP DRAWINGS AND SUBMITTALS

5.1 SHOP DRAWINGS, PRODUCT DATA, COORDINATION DRAWINGS AND SCHEDULES

5.1.1 Shop drawings are drawings submitted to the County by the Contractor showing detail of the proposed fabrication and assembly of structural elements and the installation (i.e., form, fit, and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, fabrication, erection and setting drawings, manufacturers' scale drawings, wiring and control diagrams, cuts or entire catalogs, pamphlets, and performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the Work required by the Contract. The County may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this Contract.

5.1.2 The Contractor shall coordinate all shop drawings and review them for accuracy, completeness, and compliance with Contract requirements, and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the County without evidence of the Contractor's approval shall be returned for resubmission. The Architect will indicate review for compliance of the shop drawings, and if not in compliance as submitted, shall indicate the reasons therefore. Any work done before such review shall be at the Contractor's risk. Review by the Architect shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this Contract, except with respect to variations described and approved in accordance with paragraph 5.1.3.

5.1.3 If shop drawings show any variations from the Contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Architect approves any such variation, no change in time or price will be allowed for Contractor changes. Should the Architect make changes on the shop drawings which affect time and/or cost, the Contractor will immediately notify the County with a Request for Information. If the Contractor fails to issue the Request for Information within seven (7) calendar days from receipt of the returned shop drawing, the Contractor shall have waived his right to any potential Change Order.

5.1.4 The Contractor shall submit shop drawings, coordination drawings, and schedules for review as required by the Contract Documents. The Contractor will provide a submittal schedule listing all shop drawings and submittals, the submission dates by the Contractor, and return dates from the Architect. This schedule will be provided fourteen (14) calendar days after the Notice to Proceed.

5.1.5 Shop drawings and schedules, other than catalogs, pamphlets, and similar printed material, shall be submitted with one reproducible plus one copy.

5.1.6 Each shop drawing or coordination drawing shall have a blank area 4 by 4 inches located adjacent to the title block. The title block shall display the following:

- 1) Number and title of drawing
- 2) Date of drawing or revision
- 3) Name of project building or facility
- 4) Name of Contractor and (if appropriate) name of subcontractor submitting drawings
- 5) Clear identity of contents and location on the work
- 6) Project title and project number
- 7) Submittal number

5.1.7 Unless otherwise provided in this Contract or otherwise directed by County, shop drawings, coordination drawings, and schedules shall be submitted to the Architect with a letter, sufficiently in advance of construction requirements to permit no less than twenty (21) calendar days for checking and appropriate action.

5.2 SAMPLES

5.2.1 After the award of the Contract, the Contractor shall deliver samples required by the specifications to the County for approval. The Contractor shall prepay any shipping charges. Any materials or equipment for which samples are required shall not be used in the Work until reviewed by County.

5.2.2 Each sample shall have a label indicating:

- 1) Name of project building or facility, project title, and project number.
- 2) Name of Contractor and, if appropriate, name of subcontractor.
- 3) Identification of material or equipment with specification requirement.
- 4) Place of origin.
- 5) Name of manufacturer and brand (if any).
- 6) Identify by specification section.

5.2.3 Samples of finished materials shall have additional markings that will identify them in reference to the finish schedules.

5.2.4 The Contractor shall mail a letter in triplicate under separate cover submitting each shipment of samples and containing the information required in paragraph 5.2.2. He shall enclose a copy of this letter with the shipment and send a copy to the County representative on the project. Approval of a sample shall be only for the characteristics or use named in such review and shall not be construed to change or modify any Contract requirement. Substitutions will not be permitted unless they are approved under paragraph 5.3.

5.2.5 Approved samples not destroyed in testing will be sent to the County. Approved samples of hardware in good condition will be marked for identification and may be used in the Work. Materials and equipment incorporated in the Work shall match the approved samples. Other samples not destroyed in testing or not approved will be returned to the Contractor at his expense if so requested at time of submission.

5.2.6 Failure of any material to pass the specified tests will be sufficient cause for refusal to consider any further samples of the same brand or make of that material or equipment under this Contract.

5.2.7 Samples of various materials or equipment delivered on the site or in place may be taken by the County for testing. Samples failing to meet Contract requirements will automatically void previous approvals of the items tested. The Contractor shall replace such materials or equipment found not to have met Contract requirements, or there shall be a proper adjustment of the Contract price as determined by the County.

5.2.8 Unless otherwise specified, when tests are required, only one test of each sample proposed for use will be made at the expense of the County. Samples which do not meet specification requirements will be rejected. Requests for testing of additional samples by Contractor may be made by the County at the expense of the Contractor.

5.3 SUBSTITUTIONS

5.3.1 Wherever the name, or brand, or manufacturer of an article is specified in the Contract Documents, it is used as a measure of quality and utility or a standard. Except in those instances where the product is designated to match others presently in use, specifications calling for a designated material, product, thing or service by specific brand or trade name shall be deemed to be followed by the words "or equal" so that bidders may propose any equal material, product, thing or service in their bid. If the Contractor desires to use any other brand or manufacturer of equal quality and utility to that specified, he shall list definite particulars of that which he considers equivalent to the specified item in his bid. The Contractor shall have thirty-five (35) days after the award of the Contract for submission of data substantiating substitution of "equal" items. The County will then determine whether or not the proposed name brand or article is equal in quality and utility to that specified in the Contract Documents, and its written decision shall be final.

5.3.2 No proposal will be considered unless accompanied by complete information and descriptive data necessary to determine the equality of the offered materials, articles, or equipment. Samples shall be provided when requested by the County.

5.3.3 The burden of proof as to the comparative quality or suitability of the offered materials, articles, or equipment shall be upon the Contractor. The County shall be the sole judge as to such matters. In the event that the County rejects the use of such alternative materials, articles, or equipment, then one of the particular products designated by brand name in the specifications shall be furnished.

5.3.4 The County will examine Contractor's submittals with reasonable promptness. Return of the submittals to the Contractor shall not relieve the Contractor from responsibility for deviations and alternatives from the Contract Documents nor shall it relieve him from responsibility for errors in the submittals. A failure by the Contractor to identify, in his letter of transmittal, material deviations from the Contract Documents shall void the submittal and any action taken thereon by the County. When specifically requested by the County, the Contractor shall resubmit such shop drawing(s), descriptive data, and samples as may be required.

5.3.5 If any mechanical, electrical, structural, or design revisions are required for the proper installation and fit of alternative materials, articles, or equipment, or because of deviations from the Contract Documents, such changes shall not be made without the consent of the County's authorized representative, and shall be made without additional cost to the County, such costs, including the fees of the Architect, to be borne by the Contractor.

ARTICLE 6 SCHEDULES

6.1 CONSTRUCTION SCHEDULE

6.1.1 The Contractor shall prepare and submit to the County a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the salient features of the work (including acquiring materials and equipment). The schedule shall be in the form of a CPM (critical path method) schedule, of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. The scheduled completion date shall be the same as the contractual completion date, for the initial schedule and subsequent updates. Any proposed early completion date shall show the difference between that date and the contract completion date as Float, which shall belong to both the County and Contractor.

6.1.2 If, in the opinion of the County, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, without additional cost to the County. The Contractor shall submit any supplementary schedule or schedules in CPM form as the County deems necessary to demonstrate how the approved rate of progress will be regained.

6.1.3 All schedule updates must accurately reflect the as-built schedule. There shall be no change to the Critical Path without the County's written consent.

ARTICLE 7 TIME, LIQUIDATED DAMAGES AND EXTENSIONS

7.1 TIME OF WORK

The Contractor shall commence work on this project immediately upon receipt of the written Notice to Proceed and shall perform the work diligently to completion within the number of calendar days specified in the Contract. Neither site access nor physical work shall be commenced before the Contract is fully executed, and bonds, insurance and the schedule are submitted as required by the Contract Documents. No work shall be done on Saturday, Sunday and holidays and no work shall be performed outside of normal working hours without the prior written consent of the County, unless required by these Specifications. See: Working Hours.

7.2 LIQUIDATED DAMAGES

If the Work is not completed within the time required, damage will be sustained by the County. It is and will be impracticable and extremely difficult to ascertain and determine actual damage which County will sustain by reason of such delay; and it is therefore agreed that Contractor will pay to County the sum of \$800.00 per day for each and every day's delay in finishing the Work beyond the time prescribed. If the Contractor fails to pay such liquidated damages, the County may deduct the amount thereof from any money due or that may become due the Contractor under the Contract.

7.3 UNAVOIDABLE DELAYS

7.3.1 TIME EXTENSION

a. The Contractor will be granted an extension of time for completion of the Work beyond that named in the Contract Documents, for delays which may result through causes beyond the control of the Contractor and which he could not have avoided by the exercise of care, prudence, foresight and diligence. The appropriate extension of time shall constitute full compensation. Costs associated with extended overhead will not be considered.

b. If the Contractor is allowed extensions of time in which to complete the Work equal to the sum of all unavoidable delays, plus any adjustments of contract time due to contract change orders, during such extension of time liquidated damages shall not be charged to the Contractor.

c. Unavoidable delays within the meaning of this section shall be those caused by Acts of God or of the public enemy, fire, epidemics, or strike. There will be no liquidated damages for delays as described within this paragraph.

d. Delays in the performance of parts of the work which may in themselves be unavoidable, but do not necessarily prevent or delay the performance of critical activity(s) while the activity(s) is on the Critical Path, will not be considered as unavoidable delays within the meaning of the contract and shall not be the basis of a claim for delay.

7.3.2 WEATHER

Inclement weather shall not be a prima facie reason for granting a time extension. The Contractor shall make every effort to continue work under prevailing conditions. However, if the inclement weather prevents the Contractor from beginning at the usual starting time, or prevents the Contractor from proceeding with seventy-five percent (75%) of the normal labor and equipment force towards completion of the day's current Critical Path activities (shown on the most current, and accepted schedule update) for a period of at least five (5) hours, and the crew is dismissed as a result thereof, the County will designate such time as unavoidable delay and grant a one (1) calendar day, non-compensable, time extension.

7.3.3 NOTICE OF DELAYS

a. Whenever the Contractor foresees any delay in the performance of a Critical Path work activity, and in any event immediately upon the occurrence of any delay which he regards as an unavoidable delay, the Contractor shall notify the County in writing of such delay and its cause, in order that the County may take immediate steps to prevent, if possible, the occurrence or continuance of the delay, and 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.

b. After the completion of any part or the whole of the Work, the County, in calculating the amount due the Contractor, will assume that any and all delays which have occurred have been avoidable delays, except such delays as shall have been called to the attention of the County at the time of their occurrence and found by the County to have been unavoidable as substantiated by a change order. The Contractor shall make no claims that any delay not called to the attention of the County at the time of its occurrence has been an unavoidable delay.

7.4 REQUEST FOR TIME EXTENSION

7.4.1 In the event the Contractor requests an extension of contract time for unavoidable delay, justification shall be submitted no later than seven (7) calendar days after the initial occurrence of any such delay. When requesting time for proposed change orders, the request(s) must be submitted with the proposed change order with full justification. If the Contractor fails to submit justification he shall waive his right to a time extension at a later date. Justification must be based on the currently accepted contract schedule as updated at the time of occurrence of delay or execution of work related to any change(s) in the scope of work. The justification must include a schedule, including, but not limited to, the following information:

- a. The duration to perform the activity relating to the change(s) in the work and the resources (manpower, equipment, material, etc.) required to perform these activities within the stated duration.
- b. Logical activity ties to the contract schedule for the proposed changes and/or delay showing the activity/activities in the schedule whose start or completion dates are affected by the change and/or delay.

7.4.2 The County, after receipt of such justification and supporting evidence, shall make its finding of fact. The

County's decision shall be final and conclusive and the County will advise the Contractor in writing of such decision. If the County finds that the Contractor is entitled to any extension of Contract time, the County's determination as to the total number of days of extension shall be based upon the latest updated version of the approved contract schedule.

7.4.3 In the event the Contractor disagrees with the County's decision, the Contractor shall be required to submit a claim pursuant to the DISPUTE article.

ARTICLE 8 PERFORMANCE

8.1 SUPERVISION & CONSTRUCTION PROCEDURES

8.1.1 The Contractor shall supervise and direct the work. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences, procedures, project safety, and shall coordinate all portions of the Work under the Contract, including the relations of the various trades to the progress of the Work, in accordance with the provisions of the Contract Documents.

8.1.2 The Contractor shall be responsible to the County for the acts and omissions of the Contractor's employees, subcontractors, and their agents and employees, and any other persons performing any of the work under a contract with the Contractor.

8.1.3 The Contractor is an independent contractor and nothing in the Contract Documents shall be interpreted to make the Contractor an agent of the County.

8.2 SUPERVISION

8.2.1 Within seven (7) days after the Notice to Proceed, the Contractor shall provide to the County an organization chart outlining key job personnel. The Contractor will also provide a Letter of Authority or Corporate Resolution for the individual(s) authorized to sign documents on its behalf, i.e., payment requests, change orders, inspection reports, etc.

8.2.2 The Contractor shall employ, during the progress of the Work, a competent Project Superintendent and any necessary assistants, as approved by the County. The Project Superintendent shall not be changed except with the consent of the Authorized Representative of County, unless the Superintendent proves to be unsatisfactory to the Contractor or ceases to be in his employ. The County shall be notified immediately of any new Superintendent appointed to the Work and the Contractor shall submit qualifications for approval. The Superintendent shall represent the Contractor and all directions given to him shall be as binding as if given to the Contractor.

8.2.3 The County shall be supplied at all times with the name and telephone number of a person in charge of or responsible for the Work, who can be reached for emergency work twenty-four (24) hours a day, seven (7) days a week.

8.3 CONDUCT OF WORK

8.3.1 In connecting one kind of work with another, marring or damaging same will not be permitted and, in the event such occurs, shall be corrected by the Contractor at its cost prior to acceptance by the County. Should improper work of any trade be covered by another which results in damage or defects, the whole work affected shall be made good by the Contractor without expense to County.

8.4 PROTECTION OF WORK & PROPERTY

8.4.1 The Contractor shall continuously maintain adequate protection of the Work from damage and shall protect the

County's property from injury or loss in connection with this Contract. He shall make good any such damage, injury, or loss, except what may be directly due to errors in the Contract Documents or caused by agents or employees of the County. He shall adequately protect adjacent property as provided by law and the Contract Documents.

8.4.2 The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the Work site which is not to be removed and which does not unreasonably interfere with the work required under this Contract.

8.4.3 The Contractor shall protect from damage all existing improvements and utilities at or near the Work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this Contract or failure to exercise reasonable care in performing the Work. If the Contractor fails to repair the damage promptly, the County may have the necessary work performed and charge the cost to the Contractor.

8.5 CONTRACTOR'S RESPONSIBILITY FOR WORK

8.5.1 Until Acceptance of the Work by the County, Contractor shall have the charge and care thereof and shall bear risk of injury or damage to any part of the Work by action of the elements. If a separate Contractor sues the Owner, on account of any loss so sustained, the County shall notify the Contractor, who shall indemnify and hold harmless the County against any expenses, or judgment arising therefrom.

8.5.2 Contractor, at its cost, shall rebuild, repair, restore and make good all damages from the elements to any portion of the Work occasioned by such causes before its Acceptance.

8.5.3 No advertising of any description will be permitted in or about the Work, except by order of the County.

8.5.4 Contractor shall not create or permit the continued existence of any nuisance in or about the Work.

8.6 UTILITIES

8.6.1 Unless otherwise provided for under separate sections herein, Contractor will arrange all water, gas, and electricity required for construction purposes until acceptance of the Work. Contractor shall pay for such services unless otherwise specifically noted.

8.6.2 Utilities shall not be interrupted except with the approval of the County. A two (2) work day written notice is required prior to any and all interruptions. Interruptions shall be scheduled so as to minimize duration and disruption to existing operations.

8.6.3 a. The Contractor shall send notices, make all necessary arrangements, and perform all other services required in the care and maintenance of all public utilities.

b. Enclosing or boxing in, for protection of any public utility equipment, shall be done by the Contractor. Upon completion of the Work, the Contractor shall remove all enclosures, and leave in a finished condition.

c. All connections to public utilities shall be made and maintained in a manner so as not to interfere with the continuing use of same by the County during the entire progress of the Work.

8.7 WORKING HOURS

8.7.1 All work shall be performed on a calendar day basis during the customary working hours of the trades involved

unless otherwise specified in this Contract. Work performed by the Contractor of his own volition outside such established working hours shall be at no additional expense to the County and without County approval.

8.7.2 It is expressly stipulated that no laborer, workman, or mechanic employed at any time by the Contractor or by any subcontractor(s) under this Contract upon the Work or any part thereof, shall be required or permitted to work thereon more than eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except, as provided by Section 1815 of the California Labor Code. It is further expressly stipulated that for each and every violation of Sections 1811-1815, inclusive, of the California Labor Code, all the provisions of which are deemed to be incorporated herein, said contractor shall forfeit, as a penalty to County, twenty-five dollars (\$25.00) for each laborer, workman, or mechanic employed in the execution of this Contract by contractor for each calendar day during which said laborer, workman, or mechanic is required or permitted to work more than eight hours in any one calendar day and forty hours in any one calendar week in violation of the provisions of said Sections of the Labor Code.

8.7.3 The Contractor, and each subcontractor, shall keep an accurate record showing the names of and actual hours worked each calendar day and each calendar week by all laborers, workmen, and mechanics employed by them in connection with the Work contemplated by this Contract, which record shall be open at all reasonable hours to the inspection of the County or its officers or agents and to the Division of Labor Standards Enforcement of the Department of Industrial Relations.

8.7.4 No construction work shall be done on Saturdays, Sundays or County holidays and no work shall be performed outside of normal working hours without the prior written consent of the County. In any event, all work shall be subject to approval of the County. Prior to start of such work, the Contractor shall arrange with the County for the continuous or periodic inspection of the Work and testing of materials, when necessary. If requests are made by the Contractor for permission to work overtime, nights, Saturdays, Sundays or County holidays, and such requests are granted, the Contractor shall bear all extra expense to the County for inspection and other incidental expenses caused by such overtime work. If contractors are requested, in the interest of the County, to work overtime by the County, or if overtime work is specifically required by these specifications, all extra expense of inspection will be paid by the County.

8.8 MATERIAL & EQUIPMENT

8.8.1 Materials, equipment, and articles incorporated into the Work shall be new and of equal quality to the types and grades specified. When not particularly specified, the Contractor shall submit for approval satisfactory evidence as to the kind and quality of material. See SUBSTITUTION provision 5.3 concerning "or equal" requirements and procedure for submitting alternative material, articles, or equipment.

8.8.2 All materials shall be delivered so as to insure a speedy and uninterrupted progress of the Work. All materials shall be stored so as to cause no obstruction and so as to prevent overloading of any portion of the structure on the Work site, and the Contractor shall be entirely responsible for damage or loss by weather, theft, vandalism, or other cause.

8.8.3 Materials shall be stored to assure the preservation of their quality and fitness for the Work. Stored materials shall be reasonably accessible for inspection. When considered necessary by the County, stored materials shall be placed on wooden platforms or on other hard, clean surfaces and not directly on the ground, and shall be placed under cover when so directed.

8.9 LAYOUT OF WORK

8.9.1 The Contractor shall lay out its work from established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, material, and labor required to lay out any part of the Work. The Contractor shall be responsible for executing the Work to the lines and grades that may be established or indicated in the Contract Documents. The Contractor shall also be responsible for maintaining and preserving all stakes and other

marks established by the County until authorized to remove them. If such marks are destroyed by the Contractor before their removal is authorized, the County may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

8.10 USE OF PREMISES

8.10.1 The Contractor shall maintain the entire premises under his control in an orderly condition. He shall store his apparatus, materials, supplies and equipment in such a manner as will not interfere with the progress of his work or the work of other contractors.

8.11 OPERATIONS & STORAGE

8.11.1 The Contractor shall confine all operations (including storage of materials) on County premises to areas authorized or approved by the County.

8.11.2 Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the County and shall be built with labor and materials furnished by the Contractor without expense to the County. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at his expense upon completion of the work.

8.11.3 The Contractor shall, under regulations prescribed by the authority having jurisdiction, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the authority having jurisdiction. When materials are transported in performance of the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or County regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair, or pay for the repair, of any damaged curbs, sidewalks, or roads.

8.12 HEAT/POWER/LIGHT

8.12.1 Unless otherwise specified or already provided by the County, the Contractor shall:

- a. Provide heat, as necessary to protect all work, materials, and equipment against injury from dampness and cold;
- b. Provide heat as necessary in the area where work is to be done to provide the minimum temperature recommended by the supplier or manufacturer of the material;
- c. Provide electric power and light as required for performance of the Work.

8.13 CLEANING UP

8.13.1 The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. Before completing the Work, the Contractor shall remove from the work and premises any weeds, rubbish, tools, scaffolding, equipment, and materials that are not the property of the County. Upon completing the Work, the Contractor shall leave the work area in a clean, neat, and orderly condition satisfactory to the County.

ARTICLE 9 SAFETY & HEALTH

9.1 ACCIDENT PREVENTION

9.1.1 In performing this Contract, the Contractor shall provide for protecting the lives and health of employees and

other persons; preventing damage to property, materials, supplies, and equipment; and avoiding work interruptions. For these purposes, the Contractor shall:

- a. Provide a copy of its safety program;
- b. Provide appropriate safety barricades, signs, and signal lights;
- c. Comply with standards issued by the U.S. Government, State, County and City, and other governing agencies having jurisdiction;
- d. Ensure that any additional measures the County determines to be reasonably necessary for this purpose are taken.

9.1.2 The Contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this Contract resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment. The Contractor shall report this data in the manner prescribed by the County.

9.1.3 Before beginning excavation for a trench 5 feet or more in depth, Contractor shall provide evidence of having obtained a permit from the authority having jurisdiction.

9.1.4 Nothing herein shall be deemed to allow use of shoring, sloping, or protective systems less effective than those required by the Construction Safety Orders of the California Division of Industrial Safety.

9.2 SANITARY FACILITIES

9.2.1 Contractor shall supply and maintain at its expense such toilets and other sanitary facilities including those which are accessible by the disabled as per ADA and Title 24 requirements necessary for use by visitors and workers employed at the job site. Such facilities shall be approved by the County.

9.3 RESPONSIBILITY FOR COMPLIANCE WITH CAL-OSHA

9.3.1 All work, materials, work safety procedures and equipment shall be in full accordance with the latest Cal-OSHA rules and regulations.

9.3.2 Contractor warrants that he and each of his subcontractors shall, in performance of this Contract, comply with each and every compliance order issued pursuant to Cal-OSHA. The Contractor assumes full and total responsibility for compliance with Cal-OSHA standards by his subcontractors as well as himself. The cost of complying with any order and/or payment of any penalty assessed pursuant to Cal-OSHA shall be borne by the Contractor. Nothing contained therein shall be deemed to prevent the Contractor and his subcontractors from otherwise allocating between themselves responsibility for compliance with Cal-OSHA requirements; provided, however, that the Contractor shall not thereby, in any manner whatsoever, be relieved of his responsibility to the County as herein set forth.

9.4 TOXIC AND HAZARDOUS MATERIALS AND WASTE

9.4.1 ASBESTOS

Operations which may cause release of asbestos fibers into the atmosphere shall meet the requirements of Title 8 CCR General Industrial Safety Orders, Section 5208 and California law. Some operations which may cause such concentrations include sanding, grinding, abrasive blasting, sawing, drilling, shoveling, or otherwise handling materials containing asbestos so that dust will be raised.

9.4.2 TOXIC MATERIALS

Operations which release toxic materials into the atmosphere shall meet the requirements of Title 8 CCR. General Industrial Safety Orders. Some operations which may release such materials include use of adhesives, sealants, paint, and other coatings.

9.4.3 LEAD-BASED PAINT

Lead-based paint is prohibited. Lead-based paint is defined as:

- a. Any paint containing more than five-tenths of one percentum lead by weight (calculated as lead metal in the total non-volatile content of the paint) or the equivalent measure of lead in the dried film of paint applied or both; or
- b. For paint manufactured after June 22, 1977, any paint containing more than six one-hundredths of one percentum lead by weight (calculated as lead metal) in the total content of the paint or the equivalent measure of lead in the dried film or paint already applied.

9.4.4 HAULING AND DISPOSAL

All hauling and disposal shall meet requirements of Title 22 CCR, Division 4. Chapter 30, "Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes."

9.4.5 ASBESTOS PROHIBITED

No products or materials containing asbestos shall be incorporated into the Work without the prior written approval of the County.

ARTICLE 10 COUNTY-FURNISHED PROPERTY

10.1 COUNTY-FURNISHED PROPERTY

10.1.1 The County may furnish to the Contractor property as identified in the specification(s) to be incorporated or installed into the Work or used in performing the Contract. The listed property will be furnished f.o.b. railroad cars at the place specified in the Contract or f.o.b. truck at the project site. The Contractor is required to accept delivery. When the property is delivered, the Contractor shall verify its quantity and condition and acknowledge receipt in writing to the County within twenty-four (24) hours of delivery, also specifying any damage to or shortage of the property as received. All such property shall be installed or incorporated into the Work at the expense of the Contractor, unless otherwise indicated in this Contract.

10.1.2 Each item of property to be furnished under this clause shall be identified by the Contractor in a schedule by quantity, item, and description. Schedule form will be provided by the County.

10.1.3 The Contractor shall be held responsible for all material delivered to him and deductions will be made from any moneys due him to make good any shortages and deficiencies, from any cause whatsoever, which may occur after such delivery.

10.1.4 The Contractor shall set up accounting records and establish an inspection procedure as approved by the County.

ARTICLE 11 BENEFICIAL OCCUPANCY

11.1 BENEFICIAL OCCUPANCY

11.1.1 The County shall have the right to take possession of or use any completed or partially completed portion of the Work. The County's possession or use shall not be deemed an acceptance of any Work under the Contract. The Contractor will continue to pay for any portion of the utilities which he is using.

11.1.2 While the County has such possession or use, the Contractor shall be relieved of the responsibility for the loss of or damage to that portion of the Work resulting from the County's possession or use. If Contractor believes the partial possession or use by the County will delay the progress of the Work or will cause additional expense to the Contractor, Contractor shall immediately submit a written request for an equitable adjustment in the Contract price or the time of completion. County will then consider such request and, if in its judgment it is justified, the County will modify the contract in writing accordingly. In the event the Contractor disagrees with the County's decision, the Contractor shall be required to submit a claim pursuant to the DISPUTE article.

ARTICLE 12 INSPECTIONS AND TESTING

12.1 INSPECTION AND TESTING

12.1.1 The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work called for by this Contract conforms to contract requirements. The Contractor shall maintain complete inspection records and make them available to the County. The County shall at all times have access to the Work, and the Contractor shall provide proper facilities for such access and for inspection.

12.1.2 County inspections and tests are for the sole benefit of the County and do not:

- a. Relieve the Contractor of responsibility for providing adequate quality control measures;
- b. Relieve the Contractor of responsibility for damage to or loss of the material before Acceptance;
- c. Constitute or imply Acceptance; or
- d. Affect the continuing rights of the County after Acceptance regarding latent defects, gross mistakes, fraud or the County's rights under any warranty or guarantee.

12.1.3 The presence or absence of a County inspector does not relieve the Contractor from any Contract requirement, nor is the inspector authorized to change any term or condition of the specifications without the County's written authorization.

12.1.4 The Contractor shall promptly furnish, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the County. The County may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. Special, full size and performance tests shall be performed as described in the Contract.

12.1.5 The Contractor shall, without charge, replace or correct work found by the County not to conform to contract requirements, unless in the public interest the County consents to accept the work with an appropriate adjustment in Contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

12.1.6 If, before Acceptance of the Work, the County decides to examine already completed work by removing it or

tearing it out, the Contractor, on request, shall promptly furnish all necessary facilities, labor, and material. If the work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray the expenses of the examination and of satisfactory reconstruction. However, if the work is found to meet Contract requirements, the County shall issue a Change Order for such removal and reinstallation.

12.1.7 The Contractor shall at all times maintain proper facilities and provide safe access for inspection by the County to all parts of the work, and to the shops wherein the work is in preparation. Where the specifications require work to be specially tested or approved, it shall not be tested or covered up without timely notice to the County of its readiness for inspection and without the approval or consent of County. Should any such work be covered up without such notice, approval, or consent, it must, if required by County, be uncovered for examination at the Contractor's expense.

12.1.8 The Contractor shall notify the County at least one (1) work day in advance of the time scheduled for the inspection. Should the Contractor fail to notify the County and proceed with work requiring inspection, all such work is rejected, and no further work shall be done on that portion of the project until the rejected work is accepted by the County. Should the Contractor request acceptance of such rejected work the County shall, at the Contractor's expense, secure the services of private material testing laboratories, consulting engineers or licensed land surveyors, who shall certify that said work does in fact conform to the requirements of the Contract Documents. The work previously rejected shall be accepted by the County after receipt of such certification if the County approves of such certification.

12.1.9 If the Contractor does not promptly replace or correct rejected work, the County may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor or (2) terminate for default the Contractor's right to proceed.

12.1.10 Construction review of the Contractor's performance by the County is not intended to include the review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

12.1.11 The County will pay for initial testing services specified to be performed by the County. When initial tests indicate non-compliance with the Contract Documents, subsequent retesting occasioned by the non-compliance shall be performed by the same testing agency, and costs thereof will be deducted by the County from the Contract sum.

12.2 INSPECTION BY OTHER JURISDICTIONS

Whenever any part of the Work to be performed is under the jurisdiction or control of another public entity, including but not limited to: The United States Government, State of California, or City, such work shall be subject to inspection by the officials of such entities and it must pass inspection, in addition to County inspection, and such other inspections as may otherwise be provided for in the Contract Documents.

12.3 FINAL INSPECTION AND TESTS

The Contractor shall give the County at least ten (10) calendar days advance written notice of the date the Work will be fully completed and ready for final inspection and tests. Final inspection and tests will be started within ten (10) calendar days from the date specified in the aforementioned notice unless the County determines that the Work is not ready for final inspection and so informs the Contractor.

ARTICLE 13 ACCEPTANCE

13.1 ACCEPTANCE OF THE WORK

13.1.1 After the final inspection by County and all the contract documentation has been received, it will be

recommended to the County Board of Supervisors to accept the Work and file a Notice of Completion. Upon approval of the Notice of Completion, a copy will be sent to the Contractor. (See final payment clause.) Upon Acceptance of the Work, Contractor will be relieved of the duty of maintaining and protecting the Work. Neither determination by the County that the Work is complete, nor Acceptance thereof, shall operate as a bar to County's claim against Contractor pursuant to Contractor's warranty and guarantees.

13.1.2 Partial payments shall not be construed as acceptance of any part of the Work.

13.1.3 In judging the Work, no allowance for deviations from the drawings and specifications will be made, unless already approved in writing at the time and in the manner as called for herein.

13.1.4 County shall be given adequate opportunity to make any necessary arrangements for fire insurance and extended coverage.

13.1.5 The Acceptance of the Work will not be recommended until all requirements of the Contract Documents are complete and approved by the County. This shall include, but is not limited to, all construction, guarantee forms, parts lists, schedules, tests, operating instructions, as-built drawings, and all other documentation identified by the Contract Documents.

ARTICLE 14 WARRANTY AND GUARANTEES

14.1 CONTRACTOR'S WARRANTY AND GUARANTEE

14.1.1 Contractor warrants that all materials and equipment furnished under this Contract shall be new unless otherwise specified, and that all Work performed under this Contract conforms to the Contract requirements and is free of any defect whether performed by the Contractor or any subcontractor or supplier.

14.1.2 This warranty shall continue for a period of one (1) year from the date of filing of Notice of Completion on the Work. The Performance Bond shall remain in force during the warranty period.

14.1.3 The Contractor shall remedy at the Contractor's expense any damage to County-owned or controlled real or personal property, when that damage is the result of:

- a. The Contractor's failure to conform to Contract requirements or
- b. Any defect of equipment, material, workmanship, or design furnished by the Contractor.

14.1.4 The Contractor shall restore any work damaged in fulfilling the terms and conditions of this Article. The Contractor's warranty with respect to work repaired or replaced will run for one (1) year from the date of repair or replacement.

14.1.5 The County shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage. The Contractor shall within ten (10) calendar days after being notified in writing by the County of any work not in accordance with the requirements of the Contract or any defects in the Work, commence, and perform with due diligence, all work necessary to fulfill the terms of this Article. If the Contractor fails to remedy any defect, or damage within fourteen (14) calendar days after receipt of notice, the County shall have the right to replace, repair, or otherwise remedy the defect, or damage at the Contractor's expense. Payment due to the Architect from the County for extra architectural services required in the enforcement of Contractor's guarantee after Acceptance of the Work shall be paid to the County by the Contractor.

14.1.6 In the event of any emergency constituting an immediate hazard to health or safety of County employees,

property, or licensees, when caused by work of the Contractor that is not in accordance with the Contract requirements, the County may undertake at Contractor's expense and without prior notice, all work necessary to correct such hazardous condition(s).

14.1.7. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this Contract, the Contractor shall:

- a. Obtain all warranties that would be given in normal commercial practice;
- b. Require all warranties to be executed, in writing, for the benefit of the County, unless directed otherwise by the County; and
- c. Enforce all warranties for the benefit of the County, unless otherwise directed by the County.

14.1.8 This warranty shall not limit the County's rights under the Inspection and Acceptance section(s) of this Contract with respect to latent defects, gross mistakes, or fraud.

ARTICLE 15 ENVIRONMENTAL PROTECTIONS

15.1 DUST CONTROL

15.1.1 The Contractor shall provide any and all dust control required.

15.1.2 Whenever the Contractor is negligent in providing dust control, the County shall order the Contractor to provide such dust control. If the Contractor does not comply promptly with such order, the County shall have the authority to provide such dust control and charge the Contractor therefore by deducting the cost from progress payments to the Contractor as such costs are incurred by the County. The County shall not be held responsible for schedule delays due to actions taken by County to mitigate the failure of the Contractor in providing dust control.

15.2 EXCESSIVE NOISE

15.2.1 The Contractor shall use only such equipment on the Work and in such state of repair that the emission of sound therefrom is within the noise tolerance level of that equipment as established by CAL-OSHA.

15.2.2 Should the County determine that the muffling device on any equipment used on the Work is ineffective or defective so that the noise tolerance of such equipment is exceeded, such equipment shall not, after such determination by the County, be used on the Work until its muffling device is repaired or replaced so as to bring the noise tolerance level of such equipment within such standards.

15.3 POLLUTION CONTROL, CLEANING

15.3.1 The Contractor shall not, in connection with the Work, discharge any smoke, dust, or other contaminants into the atmosphere which are in violation of South Coast Air Quality Management District standards or discharge any fluids or materials into any lake, river, stream, or channel as will violate regulations of State of California Water Resources Board. The Contractor shall control accumulation of waste materials and rubbish and dispose of waste materials and rubbish off-site at a minimum of weekly intervals. Burning of materials is not permitted.

ARTICLE 16 EMPLOYMENT PRACTICES

16.1 QUALIFICATIONS FOR EMPLOYMENT AND APPRENTICESHIP STANDARDS

16.1.1 In accordance with Section 1735 of the California Labor Code, no person under the age of 16 years and no

person currently serving sentence in a penal or correctional institution shall be employed to perform any Work under this Contract. No person whose age or physical condition is such as to make his employment dangerous to his health or safety or to the health or safety of others shall be employed to perform Work under this Contract; provided that this requirement shall not operate against any physically handicapped persons otherwise employable where such persons may be safely assigned to Work which they ably perform.

16.1.2 This contract is subject to the provisions of Sections 1777.5 and 1777.6 of the California Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him. Section 1777.5 as amended, requires the Contractor or subcontractor employing tradesmen in any apprenticeable occupation to apply to the Joint Apprenticeship Committee nearest the site of this project and which administers the apprenticeship program in that trade for a certificate of approval. The certificate will also fix the ratio of apprentices to journeymen that will be used in the performance of the Contract.

16.1.3 The Contractor is required to make contributions to funds established for the administration of apprenticeship programs if he employs registered apprentices or journeymen in any apprenticeable trade on such contracts and if other contractors on the public works site are making contributions.

16.1.4 All employees engaged in work on the project under this Contract shall have the right to organize and bargain collectively through representatives of their own choosing, and such employees shall be free from interference, restraint, and coercion of employers in the designation of such employees for the purpose of collective bargaining or other mutual aid or protection, and no person seeking employment under this Contract shall be required as a condition of initial or continued employment to join any company, union, or to refrain from joining, organizing, or assisting a labor organization of such person's own choosing. No person in the employment of the County shall be employed by this contractor.

16.2 WAGES & RECORDS

16.2.1 WAGE RATES

a. Pursuant to Section 1770 and 1773 et seq. 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 workman needed to execute the contract which will be awarded to the successful bidder, copies of which are on file and available upon request at the Clerk of the Board, Board of Supervisors, 4080 Lemon St., 14th Floor, Riverside, CA 92501-3655, and shall be posted at the job site.

b. It shall be mandatory upon the Contractor and upon any subcontractor under him, to pay not less than the said specified rates to all laborers, workmen, and mechanics employed in the execution of the Contract. It is further expressly stipulated that the Contractor shall, as a penalty to County, forfeit twenty-five dollars (\$25.00) for each calendar day, or portion thereof, for each laborer, workman, or mechanic paid less than the stipulated prevailing rates for any work done under this Contract by him or by any subcontractor under him; and Contractor agrees to comply with all provisions of Section 1770 et. Seq. of the Labor Code.

c. In case it becomes necessary for the Contractor or any sub-contractor 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 County 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.

d. The County will not recognize any claim for additional compensation because of the payment

by the Contractor of any wage rate in excess of the prevailing wage rate set forth as provided herein. The possibility of wage increases is one of the elements to be considered by the Contractor in determining his bid, and will not under any circumstances be considered as the basis of a claim against the County on the Contract.

16.2.2 WAGE RECORDS

a. The Contractor and each subcontractor shall keep or cause to be kept an accurate record (certified payroll) showing the names and occupations of all laborers, workers, and mechanics employed by him in connection with the execution of this Contract or any subcontract thereunder. The record shall show the actual per diem wages paid to each of said workers, which records shall be provided to the County, and to the Division of Labor Standards Enforcement upon its request. Copies provided will include one which has the name and social security numbers marked out.

16.3 NOTICE OF LABOR DISPUTES

16.3.1 If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this Contract, the Contractor shall immediately give notice, including all relevant information, to the County.

16.3.2 The Contractor agrees to insert the substance of this clause, including this paragraph into any subcontract in which a labor dispute may delay the timely performance of this Contract; except that each subcontract shall provide that in the event its timely performance is delayed or threatened by delay by any actual or potential labor dispute, the subcontractor shall immediately notify the next higher tier subcontractor or the prime Contractor, as the case may be, of all relevant information concerning the dispute.

16.4 NONDISCRIMINATION

16.4.1 EQUAL EMPLOYMENT OPPORTUNITY

a. Contractor agrees for the duration of this Contract that it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, age, political affiliation, marital status, or handicap. The Contractor will take affirmative action to insure that employees are treated during employment or training without regard to their race, color, religion, sex, national origin, age, political affiliation, marital status, or handicap. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

b. The Contractor will in all solicitations or advertisements for employees placed by or on behalf of the Contractor; state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, age, political affiliation, marital status, or handicap.

c. The Contractor will send to each labor union or other representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice advising the workers' representative of the Contractor commitments under this agreement.

d. The Contractor agrees that it will comply with the provisions of Titles VI and VII of the Civil Rights Act, Revenue Sharing Act Title 31, U.S. Code Section 2716, and California Government Code Section 12990.

e. The Contractor agrees that it will assist and cooperate with the County, the State of California and the United States Government in obtaining compliance with the equal opportunity clause, rules, regulations, and relevant

orders of the State of California and United States Government issued pursuant to the Acts.

f. In the event of the Contractor's non-compliance with the discrimination clause, the affirmative action plan of this contract, or with any of the said rules, regulations or orders, this Contract may be canceled, terminated, or suspended in whole or in part by the County.

16.4.2 HANDICAPPED NON-DISCRIMINATION

This project is subject to Section 504 of the Rehabilitation Act of 1973 as amended, (29 U.S.C. 794), and the Americans with Disabilities Act of 1990, as amended, and all requirements imposed by the guidelines and interpretations issued thereto. In this regard, the County and all of its contractors and subcontractors will take all reasonable steps to ensure that handicapped individuals have the maximum opportunity for the same level of aid, benefit or service as any other individual.

16.4.3 FAIR EMPLOYMENT AND HOUSING ACT ADDENDUM

In the performance of this Contract, the Contractor will not discriminate against any employee or Applicant for employment because of race, sex, color, religion, ancestry, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, sex, color, religion, ancestry, or national origin. Such action shall include, but not limited to, the following: employment, upgrading, promotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by the State or local agency setting forth the provisions of this Fair Employment and Housing Section.

16.4.4 ACCESS TO RECORDS

The Contractor will permit access to his records of employment, employment advertisements, application forms, and other pertinent data and records by the State Fair Employment and Housing Commission, or any other agency of the State of California designated by the awarding authority, for the purposes of investigation to ascertain compliance with the Fair Employment and Housing section of this Contract.

16.4.5 REMEDIES FOR WILLFUL VIOLATION

The State or local agency may determine a willful violation of the Fair Employment and Housing provision to have occurred upon receipt of a final judgment having that effect from a court in an action to which Contractor was a party, or upon receipt of a written notice from the Fair Employment and Housing Commission that it has investigated and determined that the Contractor has violated the Fair Employment and Housing Act and has issued an order or obtained an injunction under Government Code Sections 12900, et seq.

ARTICLE 17 SUBCONTRACTING

17.1 SUBCONTRACTORS

17.1.1 A subcontractor is an individual, firm or corporation having a direct contract with the Contractor or with any other subcontractor for the performance of a part of the Work. In accordance with Section 4104 of the Public Contract Code, each Contractor, in his bid, shall include the name and location of each subcontractor who will perform work or labor, or render services to the Contractor in or about the Work in an amount in excess of one half of 1% of the Contractor's total bid.

17.1.2 The County reserves the right to approve all subcontractors. Such approval shall be a consideration to the awarding of the Contract and unless notification to the contrary is given to the Contractor prior to the signing of the

Contract, the list of subcontractors which is submitted with his proposal will be deemed to be acceptable.

17.1.3 The Contractor shall be as fully responsible to the County for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

17.1.4 Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractor and the County.

17.1.5 The divisions or sections of the specifications are not intended to control the Contractor in dividing the Work among subcontractors or to limit the work performed by any trade.

17.2 RELATIONS OF CONTRACTOR AND SUBCONTRACTOR

17.2.1 The Contractor agrees to bind every subcontractor by the terms of the Contract with the County, the General Conditions, Supplementary Conditions, and the drawings and specifications as far as applicable to his work, unless specifically noted to the contrary in a subcontract approved in writing as adequate by the County.

17.3 SUBCONTRACTS

17.3.1 Pursuant to the provisions of Sections 4100 to 4114 of the California Public Contract Code, inclusive, the Contractor shall not, without the consent of the County, either:

- a. Substitute any persons as subcontractors in place of the subcontractors designated in his original bid without the consent of County. (The County's consent can only be given in cases permitted by Public Contract Code Section 4107.)
- b. Permit any subcontract to be assigned or transferred or allow any work to be performed by anyone other than the original subcontractor listed in his bid.
- c. Sublet or subcontract any portion of the work in excess of one-half of one percent of his bid to which his original bid did not designate a subcontractor.

Should the Contractor violate any of the provisions of Sections 4100 to 4114, inclusive, of the Public Contract Code, his so doing shall be deemed a violation of this Contract, and the County may either cancel the contract, or assess the Contractor a penalty in the amount of not more than ten (10) percent of the amount of the subcontract involved, or both.

ARTICLE 18 TAXES

18.1 SALES AND PAYROLL TAXES

18.1.1 Each Contractor, subcontractor, and material dealer shall include in their bid all applicable taxes including but not limited to sales tax and payroll taxes required by law.

ARTICLE 19 CHANGES

19.1 CHANGE ORDER WORK

19.1.1 The County reserves the right to make changes in the work without impairing the validity of the Contract. The County may make changes to the work, or suspend the work, and all such changes or suspension are within the

contemplation of the parties and will not be a basis for compensable delay. Such changes may be made in accordance with any of the following methods:

- a. By written change order to the Contract ordered by the Board of Supervisors.
- b. By written change order, signed by the Director of Facilities Management in the manner and amounts specified by Board Policy B-11.
- c. By written authorization, issued by the Director of Facilities Management, for items of work done under unit prices. The cost or credit for such added or omitted work shall be determined by multiplying the number of units added to or omitted from the work by the applicable unit price.

19.1.2 Upon receipt of a proposed Change Order from County, the Contractor shall submit a proposal in accordance with the requirements and limitations set forth in this "Change Orders" article, for work involved in the contemplated change.

19.1.3 The Contractor must submit a cost proposal within fifteen (15) calendar days after receipt of the proposed change order. The Contractor must submit cost proposals in less than fifteen (15) calendar days if requested by the County or if required by schedule limitations.

19.1.4 If the Contractor fails to submit the cost proposal within the 15-day period (or as requested), the County has the right to order the Contractor in writing to commence the work immediately on a force account basis and/or issue a lump sum change to the contract price in accordance with the County's estimate of cost. If the change is issued based on the County estimate, the Contractor will waive his right to dispute the action unless within fifteen (15) calendar days following completion of the added/deleted work, the Contractor presents proof that the County's estimate was in error.

19.1.5 If the County disagrees with the proposal submitted by Contractor, it will notify the Contractor in writing and the Contractor may elect to proceed under the DISPUTE article of this Contract, or, in the event either party contests the price or time extension of Change work, or time is of the essence, the County may issue a Construction Change Directive and the contractor shall proceed with the work. The County will provide its opinion of the appropriate price and/or time extension in a "Response to Change Order Request." If the contractor agrees with the County's estimate, a change order will be issued by the County. If no agreement can be reached, the County shall have the right to issue the Change Order Directive setting forth its unilateral determination of the reasonable additions or savings in costs and time attributable to the extra or deleted work. Such determination shall become final and binding if the Contractor fails to submit a Claim in writing to the County, within twenty-one (21) days of the Change Order Directive, disputing the terms of such Directive. No dispute, disagreement or failure of the parties to reach agreement regarding the amount, if any, of any adjustment to the contract sum or contract time shall relieve the Contractor from the obligation to proceed with performance of the work, including extra work, promptly and expeditiously."

19.1.6 The Contractor will give notice of a requested change on his letterhead within seven (7) calendar days of discovery and, if the County agrees, a proposed change order will be issued on the County's standard change order form.

19.1.7 If any change involves an increase or decrease in the cost of the Contractor's work, a change order shall state the amount to be added or deducted from the Contract amount, and the additional time, if any, needed for the performance of such work.

19.1.8 Any changes to the Contract amount shall be in a lump sum mutually agreed to by the Contractor and the County, except that when, in the opinion of the County, such basis is not feasible the change to the Contract amount shall

be determined upon a cost-plus-percentage basis with a guaranteed maximum lump sum cost within the limitations provided by law.

19.1.9 Each lump sum quotation from the Contractor shall be accompanied by sufficiently detailed estimates to permit verification of totals in accordance with (a) through (d) in 19.1.11 below.

19.1.10 When the work is to be done on a cost-plus-percentage basis, the Contractor shall submit statements as required by the County showing all labor, material, and equipment costs incurred, and upon completion of the work, a summary of costs, including overhead and profit, and in accordance with Item (a) through (d) in 19.1.11 below.

19.1.11 Estimates for lump sum quotations and accounting for cost-plus-percentage work shall be limited to direct expenditures necessitated specifically by the subject extra work, and shall be segregated as follows:

- a. Labor. The costs of labor will be the actual cost for wages prevailing locally for each craft or type of worker at the time the extra work is done, plus employer payments of payroll taxes and insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State or local laws, as well as assessment or benefits required by lawful collective bargaining agreements. The use of a labor classification which would increase the extra work cost will not be permitted unless the contractor establishes the necessity for such additional costs. Labor costs for equipment operators and helpers shall be reported only when such costs are not included in the invoice for equipment rental.
- b. Materials. The cost of materials reported shall be at invoice or lowest current price at which such materials are locally available in the quantities involved, plus sales tax, freight and delivery.
- c. Tool and Equipment Use. No payment will be made for the use of tools which have a replacement value of \$100 or less. Regardless of ownership, the rates to be used in determining equipment use costs shall not exceed listed rates prevailing locally at equipment rental agencies, or distributors, at the time the work is performed.
- d. Overhead, Profit and Other Charges. The mark-up for overhead and profit on work added to the Contract shall be according to the following Schedule.
 - (1) For work performed by the Contractor's forces the added cost for overhead and profit shall not exceed fifteen (15%) percent of the net cost of the work, equipment, labor and materials.
 - (2) For work performed by a subcontractor, the added cost for overhead and profit shall not exceed fifteen (15%) percent of the net cost of the work, equipment, labor and materials, to which the Contractor may add five (5) percent of the subcontractor's price of the work.
 - (3) For work performed by a sub-subcontractor the added cost for overhead and profit shall not exceed fifteen (15 %) percent of the net cost for work, equipment, labor and materials to which sub-contractor and general contractor may each add an additional five (5 %) percent of the total price from the lower tier subcontractor.
 - (4) "Net Cost" is defined as consisting of costs of labor, materials and equipment use and/or rental only. The costs of applicable insurance and bond premium will be

reimbursed to the Contractor and subcontractors at cost only, without mark-up.

- (5) The cost of direct supervision, except when provided by working foreman whose time is included above, of change order work when done exclusively, and not in conjunction or at the same time as, other work performed on the job and when approved in advance by the County's authorized representative, including only payroll taxes, insurance, pension and direct costs for the labor of supervision may be charged to the change order. The cost of transportation, use of vehicle and other costs incurred by supervision will not be allowed.

19.1.12 For added or deducted work by subcontractors, the Contractor shall furnish to the County the subcontractor's signed detailed estimate of the cost of labor, material and equipment, including the markup by such subcontractor for overhead and profit. The same requirement shall apply to sub-subcontractors.

19.1.13 For added or deducted work furnished by a vendor or supplier, the Contractor shall furnish to the County a detailed estimate or quotation of the cost to the Contractor for such work, signed by such vendor or supplier.

19.1.14 Any change in the work involving both extras and credits shall show a new total cost, including subcontracts. Allowance for overhead and profit, as specified therein, shall be applied if the net total cost is an extra; overhead and profit allowances shall not be applied if the net total cost is a credit. The estimated cost of deductions shall be based on labor and material prices on the date the Contract was executed.

19.1.15 The Contractor shall identify any adjustment in time of the final completion of the Work as a whole which is directly attributable to the changed work within fifteen (15) calendar days of receipt of the proposed change order. The Contractor's request for a change in time will be supported by a detailed schedule analysis including a schedule indicating the activities which have been affected and the additional time being requested.

- a. For a change in time for the Work, the Contractor shall be entitled only to such adjustments where completion of the entire Work (critical path) is delayed due to the performance of the changed work. Failure to request extra time when submitting such estimate shall constitute waiver of the right to subsequently claim adjustment in time for final completion based upon such changed work.
- b. If the County and the Contractor fail to arrive at an agreement on the amount of extra cost, credit or time extension for a proposed change, a change order will be processed in the amount believed by the County to be reasonable, and the Contractor shall proceed with the work. If the Contractor believes that the amount or time stipulated in the change order is not reasonable for the work required, he may elect to issue a notification in accordance with the DISPUTES article for review by the County, stating therein the basis for his dispute with such change order.

19.1.16 Any change in the Work shall conform to the original Contract Documents insofar as they may apply without conflict to the conditions involved in the change.

19.1.17 Payment for additional work or extras, if any, shall become due and payable in accordance with the provisions for payment in the Contract.

19.1.18 Contractor shall not reserve a right to assess impact cost, extended job site costs, extended overhead, and/or constructive acceleration at a later date as related to any and all changes. All costs or estimated costs must be supported

with full schedule and cost documentation with each proposed change within the prescribed submission times. If a request for a change is denied and the Contractor disputes the denial, the Contractor must supply the aforementioned documentation to support his claim under the DISPUTES article of this Contract. No claims shall be allowed for impact, extended overhead costs, and/or construction acceleration due to the multiplicity of changes and/or clarifications. Any attempt by Contractor to change or modify the change order form (sample included herein) shall void the form, including any letters the Contractor may issue in conjunction therewith.

19.1.19 All alterations, extensions of time, extra and additional work and other changes authorized by these specifications or any part of the Contract may be made without securing consent of the surety or sureties on the contract bonds.

19.2 CHANGE ORDERS AND LABOR RATES GUIDELINES

19.2.1 The following are guidelines for preparing change orders:

a. Labor Rates:

- (1) To establish the labor rate for each classification and trade, a breakdown shall be submitted to the County.
- (2) Labor rates are based on current prevailing state and federal wages. Only those benefits mandated by law or a valid labor contract are paid by the County.
- (3) Payroll taxes shall be paid as mandated by law. Labor related insurances shall be paid according to industry standard average.
- (4) No other costs related to labor shall be paid by County.

b. Change Orders:

- (1) Change orders shall be prepared in accordance with the project contract.
- (2) No insurance costs are paid by County, except for labor insurances specified in this guideline under section 1 titled "LABOR RATES".
- (3) Material cost shall be broken down on a separate sheet, and for those jobs designated as time and material shall be supported by valid invoices from suppliers.
- (4) Hours for non-productive labor, such as non-working foremen or general foremen, shall be paid only when justified in the opinion of the County, and approved by the County. The total number of nonproductive labor hours shall be limited to a maximum of 15% of the total number of productive labor hours.
- (5) Cost of use of special equipment shall be paid when justified in the opinion of the County, and approved by the County. Equipment refers to special equipment that is needed to perform that specific job, and does not include the usual tools customarily required for that trade. Small tools costs are not paid by County.
- (6) Material transportation costs are paid by County when justified in the opinion of the County, and approved by the County's authorized representative.
- (7) Overhead, profit and fees on subcontracts, are paid according to the contract.

- (8) No costs other than those designated above shall be paid by County. The percentages of overhead and fee allowed with change orders have been established to account for any other direct or indirect costs that might be incurred due to the change order.

19.3 AUDIT

19.3.1 The County shall have the right to examine and audit all books, estimates, records, contracts, documents, bid documents, subcontracts, and other data of the Contractor (including computations and projections) related to negotiating, pricing, or performing the modification in order to evaluate the accuracy and completeness of the cost or pricing data at no additional cost to the County.

19.3.2 The Contractor shall make available at its office at all reasonable times the materials described in paragraph 19.3.1 above, for examination, audit, or reproduction, until 4 years after final payment under this Contract.

19.3.3 The Contractor shall insert a clause containing all the provisions of this 19.3, including this paragraph, in all subcontracts over \$10,000 under this contract.

ARTICLE 20 PAYMENTS

20.1 PROGRESS PAYMENTS

20.1.1 The County shall pay the Contractor the price as provided in this Contract.

20.1.2 The County shall make progress payments monthly as the Work proceeds, on estimates approved by the County. The Contractor shall furnish a breakdown of the total contract price, in a format provided by the County, showing the amount included therein for each principal category of the work, in such detail as requested, to provide a basis for determining progress payments.

20.1.3 Contractor shall submit to the County vouchers, schedule activities, or other satisfactory proof of the value of any work for which he claims payment on such account, and receipts showing that progress payments have been duly made on such contracts, and for materials furnished.

20.1.4 In the preparation of estimates, the County may authorize 75% of the value of material delivered and satisfactorily stored on the site, and preparatory work done to be taken into consideration for major equipment if:

- a. Consideration is specifically authorized by this Contract; and
- b. The Contractor furnishes certified receipt that it has acquired title and paid invoices for such material and that the material will be used to perform this Contract.

20.1.5 On the 25th of each month the Contractor will submit his request for payment. Prior to that submittal the County will review the requested percentage of completion for each activity. The payment request will be in the format as provided by the County and will refer to the schedule.

20.1.6 Upon receipt of a payment request, the County shall:

- a. Review that request as soon as practicable after receipt for the purpose of determining that the payment request is a proper payment request; and
- b. Any payment request determined not to be a proper request suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) calendar days after receipt. The returned request for payment shall be accompanied by a document setting forth in writing the reasons why the payment request is not proper.

20.1.7 Any progress payment which is undisputed and properly submitted and remains unpaid for thirty (30) calendar days after receipt by County shall accrue interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the California Code of Civil Procedure. The number of days available to the County to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the County exceeds the seven-day return requirement set forth in 20.1.6 above.

20.1.8 In making these progress payments, there shall be retained ten percent (10%) from the amount of each progress payment until the work is 50% complete. After the 50% completion point, if satisfactory progress is being made and at the sole discretion of the County, the retention may be reduced to a minimum of 5% of the contract .

20.1.9 Except as otherwise prohibited by law, the Contractor may elect to receive all payments due under the contract pursuant to this section without any retention, by posting securities in accordance with Public Contract Code Section 22300.

20.1.10 Contractor and each subcontractor shall pay each of its employees engaged in work under this Contract in full (less deductions made mandatory by law) in accordance with California law.

20.1.11 The County may withhold (in excess of retentions) or, on account of subsequently discovered evidence, nullify the whole or a part of any certificate to such extent as may be necessary to protect the County from loss on account of:

- a. Defective work not remedied.
- b. Claims filed or reasonable evidence indicating probable filing of claims.
- c. Failure of the Contractor to make payments properly to subcontractors or for material or labor.
- d. Damage to another Contractor.
- e. Delays in progress toward completion of the work, with the stipulated amount of liquidated damages being withheld for each day of delay for which no extension is granted.
- f. Default of the Contractor in the performance of the terms of the Contract.

20.1.12 Should stop notices be filed with the County, County shall withhold the amount required plus 25% from certificates until such claims shall have been resolved pursuant to applicable law. California Civil Code Section 3179 et seq.

20.1.13 At the election of the County, Contractor shall provide, within ten (10) calendar days of receipt of each progress payment, unconditional waivers and release of lien rights, signed by Contractor and each of its subcontractors and materials suppliers, in the form established therefore by Section 3262 of the Civil Code.

20.1.14 All material and work covered by progress payments made shall, at the time of payment, become the sole property of the County, but this shall not be construed as:

- a. An acceptance of any work not in accordance with the Contract Documents; or
- b. Waiving the right of the County to require the fulfillment of all of the terms of the contract.

20.2 FINAL PAYMENT

20.2.1 GENERAL

- a. The County shall pay the amount due the Contractor under this Contract after:
 - 1.) The Acceptance of all work and Notice of Completion per the terms of this Contract;
 - 2.) Presentation of a properly executed voucher;
 - 3.) Release of all liens and Stop Notices; and
 - 4.) Presentation of release of all claims against the County arising by virtue of this Contract, other than claims and disputes in stated amounts, that the Contractor has specifically excepted from the operation of the release.
- b. The Contractor may, if any subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the County, to indemnify him against any lien.

20.2.2 FINAL CERTIFICATE FOR PAYMENT

- a. When the work is ready for acceptance by the County, the Department of Facilities Management will certify and submit to the Board of Supervisors a Notice of Completion. Upon approval of the Notice of Completion, a copy will be sent to the Contractor.
- b. Notice of Completion will be recorded by the County upon completion and Acceptance of the Work. Providing no stop notices have been filed, thirty-five (35) calendar days after filing of such Notice of Completion, payment due under the contract will become due to the Contractor and the County shall so certify authorizing the final payment.

20.2.3 FINAL PAYMENT

- a. After Acceptance of Work, the County will submit to Contractor a statement of the sum due Contractor under this contract, together with County payment in the amount thereof. Said statement shall take into account the contract price, as adjusted by any change orders; amounts already paid; sums to be withheld for incomplete work; liquidated damages; and for any other cause under the Contract.
- b. The Contractor shall, from the effective date of Acceptance until the expiration of four years after final settlement under this Contract, preserve and make available to the County, all its books, records, documents, and other evidence bearing on the costs and expenses of the Contractor under this Contract.

ARTICLE 21 SUSPENSION OF WORK/TERMINATION

21.1 NON-COMPLIANCE WITH CONTRACT REQUIREMENTS

21.1.1 In the event the Contractor, after receiving written notice from the County of non-compliance with any requirement of this Contract, fails to promptly initiate appropriate action to comply with the specified requirement, the County shall have the right to withhold payment for work completed under the Contract until the Contractor has complied with the notice or has initiated such action as may be appropriate to comply, within a reasonable period of time. The Contractor shall not be entitled to any extension of contract time or payment for any costs incurred for work under this article.

21.1.2 Should the Contractor abandon the Work called for under the Contract, or assign his Contract, or unnecessarily and unreasonably delay the work, or willfully violate or perform the work in bad faith, the County shall 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 County may designate, and the County shall have the power to employ such persons as it may consider desirable, and to obtain by contract, purchase, hire or otherwise, such implements, tools, material or materials as the County may deem advisable to work at and be used to complete the work herein described, or such part thereof as shall have not been completed, and to use such material as it may find upon the site of the work, and to charge the expense of such labor and material, implements and tools to the Contractor, and the expense so charged shall be deducted and paid by the County out of such monies as may either be due, or may at any time thereafter become due to the Contractor under the Contract.

21.2 TERMINATION

21.2.1 TERMINATION FOR BREACH

If the Contractor should be adjudged bankrupt or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he or any of his subcontractors should violate any of the provisions of the Contract, the County may serve written notice upon him and his surety of its intention to terminate Contractor's performance hereunder, said notice shall contain the reasons for such intention to terminate Contractor's performance, and, unless within ten (10) calendar days after serving of said notice, such violation shall cease and satisfactory arrangements for correction thereof be made, Contractor's performance shall, upon the expiration of said ten (10) calendar days, cease and terminate. In the event of any such termination, the County shall immediately serve written notice thereof upon the surety and the Contractor, and the County may take over the Contractor's work and prosecute the same to completion by contract or by any other method it may deem advisable, for the account and at the expense of the Contractor, and the Contractor and his surety shall be liable to the County for any excess cost occasioned the County thereby, and in such event the County may without liability for so doing take possession of and utilize in completing the work, such materials, appliances, plants, and other property belonging to the Contractor as may be on the site of the work and necessary therefore.

21.2.2 TERMINATION FOR CONVENIENCE

a. If the construction of the project herein is damaged, which damage is determined to have been proximately caused by an Act of God, in excess of 5% of the contract amount, provided that the work damaged is built in accordance with applicable building standards and the plans and specifications, then the County may, without prejudice to any other right or remedy, terminate the Contract.

b. The County may terminate performance of work under this Contract in whole or in part, if the County determines that a termination is in the County's interest. The County shall terminate by delivering to the Contractor a Notice to Terminate specifying the extent of termination and the effective date.

c. After receipt of such Notice, and except as directed by the County, the Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due

under this clause:

- (1) Stop work as specified in the notice.
- (2) Place no further subcontracts or orders (referred to as subcontracts in this clause) for materials, services, or facilities, except as necessary to complete any continued portion of the Contract.
- (3) To terminate all subcontracts to the extent they relate to the work terminated.
- (4) With approval or ratification to the extent required by the County, settle all outstanding liabilities and termination settlement proposals arising from termination of subcontracts; the approval or ratification will be final for purposes of this clause.
- (5) As directed by the County, transfer title and deliver to the County (1) the fabricated or unfabricated parts; work in progress, completed work, supplies, and other material produced or acquired for the work terminated; and (2) the completed or partially completed plans, drawings, information, and other property that, if the contract had been completed, would be required to be furnished to the County.
- (6) Complete performance of work not terminated.
- (7) Take any action that may be necessary, or that the County may direct, for the protection and preservation of the property related to this contract that is in the possession of the Contractor and in which the County has or may acquire an interest.
- (8) Use its best efforts to sell, as directed or authorized by the County, any property of the types referred to in subparagraphs above; provided, however, that the Contractor (1) is not required to extend credit to any purchaser and (2) may acquire the property under the conditions prescribed by, and at prices approved by the County. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by the County under this contract, credited to the price or cost of the work, or paid in any other manner directed by the County.

d. After termination, the Contractor shall submit a final termination settlement proposal to the County in the form and with the certification prescribed by the County. The Contractor shall submit the proposal promptly, but no later than thirty (30) days from the effective date of termination. If the Contractor fails to submit the proposal within the time allowed, the County may determine, on the basis of information available, the amount, if any, due the Contractor because of the termination and shall pay the amount determined.

e. Subject to subparagraph (2) above, the Contractor and the County may agree upon the whole or any part of the amount to be paid because of the termination. The amount may include a reasonable allowance for profit on work done. However, the agreed amount may not exceed the total contract price as reduced by:

- (1) the amount of payments previously made and;
- (2) the contract price of work not terminated. The contract shall be amended with a Change Order, and the Contractor paid the agreed amount.

f. If the Contractor and County fail to agree on the whole amount to be paid the Contractor because of the termination of work, the County shall pay the Contractor the amounts determined as follows:

- (1) For contract work performed before the effective date of termination, the total (without duplication of any terms) of:
 - (i) The cost of this work;
 - (ii) The cost of settling and paying termination settlement proposals under terminated subcontracts that are properly chargeable to the terminated portion of the contract if not included in subdivision (i) above; and
 - (iii) A sum, as profit on (i) above, determined by the County to be fair and reasonable; however, if it appears that the Contractor would have sustained a loss on the entire contract had it been completed, the County shall allow no profit under this subdivision (iii).
- (2) The reasonable costs of settlement of the work terminated including:
 - (i) Accounting, clerical, and other expenses reasonably necessary for the preparation of termination settlement proposals and supporting data; and
 - (ii) Storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory.

g. Except for normal spoilage, the County shall exclude from the amounts payable to the Contractor the fair value, as determined by the County, of defective work, and of property that is destroyed, lost, stolen, or damaged so as to become undeliverable.

h. The Contractor shall have the right to make a claim under the DISPUTES article, from any determination made by the County.

i. In arriving at the amount due the Contractor, there shall be deducted:

- (1) All unliquidated advance or other payments to the Contractor under the terminated portion of this Contract;
- (2) Any claim which the County has against the Contractor under this Contract; and
- (3) The agreed price for, or the proceeds of sale of, materials, supplies, or other things acquired by the Contractor or sold under the provisions of this clause and not recovered by or credited to the County.

j. If the termination is partial, the Contractor may file a proposal with the County for a Change Order of the price(s) of the continued portion of the Contract. The County shall process any Change Order agreed upon. Any proposal by the Contractor for an equitable adjustment under this clause shall be requested within thirty (30) days from the effective date of termination unless extended in writing by the County.

k. The County may, under the terms and conditions it prescribes, make partial payments and payments against costs incurred by the Contractor for the terminated portion of the Contract, if the County believes the total of these payments will not exceed the amount to which the Contractor will be entitled. If the total payments exceed

the amount finally determined to be due, the Contractor shall repay the excess to the County upon demand, together with interest.

1. Unless otherwise provided in this Contract or by statute, the Contractor will maintain all records and documents relating to the terminated portion of this Contract for 4 years after final settlement. This includes all books and other evidence bearing on the Contractor's costs and expenses under this Contract. The Contractor shall make these records and documents available to the County, State and/or the U.S. Government or their representatives' at all reasonable times, without any direct charge.

ARTICLE 22 DISPUTES/CLAIMS

22.1 CLAIMS RESOLUTION

In accordance with Public Contract Code Sections 20104 20104.6 and other applicable law, public works claims of \$375,000 or less which arise between the Contractor and the Owner shall be resolved under the following the statutory procedure unless the Owner has elected to resolve the dispute pursuant to Public Contract Code Section 10240 et seq.

- a. All claims shall be submitted in writing and accompanied by substantiating documentation. Claims must be filed on or before the date of final payment unless other notice requirements are provided in the contract. "Claim" means a separate demand by the claimant for (1) a time extension, (2) payment of money or damages arising from work done by or on behalf of the claimant and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled, or (3) an amount the payment of which is disputed by the Owner.
- b. Claims Under \$50,000. The Owner shall respond in writing to the claim within 45 days of receipt of the claim, or, the Owner may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims the Owner may have. Of additional information is needed thereafter, it shall be provided upon mutual agreement of the Owner and the claimant. The Owner's written response shall be submitted 15 days after receiving the additional documentation, or within the same period of time taken by the claimant to produce the additional information, whichever is greater.
- c. Claims over \$50,000 but less than or equal to \$375,000. The Owner shall respond in writing within 60 days of receipt, or, may request in writing within 30 days of receipt of the claim, any additional documents supporting the claim or relating to defenses or claims the Owner may have against the claimant. If additional information is needed thereafter, it shall be provided pursuant to mutual agreement between the Owner and the claimant. The Owner's response shall be submitted within 30 days after receipt of the further documents, or within the same period of time taken by the claimant to produce the additional information or documents, whichever is greater. The Contractor shall make these records and documents available to the County, State and/or the U.S. Government or their representatives' at all reasonable times, without any direct charge.
- d. If the claimant disputes the Owner's response, or if the Owner fails to respond within the statutory time period(s), the claimant may so notify the Owner within 15 days of the receipt of the response or the failure to respond, and demand an informal conference to meet and confer for settlement. Upon such demand, the Owner shall schedule a meet and confer conference within 30 days.

- e. If following the meet and confer conference, the claim or any portion thereof remains in dispute, the claimant may file a claim pursuant to Government Code 900 et seq. and Government Code 910 et seq. For purposes of those provisions, the time within which a claim must be filed shall be tolled from the time the claimant submits the written claim until the time the claim is denied, including any time utilized for the meet and confer conference.
- f. If a civil action is filed to resolve any claim, the provisions of Public Contract Code 20104.4 shall be followed, providing for nonbinding mediation and judicial arbitration.

22.2 CLAIM FORMAT/REQUIREMENTS

22.2.1 The Contractor will submit the claim justification in the following format:

- a. Summary of claim merit and price plus clause under which the claim is made.
- b. List of documents relating to claim
 - (a) Specifications
 - (b) Drawings
 - (c) Clarifications (RFIS)
 - (d) Schedules
 - (e) Other
- c. Chronology of events and correspondence
- d. Analysis of claim merit
- e. Analysis of claim cost
- f. Analysis of Time in CPM format
- g. Cover letter and certification (form included herein)

22.2.2 If any claim submitted includes a request for overhead, the County may request a Profit & Loss statement and supporting documentation from Contractor. If requested, such documentation must be submitted for the County to consider the claim.

22.2.3 Submission of a claim, properly certified, with all required supporting documentation, and written rejection or denial of all or part of the claim by County, is a condition precedent to any action, proceeding, litigation, suit, general conditions claim, or demand for arbitration by Contractor.

22.3 NOTICE OF THIRD PARTY CLAIMS

The County shall provide notification to the Contractor within a reasonable time after receipt of any third-party claim relating to the Construction Contract.

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SECTION 01005 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, and other Division1 Specification Sections, apply to this Section.

1.02 PROJECT DESCRIPTION

- A. The Project consists of modernization of the Hemet Service Center located at 749 N. State Street, Hemet, CA 92543, as shown on Contract Documents prepared by Westberg + White, Inc., Architects and Planners.

1.03 CONSTRUCTION REQUIREMENTS

- A. All work shall conform to the requirements of the 2007 California Building Code (CBC) Title 24, Part 2.
- B. Changes to the approved documents shall be made by addenda or change order approved by the Owner and the authority having jurisdiction.

1.04 PROJECT ADMINISTRATION

- A. The Owner is the **County of Riverside, c/o Riverside County Economic Development Agency, 3403 10th Street, Suite 200, Riverside, CA 92501.**
- B. The Architect of Record is **Westberg + White, Inc., 14471 Chambers Road, Suite 210, Tustin, CA. 92780.**
 - 1. The Architect has construction phase responsibilities to the extent listed in the contract between the Owner and Architect, and as mandated by Title 24, California Code of Regulations.
 - 2. All communication with the Owner shall be through the Architect.

1.05 WORK SEQUENCE

- A. All work shall be completed within the time allotted in the approved Master Construction Schedule, including updates and revisions made by the Contractor. The contract closeout procedure as specified in Section 01700 shall be completed within the time allotted in the Master Construction Schedule. By submitting a bid and entering into a contract with the Owner, Contractor certifies that he has adequate resources and is fully capable of completing the work within the allotted time indicated in the Master Construction Schedule.

1.06 CONTRACTOR USE OF PREMISES

- A. General: Limit use of the premises to construction activities in areas indicated.

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1. Contractor will determine the time of day for construction work to begin and end based upon local ordinances, site and seasonal. Provide parking and staging areas. Provide secured storage (if required).
2. Confine operations within the Contract limits indicated. Portions of the site beyond the Contract limits indicated are not to be disturbed.

- B. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

1.07 PORTIONS OF THE WORK PERFORMED OR PROVIDED BY THE OWNER

- A. The Owner will identify all items that are Owner Furnish Owner Installed (OFOI) and the General Contractor shall inform the Owner as to when this work will be allowed to start and/or continue to keep within the Contractor's overall schedule.
- B. The Owner will identify all items that are Owner Furnish Contractor Installed (OFCI) and the General Contractor shall inform the Owner as to when this work will be required to start and/or continue to keep within the Contractor's overall schedule.

1.08 OCCUPANCY

- A. At completion, the Owner will occupy the project in the manner outlined in Section 01700, Project Closeout, and as set forth in the General Conditions of the Contract.
- B. Prior to Owner occupancy, the mechanical and electrical systems shall be fully operational and the required inspections, tests and balancing shall have been successfully completed. Upon occupancy the Contractor will provide the Owner with operation and maintenance manuals of the building systems.
- C. Upon occupancy the Owner will assume operation and maintenance of the building systems in occupied portions of the building.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

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SECTION 01030 - ALTERNATES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for Alternates.
- B. Definition: An Alternate is an amount proposed by bidders and stated on the bid form for certain construction activities defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed or in the products, materials, equipment, systems or installation methods described in Contract Documents.
- C. Coordination: Coordinate related work and modify or adjust adjacent work as necessary to ensure that work affected by each accepted Alternate is complete and fully integrated into the project. Include all costs for this work in the cost of each Alternate.
- D. Notification: Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.
- E. Schedule: A "Schedule of Alternates" is included at the end of this section. Specification sections referenced in the schedule contain requirements for materials and methods necessary to achieve the work described under each Alternate.
 - 1. Include as part of each Alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SCHEDULE OF ALTERNATES

-NO ALTERNATES LISTED-

END OF SECTION

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SECTION 01035 - MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 specification sections, apply to this section.

1.02 SUMMARY

- A. This section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.03 MINOR CHANGES IN THE WORK

- A. Supplemental instructions authorizing minor changes in the work, not involving an adjustment to the Contract sum or Contract time, will be issued by the Architect on AIA form G710, Architect's Supplemental Instructions.

1.04 CHANGE ORDER PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Proposed changes in the work that will require adjustment to the Contract sum or Contract time will be issued by the Architect, with a detailed description of the proposed change and supplemental or revised drawings and specifications, if necessary.
 - 1. Proposal requests issued by the Architect are for information only. Do not consider them an instruction either to stop work in progress, or to execute the proposed change.
 - 2. Unless otherwise indicated in the proposal request, within ten (10) days of receipt of the proposal request, submit to the Architect for the Owner's review an estimate of cost necessary to execute the proposed change.
 - a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
- B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
 - 1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract sum and Contract time.
 - 2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.

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3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Comply with requirements in Section 01631, Product Substitutions, if the proposed change in the Work requires the substitution of one product or system for a product or system specified.
- C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests, or approved equal.
1. Contractor is to fill out completely and include all information for review.

1.05 CONSTRUCTION BULLETIN

- A. Construction Bulletin: Directs the Contractor to make a change to the Project before the Owner and Contractor have agreed upon the proposed change in contract sum or time. The Construction Bulletin will be incorporated into a change order once the Owner and the Contractor have agreed upon time and cost impact of the work.
1. The Construction Bulletin will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract sum or Contract time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Bulletin.
1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.06 CHANGE ORDER PROCEDURES

- A. Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and Contractor on AIA Form G701, as provided in the General Conditions of the Contract.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work. Refer to Division-15 and Division-16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.
- C. Demolition of selected portions of the building for alterations is included in Section 02221, Demolition.

1.02 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
 - 1. Obtain approval before cutting and patching the following structural elements:
 - a. Foundation construction.
 - b. Bearing and retaining walls.
 - c. Structural concrete.
 - d. Structural steel.
 - e. Lintels.
 - f. Timber and primary wood framing.
 - g. Structural decking.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended or result in increased maintenance or decreased operational life or safety.
 - 1. Obtain Architect's approval before cutting and patching the following operating elements or safety related systems:
 - a. Shoring, bracing, and sheeting.
 - b. Primary operational systems and equipment.
 - c. Air or smoke barriers.
 - d. Water, moisture, or vapor barriers.
 - e. Membranes and flashings.
 - f. Fire protection systems.
 - g. Noise and vibration control elements and systems.
 - h. Control systems.
 - i. Communication systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic

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qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:
 - a. Processed concrete finishes.
 - b. Stonework and stone masonry.
 - c. Stucco and plaster.
 - d. Acoustical ceilings.
 - e. Finished wood flooring.
 - f. Carpeting.
 - g. HVAC enclosures, cabinets or covers.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding if unsafe or unsatisfactory conditions are encountered.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

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1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible, review proposed procedures with the original installer. Comply with the original installer's recommendations.
1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
 4. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.
 5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.
 4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.
- 3.04 CLEANING
- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access.

END OF SECTION

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SECTION 01080 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 specification sections, apply to this section.

1.02 SUMMARY

- A. This section specifies administrative and procedural requirements governing the Contractor's applications for payment.
- B. The Contractor's construction schedule and submittal schedule are included in Section 01300, Submittals.

1.03 SCHEDULE OF VALUES

- A. Coordinate preparation of the schedule of values with preparation of the Contractor's construction schedule.
 - 1. Correlate line items in the schedule of values with other required administrative schedules and forms, including:
 - a. Contractor's Construction Schedule.
 - b. Application for Payment form.
 - c. List of Subcontractors.
 - d. Schedule of Allowances.
 - e. Schedule of Add/Alternates.
 - f. List of products.
 - g. List of principal suppliers and fabricators.
 - h. Schedule of Submittals.
 - 2. Submit the schedule of values to the Architect at the earliest feasible date, but in no case later than fourteen (14) days before the date scheduled for submittal of the initial application for payment.
 - 3. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
- C. Format and Content:
 - 1. Identification: Include the following project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of the Architect.
 - c. Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange the schedule of values in a tabular form with separate columns to indicate the following for each item listed:

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- a. Generic name.
 - b. Related specification section.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that have affected value.
 - g. Dollar value.
 - h. Percentage of Contract sum to the nearest one-hundredth percent, adjusted to total 100 percent.
3. Provide a breakdown of the Contract sum in sufficient detail to facilitate continued evaluation of applications for payment and progress reports. Break principal subcontract amounts down into several line items.
 4. Round amounts off to the nearest whole dollar; the total shall equal the Contract sum.
 5. For each part of the Work where an application for payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the schedule of values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in applications for payment. Each item in the schedule of values and applications for payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
 - a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the schedule of values or distributed as general overhead expense.
 7. Schedule Updating: Update and resubmit the schedule of values when Change Orders or Bulletins result in a change in the Contract sum. Submit along with updated construction schedule prior to monthly progress payment submittal

1.04 APPLICATIONS FOR PAYMENT

- A. Each application for payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
 1. The initial application for payment, the application for payment at time of Substantial Completion, and the final application for payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is the 15th day of each month. The period of construction Work covered by each application for payment is the period ending fifteen (15) days prior to the date for each progress payment and starting the day following the end of the preceding period.
- C. Payment Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for application for payment or approved equal.
- D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions have been made.
 2. Include amounts of approved Change Orders issued prior to the last day of the construction period covered by the application.

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- E. Transmittal: Submit five (5) executed copies of each application for payment to the Architect by means ensuring receipt within twenty-four (24) hours; one copy shall be complete, including waivers of lien and similar attachments, when required.
1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.
- F. Waivers of Mechanics Lien: When requested by the Architect or Owner, with each application for payment, submit waivers of mechanics lien from every entity who may lawfully be entitled to file a mechanics lien arising out of the Contract, and related to the Work covered by the payment.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first application for payment include the following:
1. List of subcontractors.
 2. List of principal suppliers and fabricators.
 3. Schedule of Values.
 4. Contractor's Construction Schedule (preliminary if not final).
 5. Submittal Schedule (preliminary if not final).
 6. Certificates of insurance and insurance policies.
 7. Performance and Payment Bonds
- H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an application for payment. This application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Administrative actions and submittals that shall proceed or coincide with this application include:
1. Occupancy permits and similar approvals.
 2. Warranties (guarantees) and maintenance agreements.
 3. Test/adjust/balance records.
 4. Maintenance instructions.
 5. Meter readings.
 6. Start-up performance reports.
 7. Changeover information related to Owner's occupancy, use, operation and maintenance.
 8. Final cleaning.
 9. Application for reduction of retainage, and consent of surety.
 10. Advice on shifting insurance coverage.
 11. Record drawings and specifications.
 12. Final progress photographs.
 13. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- J. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final payment application for payment include the following:
1. Completion of project closeout requirements.
 2. Completion of items specified for completion after Substantial Completion.
 3. Assurance that unsettled claims will be settled.
 4. Assurance that Work not complete and accepted will be completed without undue delay.
 5. Transmittal of required project construction records to Owner.
 6. Proof that taxes, fees and similar obligations have been paid.

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7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish and similar elements.
9. Change of door locks to Owner's access.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DEFINITIONS

- A. General: Basic contract definitions are included in the General Conditions of the contract.
- B. Indicated: The term "Indicated" refers to graphic representations, notes or schedules on drawings, or other paragraphs or schedules in specifications, and similar requirements in contract documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used, it is to help locate the reference; no limitation of location is intended except as specifically noted.
- C. Directed: Terms such as "directed", "requested", "authorized," "selected", "approved", "required", and "permitted" mean "directed by Architect", "requested by Architect", and similar phrases. However, no implied meaning shall be interpreted to extend Architect's responsibility into Contractor's area of construction supervision.
- D. Approved: The term "approved," where used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in General Conditions of the contract.
- E. Regulations: The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the work.
- F. Furnish: The term "furnish" is used to mean "supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar operations."
- G. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimensions, finishing, curing, protecting, cleaning, and similar operations."
- H. Provide: The term "provide" means "furnish and install, complete and ready for intended use."
- I. Installer: An "installer" is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or sub-subcontractor, for the performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
- J. Project Site: The Project Site is the space available to the Contractor for the performance of construction activities, either exclusively or in conjunction with others performing other construction activities as part of the Project. The extent of the Project Site is shown on the drawings and may or may not be identical with the description of the land upon which the Project is to be built.

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- K. Testing Laboratories: A "Testing Laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.03 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference. Individual Sections indicate which codes and standards the Contractor must keep available at the Project Site for reference.
- B. Publication Dates: Comply with the standard in effect as of the date of the Contract Documents.
- C. Copies of Standards: Each entity engaged in construction on the project is required to be familiar with industry standards. Applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are required by individual specification sections or are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.
- D. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different, but apparently equal, and uncertainties to the Architect for a decision before proceeding.

1.04 GOVERNING REGULATIONS/AUTHORITIES

- A. The Architect has contacted authorities having jurisdiction where necessary to obtain information necessary for preparation of Contract Documents; that information may or may not be of significance to the Contractor. The Owner and the Architect, at the request of the Contractor, are to contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

1.05 SUBMITTALS

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01100 - PROJECT COORDINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
 - 1. Coordination.
 - 2. Administrative and supervisory personnel.
 - 3. General installation provisions.
 - 4. Cleaning and protection.
- B. Requirements for the Contractor's Construction Schedule are included in Section 01300, Submittals.

1.03 COORDINATION

- A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.
 - 1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
 - 2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
 - 1. Prepare similar memoranda for the owner and separate Contractors where coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of schedules.
 - 2. Installation and removal of temporary facilities.
 - 3. Delivery and processing of submittals.
 - 4. Progress meetings.
 - 5. Project close-out activities.

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- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

1.04 SUBMITTALS

- A. Staff Names: Within fifteen (15) days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.
 - 1. Post copies of the list in the Project meeting room, the temporary field office and each temporary telephone.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

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3.02 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

END OF SECTION

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SECTION 01120 - ALTERATION PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The requirements of all other sections of the specifications apply to this section. This Section covers the general requirements for special project procedures pertaining to the alteration of existing construction, and is complementary to similar requirements indicated or specified elsewhere.
- B. Work In This Section: Principal items include:
 - 1. Removals, cutting, alterations, and repairs to existing facilities as required to complete the work.
 - 2. Relocation and reinstallation of existing construction and finish.
 - 3. Salvage, storage, and protection of existing items to be reinstalled.
 - 4. Salvage and delivery to Owner of designated removed items as directed.
 - 5. Cleaning and sealing existing ceramic tile surfaces.

1.02 DESIGN INTENT

- A. The intent of the drawings and specifications is to perform alterations to the school buildings in accordance with Title 24, California Code of Regulations. If any conditions develop that are not covered by the contract documents wherein the finished work would not comply with said Title 24, California Code of Regulations, a change order detailing and specifying the required work shall be submitted to and approved by the Architect and the Owner before proceeding with the work.

1.03 SUBMITTALS

- A. Work Schedule: Perform work in existing facilities during such hours and by methods as are approved by Owner. Submit proposed schedules itemizing dates and hours that the various items of work in existing facilities will be started and completed. The Owner reserves the right to modify the proposed schedules to eliminate conflicts and ensure use of the existing facilities during the work. Exactly follow the schedule as finally approved by Owner. No extra payment will be made to the Contractor for the portions of the work required to be performed during night, Saturday, Sunday, or holiday hours. Revise and resubmit schedules when timing or sequence changes occur or are ordered by Owner.
- B. Cutting: Prior to cutting that affects structural safety, submit written request to the Architect for permission to proceed with cutting.
- C. Manufacturer's Data: Submit complete manufacturer's technical data and application instructions for concrete floor leveling materials, ceramic tile cleaning materials and brick cleaning and sealing materials.

1.04 ENVIRONMENTAL CONDITIONS

- A. Hazardous Materials: Prior to starting work, obtain certification from the Owner that hazardous materials have been removed. In the event additional material, which is suspected to be friable

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asbestos, or other regulated hazardous material is encountered during the demolition work, the Contractor shall stop work in such areas and notify the Owner. The material will be inspected and tested, if necessary, by the Owner. If the material is found to be friable asbestos or other hazardous material, the Owner will provide for its removal or encapsulation without delay at Owner's expense. After treatment, the Owner will test and certify that the contamination has been removed or controlled to within legal requirements and Contractor will be notified in writing to proceed with the work.

- B. Special Noise Restrictions: Use care to prevent generation of unnecessary noise and keep noise levels to the minimum possible. When ordered by Owner or Architect, immediately discontinue such methods that produce noise disruptive or harmful to facility functions and occupants, and employ unobjectionable methods. Equip air compressors, tractors, cranes, hoists, vehicles, and other internal combustion engine equipment with "residential" grade mufflers, and muffle the unloading cycle of compressors. Limit use of impact tools to times and locations as approved. Remove from the site any equipment producing objectionable noise as determined by Owner or Architect.
- C. Dust Control: Take appropriate action to check the spread of dust, and to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions, such as flooding or pollution. Comply with all dust regulations imposed by local air pollution agencies. Remove dust and dirt from work area at least daily or more frequently as needed or directed.
- D. Pest Control: Take appropriate measures to prevent the spread of pests and vermin from areas where work is being performed to other areas including the site and adjacent buildings.

1.05 JOB CONDITIONS:

- A. General: Coordinate work of other sections and with the Owner to assure the correct sequence, limits, methods, and times of performance. Arrange the work to impose minimum of hardship on operation and use of the facilities. Install protection for existing facilities, contents, and new work against dust, dirt, weather, damage and vandalism, and maintain and relocate protection measures as work progresses.
- B. Access: Confine entrance and exit operations to access routes designated by the Owner.
- C. Existing Portable Items: Owner will remove portable equipment, furniture and supplies from involved existing areas prior to start of work therein. Cover and protect remaining items.
- D. Verification of Conditions: Perform a detailed survey of existing site and building conditions pertaining to the work before starting work. Report to Architect discrepancies or conflicts between the drawings and actual conditions in writing for clarification and instructions and do not perform work where such discrepancies or conflicts occur prior to receipt of Architect's instructions.
- E. Shoring and Bracing: Provide supports, shoring, and bracing required to preserve the structural integrity and prevent collapse of existing construction that is cut into or altered as a part of the work.
- F. Overloading: Do not overload any part of the structures beyond the safe carrying capacity by placing of materials, equipment, tools, machinery, or any other item thereon.
- G. Building Security: Secure building entrances and exits with locking or another approved method in accordance with the Owner's instructions.

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- H. Use of Owner's Telephones: Do not use nor allow anyone other than Owner's employees to use telephone in rooms and spaces turned over to Contractor for the Work except in the case of a bona fide emergency. Reimburse to the Owner all telephone toll charges originating from the telephones in such rooms and spaces except those arising from emergencies or use by Owner's employees.
- I. Welding: Conform to following requirements where welding is performed in or on existing facilities.
 - 1. Protection During Welding: Conform to Title 8, CCR. Further protect occupants and the public with portable solid vision barricades around locations where welding is performed plus signs warning against looking at welding without proper eye protection, or equivalent.
 - 2. Fire Extinguishers: Maintain a fully charged UL-labeled minimum 4A/60BC fire extinguisher at every location where welding is performed within or on the facilities.
 - 3. Welding Smoke Control: Verify locations of existing smoke detectors. Perform welding operations by methods that produce the minimum feasible smoke and fumes. Furnish portable type smoke collection and ventilating equipment as required to prevent smoke and fume nuisances. Notify Owner at least 48 hours in advance if temporary deactivation of any smoke detector is required to prevent false alarms from the welding operations. The Owner's personnel will deactivate detectors only for the time welding is actually in progress.
 - 4. Fire Prevention: Before welding, examine existing construction and backing for all combustible materials and finishes and for conditions where heat conduction in metals may bring adjoining materials to ignition temperature. Use positive fire prevention measures including temporary removal and reinstallation of combustible materials, installation of temporary shields and/or heat sinks, and other necessary means. When actual field conditions are such that positive fire prevention measures cannot be achieved, notify Architect and do not proceed with the involved Work until receipt of Architect's instructions,
- J. Protection of Floors: Use care to protect all floor surfaces and coverings from damage. Protect existing floor finishes to remain with heavy kraft paper or other covering. Equip mobile equipment with pneumatic tires.

1.06 EXISTING CONDITIONS

- A. The intent of the drawings is to show existing site and building conditions with information developed from the original construction documents, field surveys, and Owner's records, and to generally show the amount and types of demolition and removals required to prepare existing areas for new work. Contractor shall make a detailed survey of existing conditions pertaining to the work before commencing demolition. Report discrepancies between drawings and actual conditions to the Architect for instructions, and do not perform any removal work where such discrepancies occur prior to receipt of the Architect's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. General Requirements that Work be complete:
 - 1. Provide same products or types of construction as that in existing structure, as needed to patch, extend or match existing work.

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- a. Generally Contract Documents will not define products or standards of workmanship present in existing construction; Contractor shall determine products by inspection and any necessary testing, and workmanship by use of the existing as a sample of comparison.
 2. Presence of a product, finish, or type of construction, that requires patching, extending or matching shall be performed as necessary to make work complete and consistent to identical standards of quality.
- B. Material for Concrete Floor Leveling: Self-leveling, self smoothing, cementitious, factory mixed compound requiring only addition of water at the site. Materials shall be manufactured by Ardex, Inc., 630 Stoops Ferry Road, Coraopolis, PA 15108, (412) 264-4240.
1. Primer for porous (concrete) surfaces: Ardex P-51.
 2. Primer for non-porous surfaces, such as sealed concrete, ceramic and quarry tile, wood, etc.: Ardex P-82 Ultra Prime.
 3. Leveling compound for surfaces to be covered by other materials, Ardex K-15, having the following properties:
 - a. Initial set, ASTM C191: 30 minutes at 70 degrees F.
 - b. Final set, ASTM C191: 2 hours at 70 degrees F.
 - c. Compressive strength 2630 psi after 24 hours,
 - d. ASTM C109 4100 psi after 28 days
 - f. Flexural strength 770 psi after 24 hours,
 - g. ASTM C348 100 psi after 28 days
 - h. Flammability, ASTM E84: Flame spread: 0
 - i. Smoke developed: 0
 - j. Fuel contributed: 0
 4. Use formable type for constructing ramps to door thresholds and elsewhere as required.
 5. Leveling compound for surfaces to remain exposed: Ardex K-500 Self-Leveling Fast Track Concrete Topping. Minimum properties shall be not less than those specified above.
- C. Materials for Cleaning Ceramic Tile: Aqua Mix Products, manufactured by Aqua Mix Inc., 12940 Sunnyside Place, Santa Fe Springs, CA 90670 (310) 946-6877.
- D. Materials for Cleaning Brick Masonry: Sure Klean restoration products, manufactured by ProSoCo, Inc., PO Box 171677, Kansas City, KS 66117, (913) 281-2700.

PART 3 -EXECUTION

3.01 WORKMANSHIP

- A. Removal of Equipment From Utility Lines to Remain: Where equipment connected to piping, conduit or ductwork is to be removed, disconnect the equipment from the service, and make the separation at appropriate joints before moving.
- B. Locate, identify, stub off and disconnect utility services that are not indicated to remain.
 1. Provide by-pass connection as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shut-down of service is necessary during change-over.

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3.02 REMOVALS, ALTERATIONS, AND REPAIRS

- A. Basic Requirement: Restore and refinish all new and existing construction and improvements that are cut into, altered, damaged, relocated, reinstalled, or left unfinished by removals to original condition or to match adjoining Work and finishes unless otherwise shown, specified, directed, or required. Workmanship and materials shall conform to applicable provisions of other Sections. Provide new fasteners, connectors, adhesives, and other accessory materials as required to fully complete approved re-installations and restorations. Where restorations and refinishing are defective or are otherwise not acceptable to Owner, remove all the defective or rejected materials and provide new acceptable materials and finish at no extra cost to Owner.
- B. Extent: Perform removals to extent required plus such additional removals as are necessary for completion even though not indicated or specified. More or less of the existing construction may be removed if such variation will expedite the Work and reduce cost to the Owner, subject to prior approval in each case.
- C. At completion of removal and demolition work, the Contractor shall compare existing conditions with drawings and with new construction to be attached to, aligned with or otherwise influenced by said existing conditions. In all cases where modifications may be required because of differences between existing conditions and assumed conditions shown or not shown on the drawings, the Contractor shall provide detailed information, dimensions, limitations and other documentation to enable the Architect to design the necessary modifications.
- D. Removals: Carefully remove Work to be salvaged or reinstalled and store under cover.
 - 1. Walls, Partitions, and Ceilings: Remove by cutting down and not by tumbling, throwing, or dropping.
 - 2. Concrete: Saw with powered concrete saw, or chip where sawing is not feasible, to prevent spalling of concrete to remain. Cut off reinforcing bars, except where bonded into new concrete or masonry, and paint ends with bituminous paint before enclosing.
 - 3. Masonry: Remove masonry carefully so as to prevent damage to surfaces to remain and to facilitate the installation of new work. Cut back to joint lines and remove old mortar. Allow space for repairs to backing where applicable. Where new masonry adjoins existing, the new work shall abut or tie into the existing construction as indicated or as specified for new work.
 - 4. Wood Framing: Remove portions as indicated or as required to complete new work. Cut to neat straight lines at points of minimum stress, or provide supplementary supports as required.
 - 5. Woodwork: Cut or remove to a joint or panel line. Undamaged removed material may be reused.
 - 6. Roofing: Remove built-up roofing to effect connections with new flashing or roofing. Cut existing felts and insulation along straight lines. Remove gravel surfacing from existing roofing felts for a distance of not less than 18 inches back from the cut. Remove gravel without damaging felts down to the top ply of felt. Remove roofing and insulation without damaging the roof deck.
 - 7. Sheet Metal: Remove back to joint, lap, or connection. Secure loose or unfastened ends or edges and make watertight.
 - 8. Glass: Remove broken or damaged glass and clean rebates and stops of setting materials.
 - 9. Plaster: Cut back to sound plaster on straight lines, and back-bevel edges of remaining plaster. Trim existing lath and prepare for new lath.

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10. Gypsum Wallboard: Cut back on straight lines to undamaged surfaces, with at least two opposite cut edges centered on supports.
11. Acoustical Ceilings: Remove adhesive from substrates.
12. Tile: Cut back to sound tile and backing on joint lines if portions are to remain. Remove mortar bed unless indicated to be reused. Remove adhesives from substrates.
13. Carpet, Resilient and Other Soft Flooring: Completely remove flooring, tackless strips, edgings, and other accessories, and clean substrates of old cement or adhesive.
14. Sealant: Removal of windows, door frames, panels and similar items, shall include the complete removal of perimeter sealant. Where such items are to remain, inspect the sealant, and if defective, remove the sealant and prepare surfaces for replacement of sealant as specified for new work.
15. Hangers: Where piping, ductwork, suspended ceilings and similar work is removed, completely remove all hanger wires and rods, suspension channels, tees and other devices. Inserts in slabs may remain.
16. Sleeves: Where holes in concrete, masonry or plaster are to be filled, remove sleeves.
17. Miscellaneous Items: Remove items not mentioned but required to be removed in such manner as minimizes damage to Work to remain.

E. Patching, Repairing, and Finishing:

1. Concrete: Keep the cut edges damp for 24 hours and scrub with a neat portland cement mortar just before new concrete is placed. Epoxy adhesive may be used in lieu of cement mortar. Finish new concrete to match existing. Provide 3,000 psi concrete for repairs except 2,000 psi concrete may be used for slabs on grade. At cut concrete edges to remain exposed, apply adhesive and restore with minimum 3/4" thick cement mortar finished to match adjoining surfaces.
2. Openings To Be Closed: Trim edges square and straight, and dampen and grout-scrub or treat with an adhesive as specified above for cut concrete edges. Provide reinforcement as required to match existing concrete. Where installation of concrete is impracticable, fill openings with dry-packed non-shrink grout. Finish to match adjoining surfaces.
3. Metal Items: Grind cut edges to remain exposed until smooth and rounded.
4. Woodwork: Trim back to joint lines or splices, retrim cut surfaces, and patch with new matching, or undamaged removed, materials.
5. Sheet Metal: Restore removed or damaged sheet metal items as required or directed.
6. Roofing: Repair as specified in Division 7 roofing sections.
7. Glass: Install new glass to match adjacent existing.
8. Lath and Plaster: Repair as specified in Section 09220.
9. Gypsum Wallboard: Refasten cut edges of existing wallboard. Apply patches with at least two opposite edges centered on supports and secure at 6" centers

- F. Relocations: Carefully relocate Work to be reinstalled in a new location where indicated on drawings.

3.03 PREPARATION OF EXISTING WORK

- A. Holes: Drill holes through existing concrete or masonry for new conduit and/or piping, and do not jack-hammer.
- B. Sandblasting: Work includes sandblasting of existing surfaces to receive materials secured by cementitious, adhesive, or chemical bond (such as concrete, concrete floor sealer, plaster, mortar, etc.), and the sandblasting of other surfaces as shown, specified, directed, or required for proper preparation of surfaces. Completely remove existing finishes, stains, oil, grease, bitumen, penetrated mastics and adhesives including primers, and substances deleterious to bond or connection of new materials, and expose clean sound surfaces. Employ wet

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sandblasting for interior surfaces, and for exterior surfaces where directed or necessary to prevent creation of a dust nuisance or required by Code.

- C. Filling, Patching and Grinding: Where existing surfaces are shown or required to receive new finish materials, and where such surfaces have cracks, holes, depressions, ridges, foreign materials or other conditions which preclude proper installation of the new finish materials, the existing surfaces shall be reconditioned. Holes, cracks and depressions shall be filled with patching compounds of suitable types compatible with new materials. Ridges and "high spots" shall be ground down. Areas of different planes shall be feathered out. Foreign materials shall be removed by use of solvents where approved, or by sandblasting as specified above. Any other reconditioning as may be required shall be performed to enable existing surfaces to receive new finish materials.

3.04 CONCRETE FLOOR LEVELING (TO DEPTHS OF 1" or MORE)

- A. All existing and new concrete floors which are not level within 1/8" in 10' shall be treated as specified herein:
 - 1. Mixing: Leveling compound shall be mixed 1 bag of compound to not over 7 quarts of water. Where depth of leveling compound will exceed 1/2", fine gravel (1/8"-1/4" gradation) may be added. Mix approximately 2 minutes until material is smooth and lump free.
 - 2. Test Area: Prior to application of floor leveling compound, provide primer and leveling compound on a test area of not less than 4 feet square to assure the suitability of the material for the intended use.
 - 3. Preparation: Floors shall be inspected, and all uneven areas shall be treated by grinding to remove high spots, and with floor leveling compound to eliminate low areas. Floors shall be clean and free from oil, grease, wax, latex compounds, curing compounds dust and foreign matter. Floors shall be primed with appropriate primer for each type of surface.
 - 4. Mix the material in accordance with manufacturer's instructions, and apply and smooth the material over the floor. Where pumping of the material is feasible, use manufacturer's recommended equipment and methods. Featheredge at edges. Where gravel is incorporated into the mix, apply to slightly below final elevation, then apply a thin layer of neat material over the first layer before the first layer has set. Finished surfaces shall be level to within 1/8" in 10 feet in any direction, non-accumulative. Texture of finish shall match adjacent floors.

3.05 CLEANING AND SEALING CERAMIC TILES

- A. Clean all existing ceramic tile surfaces to remain, using materials and methods recommended by cleaning materials manufacturer. Prior to performing work, treat an area 6' square, and obtain approval.

3.06 DISPOSITION OF MATERIALS

- A. Promptly remove from the site all materials resulting from demolition and alteration which are not to be reused.
- B. Burning of materials on site is not permitted.
- C. Store items to be reused in a protected location until reinstallation.

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3.07 SALVAGE OF MATERIALS

- A. Salvage by Contractor for Owner's Use: When directed, Contractor shall salvage items, by removing in good condition, and stock piling as directed, on the site, for Owner warehousing.
- B. Salvage by Contractor for his Own Use: Contractor may remove for his own salvage the balance of materials not claimed by the Owner.

3.08 CLEAN-UP AND REPAIR

- A. Perform periodic and final cleaning.
- B. Upon completion of alteration work, remove tools, equipment and demolished materials from site. Remove protections and leave areas broom clean.
- C. Repair demolition performed in excess of that required, at no extra cost to Owner. Return structures and surfaces to remain to condition existing prior to commencement of alteration work. Repair adjacent construction or surfaces soiled or damaged by alteration work.

END OF SECTION

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SECTION 01200 - PROJECT MEETINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This section specifies administrative and procedural requirements for project meetings including but not limited to:
 - 1. Pre-Construction Conference
 - 2. Progress Meetings
 - 3. Scheduling Conference
- B. Construction schedules are specified in another Division 1 Section.

1.03 PRE-CONSTRUCTION CONFERENCE

- A. Schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: The Owner, Architect and their consultants, the Contractor and his superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
 - 1. Tentative construction schedule.
 - 2. Critical Work sequencing.
 - 3. Designation of responsible personnel.
 - 4. Procedures for processing field decisions and Change Orders.
 - 5. Procedures for processing Applications for Payment.
 - 6. Distribution of Contract Documents.
 - 7. Submittal of Shop Drawings, Product Data and Samples.
 - 8. Preparation of record documents.
 - 9. Use of the premises.
 - 10. Office, Work and storage areas.
 - 11. Equipment deliveries and priorities.
 - 12. Safety procedures.
 - 13. First aid.
 - 14. Security.
 - 15. Working hours.

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1.04 PROGRESS MEETINGS

- A. Conduct weekly progress meetings at the Project site. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees: In addition to representatives of the Owner and Architect, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
 - 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 2. Review the present and future needs of each entity present, including such items as:
 - a. Interface requirements.
 - b. Time.
 - c. Sequences.
 - d. Deliveries.
 - e. Off-site fabrication problems.
 - f. Access.
 - g. Site utilization.
 - h. Temporary facilities and services.
 - i. Hours of Work.
 - j. Hazards and risks.
 - k. Housekeeping.
 - l. Quality and Work standards.
 - m. Change Orders.
 - n. Documentation of information for payment requests.
- D. Meeting Records: The Owner's Representative or the Architect shall record minutes of each meeting and furnish copies within a reasonable time to the Owner and other attendees. Unless written objections to contents of the meeting minutes is received by the Architect within seven (7) calendar days of the meeting, it shall be understood and agreed that the minutes are a true and complete record of the meeting.
 - 1. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule within seven (7) calendar days of the meeting.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:
 - 1. Contractor's construction schedule.
 - 2. Submittal schedule.
 - 3. Shop drawings.
 - 4. Product data.
- B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
 - 1. Permits.
 - 2. Applications for payment.
 - 3. Performance and payment bonds.
 - 4. Insurance certificates.
 - 5. Inspection and test reports.
 - 6. Schedule of values.
 - 7. Progress schedule.
 - 8. List of subcontractors.
- C. The Schedule of Values submittal is included in Section 01080, Applications for Payment.

1.02 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 - 2. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
 - a. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Architect will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
 - b. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
 - 1. Include the following information on the label for processing and recording action taken:
 - a. Project name.

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- b. Date.
- c. Submittal reference number assigned by the contractor; this number should not be the specification section number.
- d. Specification section number to which the submittal applies.
- e. Name and address of Contractor.
- f. Name and address of subcontractor.
- g. Name and address of supplier.
- h. Name of manufacturer.

1.03 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. General: Per General and Supplementary Conditions, prepare a comprehensive Construction Progress Schedule of basic operations of entire Project in form of Critical Path Method (CPM) network.

B. Definitions:

- 1. Critical Path Method (CPM): Construction scheduling technique using network analysis diagrams to plan and organize construction activities in an orderly manner along critical path.
- 2. Network Diagram: Graphic representation showing relationship of activities and events in correct sequences required to complete Project within Contract Time.
- 3. Activity: Any single identifiable step in Project. It depends upon and cannot begin until completion of all preceding activities.
- 4. Critical Activities: Activities with no (zero) float time and are, therefore, operations that determine critical path and control Project completion.
- 5. Event: Starting or ending point of an activity, which occurs only when all preceding activities have been completed.
- 6. Float Time: Amount of time available for given activity on excess of its estimated duration. It represents amount of leeway available in scheduling an activity.
- 7. Free Float: Amount of time an activity can be delayed without adversely affecting early start of following activity.
- 8. Total Float: Amount of time an activity can be delayed without adversely affecting overall time for the period of time of contract operations and show its effect on construction progress in the Progress Schedule.

C. Quality Assurance:

- 1. Consultant: Retain and pay for Consultant to provide CPM scheduling services, including planning evaluating and reporting.
- 2. Consultant's Qualifications: Recognized specialist, acceptable to Architect, who is expert in critical path methods (CPM) of scheduling and reporting.
- 3. Consultant's Facilities: Computer facilities available that are capable of delivering detailed network diagrams within 48 hours of request.
- 4. In-House Option: Requirement to retain Consultant may be waived if Contractor can demonstrate to Architect's satisfaction that:
 - a. He has computer equipment and software required to produce CPM network diagrams.
 - b. He employs skilled personnel who are experienced in CPM scheduling and reporting techniques.
- 5. Standards: Provide schedule on Primavera "SureTrak", Microsoft "Project", or equal, to be approved by the Architect.

D. Preliminary Network Diagrams:

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1. General: Within ten (10) working days of the issuance of the Notice to Proceed, submit a Preliminary Network Diagram outlining activities for first sixty (60) days of construction. Include skeleton diagram for remainder of Work with preliminary diagram. Include each significant construction activity. Coordinate each activity in network with other activities. Schedule each construction activity in proper sequence. Indicate completion of Work in advance of date established for Substantial Completion.
2. Owner's Activities: Include in Preliminary Network Diagram appropriate time periods for Owner's separate vendors and installers.
3. Phased Relocations: Allot appropriate times for phasing relocations of Owner's operations during overall construction period.
4. Distribution: Distribute Preliminary Network Diagram to all parties that need to know about construction activities that are scheduled early, including Architect and Owner.

E. CPM Schedule:

1. General: Proceed with preparation of Construction Schedule immediately following notification of Contract award as required by the General Conditions.
2. Estimated Times: Indicate estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Indicate estimated times for following activities to be performed:
 - a. Preparation and processing of submittals.
 - b. Pre-installation conferences.
 - c. Delivery.
 - d. Fabrication.
 - e. Installation.
 - f. Testing and Inspections.
3. Activities: Treat each floor or separate area as separate numbered activity for principal elements of Work.
4. Format: Display full network on single sheet of stable transparency, or other reproducible media, of sufficient width to show data clearly for entire construction period. Mark critical path. Sub-networks on separate sheets are permissible for activities clearly off critical path.
5. Initial Issue: Prepare initial issue of CPM Schedule Network Diagram from listing of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports to show following:
 - a. Contractor or subcontractor and Work or activity.
 - b. Principal events of that activity.
 - c. Early and late start dates.
 - d. Early and late finish dates.
 - e. Activity duration in working days.
 - f. Total float or slack.
6. Submittal and Distribution:
 - a. General: Submit initial issue of tabulations and network for acceptance. When authorized, distribute copies to Architect (three copies), Owner, Owner's Inspector, separate Contractors, principal subcontractors and suppliers or fabricators, and others identified by Contractor with need-to-know schedule responsibility.
 - b. Copies: Post in Project meeting rooms and temporary field office.
 - c. Revisions: When revisions are made distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of Work and are no longer involved in performance or construction activities.

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- d. Submittal: Submit copies of each computer-produced report (listing) in triplicate to Architect.

- F. Accepted Schedule: Conform to accepted Schedule and arrange work in such a manner that it will be installed in accordance with Schedule.

- G. Coordination: Coordinate letting of subcontracts, material purchases, delivery of materials, sequence of operations, etc., to conform to accepted Schedule and furnish proof of conformance as may be required by Owner.

- H. Dates: Schedule shall be basis for establishing starting and completing dates of work for Project.

- I. Weather:
 - 1. Normal weather conditions shall be considered and included in the planning and scheduling of all work influenced by high or low ambient temperatures and/or precipitation to ensure completion of all work within the Contract Time.
 - 2. Time extensions for unusually severe weather: This provision specifies the procedure for determination of time extensions for unusually severe weather. The listing below defines the monthly anticipated adverse weather in workdays to be used for the Contract Period.

Monthly anticipated adverse weather days:

January:	Six	July:	One
February:	Four	August:	One
March:	Four	September:	One
April:	Two	October:	Two
May:	One	November:	Three
June:	One	December:	Five

- 3. The above schedule of anticipated adverse weather will constitute the baseline for monthly weather evaluations. Upon acknowledgement of the Notice to Proceed and continuing throughout the Contract, actual adverse weather days will be recorded on a workday basis and compared to the monthly anticipated adverse weather days listed above.
 - 4. The number of actual adverse weather delays shall be calculated chronologically from the Notice to Proceed date for 365 calendar days. The term "actual adverse weather days" means the Work, critical to the timely completion of the Project, is prevented for 60% or more of the Contractor's workday. The Construction Manager will convert any qualifying delays to calendar days on an annual basis. If the number of actual adverse weather days for each year or portion thereof exceeds the number of anticipated adverse weather days, an equitable adjustment in calendar days to the Contract performance period will be made.
- J. Revisions:
- 1. General: In addition to updates required by the General Conditions, if in judgment of Architect, progress on Project requires, revise Schedule. In general, conditions under which revision shall be required are as follows:
 - a. Schedule Updating: Revise schedule immediately after each meeting or other activity, where revisions have been recognized or made. Issue updated schedule concurrently with report of each Project meeting.

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- b. When delay in completion of any Work item or sequence of Work items result in an indicated extension of Project completion by 20 working days or 10 percent the then of remaining Contract Time, whichever is less.
 - 4. When delays in submittals or deliveries or Work stoppages are encountered which make re-planning or rescheduling of work necessary.
 - 5. When the Schedule does not accurately represent actual prosecution and progress of the Work.
 - 6. Format: Whenever revision of overall schedule is required, revise format.
 - K. Accelerated Work, if Required to Meet Schedule: If Contractor's performance falls behind schedule, accelerate Work as required to get back on schedule at no additional cost to Owner. Include in accelerated work, air or express delivery of materials and equipment, increasing number of workers, working overtime, working equipment, increasing number of workers, working overtime, working Saturdays, Sundays, and holidays, and working additional shifts.
 - L. Failure to Comply: In case Owner determines, after consultation with Architect, that Contractor fails or refuses to take such measures as may be appropriate and necessary in opinion of Owner, to complete Work per accepted Schedule or within time to which such completion may be extended, Contract, or any part thereof, may be terminated under provisions of General Conditions.
- 1.04 SHOP DRAWINGS
- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
 - B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 - 1. Dimensions.
 - 2. Identification of products and materials included.
 - 3. Compliance with specified standards.
 - 4. Notation of coordination requirements.
 - 5. Notation of dimensions established by field measurement.
 - 6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 30" x 42".
 - 7. Submittal: Submit 3 opaque copies. The Architect will red mark and retain one copy as a record document, the Project Inspector will receive one red-marked copy, and the Contractor will receive one red-marked copy. The Contractor is responsible for making any additional copies.
 - 8. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
 - C. Contractor may request the use of the Architect's computer-generated drawings in electronic format. Software for CAD formats requested by Contractor not currently available to Architect will be provided by Contractor at his own expense. Contractor must complete CAD Drawing Request Form (Attachment A) and submit it to the Architect in a timely manner.
- 1.05 PRODUCT DATA
- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's product specifications and

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installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, performance curves and standard product operating and maintenance manuals. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as shop drawings."

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with recognized trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions and clearances required and as verified by field measurement.
 - f. Notation of coordination requirements.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
3. Submittals: Submit a minimum of 4 copies of each required submittal. The Architect will retain 1 copy, will send 1 copy to the Project Inspector and will return the other copies marked with action taken and corrections or modifications required.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
4. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until an applicable copy of Product Data is in the installer's possession.
 - b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.06 SAMPLES

- A. Samples are physical examples of work, including but not limited to the following items:
 1. Partial sections of manufactured or fabricated work
 2. Small cuts or containers of materials.
 3. Complete units of repetitively- used materials.
 4. Swatches showing color, texture and pattern.
- B. Color Range Sets:
 1. Units of work to be used for independent inspection and testing.
- C. Office Samples: Samples shall be of sufficient size and quantity to clearly illustrate:
 1. Functional characteristics of product of material, with integrally related parts and attachment devices.
 2. Full range of color, texture and pattern.
- D. Field Samples and "Mock-Ups":
 1. Erect at project site at location acceptable to Architect.

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2. Construct each sample or mock-up complete, including work of all trades required in finished work.
3. Size of area as specified in the respective specification section.
4. Remove mock-ups at conclusion of work or when acceptable to the Architect.

1.07 MISCELLANEOUS SUBMITTALS (WORK-RELATED)

A. Including but not limited to the following types of submittals:

1. Specially prepared warranties (guarantees).
2. Standard printed warranties.
3. Maintenance agreements.
4. Printed industry standards.
5. Collected-and-bound operating/maintenance manuals.
6. Keying schedule, keys and other security-protection-safety devices.
7. Maintenance tools and spare parts.

1.08 CONTRACTOR RESPONSIBILITIES

A. Review shops drawings, product data and samples prior to submission to Architect.

B. Determine and Verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with specifications.

C. Coordinate each submittal with requirements of the work and of the Contract documents.

D. Notify the Architect in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents

E. Do not begin fabrication or work that requires submittals until return of submittals with Architect approval.

1.09 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the work or in the work of any other contractor.

B. Schedule submissions at least 20 working days before dates reviewed submittals will be needed.

C. Number of submittals required: Submit the number stated in each specification section, or as follows:

1. Shop Drawings: Submit three opaque prints.
2. Product Data: Submit four copies of manufacturer's product data.
3. Samples: Submit the number stated in each specification section or, if not stated, submit two samples.
4. Warranties, Maintenance Agreements, Industry Standards, and Operation/Maintenance Manuals: Submit two copies.

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D. Accompany submittals with transmittal form provided by Architect, in duplicate, containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. The number of each shop drawing, product data and sample submitted.
5. Notification of deviations from Contract Documents.
6. Other pertinent data.

E. Submittals shall include:

1. Data and revision dates:
2. Project title and number.
3. The names of:
 - a. Architect.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier
 - e. Manufacturer.
 - f. Separate detailer, when pertinent.
4. Identification of product or material.
5. Relation to adjacent structure or materials.
6. Field dimensions, clearly identified as such.
7. Specification section number.
8. Applicable standards, such as ASTM number or Federal Specification.
9. A blank space, 8" x 3", for the Contractor and Architect stamps.
10. Identification of deviations from Contract Documents.
11. Contractor's stamp, initialed or signed, certifying review of submittal, verification of field measurements, and compliance with Contract Documents. Submittals without Contractor's stamp and signature will be returned by Architect without review.

1.10 RESUBMISSION REQUIREMENTS

A. Shop Drawings:

1. Revise initial drawings as required and resubmit as specified for initial submittal.
2. Indicate on drawings any changes that have been made other than those requested by Architect.

B. Product Data and Samples: Submit new data and samples as required for initial submittal.

1.11 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. Distribute reproductions of Shop Drawings and copies of Product Data which carry the Architect/Engineer stamp to:

1. Job site file.
2. Record Documents file.
3. Other affected contractors.
4. Subcontractors.
5. Supplier or Fabricator.
6. Owner's Inspector.

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- B. Distribute samples that carry Architect's review stamps as directed by Architect.

1.12 ARCHITECT'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.
 - 1. Compliance with specified characteristics is the Contractor's responsibility.
- B. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
 - 1. Final Unrestricted Release: Where submittals are marked "No Exception", that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 - 2. Final-But-Restricted Release: When submittals are marked "Make Corrections Noted", that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 - 3. Returned for Re-submittal: When submittal is marked "Revise and Resubmit", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - a. Do not permit submittals marked "Rejected" or "Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
 - 4. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required".

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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ATTACHMENT A - CAD DRAWING REQUEST FORM

Date: _____ Westberg + White Job No. _____

Project: _____ Project Architect: _____

We (Contractor) _____ request the following listed CAD file sheet numbers for use in the execution of our Work under the Contract Documents of the subject project and hereby assume all and sole responsibility of field verification and coordination with the Work of associated trades.

The attached computer-based information for the Project is provided to the Contractor (The User) as a courtesy for their sole convenience. The User recognizes that computer-based information is easily changeable, that changes are difficult to detect and that use or conversion of the information provided may introduce errors, inaccuracies or anomalies that Westberg + White, Inc., and their consultants can neither predict nor control. The delivery of this electronic data does not constitute the delivery of the professional work product of Westberg + White, Inc., and their consultants and Westberg + White, Inc., and their consultants shall not be responsible for any modifications made to the electronic files or any products derived from electronic files that are not prepared by Westberg + White, Inc., and their consultants.

By accepting and utilizing this electronic data in lieu of the corresponding drawings and specifications prepared by Westberg + White, Inc., and their consultants, the User agrees that such data is an instrument of service of Westberg + White, Inc., and their consultants, who shall be deemed to be the authors of the drawings and data and shall retain all common law, statutory law and other rights, including copyrights. The User, by accepting the electronic files, agrees to assume all risk and liabilities associated with the use of the information provided by Westberg + White, Inc., and their consultants and understands that Westberg + White, Inc., and their consultants make no claim or warranty as to the suitability or usefulness of the information for any purpose. The User also agrees, to the fullest extent permitted by law, to hold harmless and indemnify Westberg + White, Inc., and their consultants from and against any and all claims, liabilities, losses, damages and cost, including but not limited to attorney's fees, arising from or in connection with the use, misuse, modification, or misinterpretation of the electronic data provided by Westberg + White, Inc., and their consultants.

Use of the attached computer-based information indicates acceptance and constitutes agreement to abide by the terms and conditions of this agreement.

Sheet No.	Dated	Sheet Title

Requested File Format:

- DXF
- DWG (Auto CAD Version 2004, unless requested otherwise)

Requested File Deliverable:

- CD Rom
- E-Mail (Zipped Files)

Contractor's E-mail address _____

Signed: _____

Date: _____

Print Name: _____

Title: _____

Company: _____

Address: _____

Phone: _____

Total payment enclosed herewith at the rate of \$30.00 per sheet:

\$ _____

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Make checks payable to Westberg + White, Inc.

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SECTION 01400 - TESTING AND INSPECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section covers Testing and Inspection procedures.
- B. Requirements Not In This Section:
 - 1. Specific test requirements are specified in each section where they occur.
 - 2. Verification of conditions.
 - 3. Tolerances nomenclature.

1.02 PAYMENT FOR TESTING

- A. Owner will employ and pay for services of an independent testing laboratory to perform specified inspection and testing. Contractor shall reimburse the Owner for excessive inspection costs incurred by the Owner due to any or all of the following:
 - 1. Contractor's failure to complete entire Work within the Contract Time stated in Agreement, and any previously authorized extensions thereof.
 - 2. Claims between separate contractors.
 - 3. Covering of Work before required inspections or tests are performed.
 - 4. Extra inspections for Contractor's correction of defective Work.
 - 5. Overtime costs for acceleration of Work for Contractor's convenience.
- B. Contractor shall pay cost of the following:
 - 1. Additional tests necessitated if materials fail to meet contract requirements.
 - 2. Tests required by Architect to substantiate proposed substitutions.
 - 3. Tests required determining code compliance.
 - 4. Costs of concrete mix designs.

1.03 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on the requirements of the Contract Documents.
 - 2. Approve or accept any portion of the work.
 - 3. Perform any duties of the Contractor.
 - 4. Stop work.
- B. Work of the testing laboratory shall in no way limit Contractor's quality control procedures or relieve Contractor of his obligation to perform work in accordance with the Contract Documents.

1.04 ADDITIONAL TESTING

- A. If the Architect determines that any work requires additional inspection, testing or approval, Owner will direct the Contractor to order such special inspection, testing or approval.

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- B. If special inspection, testing or approval reveals a failure of the work to comply with the Contract Documents, the Contractor shall be back-charged with all costs, including additional services made necessary by such failure.
- C. If special inspection, testing or approval indicates that the work complies with the Contract Documents, the Owner will bear all costs.

1.05 GENERAL QUALITY CONTROL REQUIREMENTS

- A. General Test Requirements: Materials to be furnished under the Contract are subject to testing and inspection for compliance with the requirements of Drawings and Specifications.
- B. Testing Laboratory: The licensed Testing Laboratory certified as meeting requirements of ASTM D 3666, D 3740, E 329, E 543, and E 548, as applicable to Work involved and approved by Owner, referred to hereafter as the Testing Laboratory. Perform all testing under the supervision and control of a California registered professional engineer employed by Testing Laboratory.
- C. Soils Engineer: The registered professional Soils Engineer employed and paid by Owner.
- D. Disqualified Material: Material shipped or delivered to the site by Contractor from the source of supply prior to having satisfactorily passed the required testing and inspection, or prior to the receipt of a notice from the Architect that such testing and inspection will not be required, shall not be incorporated in the Work.
- E. Notification of Field Tests: Architect and Owner reserve the right to be present at any or all field testing as required by the contract documents. Contractor shall notify the Architect not less than 24 hours in advance of field testing.

1.06 TEST PROCEDURES

- A. All materials to be furnished under the Contract shall be subject to testing for compliance with the Contract Documents. Tests will be made in accordance with the applicable standard methods of the ASTM, AASHTO, or procedure herein specified.
- B. All materials so specified herein, including such others as the Architect may direct, shall be tested. The Contractor shall furnish all samples of the materials prepared for tests as required to the Testing Laboratory providing adequate time for testing before need at the project. The materials represented by samples under tests shall not be incorporated in the work without the approval of the Architect.
- C. Test Procedures: Testing Laboratory shall perform tests according to ASTM or other methods of test specified for various materials in other Sections. If no procedure or test method is specified, testing shall conform to the material specification referenced except as otherwise directed. Testing Laboratory shall tag, seal, label, record, or otherwise adequately identify materials for testing and no such materials shall be used or installed in the work until test result reports are submitted and approved, excepting only those materials specified to be placed or installed prior to testing.
- D. Test Repeating: Repeat applicable tests at specified intervals, whenever source of supply is changed, or whenever the characteristics of materials change or vary in the opinion of Owner or Architect.

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1.07 COORDINATION AND COOPERATION

- A. The Contractor shall initiate and coordinate testing and inspections required by the contract documents and public authorities having jurisdiction of the work. Notify the testing laboratory sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to:
1. Providing access to the work and furnishing incidental labor and facilities necessary for inspections and tests.
 2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
 3. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 4. Providing testing laboratory with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
 5. Security and protection of samples and test equipment at the project site.
 6. Furnishing copies of mill test reports.

1.08 TEST REPORTS

- A. Reports shall be provided of all tests. Such reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of Title 24 and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with requirements.
- B. Furnish and deliver copies of each test report, signed and certified by the testing laboratory professional engineer, as follows:
1. No. of Copies:
 - 1 Owner
 - 1 Architect
 - 1 Structural Engineer (structural tests only)
 - 2 Contractor
 - 1 Inspector
- C. Promptly notify the Architect of observed irregularities or deficiencies in the work or in products to be used in the work.
- D. Each report shall include:
1. Date issued.
 2. Project title and number.
 3. Testing laboratory name, address and telephone number.
 4. Name and signature of laboratory inspector.
 5. Date and time of sampling or inspection.
 6. Record of temperature and weather conditions.
 7. Date of test.
 8. Identification of product and specification section.
 9. Location of sample or test in the project.
 10. Type of inspection or test.
 11. Results of tests and compliance with contract documents.

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12. Interpretation of test results, when requested.

1.09 INSPECTION BY THE OWNER

- A. The Owner and his representatives shall at all times have access for the purpose of inspection to all parts of the work and to the shops wherein the work is in preparation, and the Contractor shall at all times maintain proper facilities and provide safe access for such inspection.
- B. The Owner shall have the right to reject materials and workmanship, which are defective, or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the Owner. If the Contractor does not correct such rejected work within a reasonable time, fixed by written notice, the Owner may correct it and charge the expense to the Contractor.
- C. Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of the work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to the fault of the Contractor or his subcontractor, he shall defray all expenses of such examinations and of satisfactory reconstruction. If, however, such Work is found to meet the requirements of the Contract, the additional cost of labor and material necessarily involved in the examination and replacement shall be allowed the Contractor.

1.11 PROJECT INSPECTOR

- A. The work of construction in all stages of progress shall be subject to the personal observation of the Inspector. He shall have free access to any or all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract.

1.12 CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall perform the following duties:
 - 1. Deliver to laboratory at designated location, adequate samples of materials proposed to be used that require testing.
 - 2. Cooperate with laboratory personnel, Owner's Representative, Project Inspector and the Architect, and provide access to the Work including weekends and after work hours and to manufacturer's facilities.
 - 3. Provide incidental labor materials and facilities to provide at all times, safe access to Work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
 - 4. Notify Architect, Project Inspector and laboratory 24 hours prior to expected time for operations requiring inspection and testing services. Also notify Owner in advance of manufacturer of materials to allow testing at source of supply.
- B. The Owner, Project Inspector or the Architect shall have the right to reject materials and workmanship that are defective or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without cost to the Owner. If the Contractor fails to correct such rejected Work within a reasonable time, fixed by written notice, the Owner will correct same and charge the expense to the Contractor by Change Order.

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- C. Should it be considered necessary or advisable by the Owner at any time before date of completion of the entire Work to make an examination of Work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such Work is found to be defective in any respect due to fault of the Contractor or his subcontractor, all extra expenses shall be charged to the Contractor by Change Order. If, however, such Work is found to meet the requirements of the Contract, the additional cost of labor and materials necessarily involved in the examination and replacement costs shall be allowed the Contractor by Change Order.
- D. When changes of construction schedule are necessary during construction, coordinate such changes with the Testing Laboratory as required.
- E. When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, extra charges for testing attributable to the delay shall be charged to the Contractor by Change Order.
- F. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.
- G. Selection of materials to be tested shall be made by the testing laboratory or the Project Inspector and not by the Contractor.

1.13 REQUIRED TESTS AND INSPECTIONS

- A. Tests and inspections as set forth in the 2007 California Building Code and Title 24, CCR, shall be required of the following.
- B. Excavations, Foundations and Retaining Walls - CBC Chapters 18 and 17:
 - 1. Inspection:
 - a. Excavation and Fill for Foundations 1704.7
- C. Concrete - CBC Chapter 19 and 17:
 - 1. Materials:
 - a. Tests of Materials 1916
 - b. Portland Cement Tests 1903.
 - c. Concrete Aggregates 1903.1, 1913.3
 - d. Combined Aggregates 1903.1
 - e. Reinforcing Bars 1916.2
 - f. Structural Steel, Steel Pipe or Tubing 1907
 - g. Admixtures 1905
 - h. Batch Plant Inspection 1704.4.3
 - i. Waiver of Batch Plant Inspection/Tests 17044.4
 - 2. Quality:
 - a. Proportions of Concrete 1905.1
 - b. Strength Tests of Concrete 1905.1, 1704.4
 - c. Mixing and Placing 1905.7, .8, .9, .10
 - d. Gypsum Concrete Strength Tests 1914, 1916.7
 - 3. Inspection:
 - a. Job Site Inspection 1905.7. 1704.5

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- b. Batch Plant or Weighmaster Inspection 1704..4.3
- c. Reinforcing Bar Welding Inspection 1903.4, 1704.4.2

D. Steel - CBC Chapter 22:

- 1. Materials:
 - a. Structural Steel, Cold Formed Steel 2209, 1710.1
 - b. Material Identification 2203.1, 1704.3
- 2. Inspection and Tests:
 - a. Tests of Structural & Cold Formed Steel 2212.1, 1707A2, 1707.4
 - b. Shop Fabrication Inspection 2212., 1704.2, 1704.3.2.1
 - c. Welding Inspection 1704.3, 1704.3.1.1
 - d. Steel Joist Load Tests 1704.3.2.2

E. Wood - CBC Chapter 23:

- 1. Materials:
 - a. Lumber and Plywood Grading 2303.1.2303.1.1, 2303.1.8.1
 - b. Glue-Laminated Members 2303.1.3
- 2. Inspection:
 - a. Glue-Laminated Fabrication 1704.2

F. Exterior Wall Coverings - CBC Chapter 14:

- 1. Veneer Materials:
 - a. Masonry Units 2102.2
 - b. Precast Concrete Units Chapter 19
 - c. Mortar and Grout 2102.2, 2103.3 & .4
- 2. Inspection and Tests:
 - a. Adhered Veneer Test 1405.9
 - b. Veneer Inspection 1705.5

1.14 CONCRETE MOISTURE VAPOR EMISSION TESTING

A. Work Specified:

- 1. Testing for moisture vapor emission of the existing concrete floors which are scheduled to be covered in a resilient floor covering, i.e. Wood Flooring, Vinyl Composition or Solid Vinyl Tile, Sheet Vinyl, Rubber Flooring, Carpet Tile or Carpeting with a Vinyl, Rubber or Unitary type backing. Moisture Vapor Emission Tests (VETs) shall be conducted by qualified testing personnel and paid for by the Owner.
- 2. If areas of existing concrete are not within the floor covering's maximum allowable emission rate, then vapor emission control procedures shall be required to remedy the condition and prepare the slab for the specified finish floor covering.

B. Materials For Test Procedures:

- 1. The level of moisture vapor emission shall be determined by use of anhydrous calcium chloride test kits, administered by a qualified and competent laboratory or licensed

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contractor with verifiable experience. Results of tests are to be reported as Pounds per 1,000 Square Feet per 24 Hours.

2. Calcium Chloride test kits must be prepackaged and of commercial consistency. Factory pre-weighed measurements are not acceptable for test purposes.

C. Testing Procedures:

1. Environmental requirements of area to be tested are to match that of the finished floor covering. Doors, windows, roofing, etc. must be installed and the temperature of the building controlled to a finished building atmosphere. Do not execute tests when building interior is below 65 degrees for 72 hours prior to, and throughout the duration of, the tests.
2. The number of test kits required is determined by the square footage of the facility. A minimum of three test kits is required in the first 1,000 s.f. with a minimum of one test kit per each additional 1,000 s.f., with consideration given to separation of test areas. Time of exposure is a minimum of 60 hours and a maximum of 72 hours.
3. A prepackaged calcium chloride test kit shall be equipped with a sealed dish of anhydrous calcium chloride, a metering dome with gasket, and instructions.
 - a. Weigh the tape sealed dish on a gram scale with 1/10th gram gradation. Record start weight, date and time on dish's label and instruction document.
 - b. Unseal dish and expose test according to preprinted test kit instructions.
 - c. Allow 60 to 72 hours of exposure. Retrieve test dish re-seal and re-weigh according to instructions.
 - d. Perform calculations and report results to Owner in writing.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

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SECTION 01410 - REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: The general regulatory requirements pertaining to the Work supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.
- B. Incorporated Documents: The Drawings and general provisions of the Contract, and Division 1 specification sections, apply to this section.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. All pertaining statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction of the Work are hereby incorporated into these Contract Documents the same as if repeated in full herein and such are intended where any reference is made in either the singular or plural to Code or Building Code unless otherwise specified including, without limitation, those in the list below. Contractor shall make available at the site such copies of the listed documents applicable to the Work as the Architect or Owner may request including mentioned portions of the California Code of Regulations (CCR).
- B. This project shall be fully governed under the State of California's Codes Section Group 1, Chapter 4, Part I, Title 24, CCR.
 - 1. A copy of Part 1 and Part 2, Volumes 1 and 2, of Title 24, CCR shall be kept and available in the field during construction.
- C. Public regulatory requirements: Statutes, ordinances, laws, rules, codes, regulations, and standards shall include, but not be limited to, the following:
 - 1. Title 24, CCR, 2007 California Building Code (CBC), including research reports issued or approved for materials, equipment, systems, and designs as applicable to the Work.
 - 2. Title 19, CCR, Public Safety.
 - 3. Title 24, CCR, Building Standards, including architectural barrier laws and regulations regarding persons with disabilities.
 - 4. 2007 California Mechanical Code (CMC).
 - 5. 2007 California Plumbing Code (CPC).
 - 6. 2007 California Fire Code (CFC).
 - 7. 2007 California Electrical Code (CEC).
 - 8. 2007 California Elevator Safety Construction Code (CESCC).
 - 9. Other statutes, ordinances, laws, regulations, rules, orders, and codes specified in other Sections of the Specifications or bearing on the Work.

1.03 GOVERNING REGULATIONS/AUTHORITIES

- A. The Architect has contacted authorities having jurisdiction where necessary to obtain information necessary for preparation of Contract Documents; that information may or may not be of significance to the Contractor. The Owner and the Architect, at the request of the Contractor, are to contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

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1.04 SUBMITTALS

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Temporary facilities required for this work include, but are not necessarily limited to:
 - 1. Temporary utilities such as heat, water, electricity, and telephone.
 - 2. Field offices and sheds
 - 3. Sanitary facilities.
 - 4. Construction aids.
 - 5. Barriers.
 - 6. Temporary controls.
 - 7. Project identification and signs.
 - 8. Haul road.

1.02 RELATED SECTIONS

- A. All equipment furnished by subcontractors shall comply with all requirements of pertinent safety regulations. The ladders, planks, hoists, and similar items normally furnished by the individual trades in execution of their own portions of the work are not part of this section.
- B. Permanent installation and hook-up of the various utility lines are described in the other pertinent sections.

1.03 PRODUCT HANDLING

- A. Use means necessary to maintain temporary facilities in proper and safe condition throughout progress of the work.

PART 2 - PRODUCTS

2.01 UTILITIES

- A. Water:
 - 1. Provide necessary temporary water lines and water supply and upon completion of the work, remove such temporary facility.
 - 2. Provide and pay for water needed for construction.
- B. Electricity:
 - 1. Provide necessary temporary wiring and upon completion of the work, remove such temporary facility.
 - 2. Provide area distribution boxes so located that the individual trades may furnish and use 100-foot maximum length extension cords to obtain adequate power and artificial lighting at points where needed for work, inspection, and safety.
 - 3. Provide and pay for electricity needed for construction.

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- C. Heating: Provide and maintain heat necessary for proper conduct of operations needed in the work.
- D. Telephone:
 - 1. Make necessary arrangements and pay costs for installation and operation of telephone service to the Contractor's office on the site.
 - 2. Coin operated telephones not acceptable.
 - 3. Facsimile Terminal (FAX): Make necessary arrangements and pay costs for installation and operation of FAX machine in the Contractor's office on the site.

2.02 FIELD OFFICES AND SHEDS

- A. Contractor's Facilities:
 - 1. Provide a field office building and sheds adequate in size and accommodation for Contractor's offices, supply, and storage.

2.03 SANITARY FACILITIES

- A. Provide temporary sanitary facilities in the quantity required, for use by all personnel.
- B. Maintain in a sanitary condition at all times.

2.04 CONSTRUCTION AIDS

- A. Provide construction aids and equipment required by personnel and to facilitate the execution of the work; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment.
- B. Provide all necessary facilities and means of access to all parts of the structure so that Building Inspectors, Special Inspectors and the Architect and Structural Engineer may inspect any portion of the structure.
 - 1. Means of access includes, but is not limited to, ladders, scaffolds, and construction elevators.

2.05 BARRIERS

- A. Temporary Fencing: Provide a temporary fence around the entire construction area as required for safety and protection.
 - 1. Construction: Provide woven wire mesh fencing not less than six feet in height, complete with metal or wood posts and required bracing, and with suitably locked truck and pedestrian gates as required.
- B. Tree and Plant Protection: Preserve and protect existing trees and plants at the site that are designated to remain, and those adjacent to site.
 - 1. Provide temporary barriers around each, or around each group of trees or plants.

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2.06 TEMPORARY CONTROLS

- A. Provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and related areas under Contractor's control; remove physical evidence of temporary facilities at completion of work. Comply with requirements of authorities having jurisdiction.
- B. Dust Control: Provide positive methods and apply dust control materials to minimize raising dust from construction operations, and provide positive means to prevent air-borne dust from dispersing into the atmosphere.
- C. Water Control: Provide methods to control surface water to prevent damage to the Project, the site, or adjoining properties.
 - 1. Control fill, grading and ditching to direct surface drainage away from excavations, pits, tunnels and other construction areas; and to direct drainage to proper runoff.
 - 2. Provide, operate and maintain hydraulic equipment of adequate capacity to control surface water.
 - 3. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas.
- D. Debris Control: Maintain all areas under Contractor's control free of extraneous debris. Prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes.
 - 1. Provide containers for deposit of debris.
- E. Pollution Control:
 - 1. Provide methods, means and facilities required to prevent contamination of soil, water and atmosphere by the discharge of noxious substances from construction operations.
 - 2. Provide equipment and personnel to perform emergency measures required to contain spillage, and to remove contaminated soils and liquids.
- F. Excavate and dispose of contaminated earth off-site and replace with suitable compacted fill and topsoil.
 - 1. Take special measures to prevent harmful substances from entering public waters.
 - a. Prevent disposal of wastes, effluents, chemicals, and other such substances in sanitary or storm sewers.

2.07 PROJECT IDENTIFICATION AND TEMPORARY SIGNS

- A. Prepare project identification and other signs of the size indicated; install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.
- B. Project Identification Sign: Size, design and information as specified and as shown on drawings. Engage an experienced sign painter to apply graphics. Finish with 3 coats of paint. Locate sign as indicated or directed.
- C. Provide temporary on-site informational signs.
 - 1. As required by codes, laws and regulatory agencies

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2. To identify key elements of the construction facilities.
3. To direct traffic.

2.08 HAUL ROAD

- A. Provide and maintain, at no additional cost to the Owner, required access to the site from paved areas and other routes. Upon completion of the work, return haul road and other areas damaged during access to the site to the condition in which they existed prior to start of construction.

2.09 OWNERSHIP OF TEMPORARY FACILITIES AND CONTROLS

- A. Items provided by the Contractor under this section shall remain the property of the Contractor and shall be removed from the job site immediately upon completion of the work.

PART 3 - EXECUTION

3.01 MAINTENANCE AND REMOVAL

- A. Maintain temporary facilities as long as needed for the safe and proper completion of the work.
- B. Remove such temporary facilities as rapidly as progress of the work will permit, or as directed by the Architect.

END OF SECTION

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SECTION 01600 - MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

1.03 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.

1.04 SUBMITTALS

- A. Product List Schedule: Prepare a schedule showing products specified in a tabular form acceptable to the Architect. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.
1. Form: Prepare the product listing schedule with information on each item tabulated under the following column headings:
 - a. Related Specification Section number.
 - b. Generic name used in Contract Documents.
 - c. Proprietary name, model number and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 2. Completed Schedule: Within fifteen (15) days after date of commencement of the Work, submit four (4) copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.
1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

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1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION

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SECTION 01631 - PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and other Division 1 specification sections, apply to this section.

1.02 SUMMARY

- A. This section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

1.03 DEFINITIONS

- A. Definitions used in this article are not intended to change or modify the meaning of other terms used in the Contract documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:
 - 1. Revisions to Contract documents requested by the Owner or Architect.
 - 2. Specified options of products and construction methods included in Contract documents.
 - 3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.04 SUBMITTALS

- A. Substitution Request Submittal: Requests for substitution will be considered if received within thirty (30) days after commencement of the Work. Requests received more than thirty (30) days after commencement of the Work may be considered or rejected at the discretion of the Architect.
 - 1. Submit three (3) copies of each request for substitution for consideration. Submit requests on the enclosed form and in accordance with procedures required for Change Order proposals per Section 01035, Modification Procedures.
 - 2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related specification section and drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Product Data, including drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.

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- d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the substitution's effect on the Contractor's construction schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract time.
 - f. Cost information, including a proposal of the net change, if any in the Contract sum.
 - g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.
3. Architect's Action: Within one (1) week of receipt of the request for information or documentation necessary for evaluation of the request. Or within two (2) weeks of receipt of the request, including one week for receipt of the additional information or documentation, whichever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitution cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

- A. Conditions: The Contractor's "Substitution Request Form" will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.
1. Extensive revisions to Contract documents are not required.
 2. Proposed changes are in keeping with the general intent of Contract documents.
 3. The request is timely, fully documented and properly submitted.
 4. The request is directly related to an "or equal" clause or similar language in the Contract documents.
 5. The specified product or method of construction cannot be provided within the Contract time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
 6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 7. A substantial advantage is offered the Owner in terms of cost, time, energy conservation or other considerations of merit after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
 8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
 9. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
 10. The specified product or method of construction cannot provide a warranty required by the Contract documents and where the Contractor certifies that the proposed substitution provide the required warranty.

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- B. The Contractor's submittal and Architect's acceptance of shop drawings, product data or samples that relate to construction activities not complying with the Contract documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 specification sections, apply to this section.

1.02 SUMMARY

- A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Submittal of warranties.
 - 4. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate sections in Divisions 2 through 16.

1.03 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before 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 one hundred (100) percent completion for the portion of the Work claimed as substantially complete. Include supporting documents for completion as indicated in these Contract documents and a statement showing an accounting of changes to the Contract sum.
 - a. If one hundred (100) percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 2. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 - 3. Submit record drawings and similar final record information.
 - 4. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect 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.
 - 1. The Architect will repeat inspection when requested and assured that the Work has been substantially completed.
 - 2. Results of the completed inspection will form the basis of requirements for final acceptance.

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1.04 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract sum.
 3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.
 4. Submit consent of surety to final payment.
- B. Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.
1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance, or advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, reinspection will be repeated.

1.05 RECORD DOCUMENT SUBMITTALS

- A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistive location. Provide access to record documents for the Architect's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract drawings and shop drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately. Where shop drawings are used, record a cross-reference at the corresponding location on the Contract drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
 2. Mark new information that is important to the Owner, but was not shown on Contract drawings or shop drawings.
 3. Note related Change Order numbers where applicable.
- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and product data.
1. Upon completion of the Work, submit record specifications to the Architect for the Owner's records.

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PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01740 - WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 specification sections, apply to this section.

1.02 SUMMARY

- A. This section specifies general administrative and procedural requirements for warranties and bonds required by the Contract documents, including manufacturers standard warranties on products and special warranties.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.03 DEFINITIONS

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

1.04 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract documents.

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- E. The Owner reserves the right to refuse to accept Work for the project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.05 SUBMITTALS

- A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 02221 - DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes: Furnishing labor, materials and equipment necessary for demolition, dismantling, cutting and alterations as indicated, specified, or required for completion of the Work. Includes items such as the following:
 - 1. Protection of existing improvements to remain.
 - 2. Cleaning existing improvements to remain.
 - 3. Disconnecting and capping utilities.
 - 4. Removing debris, waste materials, and equipment.
 - 5. Removal of items for performance of the Work.
 - 6. Salvageable items to be retained by the Owner.
- C. Related Sections:
 - 1. Section 01005: Summary of Work.
 - 2. Section 01120: Cutting and Patching.
 - 3. Section 01120: Alteration Procedures.
 - 3. Section 01500: Temporary Facilities.
 - 4. Division 15: Mechanical.
 - 5. Division 16: Electrical.

1.02 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating the extent of items and systems to be removed. Indicate items to be salvaged or items to be protected during demolition. Indicate locations of utility terminations and the extent of abandoned lines to be removed. Include details indicating methods and location of utility terminations.

1.03 QUALITY ASSURANCE

- A. Prior to commencement of Work, schedule a walkthrough with the Owner's Authorized Representative to confirm Owner property items have been removed from scheduled Work areas. Identify and mark remaining property items and schedule their removal.
- B. Perform the Work of this section by workers skilled in the demolition of buildings and structures. Perform the Work of this section under direct supervision at all times.
- C. Coordinate demolition for the correct sequence, limits, and methods. Schedule demolition Work to create least possible inconvenience to the public and facility operations.

1.04 PROJECT CONDITIONS

- A. Drawings may not indicate in detail all demolition Work to be performed. Examine existing conditions to determine the full extent of required demolition.

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1. The existence and location of any underground utility pipes or structures shown on the Drawings are obtained by a search of available records. The Contractor is required to take due precautionary measures to protect the utilities shown and any other lines or structures not shown on the Drawings. The Design Professional is not responsible for the location of underground utilities or structures whether or not shown on and installed by the Contract Documents. It shall be the Contractor's responsibility to examine the conditions before commencing the operations.
- B. Repair damage to existing improvements or damage due to excessive demolition.
- C. Provide all measures to avoid excessive damage from inadequate or improper means and methods, improper shoring, bracing or support.
- D. If conditions are encountered that varies from those indicated, promptly notify the Architect for clarification before proceeding.

PART 2 - PRODUCTS

2.01 HANDLING OF MATERIALS

- A. Items scheduled for salvage by the Owner shall be delivered to a location designated by the Owner's authorized representative. Items shall be cleaned, packaged and labeled for storage.
- B. Items scheduled for reuse shall be stored on the project site and protected from damage, theft and other deleterious conditions.

PART 3 - EXECUTION

3.01 GENERAL

- A. Protection:
 1. Do not commence demolition until safety partitions, barricades, warning signs and other forms of protection are installed. Refer to Section 01500, Temporary Facilities.
 2. Provide all safeguards, including warning signs, lights and barricades, for protection of workers, occupants, and the public.
- B. If, at any time, safety of existing construction appears to be endangered, take immediate measures to correct such conditions. Cease operations and immediately notify the Architect and Owner.

3.02 DEMOLITION

- A. Do not throw or drop materials. Furnish ramps or chutes as required by the Work.
- B. Remove existing construction only to extent necessary for proper installation of Work and interfacing with existing construction. Cut back finished surfaces to straight, plumb or level lines as required for a smooth transition.
- C. Where openings are cut oversize or in improper locations, replace or repair to required condition.

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3.03 CUTTING EXISTING CONCRETE

- A. Skilled workers familiar with the requirements and space necessary for placing concrete shall perform cutting of existing concrete. Perform concrete cutting with concrete cutting wheels and hand chisels. Do not damage concrete intended to remain.
- B. Extent of cutting of structural concrete shall be as indicated on Drawings. Cutting of non-structural concrete shall be as indicated on Drawings or as reviewed by the Architect or structural engineer. Replace concrete demolished in excess of amounts indicated.
- C. Prior to cutting or coring concrete, determine locations of hidden utilities or other existing improvements and provide necessary measures to protect them from damage.

3.04 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

- A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of the Work. Remove abandoned lines and cap unused portions of existing lines.

3.05 REMOVAL OF OTHER MATERIALS

- A. Masonry: Cut back to joint lines and remove mortar without damaging units to remain. Allow space for repairs to backing where applicable.
- B. Woodwork: Cut or remove to a joint or panel line.
- C. Roofing: Remove as required, including accessory components such as insulation and flashings. At penetrations through existing roofing, trim cut edges back to sound roofing with openings restricted to the minimum size necessary to receive Work.
- D. Sheet Metal: Remove back to joint, lap, or connection. Secure loose and unfastened ends or edges and provide a watertight condition. Re-seal as required.
- E. Glass: Remove broken or damaged glass and clean rebates and stops of glazing channels.
- F. Remove modular materials, such as acoustical ceiling panels, resilient tile, or ceramic tile, to a natural joint without leaving damaged or defective Work where joining new Work. After flooring removal, clean substrates to remove setting materials and adhesives.
- G. Gypsum Board: Remove to a panel joint line on a stud or support line.
- H. Plaster: Saw cut plaster on straight lines, leaving a minimum 2-inch width of firmly attached metal lath for installing new lath and plaster.
- I. Remove existing improvements not specifically indicated or required but necessary to perform Work. Cut to clean lines, allowing for installation of Work.

3.06 PATCHING

- A. Patch and/or repair materials to remain when damaged by the performance of the Work of this section. Finish material and appearance of patch and/or repair Work shall match existing.

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3.07 CLEANING

- A. Clean existing materials to remain with appropriate tools and equipment.
- B. Protect existing improvements during cleaning operations.
- C. Debris shall be dampened by fog water spray prior to transporting by truck.
- D. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.
- E. Remove waste and debris, other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where required. Continuously clean up and remove items as demolition Work progresses.
- F. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 02230 - SITE CLEARING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Removal of vegetation, grass, grass roots, shrubs, tree stumps, trees, upturned stumps, weed growth, tree roots, brush, masonry, concrete, rubbish, debris and other objectionable materials, within limits of the Work.
- C. Related Sections:
 - 1. Section 02316: Excavating, Backfilling and Compacting for Pavement.
 - 2. Section 02319: Base Course.
 - 3. Section 02821: Chain Link Fences and Gates.

1.02 SUBMITTALS

- A. Shop Drawings: Submit site plan indicating extent of site clearing.

1.03 QUALITY ASSURANCE

- A. Comply with Standard Specifications for Public Works Construction, current edition, as a minimum requirement.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 TREE AND STUMP REMOVAL

- A. Remove trees and stumps indicated and/or required to be removed. Remove trees, together with bulk of roots, to a minimum depth of 4 feet below required grade, and within a radius of approximately 7 feet beyond perimeter of trunk at grade.
- B. Fill and compact excavation from tree and stump removal. Fill in 6-inch layers, each compacted to 90 percent of maximum density in accordance with ASTM D 1557.
 - 1. Back filling shall not commence until the excavation is inspected and tested.

3.02 CONCRETE AND BITUMINOUS SURFACING REMOVAL

- A. Break up and completely remove existing concrete surfacing, curbs, gutters, walks and bituminous surfacing to indicated limits. Cutting shall be performed to a neat and even line with

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proper tools or a concrete cutting saw. Minimum depth of cut shall be 1-1/2 inches, unless otherwise indicated. Remove concrete broken beyond the indicated limits to the nearest joint or score line and replace with new concrete to match existing.

3.03 FENCING

- A. Existing fences scheduled to remain may be removed to facilitate the Work, provided they are installed to their original condition in accordance with requirements of Section 02821: Chain Link Fences and Gates.
- B. Fencing indicated to be removed and not reinstalled shall be completely removed, including footings. Fill and compact excavations.
- C. Install chain link fencing indicated to be relocated or reset in accordance with applicable requirements specified under Section 02821: Chain Link Fences and Gates.

3.04 CLEANUP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

END OF SECTION

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SECTION 02316 - EXCAVATING, BACKFILLING AND COMPACTING FOR PAVEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Excavating, backfill, and compacting for paved areas.
 - 2. Installation of fill materials.
- C. Related Sections:
 - 1. Section 02319: Base Course.
 - 2. Section 02711: Bituminous Surfacing.
 - 3. Section 02765: Pavement Repair.
 - 4. Section 02770: Site Concrete Work.

1.02 SYSTEM DESCRIPTION

- A. Import and Export of Earth Materials:
 - 1. Fees: Pay as required by authorities having jurisdiction over the area.
 - 2. Bonds: Post as required by authorities having jurisdiction over the area.
 - 3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.03 QUALITY ASSURANCE

- A. Comply with Standard Specifications for Public Works Construction, current edition, except as modified herein.
- B. Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 01400, Testing and Inspection.

1.05 PROJECT CONDITIONS

- A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

PART 2 - PRODUCTS

2.01 BASE MATERIALS

- A. Concrete Slabs On Grade: Provide "Crushed Aggregate Base " as specified in the Standard Specifications for Public Works Construction, Section 200: "Rock Materials," with ¾ inch maximum size aggregates. Provide 3-inch thick base, unless noted otherwise.

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- B. Bituminous Surfacing: As indicated on Drawings and specified in Section 02319, Base Course.

2.02 FILL AND BACKFILL MATERIALS

- A. Fill and backfill materials shall be previously excavated materials or imported fill material, free of clods and stones larger than 3 inches, foreign materials, vegetable growths, sod, expansive soils, rubbish and debris. Material shall conform to these specified requirements and related sections.

- B. Fill material exhibiting a wide variation in consistency and/or moisture content shall be blended and/or aerated to stabilize and upgrade the material.

- C. Imported Fill Material:

- 1. Provide suitable materials obtained from Project site excavations for earthwork and fill materials. If excavated materials are not of suitable quality or sufficient quantity, import additional materials as necessary.
- 2. Imported fill shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing 200-mesh sieve. Material shall have a coefficient of expansion of not more than 2 percent from air dry to optimum moisture content and not more than 6 percent from air dry to saturation. Imported material shall be clean and free of rubbish, debris, and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

- D. Permeable Backfill:

- 1. Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations of these materials conforming to the following gradations:

Sieve Size:	Percentage Passing:
3/4 inch (19mm)	100
3/8 inch (10mm)	80-100
No. 100	0-8
No. 200	0-3

- 2. Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.
- 3. Provided backing for weep-holes shall consist of 2 cu. ft. of aggregate in burlap sacks, securely tied. Aggregate shall conform to requirements for No. 3 concrete aggregate as specified in subsection 200-1.4 of the Standard Specifications for Public Works Construction.
- 4. Permeable Backfill Alternate Materials: Instead of the materials specified for retaining structures backfill, a drainage matting system such as Miradrain by Mirafi, Inc., or equal, may be provided if reviewed and approved by the Architect.

PART 3 - EXECUTION

3.01 SITE PREPARATION

- A. Clear the Project site as required in Section 02230: Site Clearing.

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3.02 PROTECTION

- A. Protect and guard excavations against danger to life, limb, and property as required by, but not limited to, OSHA regulations.
- B. Protect adjacent existing improvements including landscaping against damage.

3.03 EXISTING UTILITY LINES

- A. Protect existing utility lines from damage or displacement.
- B. Remove conduits or pipes not in service, exposed during Work, unless a minimum cover of 2 feet is provided. Remove concrete, clay or other non-metallic pipe over 8 inches in diameter, unless otherwise indicated.

3.04 EXCAVATION

- A. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork," except as modified herein.

3.05 FILL

- A. Unclassified Fill and Compaction: Comply with the Standard Specifications for Public Works Construction, Section 300, Earthwork, except as modified herein.
- B. Provide fill materials as specified in Part 2 – Products. If excavated materials from the Project site are not of required quality or sufficient quantity, import additional materials as necessary.
- C. In addition to the requirements of this section, import and/or exported materials shall comply with the requirements of Section 01400, Testing and Inspection.
- I. Bills of lading or equivalent documentation will be submitted to the Architect on a daily basis.
- J. Upon completion of import operations, provide the Owner a certification statement attesting that all imported material has been obtained from the identified source site.

3.06 INSTALLATION OF MATERIALS

- A. Fill or backfill materials shall be installed in horizontal layers of 6 inches, unless otherwise required. Each layer shall be evenly placed and moistened or aerated as necessary. Unless otherwise reviewed by the geotechnical engineer, each layer of fill material shall cover the length and width of the area to be filled before the next layer of material is installed. Top surface of each layer shall be installed to an approximate level with a crown or crossfall of at least 1 in 50, but no more than 1 in 20. Provide adequate drainage at all times during construction of the Work of this section.

3.07 COMPACTING

- A. Each layer of fill material shall be compacted by tamping, sheepfoot rollers, or pneumatic-tired rollers to provide specified relative compaction. At inaccessible locations, provide specified compaction by manually held, operated and directed compaction equipment.

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- B. Unless otherwise indicated, compact each layer of earth fill to a relative compaction of at least 90 percent.
- C. When fill materials, or a combination of fill materials, are encountered or provided that develop densely packed surfaces as a result of installation or compacting operations, scarify each compacted layer before installing the next succeeding layer.
- D. Compaction: Test compaction in accordance with ASTM D 1557, Method C.

3.09 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.10 CLEANING

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 02319 - BASE COURSE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Installation of base material.
- C. Related Sections:
 - 1. Section 02230: Site Clearing.
 - 2. Section 02316: Excavating, Backfilling and Compacting for Pavement.
 - 3. Section 02770: Site Concrete Work.

1.02 SUBMITTALS

- A. Product Data: Submit material source, technical information and test data for base materials. Gradation and quality certifications shall be dated within 30 days of the submittal.
- B. Sample: Submit sample of proposed base course material.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.01 UNTREATED BASE MATERIALS

- A. The following base materials are classified, in order of preference, in conformance with the requirements of Standard Specifications for Public Works Construction: Section 200 - Rock Materials.
 - 1. Crushed aggregate base or crushed slag base.
 - 2. Crushed miscellaneous base.
 - 3. Processed miscellaneous base.
 - 4. Select sub-base.
 - 5. Disintegrated Granite Base: Conforming to requirements of the Standard Specifications for Public Works Construction: Section 400 - Alternate Rock Products, Asphalt Concrete, Portland Cement Concrete and Untreated Base Material.

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2.02 MATERIAL APPROVAL

- A. Base material shall be inspected by the Project Inspector prior to installation. The Owner may choose to have additional tests performed by a geotechnical engineer, retained by the Owner, before installation.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install base course material in layers not exceeding 4 inches in thickness, unless required otherwise. Grade and compact to indicated levels or grades, cut and fill, water and roll until the surface is hard and true to line, grade and required section. Provide a relative compaction of at least 95 percent, unless otherwise required.
- B. Grade base course to elevations indicated on Drawings, ready to receive surfacing.

3.02 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 02510 - SITE WATER DISTRIBUTION SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Site water distribution systems located at least 5 feet outside the building perimeter, extending to an existing water line or meter.
- C. Related Sections:
 - 1. Section 02316: Excavating, Backfilling and Compacting for Pavement.
 - 2. Section 02770: Site Concrete Work.
 - 3. Division 15: Mechanical and Plumbing.

1.02 SUBMITTALS

- A. Shop Drawings: Submit site plan indicating locations of lines, valves, and related appurtenances.
- B. Product Data: Manufacturer's catalog data for materials. Include technical data for accessories, gaskets, joints and couplings.
- C. Certificates: Certificates attesting that tests set forth in referenced publications have been performed, and the performance requirements have been satisfied.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. ANSI:
 - a. ANSI B16.18 Cast Copper Alloy Solder Joint Pressure Fittings.
 - b. ANSI B18.5.2.1M Metric Round Head Short Square Neck Bolts.
 - 2. ASME:
 - a. ASME B16.3 Malleable Iron Threaded Fittings.
 - b. ASME B16.4 Cast Iron Threaded Fittings.
 - c. ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - d. ASME B16.26 Cast Copper Alloy Fitting for Flared Copper Tubes.
 - e. ASME B18.2.2 Square and Hex Nuts (Inches Series).
 - f. ASME B18.5.2M Metric Round Head Square Neck Bolts.
 - 3. ASTM:

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- a. ASTM A 47 Ferric Malleable Iron Castings.
- b. ASTM A 48 Gray Iron Castings.
- c. ASTM A 53 Pipe, Steel, Black and Hit-Dipped, Zinc-Coated Welded and Seamless.
- d. ASTM A 307 Carbon Steel bolts and Studs, 60,000 psi Tensile Strength.
- e. ASTM A 563 Ductile Iron Castings.
- f. ASTM A 563 Carbon and Alloy Steel Nuts.
- g. ASTM B 61 Steam or Valve Bronze Castings.
- h. ASTM B 62 Composition Bronze or Ounce Metal Castings.
- i. ASTM B 88 Seamless Copper Water Tube.
- j. ASTM C 94 Ready-Mixed Concrete.
- k. ASTM D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80.
- l. ASTM D 1785 Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120.
- m. ASTM D 2235 Solvent Cement for ABS Plastic Pipe, and Fittings.
- n. ASTM D 2241 PVC Plastic Pipe Fittings, Schedule 40.
- o. ASTM D 2282 ABS Plastic Pipe.
- p. ASTM D 2466 PVC Plastic Pipe Fittings, Schedule 80.
- q. ASTM D 2468 ABS Plastic Pipe Fittings, Schedule 40.
- r. ASTM D 2564 PVC Plastic Piping Systems.
- s. ASTM D 2774 Underground Installation of Thermoplastic Pressure Piping.
- t. ASTM D 2855 Making Solvent-Cemented Joints with PVC Pipe and Fittings.
- u. ASTM D 3139 Joints Pressure Pipes Using Flexible Elastomeric Seals.
- v. ASTM F 402 Safe Handling Of Solvent Cements, Primer and Cleaners Used for Joining Thermoplastic Pipes and Fittings.
- w. ASTM F 477 Elastomeric Seals for Joining Plastic Pipes.
4. American Water Works Association (AWWA) Standards:
 - a. AWWA C104/A21.4 Cement-Mortar Lining For Ductile-Iron Pipe and Fittings For Water
 - b. AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings, 3 inches through 48 inches, for Water and Other Liquids.
 - c. AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron pressure Pipe and Fittings.
 - d. AWWA C153/A21.53 Ductile-Iron Compact Fittings, 3 inches through 16 inches, for Water and Other Liquids.
 - e. AWWA C500 Gate Valves for Water and Sewerage Systems.
 - f. AWWA C503 Wet- Barrel Fire Hydrants.
 - g. AWWA C508 Swing-Check Valves for Waterworks Service, 2 inches through 24 inches NPS.
 - h. AWWA C509 Resilient-wedge seated Gate Valves for Water and Sewerage Systems.
 - i. AWWA C511 Reduced-Pressure Principal Backflow-Prevention Assembly.
 - j. AWWA C600 Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - k. AWWA C651 Disinfecting Water Mains.
 - l. AWWA C 800 Underground Service Line valves and Fittings.
 - m. AWWA C900 PVC Pressure Pipe, 4 inches through 12 inches, for Water Distribution.
 - n. AWWA M23 PVC Pipe - Design and Installation.
5. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry:
 - a. MSS SP-80 Bronze Gate, Globe, Angle and Check Valves.
6. Uni-Bell PVC Pipe Association (UBPPA):

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- a. UBPPA UNI-B-3 Installation of PVC Pressure Pipe.
 - b. UBPPA UNI-B-8 Direct Tapping of PVC Pressure Water Pipe.
 - c. UBPPA UNI-B-13 Standard Performance Specification on joined restrained devices for use with Poly Vinyl Chloride (PVC) Pipe.
7. Underwriters Laboratories Inc. (UL):
- a. UL 246 Hydrants for Fire-Protection Service.
 - b. UL 262 Gate Valves for Fire-Protection Service.
 - c. UL 312 Check Valves for Fire-Protection Service.
 - d. UL 789 Indicator Posts for Fire-Protection Service.

B. Provide all valves from the same manufacturer.

1.04 PRODUCT HANDLING

- A. Store items above ground on platforms, skids, or other required supports.
- B. Protect materials from direct sunlight.
- C. Protect coating and linings on piping, fittings, and accessories from damage. Repair and/or replace damaged coatings or linings.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Pipe:
 - 1. Pipe sizes up to 2.5 inches shall be copper water tubing, Type L hard, ANSI H23.1, ASTM B 88, IAPMO IS. Muller Brass, Cambridge-Lee Halstead, or equal.
 - 2. If soil report indicates corrosive condition, an approved protective wrap shall be used to completely isolate and protect all underground copper tubing and extend past the surface a minimum 12 inches. The excess wrapping shall be trimmed down and taped to copper tubing with 10-mil PVC pipe tape at grade level of concrete or asphalt.
 - 3. Underground pipe sizes 3 inches and larger shall be PVC water main pipe material complying with ASTM D 1784 Cell Class 12454B and AWWA C900. Piping shall be plain end or gasket bell end, pressure class 200 (DR14) with cast iron pipe equivalent OD.
 - 4. Stainless steel pipe, sizes 2 inch and larger may be used above or below ground with the approval of the Architect in lieu of copper, ductile iron, or plastic. Stainless steel pipe shall be schedule 10, 304 s. s. pipe (tubing) conforming to ASTM A312. Flanges shall be HR carbon steel plated conforming to ASTM A36. Flange exterior coating shall be Zink plated conforming to ASTM B633-85. Welding wire/rod shall be 308L SS wire rod conforming to ASME SF A5.9.
 - a. Underground connections shall be welded s.s. pipe or made with a welded flange connection.

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- b. Above ground connections may be with either flange or grooved Victaulic type coupler. Victaulic couplers shall be constructed of ductile iron and conform to ASTM A-395, 65-45-15. Gaskets shall be of EPDM material, UL classified according to ANSI/NSF 61.
- B. Poly vinyl chloride (PVC) water main fittings shall be gray-iron or ductile iron conforming to AWWA C110/A21.10 or AWWA C153/A21.53 and shall have cement mortar lining conforming to AWWA C104/A21.4, standard thickness unless otherwise indicated on Drawings. Fittings shall be mechanical joints.
- C. PVC Joints and Jointing Materials:
1. Pipe joints shall be push on as specified in ASTM D 3139.
 2. Joints between pipe and metal fittings, valves, and other accessories shall be mechanical joints as specified in AWWA C111/A21.11.
 3. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling installation.
 4. Gaskets for push on joints for pipe shall conform to ASTM F 477.
 5. Gaskets for push on joints and compression type joints or mechanical joints for connections between pipes and metal fittings, valves, and other accessories shall be as specified in AWWA C111/A21.11.
 6. Sleeve-type mechanically coupled joints may be provided instead of push-on joints on plain-end PVC plastic joints. Comply with requirements of ASTM D 3139.
- D. Gates Valves for PVC:
1. Non-rising stem type with resilient wedge gates or iron body bronze wedge gates and mechanical joint ends conform to AWWA C500.
 2. Non-rising stem type with mechanical joints ends shall conform to AWWA C509.
 3. Valves designed for a working pressure of 175 psi shall be inside-screw type with operating nut, and resilient wedge type gate. Valve shall be provided with mechanical joints as required for the pipe to which it is intended to connect.
 4. Valves with UL listing of 262 shall conform to AWWA C500. Valves shall open by counterclockwise rotation of valve stem.
 5. Stuffing boxes shall be provided with O-ring stem seals and shall be bolted and constructed to permit easy removal of parts for repair.
 6. Sleeve type mechanical couplings may be provided instead of mechanical and push on joint ends.
 7. Valve ends and gaskets for connection to sleeve type mechanical couplings shall conform to specified requirements for the joint or coupling.
- E. Gate Valves in Valve Pits:
1. Outside screw and yoke rising stem type valves with resilient wedge gates and flanged ends shall conform to AWWA C500.
 2. Outside screw and yoke rising stem type valves with flanged ends shall conform to AWWA C509.
 3. Outside screw and yoke type Valves with double disc gates or split-wedge type gate and flanged ended ends shall be designed for 175 psi and conform to UL 262.
 4. Provide valves with hand wheels that open by counterclockwise rotation of the valve stem.
 5. Stuffing boxes shall be provided with O-ring stem seals and shall be bolted and constructed to permit easy removal of parts for repair.
- F. Check Valves for PVC:

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1. Valves shall be swing-check type conforming to AWWA C508 or UL 312.
2. Valves shall be provided with cast iron or steel body and cover, flanged ends and clear port opening.
3. Valves shall be designed for a working pressure of 175 psi.

G. Fire Hydrants:

1. Before procurement, verify approval issued by the County or Fire Department having jurisdiction.
2. Hydrants shall be wet barrel types conforming to AWWA C503 or UL 246.
3. Only 1 $\frac{3}{4}$ -inch pentagonal nuts are to be provided on stems and protective caps.
4. Specified hydrants:
 - a. Clow/Rich # 850 or 860
 - b. James Jones #J3700 Fluted Barrel
 - c. LB Ironworks #702 Lido or 425

H. Valve Boxes: Valve boxes shall be cast iron and painted with bituminous paint. Shaft shall be adjustable with the word "WATER" cast on the valve box cap. Box shaft shall be 5-1/4 inches minimum diameter. Provide either pedestrian or vehicular traffic type as required. Valve boxes shall be as manufactured by Alhambra Foundry Company, or equal.

I. Mechanical Thrust Restraint:

1. Restraint shall be incorporated into the follower gland.
2. Restraint shall consist of individually actuated wedges that increase resistance to pull out as internal pressure or external forces increase.
3. Gland shall be ductile iron conforming to ASTM A 536.
4. Provide twist off nuts and tee-head bolts of the same size to ensure proper actuating of restraint devices.
5. Restraining device shall be provided with pressure rating equal to that of the pipe on which it is installed.
6. Restraining gland shall be UL listed.
7. Mechanical thrust restraint devices shall be EBAA Iron "Megalug", or equal.

J. Restraint Device Adapters:

1. Restrained flange adapters shall be provided instead of threaded or welded flange spool pieces on plain end of ductile iron or PVC pipe.
2. Flange adapters shall be manufactured of ductile iron conforming to ASTM A 536 and be provided with flange bolt circles compatible with ANSI/AWWA C115/A21.15.
3. Restraint of flange adapter shall consist of a multiple number of individually actuated gripping wedges to maximize restraint capability.
4. Torque limiting actuating screws shall be provided to insure proper initial set of gripping wedges.
5. Flange adapter shall be capable of deflection during assembly or permit lengths of pipe to be field cut to allow at least 0.6 inch of gap between end of pipe and mating flange without affecting integrity of seal.
6. Flange adapter shall be provided with a safety factor of at least 2:1 for rated pressure.
7. Restraint device adapters shall be EBAA Iron "Megaflange", or equal.

K. Tracer Wire for Nonmetallic Pipes: Tracer wires shall be electrically continuous #14 copper tracer wire, Type TW, blue plastic covered for domestic water and red for fire sprinkler. (Aluminum wire is prohibited). Provide in sufficient length to be continuous over each installed section of nonmetallic pipe.

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- L. Pipe markers shall be a concrete plaque inscribed with the word "WATER."
- M. Water Service Line Materials:
1. Copper Tubing: Copper tubing shall conform to ASTM B 88, Type L.
 2. Fittings for Copper Tubing: Fittings for solder-type joints shall conform to ANSI B16.18 or ASME/ANSI B16.22. Fittings for compression-type joints shall conform to ASME/ANSI B16.26, flared tube type.
 3. Water Service Line Appurtenances:
 - a. Corporation stops shall be ground key type; manufactured of bronze conforming to ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be suitable for solder-joint or flared tube compression type joint connection. Threaded ends for inlet and outlet of corporation stops shall conform to AWWA C800; coupling nut for connection to flared copper tubing and shall conform to ASME/ANSI B16.26.
 - b. Goosenecks shall be type K copper tubing. Joint ends for goosenecks shall be as required for connecting to corporation stop and service line. Where multiple gooseneck connections are required for individual service, connect goosenecks to service line through brass or bronze branch connection; the total clear area of branches shall be at least equal to clear area of service line. Length of goosenecks shall be as indicated or required.
 - c. Curb or service stops shall be ground key, round way, inverted key type; bronze, conforming to ASTM B 61 or ASTM B 62; and rated at 150 psi. Ends shall be as required for connection to service piping. Arrow shall be cast into body of curb or service stop indicating direction of flow.
 - d. Gate valves 2.5 inches and larger shall be MSS SP-80, Class 150, solid wedge, or resilient wedge gate, and non-rising stem. Valves shall be provided with flanged end connections. Provide hand wheel operators if easily accessible. Provide operating nut if inside a vault, pit or valve box.
 - e. Gate valves in valve pits 2 inches, and smaller shall be MSS SP-80, Class 150, bronze, solid wedge, inside screw, rising stem. Valves shall be provided with flanged end connections or threaded end connections with union on one side of valve and hand wheel operator.
 - f. Valve boxes shall be provided at each gate valve. Valve boxes shall be as of size suitable for valve on which it is installed.
- N. Water meter indicated on Drawings will be installed by water purveyor for the area, unless noted otherwise.
- O. Strainers:
1. STR-1 Description: Wye type with monel or stainless steel strainer cylinder (manufacturer's standard mesh), and gasketed machine strainer cap. Where indicated on Drawings, provide with valved (globe valve) blow out piping, same size as blow out plug:
 - a. 2" and smaller: C.M. Bailey #100-A, bronze, 250 lb., or ductile iron with fusion bonded epoxy coating.
 - b. 2 1/2" and larger: Watts 77F-DI-FDA-125 lb., or other ductile iron fusion bonded epoxy coated flanged strainer, conforming to ASTM A-312 for the strainer body, and ASTM A-240 for the stainless steel strainer element. (No iron body strainer shall be used on potable water that is not fusion bonded epoxy coated inside and out.)

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2. STR-2 "Y" pattern, cast iron bodies, 125 psi, monel screen 16 sq. mesh. Open area at least twice the cross-sectional area of IPS pipe in which strainer is installed and may be woven wire or perforated type. Screwed ends for sizes up to 2", flanged ends for 2 ½" and larger perforations, in accordance with the following:

BAILY #100 ARMSTRONG RP & C KECKLEY

3. STR-3 Bucket type, flange, semi-steel body, 125 psi, stainless steel screen with 1/8" diameter perforations (mounted above grade for water service). All sizes, (for mains serving fire sprinkler risers):

BAILEY #1 ZURN 150 Series RP 7 C WATTS 97FB-FSFE

4. STR-42" and larger: Watts 077-F-SS stainless steel flange type strainer, or equal conforming to ASTM A-312 for strainer body, ASTM A-240 for the SS strainer element and ASTM A-36 for base flange material.

P. Backflow Preventer Assemblies:

1. Assembly shall be provided with flanged connections, ductile iron with fusion bonded epoxy coated construction, bronze, or stainless steel.
2. Backflow preventer shall be suitable for cold water working pressure of 175 psi.
3. Internal parts shall be designed for replacement without removing valves from line.
4. Double check backflow preventer assembly shall consist of two independently acting spring cam or poppet style check valves, 2 shut-off valves and 4 test cocks. Check valve shall be designed to provide drip tight closure against reverse flow, low-pressure drop at maximum flow capacity. Spring-loaded checks shall cause valve to seal against a higher inlet pressure than outlet pressure when there is no flow.
5. Double check backflow preventer assembly shall meet AWWA Standard C510-89. Assembly shall be:

Ames 2000ss Febco 850 Watts 709 Wilkins 350, or equal.
6. Reduced pressure backflow preventer assembly shall consist of two check valves located between two shut-off valves with an area of reduced pressure between two check valves and a relief device arranged to discharge to atmosphere.
 - a. Comply with AWWA Standard C511.
 - b. Fluctuation in piping pressure shall not cause cycling. Backflow preventer shall automatically maintain low-pressure zone to positively prevent backflow of water into system. Assembly shall automatically indicated failure of any part vital to backflow prevention by the continuous discharge relief device.
 - c. Reduced pressure backflow preventer assembly shall be Cla-Val Model RP-4, or equal.
7. Backflow prevention assemblies (devices), shall be tested and certified by a certified backflow tester, and a test report shall be provided to the water agency having jurisdiction. Testing shall be performed in the presence of the Project Inspector.

PART 3 - EXECUTION

3.01 EXCAVATION, BACKFILLING AND COMPACTING

- A. Conform to requirements in Section 02316: Excavation, Backfilling and Compacting for Pavement.

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3.02 PIPE INSTALLATION

- A. Project site water lines shall terminate approximately 5 feet from buildings, unless otherwise indicated on Drawings. Temporarily cap or plug terminals for future connection to building.

3.03 CLEARANCES OF WATER LINE

- A. Building or Structures: 2 feet.

- B. Parallel to Sewer Line:

- 1. Water line 4 inches or less in diameter shall not be installed in a common trench with the building sanitary drain unless the bottom of the water line is at least 12 inches above the top of the building sanitary drain or where the water line is installed on a solid shelf excavated on one side of the common trench with a minimum clear horizontal distance of 12 inches from the building sanitary drain.
- 2. Water mains 6 inches and larger in diameter shall be separated from the Project site sanitary sewer, receiving more than one building sanitary drain or acid pipeline, in accordance with the requirement of the State of California Department of Public Health.

- C. Crossing Sewer Line:

- 1. A water main shall be separated from sanitary sewer in accordance with the requirements of the State of California Administrative Code, Title 22, Section 64630(e)(2), unless modified herein.
- 2. Install water main a minimum of 12 inches clear, above or below a sanitary sewer.
- 3. A water main 6 inches or greater in diameter, crossing under a Project site sanitary sewer line, shall be installed with all their joints located at least 10 feet away from each side of the sanitary sewer line.
- 4. A water main 6 inches or greater in diameter, crossing over a Project site sanitary sewer line, shall be installed with all their joints located at least 4 feet away from each side of the sanitary sewer line.

- D. Install all water mains no closer than 10 feet horizontally clear from the edge of sewage leach fields, seepage pits, and septic tanks.

3.04 PIPE INSTALLATION AND JOINING

- A. Remove fins and burrs from pipe and fittings.

- B. Clean piping, fitting, valves, and accessories before installing. Maintain items in a clean condition.

- C. Provide proper facilities for lowering sections of pipe into trenches. Do not drop into piping, fittings, or other materials into trenches. Accurately cut pipe and install without springing or forcing. Replace any piping or fitting that does not provide sufficient space for proper installation of joining material.

- D. Blocking or wedging between bells and spigots is not permitted. Install bell and spigot pipe with bell end pointing in the direction of flow.

- E. Install piping to the lines and grades indicated or required. Low points and dips are not permitted. Support piping at proper elevation and grade with secure and uniform supports. Wood support blocking is not permitted. Where sand cement slurry will not be furnished for

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backfill, install piping so that full length of each section of pipe and each fitting will solidly rest on pipe bedding. Excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where indicated or required for installation. Provide proper allowances and devices for expansion and contraction of piping and systems.

- F. Maintain trenches free of standing water until pipe joints have been installed.
- G. At the end of each day close open ends of pipe with temporary wood blocks or bulkheads.
- H. Do not install piping when trench or weather conditions prevent proper installation.

3.05 INSTALLATION OF TRACER WIRE AND PIPE MARKERS

- A. Tracer Wire: Install continuous length of tracer wire for full length of each run of nonmetallic pipe. Fasten wire to top of pipe in such a manner that it will not be displaced during construction operations. Wire shall be fastened to pipe at not greater than 20-foot intervals. Wire shall terminate above finished grade with a 12-inch lead taped around each riser. Provide a tracer wire to grade under a permanent marker where straight-line transitions of metallic to non-metallic pipe are installed.
- B. Underground Pipe Markers: Provide markers at grade where non-metallic pipe is installed and for each horizontal change in direction.

3.06 CONNECTIONS TO EXISTING WATER LINES

- A. After Project Inspector has inspected installation, perform connections to servicing water lines. Schedule service shutdown for connecting new system at a time causing minimum disruption.
- B. Use a tap or drilling machine with valve and mechanical joint type sleeves for connections to waterlines under pressure, only if all other means of scheduling a shutdown time have been unsuccessful, and with the approval of the responsible engineer, and Project Inspector.
- C. Bolt sleeves around mains; bolt valve conforming to AWWA C500 to branch. Open valve, attach drilling machine, perform tap, close valve, and remove drilling machine, without interruption of service. Notify the Project Inspector in writing at least 5 days prior to the date of scheduled connections.

3.07 INSTALLATION OF PVC PLASTIC WATER MAINS

- A. Unless otherwise indicated, install pipe and fittings as specified and in accordance with UBPPA UNI-B-3 and AWWA M23, Chapter 7, "Installation".
- B. Jointing:
 - 1. Provide push on joints with elastomeric gaskets specified for this type of joint, furnishing either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push on joint connections, provide pipe with push on joint ends furnished with factory installed bevel; for push on joint connections to metal fittings, valves and other accessories, square cut spigot end off pipe end.
 - 2. Provide push on joint lubricant recommended by manufacturer.

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3. Install push on joints for pipe-to-pipe connections in accordance with UBPPA UNI-B-3 and AWWA M23, Chapter 7, "Installation."
 4. Install push on joints for connection to fittings, valves, and other accessories in accordance with requirements of UBPPA Uni-B-3 and with applicable requirements of AWWA C600.
 5. Compression-type joints/mechanical-joints with gaskets, glands, bolts, nuts and internal stiffeners shall be installed in accordance with the requirements of UBPPA UNI-B-3 and AWWA C600 and Appendix A to AWWA C 111/A21.11.
 - a. Square cut spigot off end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel.
 6. Sleeve-type mechanical couplings shall be provided in strict accordance with coupling manufacturer's recommendations using internal stiffeners as specified for compression-type joints.
- C. Provide mechanical thrust restraint devices for anchorage and piping unless thrust blocks are indicated on the Drawings. Thrust blocks shall be installed in accordance with the requirements of UBPPA UNI-B-3 except that size and location of blocks shall be as indicated. Thrust blocks shall be provided as specified in Section 02770: Site Concrete Work.

3.08 INSTALLATION OF VALVES

- A. Provide gate valves conforming to AWWA C 500 and UL 262 in accordance with AWWA C600 for valve and fitting installation and with recommendations of AWWA C500 Appendix "Installation, Operation, and Maintenance of Gate Valves".
- B. Provide gate valves conforming to AWWA C 600 in accordance with AWWA C 509 for valve and fitting installation and with recommendations of AWWA C 500 Appendix "Installation, Operation, and Maintenance of Gate Valves".
- C. Provide gate valves on PVC mater mains in accordance with AWWA M23 Chapter 7, "Installation."
- D. Provide check valves and fittings in accordance with applicable requirements of AWWA C600 unless noted otherwise on the Drawings.
- E. Provide gate and check valve joints as specified for the type of joints between pipe and fittings.

3.09 INSTALLATION OF HYDRANTS

- A. Install hydrants according to requirements of AWWA C 600 for hydrant installation and as indicated. Provide joints as specified for the type of joints between pipe and fittings.
- B. Install hydrant with a 6-inch key gate valve between 4 and 10 feet from the hydrant.

3.10 INSTALLATION OF BACKFLOW PREVENTERS

- A. Install in accordance with manufacturer's recommendations.

3.11 WATER SERVICE LINE CONNECTION TO WATER MAINS

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- A. Connect service line to main by corporation stop and gooseneck. Install service stop as indicated on the Drawings. Connect service lines to PVC plastic water mains in accordance with UBPPA UNI-B8 and AWWA M23, Chapter 9, "Service Connections".
- B. Special Requirements for Plastic Piping: Unless otherwise indicated, install pipe and fittings in accordance with ASTM D 2774 and ASTM D 2855. Handle solvent cements for plastic pipe jointing in accordance with ASTM F 402. Install joints according to ASTM D 2855. Install other joints to materials other than pipe materials in accordance with plastic pipe manufacturer's recommendations.
- C. Connect plastic pipe service lines to corporation stops and gate valves according to plastic pipe manufacturer's recommendations.

3.12 INSTALLATION OF STRAINERS:

- A. Strainers shall be installed on each water main downstream of the meter, above grade at the pressure regulating station. When a pressure regulating station (assembly) is not provided, "wye" type flange strainer shall be provided, with a shut off valve on the inlet and the outlet side.
- B. If the water main is serving fire sprinkler risers or hydrants, then an approved fire service strainer shall be used: Watts 97DB-FSFE or equal.

3.13 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. When water piping has been installed and tested, sterilize system before use and/or Substantial Completion.
- B. Inject solution of liquid chlorine or sodium hypochlorite and water containing at least 50 PPM of free chlorine into a system in a manner to ensure that entire system is completely filled with solution. During this procedure operate valves and test outlets for residual chlorine. Continue injection until outlets indicate at least 59 PPM of free chlorine.
- C. After injection, isolate system and hold solution in retention for a period of at least 8 hours. Perform tests for residual chlorine after retention. If such tests indicate less than 50 PPM of residual chlorine, repeat entire procedure. After satisfactory sterilization has been verified, flush entire system until all traces of chlorine have been removed or until chlorine content is no greater than in existing water supply.

3.14 ELECTROLYSIS PREVENTION

- A. A minimum 6-inch long brass nipple shall be installed at locations specified or as required. Flanges shall be provided with a complete insulating component consisting of; gasket bolt sleeves and bolt washers. Dielectric insulators shall be installed at locations indicated or as required. Dielectric fittings are prohibited.
- B. Where steel or cast iron below grade connects to copper or brass piping above grade, the transition from steel or cast iron pipe to copper or brass pipe shall be installed in an above grade accessible location.
- C. Underground connections between dissimilar metals shall be in accessible yard boxes.
- D. Above ground dielectric connections shall be exposed.

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3.15 ABANDONING WATER LINES AND STRUCTURES

- A. Water lines and all appurtenances to be abandoned in place shall be cut and removed from all areas where new Work is being installed.
- B. Cap or plug abandoned existing drain lines in a code-recognized manner.

3.16 TESTS AND INSPECTIONS

- A. Provide labor, equipment, materials, test equipment and incidentals required for performing required field tests.
- B. Tests shall not be performed for 5 days after concrete thrust blocks have been installed.
- C. Testing Procedure: Water mains and service lines shall be tested in accordance with applicable specified standard.
 - 1. Test PVC plastic water system in accordance with UBPPA UNI-B-3 for pressure and leakage. The amount of leakage from PVC piping shall not exceed the amounts given in UBPPA UNI-B-3, except that no leakage is permitted for joints installed with sleeve type mechanical couplings.
 - 2. Test water service lines in accordance with applicable requirements of AWWA C 600. No leakage is permitted.
 - 3. Pressure testing: Before pressure test, fill portion of piping being tested with water for a minimum of 24 hours. Provide hydrostatic pressure of at least 50 psi greater than the maximum working pressure of tested system, but no less than 200 psi hydrostatic test pressure for system piping of 2 inches in diameter and larger. Provide and maintain hydrostatic test pressure for at least 2 hours to ensure no leakage of any portion of piping or appurtenances under pressure test.

3.17 CLEANING

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

3.18 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 02711 - BITUMINOUS SURFACING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Paving for parking areas, areas between buildings, adjacent to planting and turf areas as indicated.
- C. Related Sections:
 - 1. Section 02319: Base Course.
 - 2. Section 02786: Seal for Bituminous Surfacing.

1.02 SUBMITTALS

- A. Shop Drawings: Submit site plan indicating extent of paving and accessories.
- B. Product Data: Manufacturer's technical data for materials and products.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction.

1.04 PROJECT CONDITIONS

- A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

PART 2 - PRODUCTS

2.01 BITUMINOUS MATERIALS

- A. Provide materials of the class, grade, or type indicated on the Drawings, conforming to relevant provisions of Section 203 - Bituminous Materials of the Standard Specifications for Public Works Construction.

2.02 HEADERS AND STAKES

- A. Headers: Redwood, Construction Heart Grade, size 2 x 6, unless otherwise indicated.
- B. Stakes: 2 x 4 redwood or 2 x 3 Douglas fir, Construction Grade.
- C. Nails: Common, galvanized, 12d minimum.

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PART 3 - EXECUTION

3.01 HEADERS

- A. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.
- B. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of adjacent undisturbed earth.
- C. Fasten headers in place with redwood or Douglas fir stakes of length necessary to extend into solid grade a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on centers with top of stakes set one inch below top of header. Provide a minimum of 2-12d galvanized common nails through each stake.
- D. Remove existing headers where new surfacing is installed adjacent to existing surfacing.
- E. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.
- F. Provide additional stakes and anchorage as required to fasten headers in place.

3.02 CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT

- A. Thickness of Surfacing: Unless otherwise indicated on Drawings or specified, install bituminous surfacing to a compacted thickness of 2 inches.
- B. Provide surfacing material over base course as specified in Section 02319, Base Course.
- C. Surfaces of walls, concrete, masonry, or existing bituminous surfacing indicated to be in direct contact with installed bituminous surfacing shall be cleaned, dried and uniformly coated with an asphalt emulsion film.
- D. Thicken edges of bituminous surfacing that do not abut walls, concrete, or masonry, and edges joining existing bituminous surfaces. Remove headers at existing bituminous surfacing where new bituminous surfacing is to be installed. Thicken edges an additional 2 inches and taper to the indicated or specified thickness 6 inches back from such edges.
- E. At stairways, join surfacing to first tread or riser below first tread, at an elevation below first riser equal to height of risers of stairway.
- F. Provide adequate protection for concrete, planting areas, and other finish Work adjacent to areas indicated to receive bituminous surfacing.
- G. Placing:
 - 1. Do not install bituminous surfacing when atmospheric temperature is below 40 degrees F or when fog or other unsuitable weather conditions are present. Temperature of mixture at time of installation shall not be lower than 260 degrees F in warm weather or higher than 320 degrees F in cold weather.
 - 2. Where 2-inch or 3-inch thick surfacing is indicated or specified, install surfacing in one course. Where surfacing is indicated or specified 4 inches or more in thickness, except for

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thickened edges, install bituminous surfacing in courses of approximately equal thickness, each course not exceeding 2-1/2 inches in thickness unless otherwise required by the Architect.

- H. Stakes or Screeds: Provide grade or screed stakes spaced not more than 15 feet apart in flow lines with grades of less than one percent. Continuous screeds may be provided instead of stakes.
- I. Spreading: Install bituminous surfacing in a manner to cause least possible handling of mixture. In open areas and wherever practicable, install by mechanical means with a self-propelled mechanical spreader. In confined or restricted areas, install mixture with hot shovels and rakes, and smooth with lutes.
- J. Joints: Provide vertical joints between successive runs. Install joints true to line, grade, and cross section. Lapped joints are not permitted.
- K. Rolling:
 - 1. Finish roll with a self-propelled tandem roller weighing at least 8 tons. Break down roll with a self-propelled roller weighing between 1-1/2 tons and 8 tons.
 - 2. Roll in a manner that preserves flow lines and the established finished grades. Break down roll in areas adjacent to flow lines parallel to flow lines. Break down roll after bituminous surfacing is installed without shoving or cracking of mixture under roller. Continue finish rolling until surfacing is unyielding, true to grade, and meets requirements for specified smoothness. Areas inaccessible to finish roller may be finish rolled with breakdown roller or tamped with hot tamping irons and smoothed with hot smoothing irons or hand roller.
 - 3. Where bituminous surfacing abuts concrete, masonry, and walks or paving, tamp joint smooth, if necessary, as described above to obtain a uniformly even joint, true to line and grade. Tamp and smooth to properly compact.
 - 4. Compacted bituminous surfacing shall be provided with a bulk specific gravity of at least 2.31 when tested in accordance with ASTM D 1188.

3.03 TOLERANCE

- A. Smoothness: Surface of bituminous surfacing after rolling, shall be even, smooth and uniform in texture with no voids or rock pockets, free of roller marks or other irregularities, and not varying by more than 0.03 foot, except at local depressions or raised areas as indicated, when a 10 foot straightedge is placed on surface.
- B. Grade: Finished grade shall not vary more than 0.02 foot above or below required grade. Variations within prescribed tolerance shall be compensating so that average grade and cross-section are provided.

3.04 TESTING

- A. After first coat of surface seal has been installed and cured, flood test completed bituminous surfacing in presence of the Project Inspector. Repair areas of standing water or puddles and flood test locally; install surface seal and retest as necessary.

3.05 SURFACE SEALING

- A. After bituminous surfacing has passed flood test, clear and allow to dry and provide one more coat of surface seal as specified in Section 02786: Seal for Bituminous Surfacing.

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- B. Where indicated, provide multiple coats of surface seal to existing bituminous surfacing.
- C. Where new bituminous surfacing joins existing bituminous surfacing, overlap surface seal a minimum of 12 inches onto existing bituminous surfacing.

3.06 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.07 CLEANUP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

END OF SECTION

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SECTION 02765 - PAVEMENT REPAIR

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Bituminous Surfacing Repair: Areas removed for utility trenches, heaved by tree roots, cracked areas, protruding areas where pavement meets hard surfaces, depressed areas, holes and areas around new structures, and raveled bituminous pavement.
 - 2. Concrete Pavement Repair: Areas heaved by tree roots, cracked areas, holes and trenches, and areas around new structures.
- C. Related Sections:
 - 1. Section 02316: Excavating, Backfilling and Compacting for Pavement.
 - 2. Section 02319: Base Course.
 - 3. Section 02711: Bituminous Surfacing.
 - 4. Section 02770: Site Concrete Work.
 - 5. Section 02786: Seal for Bituminous Surfacing.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating areas to be repaired.
- B. Product Data: Submit manufacturer's technical data for materials and products.

1.03 QUALITY ASSURANCE

- A. Comply with Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials specified in Section 02319: Base Course.
- B. Materials specified in Section 02711: Bituminous Surfacing.
- C. Materials specified in Section 02770: Site Concrete Work.
- D. Materials specified in Section 02786: Seal for Bituminous Surfacing.

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2.02 BITUMINOUS MATERIALS

- A. Provide materials and products of the class, grade or type indicated, conforming to relevant provisions of Section 203 - Bituminous Materials of the latest Standard Specifications for Public Works Construction.

2.03 HEADERS AND STAKES

- A. Headers: Redwood, Construction Heart Grade, size 2 x 6, unless otherwise indicated on Drawings.
- B. Stakes: 2 x 4 redwood or 2 x 3 Douglas fir, Construction Grade.
- C. Nails: Common, galvanized, 12d minimum.

2.04 SLURRY

- A. Cement-sand slurry; minimum one sack of cement per cubic yard of mixture.

PART 3 - EXECUTION

3.01 PAVEMENT REMOVAL

- A. Remove bituminous and concrete pavement in accordance with applicable provisions of Section 300 - Earthwork of the Standard Specifications for Public Works Construction.
- B. Pavement Heaved By Roots: Remove pavement to limits of distortion and expose roots. Trim roots to provide at least 12 inches clearance to pavement.
- C. Remove protruding bituminous surfaces flush with the surrounding grade using a suitable tool or equipment so that adjacent finishes are not blackened.
- D. Remove raveled and depressed bituminous pavement to limits indicated or required.
- E. Saw cut existing improvements, trim holes and trenches in bituminous and concrete pavement to permit mechanical hand tampers to compact the fill.
- F. Remove broken concrete by saw cutting. If the required cut line is within 30 inches of a score or joint line or edge, cut and remove to the score, joint line, or edge.

3.02 EXCAVATING, BACKFILLING AND COMPACTING

- A. Conform to requirements in Section 02316: Excavating, Backfilling and Compacting for Pavement, as required.
- B. Where subgrade or base is deemed to be unstable or otherwise unsuitable, excavate such materials to firm earth, and replace with a required material. Install and compact fill materials in accordance with the requirements of related Specification sections.

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3.03 HEADERS

- A. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.
- B. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of the adjacent undisturbed grade.
- C. Fasten headers in place with redwood or Douglas fir stakes of length necessary to extend into solid earth a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on centers with top of stakes set one inch below top of header. Provide a minimum of 2-12d galvanized common nails through each stake.
- D. Remove existing headers where new surfacing is installed adjacent to existing surfacing.
- E. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.
- F. Provide additional stakes and devices as required to fasten headers.

3.04 BASE COURSE

- A. Unless otherwise indicated, base course shall be crushed aggregate base, fine grade, 3 inches thick or equal to thickness of the existing base, whichever is greater.

3.05 RESURFACING

- A. Holes and Trenches: Remove loose dirt and backfill with cement-sand slurry allowing for surfacing one inch thicker than existing. Unless otherwise indicated on Drawings, resurface flush with existing adjoining pavement installing the same type of materials and section provided in existing improvements.
- B. Other Areas: Other surface improvements damaged or removed shall be cut to a neat even line and excavated one inch below the bottom of the existing pavement. Resurface by following the original grades and installing the same type of materials provided in existing improvements.
- C. Where bituminous surfacing abuts concrete, masonry, and walks or paving, tamp joint smooth, if necessary, as described above to obtain a uniformly even joint, true to line and grade. Tamp and smooth materials before asphalt cools.

3.06 REPAIRING AND RESEALING EXISTING SURFACES

- A. Preparation of Surfaces: Prior to filling cracks, clean existing bituminous surfacing of loose and foreign materials and coat with a film of asphalt emulsion.
- B. Repair of Existing Surfacing:
 - 1. Fill cracks 1/2 inch wide and less with RS-1 emulsion and silica sand or other required material. Cracks larger than 1/2 inch wide shall be filled with Type C2 Asphalt Concrete as specified. Cracks shall be filled to the level of adjacent surfacing.
 - 2. Where low areas, holes, or depressions occur in existing surfacing, repair with emulsified asphalt. Install material; strike off the emulsified asphalt with a straightedge flush with

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adjoining surfacing. Finish with a steel trowel, and after dehydration, compact by rolling or tamping.

- C. Testing: Flood test entire area in presence of the Project Inspector. Entire area tested shall be free of standing water or puddles.
- D. Surface Seal: After surface has been repaired and tested, install seal coat over entire area indicated. Surface seal shall be as specified in Section 02786: Seal For Bituminous Surfacing.

3.07 CLEANING

- A. Remove all stains on the Project site and adjacent properties caused by or attributed to the Work of this section.
- B. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

3.08 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 02770 - SITE CONCRETE WORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Portland cement concrete pavement, cement walks, curbs, gutters, trash pick-up area, ramps, mowing strips, fence post footings, sliding gate concrete tracks, catch basins, pipe bedding and encasements, thrust blocks, transition structures, light standard bases and footings.
- C. Related Sections:
 - 1. Section 02316: Excavating, Backfilling and Compacting for Pavement.
 - 2. Section 02319: Base Course.
 - 3. Section 02510: Site Water Distribution Systems.
 - 4. Section 02765: Pavement Repair.
 - 5. Section 02821: Chain Link Fences and Gates.
 - 6. Section 03200: Concrete Reinforcement.
 - 7. Division 15: Mechanical.
 - 8. Division 16: Electrical.

1.02 SUBMITTALS

- A. Shop Drawings: Submit plans, elevations and details of concrete site Work.
- B. Product Data: Submit mix designs and manufacturer's technical data for materials and products. Submit 3" x 3" concrete sample of each specified color

1.03 QUALITY ASSURANCE

- A. Comply with Standard Specifications For Public Works Construction.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete, Mortar and Related Materials: Comply with applicable provisions of Standard Specifications for Public Works Construction, Section 201 - Concrete, Mortar and Related Materials:
 - 1. Concrete: 28-day compressive strength 2,500 psi, unless specified otherwise.
 - 2. Reinforcing Mesh: ASTM A 185, 4x4/W1.4 x W1.4 welded wire mesh.
 - 3. Expansion Joint Filler: Preformed expansion joint filler, bituminous type, complying with ASTM D 994.

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B. Form Materials:

1. Side forms: Douglas fir, Construction Grade or Better or metal forms.
2. Stakes: Douglas fir, Construction Grade or Better or metal stakes.

C. Concrete Parking Bumpers:

1. Precast concrete, smooth and free of pits and rock pockets, providing a minimum 28-day compressive strength of 3,500 psi. Size at least 7-1/2 inches wide, 5-1/2 inches high and 6 feet long. Reinforce with 2 #5 reinforcing bars. Provide 2-3/4-inch diameter pre-drilled holes for anchor installation.
2. Bumper Anchors: Provide 1/2-inch diameter x 18-inch long galvanized steel pipe.
3. Bumper Adhesive: Provide adhesive recommended by bumper manufacturer/installer for fastening bumpers to concrete pavement.

PART 3 - EXECUTION

3.01 CONSTRUCTION OF FORMS FOR CAST-IN-PLACE STRUCTURES

- A. Concrete Pavement: Install Portland cement concrete pavement in compliance with the Standard Specifications for Public Works Construction, Section 302- Roadway Surfacing.
- B. Miscellaneous Exposed Concrete: Install concrete curbs, walks, gutters, cross gutters, access ramps, driveways, catch basins, yard boxes, vaults and similar structures, in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
- C. Exposed Concrete Bases: Install bases, such as for post, flagpole, light standards and similar bases, in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
- D. Post, flagpole, light standard footings below grade, underground conduit bedding, encasements, thrust blocks and similar structures may be placed directly in excavations conforming to the required sizes.
- E. Reinforcement installation and concrete placement, surface finishes, curing and removal of forms shall be performed in compliance with applicable provisions of Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
 1. Portland cement concrete paving shall have a medium broom finish on all surfaces less than 6% and a slip resistant, heavy broom finish on all surfaces greater than 6%.

3.02 INSTALLATION OF PARKING BUMPERS

- A. Install bumpers as indicated on the Drawings. On bituminous paving, install anchors through pavement and into the ground a minimum of 12 inches. On concrete pavement, install bumpers in a continuous bed of adhesive.

3.03 CLEAN UP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

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3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 02786 - SEAL FOR BITUMINOUS SURFACING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Surface sealer over bituminous surfacing.
- C. Related Sections:
 - 1. Section 02711: Bituminous Surfacing.
 - 2. Section 02788: Pavement Marking.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's product information and application procedures for bituminous surfacing.

1.03 QUALITY ASSURANCE

- A. Comply with the Standard Specifications For Public Works Construction, current edition.
- B. Agitate bulk materials during transport.

1.04 MAINTENANCE

- A. Extra Materials: Provide 10 gallons in unopened containers.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide one of the following surface seals:

Product Name	Manufacturer
Guard-Top	Vulcan Materials Co.
OverKote	Diversified Asphalt Product
Park Top	Western Colloid Products
Super Drive Top.	SAF-T-Seal. Inc.

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PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. Thoroughly wash surfaces with water to remove dirt, debris, excessive oil and grease, or other foreign matter.

3.02 APPLICATION

- A. Install seal coat in strict accordance with manufacturer's written directions and recommendations.
- B. Install 2 coats of surface seal to new bituminous surfacing. First coat shall be installed before flood testing. Clean surface and allow to dry before installing second coat. Second coat shall be installed after bituminous surfacing has passed flood test.
- C. Where new bituminous surfacing is installed adjacent to existing bituminous surfacing, overlap surface seal a minimum of 12 inches onto existing bituminous surfacing.
- D. Where existing bituminous surfacing is indicated to be patched and sealed, install 2 coats of surface seal after patching. Refer to Section 02711: Bituminous Surfacing.

3.03 PROTECTION OF SURFACES

- A. Protect sealed and unsealed surfaces from damage and traffic during performance of the Work of this section and until surface seal has thoroughly set and cured. Do not permit traffic of any kind for at least 24 hours after completion of installation.
- B. Protect the Work of this section until Substantial Completion.

3.04 TESTING

- A. Owner reserves the right to obtain samples, perform tests to ensure compliance with the Specifications, and to review weight slips and invoices of materials delivered to the Project site.

3.05 CLEAN UP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 02788 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Parking stripes, markings and accessibility symbols, as indicated.
 - 2. Fire lane "No Parking."
 - 3. Curb marking and red curbs.
- C. Related Sections:
 - 1. Section 02786: Seal for Bituminous Surfacing.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings, indicating location, extent, color and texture of markings.
- B. Material Samples: Submit color Samples.

1.03 PROJECT CONDITIONS

- A. Do not install markings when adverse weather conditions are forecasted.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Paint: Water emulsion-based Dura-Strip paint as manufactured by TMT-Pathway, or equal.

PART 3 - EXECUTION

3.01 PAVEMENT MARKINGS

- A. Application of Paint:
 - 1. Prior to application of paint, allow the pavement to properly cure. Clean and prepare in accordance with paint manufacturer's written recommendations.
 - 2. Provide mechanical equipment to install paint in a uniform, straight or curved pattern, without holidays and other defects.
 - 3. Do not permit traffic until paint has completely cured.
 - 4. Install 2 coats in thickness recommended by manufacturer.
- B. Marking Width and Color: Unless indicated otherwise, marking width and color are as follows:

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	<u>Width</u>	<u>Color</u>
1. Parking stall lines	4 inches	White General / Blue Accessible
2. Traffic markings	4 inches	Yellow
3. Striping:		
a. General	4 inches	Yellow
b. Accessible	4 inches	Blue
4. International Symbol of Accessibility	2 inches	White on blue background
5. Accessible parking spaces shall be marked according to 2007 CBC Section 1129B.4.		
a. Painted lines and markings on pavement shall be 3" minimum wide and blue in color equal to Color No. 15090 per Federal Standard 595B.		
b. Tactile warning lines shall be in conformance to 2007 CBC Section 1121B.3.		

3.02 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 02810 - IRRIGATION SYSTEMS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Include all services, labor, materials, transportation, and equipment necessary to perform the work indicated on the Drawings and specified herein, and as required to properly complete the irrigation work and provide an operable system. The work includes:
 - 1. Automatic irrigation system including piping, fittings, sprinkler heads, and accessories.
 - 2. Valves, backflow preventers and fittings.
 - 3. Controller, control wire.
 - 4. Testing.
 - 5. Excavating and backfilling irrigation system work.
 - 6. Accessories to complete system.
 - 7. Pipe sleeves.
- B. Related work includes:
 - 1. Section 02900: Planting

1.02 SUBMITTALS

- A. See requirements in General Provisions and Special Conditions and Section 01300, Submittals.
- B. Submit a list of all irrigation equipment to be used, manufacturer's brochures, maintenance manuals, guarantees, and operating instructions.
- C. Approval by Architect of any items, alternate or substitute, indicates only that the product or products apparently meet the requirements of the Drawings and Specifications on the basis of the information or samples submitted.

1.03 GUARANTEES AND REPLACEMENTS

- A. The Contractor shall furnish a guarantee in accordance with the General Provisions and Special Conditions for a period of one year from the date of final acceptance, at the conclusion of the maintenance period by the Contractor. The entire system shall be guaranteed against defective equipment, materials, and workmanship. The Contractor shall make repairs in a timely fashion at no expense to Owner. The guarantee shall include provisions for non-settling of the backfill in trenches which, if occurring, shall be corrected, including repairs and/or replacement of any material damaged thereby or there from, to the complete satisfaction of, and at no cost to the Owner.

1.04 TESTING

- A. All PVC main and lateral lines shall be subjected to a pressure test of 150 PSI for a period of four hours. All testing shall be in the presence of the Project Inspector. If leaks develop, repair leaking portions and repeat test until entire system is proven watertight. Approval shall be

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received before backfilling any trench. DO NOT COVER any lines until they have been inspected and approved.

B. Wire Test:

1. All wiring shall be tested for continuity, open circuits, and unintentional grounds prior to connecting to equipment. The minimum insulation resistance to ground shall be fifty (50) megohms. Any wiring not meeting these requirements shall be replaced.
2. If additional wire or tape is necessary repeat color sequence from beginning.

C. Testing of Backflow Preventer Assembly shall be accomplished by a certified backflow tester. A certified tester is a person or organization authorized by the governing water authority or agency to perform testing on all backflow assemblies. The testing report certifying compliance with the authority or agency shall be submitted to the Engineer within ten calendar days effective from the date of testing. Report shall be an original report. Full compensation for performing the functional tests for backflow preventer assemblies shall be considered as included in the contract lump sum price paid for landscape irrigation and no additional compensation will be allowed therefore.

1.05 COVERAGE TEST

- A. When the sprinkler system is completed, the Contractor, in the presence of the Architect, shall perform a coverage test to determine if the coverage of water afforded the lawn and planting areas is complete and adequate. The contractor shall furnish all materials and perform all work required to correct any inadequacies.**

1.06 RECORD DRAWINGS

- A. Before final acceptance of work by the Architect, the Contractor shall provide a record set of As-built Drawings showing the sprinkler system as installed. Drawings shall indicate:**

1. Any changes in location of items or type of equipment or installations from that shown on Drawings shall be so indicated on the Record Drawings.
2. Valves shall be numbered and corresponding numbers shall be shown on the Record Drawings.
3. All remote control valves, quick coupling valves and shut-off valves shall be located by measured dimensions. Dimensions shall be given to permanent objects and shall be to the nearest one-half foot.
4. On the inside surface of the cover of the automatic controller, the Contractor shall prepare and mount a chart showing the valves and sprinkler heads serviced by that particular controller. All valves shall be numbered to match the operation schedule and the Drawings. Only those areas controlled by that controller shall be shown. This chart shall be a plot plan, entire or partial, showing buildings, walks, roads, and walls. A photo static print of this plan, reduced as necessary and legible in all details, shall be made to a size that will fit into the controller cover. This print shall be approved by the Architect and shall be secured to the inside of the cover. It shall be sealed in a watertight plastic cover.

- B. Retrofitted systems: Contractor shall provide a reduced print of all changes to any existing irrigation systems affected by the retrofit. Prints shall be provided in conformance with above paragraph.**

1. Immediately upon the installation of any buried pipe or equipment, the Contractor shall indicate on the Drawings the locations of said equipment. Dimensions shall be given from permanent objects such as buildings, sidewalks, curbs, and driveways.

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2. As-built Drawings shall be drawn on reproducible prints of the irrigation plans and detail sheet. Request reproducible from the Architect.
3. The following shall be dimensioned from two permanent points of reference (i.e. building corners, sidewalks, etc.):
 - a. Points of connection
 - b. Gate valves
 - c. Pressure line location
 - d. Controllers and control valves (including source of power)
 - e. Quick couplers
 - f. Routing of all direct burial control wire for irrigation
 - g. Size and location of irrigation control wire conduit
 - h. Size and location of all sleeving

1.08 GENERAL REQUIREMENTS

- A. Landscape mow-strips shall be in place before installation of sprinkler system.
- B. Scaled dimensions are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions.
- C. Plan locations of heads, valves, controller and pipe lines are diagrammatic and indicate the spacing and relative locations of all installations. Minor modifications to locations may be made necessary by site conditions.
- D. All lines shall have a minimum clearance of six (6) inches from each other, and from lines of other trades. Parallel lines shall not be installed directly over one another.
- E. Dielectric bushings shall be used in any connections with piping of dissimilar metal materials.
- F. Point of connection shall be approximately as shown on Drawings. The Contractor shall connect new underground piping and valves, and shall provide all flanges, adapters, or other necessary fittings for connection satisfactory to the Architect.
- G. Permission to shut off any existing, in-use water line must be obtained 48 hours in advance, in writing, from the Owner. The Contractor shall receive instructions from the Owner as to the exact length of time of each shut-off.
- H. Contractor shall be responsible for all existing irrigation and domestic systems in the project. Damage to existing irrigation or domestic system shall be required at the Contractor's expense to provide complete restoration of the damaged system back to its normal operational status.
- I. Care shall be used to avoid severing roots of existing trees. All trenching within 20' of trunk of existing trees to remain shall be done by hand methods, carefully tunneling under roots and routing pipe to avoid disturbing roots.
- J. If discrepancies are encountered between the plans and actual site conditions, or within the plans themselves, the Contractor shall contact the Architect for decision on appropriate changes.
- K. The Contractor is responsible for understanding the correct operation of all equipment. If operation is in doubt, contact manufacturer's representative for instruction.
- L. A separate plumbing permit and inspection will be required from the Building Inspection Department for the installation of the irrigation system shown on these drawings.

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PART 2 - PRODUCTS

2.01 MATERIALS

A. Piping: Pipe sizes shown are nominal inside diameter unless otherwise noted.

1. Polyvinyl Chloride Pipe:

- a. PVC Plastic Pressure Lines: For piping upstream of remote control valves and hose bibs. All three (3) inches and smaller shall be Type I, Grade 2, (Impact Modified), designated as PC 1220, Class 315 (SDE 13.5), conforming to Commercial Standards (CS256-63). Pipe smaller than 2" diameter shall be Schedule 40.
- b. PVC Plastic Non-Pressure Lateral Lines: For piping downstream of remote control valves, Type I, Grade 2, (Impact modified) designated as PVC 1200, Class 200, (SDR21), conforming to Commercial Standards (CS256-63).
- c. All sleeving installed under paving, roadways and walkways shall be Type I, Grade 2 (Impact modified) designated as PVC 1120, schedule 40, conforming to Commercial Standards (CS256-63). Size shall be two times diameter of pipe to be sleeved.
- d. Identification: Furnish plastic pipe continuously and permanently marked with the following information: Manufacturer's name or trademark, size, class and type of pipe, working pressure at 73.4 degrees Fahrenheit, and National Sanitation Foundation (NSF) rating.

2. Brass pipe shall be IPS Standard Weight 125 pounds, 85% red brass.

3. Galvanized steel pipe shall be Schedule 40 ASTM, A120-GIT threaded, coupled, and hot dip galvanized. Pipefitting shall be heavy pattern, banded, and galvanized malleable iron.

4. Copper pipe shall be seamless, Type K, hard drawn tubing.

2.02 FITTINGS AND CONNECTIONS

A. Polyvinyl Chloride Pipe Fittings and Connections: Type II, Grade I, Schedule 40, high impact molded fittings, manufactured from virgin compounds as specified for piping, tapered socket or molded thread type, suitable for either solvent weld or screwed connections. Machine threaded fittings and plastic saddle and flange fittings are not acceptable. Furnish fittings permanently marked with the following information: Nominal pipe size type and schedule of material, and National Sanitation Foundation (NSF) seal of approval. PVC fitting shall conform to ASTM D2464 and D2466.

B. Brass Pipe Fittings and Connections: Standard 125 pound class, 85% red brass fittings and connections.

2.03 AUTOMATIC CONTROL WIRE

A. Electric wiring running from controller to the remote control valves shall be solid, single conductor, copper wire, 4/64-inch insulation, 4/64-inch neoprene jacket, Direct Burial or equal, color code wires to each valve. Common wire shall be white. Provide two extra wires to furthest valve on each run. Wire gauge shall be 12-gauge minimum. Verify gauge of wire required with controller manufacturer's recommendations. Control wire coloration shall conform to the following:

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<u>Valve No.</u>		<u>Valve No.</u>	
1	Yellow	10	White/Black Stripe
2	Orange	11	Yellow w/Red Stripe
3	Blue	12	Blue w/Red Stripe
4	Black	13	Orange w/Red Stripe
5	Brown	14	Purple w/White Stripe
6	Purple	15	Brown w/White Stripe
7	Yellow w/Black Stripe	16	Yellow w/White Stripe
8	Orange w/Black Stripe	17	Blue w/White Stripe
9	Red w/Black Stripe	18	Red w/White Stripe

For controllers with more than 18 valves, the sequence shall be repeated.

B. Wire Splices:

1. Make with "Pen-Tite" or equal, epoxy, or PVC packaged kit recommended for underground use.
2. Seal stubbed out wires in similar manner.

2.04 AUTOMATIC CONTROLLER

- A. Each automatic controller shall be UL approved for indoor and outdoor installation, sized and mounted as noted on the Drawings, and electrically timed for automatically opening and closing automatic valves, as designated on plans.
- B. Controllers shall operate on single-phase, 110/120 volt, 60 cycles primary supply with 24/28 volt secondary output to solenoid valves and 40 VA transformer (UL approved) mounted inside case. Controllers shall have rain tight and dust proof steel case; UL approved for outdoor installation, and shall have all solid-state logic, fully programmable microcomputer with no moving mechanical parts.
- C. Controllers shall have the following features:
1. Operate automatically, semi-automatically, and manually.
 2. Dual programming feature. Any station can be programmed into one or both programs. Stations can be grouped at any desired combinations on each program. Both programs can operate simultaneously, and are totally independent of each other.
 3. Each station can be programmed to operate from 1 minute up to 9 hours and 59 minutes, with a minimum of one-minute increments.
 4. Each program shall have up to 4 cycle starts (repeats) per day, and be capable of 8 repeats, utilizing each program.
 5. Programmable to operate daily and on any selected day(s) of the week.

2.05 CONTROL VALVES

- A. Remote control valves shall be of type, size and manufacturer as indicated on the irrigation legend.

2.06 BACKFLOW PREVENTER

- A. Reduced pressure backflow preventer shall be of type, size and manufacturer as indicated on the irrigation legend and shall be of a type and manufacture approved by the local Water District.

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2.07 SPRINKLERHEADS

- A. Lawn spray and turf and pop-up heads shall be constructed of bronze, brass, plastic, and/or stainless steel or a combination of the above, and shall conform to types and sizes determined by designations shown on the Drawings. Rotary heads shall have heavy-duty plastic casings or housings.
- B. Shrub spray, bubbler, and pop-up heads shall be constructed of bronze, brass, plastic, and/or stainless steel or a combination of the above as indicated on the Drawings.
- C. All sprinkler heads with similar functions shall be of common manufacture and shall be marked with the manufacturer's name and identification in a position where they may be identified without being removed from the system.

2.08 VALVE BOX

- A. For remote control valves and control wires: 9-1/2" x 16" x 11" green plastic meter box with lockable cover; maximum of 2 valves per valve box. Cover is to be hot branded with letter and number designation indicated on plans.
- B. For ball valve: 8-3/4" diameter x 12" round, green plastic valve box and lockable cover marked "Water".
- C. For pull boxes: 9-1/2" x 16" x 11" plastic meter box with cover, hot branded "P.B.".
- D. For quick coupling valve: 8-3/4" diameter x 12" round, green plastic valve box and lockable cover marked "QCV".

2.09 QUICK COUPLING VALVE

- A. Quick coupling valves shall be of type, size and manufacture as indicated on the irrigation legend, with resilient rubber cap.

2.10 BALL VALVES

- A. Ball valves shall be of type, size and manufacturer as indicated on the irrigation legend.

2.11 TRACER WIRES

- A. Tracer wires shall be No. 12, Type TW plastic coated copper wires.

2.12 CHECK VALVES

- A. Check valves shall be spring type, adjustable P.V.C. sized to match line.

2.13 PRESSURE REGULATOR

- A. Shall be manufactured of brass or bronze, and shall be capable of withstanding a cold water working pressure of 150 pounds per square inch. Each pressure regulator shall be preset to operate at the pressure indicated on plans. Supply pressure regulator operating range corresponding to the pressure setting required on the plans.

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2.14 GRAVEL

- A. Clean pea gravel free from organic material, clay or loam; 1/4 to 1/2 inch in size.

2.15 MISCELLANEOUS IRRIGATION EQUIPMENT

- A. Shall be as noted and detailed on plans.

2.16 SPARE PARTS

- A. Contractor shall provide to the Owner the following items at time of turnover of the project:
 - 1. Two wrenches for removing each different type of sprinkler head.
 - 2. Six loose keys for quick coupling valves.
 - 3. Five keys for opening and locking each automatic controller case.
 - 4. Six-valve box cover keys of each type.
 - 5. All manufacturers' warranties and instruction manuals associated with the irrigation equipment.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Locations on Drawings are diagrammatic and approximate only, and shall be changed and adjusted as necessary and as directed to meet existing conditions and obtain complete water coverage. Locate and stake all work and obtain approval of the Architect before any installation.
- B. The Contractor shall install and extend system as shown on the Drawings, and as necessary to carry out the intent of the Drawings and Specifications.
- C. The system is designed for the minimum operating pressure as shown at each point of connection. The maximum demand of gallons per minute is as specified. The Irrigation Contractor shall verify the available water pressure on the site prior to the start of installation.
- D. The Contractor shall not willfully install any equipment as shown on plans when it is obvious in the field that conditions exist that were not evident at the time these plans were prepared. Any such conditions shall be brought to the attention of the Owner's authorized representatives prior to any work or the Irrigation Contractor shall assume all responsibility for any field changes deemed necessary by the Owner.
- E. If it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage, Contractor shall make all necessary adjustment prior to finalizing project.
- F. To the extent possible, all irrigation lines and appurtenances are to be installed within the property line outside of public right-of-way, and at no time will an irrigation line cross a public street unless otherwise noted on plans. Contractor shall verify locations of all equipment prior to beginning work.
- G. The Contractor shall locate lines, valves, and other existing underground utilities prior to starting work and shall protect all existing utilities from damage during the course of construction. The Contractor shall obtain approval of the Owner before digging trenches or interrupting utility service.

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- H. The Contractor shall obtain permits and call for inspections as required by local codes and regulations.
- I. All installations shall conform to local codes and accepted construction practices.
- J. Existing trees shall be protected and due care exercised to avoid damage to root systems.
- K. 120 volt electrical power source is to be provided by Electrical Contractor to the location for the automatic controller. Irrigation Contractor shall be responsible for final connection to equipment.
- L. Prior to commencing work, the contractor shall verify the existing Static Water pressure at the point of connection, and shall report any discrepancies with the pressure listed on the plans for each point of connection.

3.02 INSTALLATION OF IRRIGATION SYSTEM

A. General:

- 1. All irrigation system work including hydrostatic testing, coverage tests, preliminary operation tests of automatic controller, backfill, densification and compaction of trenches, and other excavation shall take place after finish grading and before planting.
- 2. During installation of pipe, fittings, valves, and other pipeline components, prevent foreign matter from entering system. Temporarily cap or plug open ends during cessation of installation operations.
- 3. Locate valves and other irrigation equipment in planting areas and locate piping along edges of planting areas except where infeasible to do so.
- 4. Coordinate irrigation work so that there will be no conflict with installation of utilities or work of other trades.
- 5. The Contractor shall be responsible for furnishing the labor and materials to connect to the service connections for water and electrical.
- 6. All irrigation piping and control wires under existing roadway, streets and walkways shall be placed in sleeves.

B. Excavation and Backfilling of Trenches:

- 1. The Contractor shall excavate trenches, prepare sub-grade, and backfill true to line and grade with sufficient room for pipefitting, testing and inspecting operations. Do not backfill until the pipe system has been subjected to a hydrostatic test as specified.
- 2. Trenching within "drip line" of existing trees shall be approved by the Architect prior to start of trenching operations. Contractor shall not sever roots over 1" in diameter. No mechanical trenching methods shall be permitted within the drip line of trees.
- 3. Depth of trench:
 - a. Pressure line - 18" cover minimum (3" and smaller), 24" under paving
 - b. Non-pressure line - 12" cover minimum, 18" under paving
- 4. Subsoil shall be free of all rocks over one (1) inch diameter, debris, and litter prior to use as backfill.
- 5. Repair any leaks and replace all defective pipe or fittings until they meet test requirements. DO NOT COVER any lines until they have been inspected and approved by the Architect for tightness, quality of workmanship and materials.
- 6. Backfill trenches, after approval of piping, with suitable and approved material, tamping soil around pipe. Thoroughly water, settling all trench fills until 90% compaction has been achieved.
- 7. Backfill material shall be an approved soil, free from rocks and clods.

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8. All irrigation piping and control wires under existing roadways, streets and walkways shall be placed in sleeves.

C. Installation of Polyvinyl Chloride Pipe:

1. Because of the nature of plastic pipe and fittings, the Contractor shall exercise all caution in handling, loading, and storing, to avoid damage.
2. The pipe and fittings shall be stored under cover until use, and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lay flat so as not to be subjected to undue bending or concentrated external load to any point.
3. Any pipe that has been dented or damaged shall be discarded until such dent or damaged section is cut and rejoined with a coupling. Pipe exposed to sunlight for more than 7 days shall not be installed.
4. Trench depth shall be as specified above from the finish grade to the top of the pipe. The bottom of the trench shall be free of rocks, clods, and other sharp-edge objects.
5. Pipe ends and fittings shall be wiped with MEK, or P-70 Primer or equal, before welding solvent is applied. Welded joints shall be given a minimum of 15 minutes to set before moving or handling. All field cuts shall be beveled to remove burrs and excess before fitting and gluing together.
6. Pipe shall be snaked from side to side of trench bottom to allow for expansion and contraction.
7. Center load pipe with small amounts of backfill to prevent arching and slipping under pressure. Leave joints exposed for inspection during testing.
8. No water shall be permitted in the pipe until inspections have been completed and a period of at least 24 hours has elapsed for solvent weld setting and curing.
9. Plastic to metal joints shall be made with plastic male adapters and metal nipple, hand tightened, plus one turn with a strap wrench.
10. Slip-fit plastic-to-plastic joints: Solvent weld using solvent recommended by pipe manufacturer only. Assemble per manufacturers' recommendations.
11. Threaded joints shall be fitted using Teflon tape.
12. Flush all debris out of pipe prior to installing heads.

D. Automatic Control Wiring:

1. Direct Burial Control Wire Sizes: As shown and specified. (See materials.)
2. Provide one (1) control wire and one (1) common ground wire to service each valve in system. Provide two (2) foot minimum expansion loop at each valve to permit removal and maintenance of valves.
3. Provide one (1) additional common (white) and one (1) additional control wire (red) to the last valve on each mainline run.
4. Install control wires at least 18 inches below finish grade and minimum four (4) inches from any pipe or fittings except at terminal points.
5. Wire Connections: Neutral, pilot, and spare wires shall be installed with a two foot (2') coiled excess wire length at each end enclosure. Each and every wire splice shall be soldered (using 60-40 solder) together, then encased in the waterproofed epoxy of the "Scotch-Pac: or "Pen-Tite" connectors. Wire splices shall be made only in valve or pull boxes.
6. Control Wire Splices: allowed only on runs of more than 300 feet. Install as for wire connections (above) using "Pen-Tite" or "Scotch-Pac" connectors.
7. Numbering and Tagging: Identify direct burial control wires from automatic valves to terminal strips of controller at terminal strip by tagging wire with number of connected valve. Valves shall be tagged with a metal band (non-corrosive) with valve and controller designation.
8. All wire connections or splices shall be made with "Pen-Tite" or "Scotch-Pac" connectors.
9. Control wires shall be bundled with electrical tape at maximum five-foot intervals.

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10. Trench Marker: All direct burial wires shall be marked with a continuous yellow colored trench marker tape placed nine inches (9") below finished grade directly above the buried wires. Marker tape shall be equal to "Alarmatape" as manufactured by Paul Potter Warning Tape, Inc. Tape shall be four inches (4") wide.

E. Automatic Sprinkler Controller:

1. Shall be installed in the location as shown on the Drawings and as directed. Connect electrical to stub out or outlet as shown on Drawings to conform to applicable electrical codes.
2. Connections to control wiring shall be made within the pedestal of the controller. All wire shall follow the pressure main insofar as possible.
3. Electrical wiring shall be in a rigid PVC plastic conduit from controller to electrical outlet. The Contractor shall be responsible for installing all wiring to the sub-panels or elsewhere as required, in order to complete this installation. A disconnect switch shall be included.
4. Controllers shall have a master switch. It shall be possible to operate each valve manually, independent of the clock or any other valve.
5. Rain shutoff device shall be installed per manufacturer's directions in a location open to receiving direct rainfall.
6. Contractor shall be responsible for programming controller to provide an appropriate amount of irrigation to assure appropriate soil moisture for planting area covered by valves. Modify programming to adapt to plant growth and weather conditions. Run-off and excessive moisture shall be eliminated.

F. Control Valves:

1. Install remote control valves in groundcover area whenever possible and/or as directed by Landscape Architect, with four (4) inches minimum between cover and top of flow control stem. Install a union type connection. Fit with plastic meter box and cover.
2. Adjust flow control and/or pressure regulating device on each valve so farthest sprinkler head served by valve operates at pressure recommended by head manufacturer, and so planted areas are supplied with uniform and even distribution of water.

G. Backflow Preventer:

1. Install backflow preventer with concrete footings, minimum 12 inches above grade per detail shown on Drawings.

H. Sprinkler Heads:

1. The installation of sprinkler heads shall include excavation and backfill; the furnishing, installation, and testing of risers, fittings, and heads; and all other related work in accordance with the Drawings and Specifications.
2. Adjust heads to eliminate over-spray water on walks, walls and structures.
3. Verify 100% coverage with a minimum of 70% overlap. Adjust system to provide maximum coverage.

I. Valve Boxes:

1. Valve boxes shall be set 3/4 inch above the final finish grade in the lawn area and 2 inches above grade in groundcover and shrub areas.
2. No more than two control valves shall be installed in any single valve box. For valves over 1", install no more than 1 valve per box.
3. All valve boxes shall have proper base support and extensions to prevent any settling of boxes. Fill in any settling adjacent to boxes.
4. All valve boxes shall be set parallel with each other and with structures or paving.

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J. Quick Coupling Valve:

1. All quick coupling valves shall be installed plumb and vertical with the valve accessible and removable with proper tools. Concrete footing for quick coupling valve shall be installed per detail at approved locations. Valves shall be located adjacent to paving in planting areas.

K. Ball Valves:

1. All ball valves shall be installed plumb with handles readily accessible. Valves shall be set in valve boxes.

L. Anti-Drain Valves (Check Valves):

1. Contractor shall install an approved anti-drainage device for all low heads to prevent low head drainage and possible soil erosion. In addition to in head or riser type check valves, in line check valves may be required at approximately 10' vertical intervals for lateral lines running down hill to prevent low head drainage.

M. Automatic Controller Enclosure:

1. Shall be installed per manufacturer's instructions and specifications, with concrete base.

N. Existing Irrigation Systems to be modified: All new work on all existing irrigation systems to be modified shall conform to these specifications and the following:

1. Control wire for all valves shall be tested for continuity and repaired to operable condition.
2. All sprinklers on risers adjacent to paving on each valve system to be modified shall be replaced with pop-up sprinklers to match those required by the plans for new construction.
3. All sprinklers controlled by valves on systems to be modified shall be adjusted to prevent over-spray onto walls and paving, and to promote 100% coverage of planting areas.
4. The existing systems shall be tested by the contractor for proper operation following completion of the work and prior to the irrigation substantial completion review.
5. All systems will be operated through the respective controller during the substantial completion review. Contractor is responsible for any corrections required to make the system fully functional and to achieve proper adjustment.

3.03 FIELD QUALITY CONTROL

A. Irrigation Pressure Testing:

1. No testing shall take place, nor shall any water be allowed into any system, before solvent manufacturer's recommending curing time has elapsed.
2. A water pressure test shall be performed on all pressure mains and laterals before any couplings, fittings, valves, and the like are concealed.
3. Provide plugs, valves, tanks, pumps, and accurately calibrated recording gauge as required for pressure testing.
4. Test pressure lines and non-pressure lines under hydrostatic pressure of 150 lbs. per sq. in. watertight.
5. Pressure mains shall be tested with all control valves to lateral lines open and the outlet side of valve capped. After the pressure main test, all valves shall be opened to test lateral lines.
6. Sustain pressures in lines for not less than two hours. If leaks develop, replace joints and repeat test until entire system is proven watertight. Tests shall be observed by Project Inspector prior to backfill.

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7. Upon completion of each phase of work, entire system shall be tested and adjusted to meet site requirements. Testing shall be completed and system operable prior to planting of all plants except specimen trees.
8. At conclusion of pressure test, irrigation heads and quick coupling valves shall be installed in following manner: riser nearest the control valve, or gate valve, shall be uncapped, and full head of water shall be used for at least 30 seconds to flush out risers. Irrigation head or quick coupler valve shall then be placed in position on the riser. Cap on next closest riser shall be removed and preceding procedure used. Procedure shall continue until most distant riser in piping system or sprinkler battery has been flushed and quick coupling valve or irrigation head installed.

- B. Irrigation Coverage Testing: When sprinkler system is completed and prior to planting, perform coverage test in presence of Architect to determine if coverage is complete and adequate. Coverage test shall be performed after sprinkler heads have been installed and shall demonstrate that each section or unit in irrigation system is balanced to provide uniform and adequate coverage of areas serviced. Correct any deficiencies in system.
- C. Electrical Wire Testing: Before backfill material is placed over control wires in trench, test wires with megger for insulation resistance. Minimum insulation resistance to ground shall be 50 megohms. Replace any wires not meeting this requirement.
- D. Operational Testing:
1. The performance of all components of the automatic control system shall be evaluated for manual and automatic operation.
 2. Controller clocks shall be tested operationally for 14 days after complete installation of sprinkler system.
 3. All necessary repairs, replacements, and adjustments shall be made until all equipment, electrical work, controls, and instrumentation are functioning in accordance with the Contract Documents.

3.04 ADJUSTING AND CLEANING

- A. Irrigation System Adjustment:
1. After installation has been completed, make final adjustment of sprinkler system prior to Architect and Project Inspector's final review.
 2. Check sprinklers for proper operation and alignment of spray throw.
 3. Check each section of spray heads for operating pressure and balance to other section by use of flow adjustment on top of each valve.
 4. Adjust irrigation heads to fully cover planting areas and not throw onto walks, buildings, or windows.
 5. Adjust pressure regulator to achieve 10 P.S.I. more than minimum head operating pressure at highest system or highest and largest system.
- B. Site Clean Up:
1. Upon completion of work, clean site to the satisfaction of the Architect and the Owner.
 2. Repair or replace any existing site improvements or systems damaged during course of work in this section.

3.05 POST INSTALLATION

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- A. The Contractor shall be responsible for complete maintenance and protection of the irrigation system until final acceptance of work is given by the Architect.
- B. The Contractor shall instruct the Owner's personnel on all phases of operating and maintaining the irrigation system.
- C. The Contractor shall turn over to the Architect all heretofore-specified special equipment and approved service manuals prior to final acceptance of work.
- D. The Contractor shall transmit to the Architect the Record Drawings.
- E. Clean Up. All work and all areas of work shall be left clean and free of excess material and debris at the end of the construction period.

3.06 MAINTENANCE SCHEDULE

- A. Provide maintenance of entire system for period of 90 days following pre-maintenance review and acceptance by Architect of planting and irrigation installation, including cleaning and adjustment of sprinkler heads and raising or lowering shrub heads to compensate for shrub growth.
- B. Contractor shall be responsible for damaged plant materials due to system failure during installation of plant materials and maintenance period.
- C. Contractor's maintenance period shall not be terminated until the following conditions are satisfied and acceptable by Architect:
 - 1. Valves shall be wired to controller in same numerical sequence as indicated on drawings.
 - 2. Plastic sealed diagram of irrigation system are provided and mounted in each controller.
 - 3. All guarantees and warranties are submitted.
 - 4. Record drawings are submitted.
 - 5. System is fully operational, properly adjusted to provide uniform coverage, and operating automatically in a schedule suited to current seasonal climatic conditions.

END OF SECTION

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SECTION 02851 - ORNAMENTAL STEEL FENCE

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Pre-finished decorative metal picket fence including personnel and vehicle gates.
- B. Related Sections:
 - 1. Section 03300: Cast-in-Place Concrete.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A787, Standard Specification for Electric-Resistance-Welded Metallic-Coated Carbon Steel Mechanical Tubing.
 - 3. ASTM B117, Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 4. ASTM D523, Standard Test Method for Specular Gloss.
 - 5. ASTM D822, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
 - 6. ASTM D1654, Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
 - 7. ASTM D2244, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 - 8. ASTM D2794, Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
 - 9. ASTM D3359, Standard Test Methods for Measuring Adhesion by Tape Test.

1.03 PERFORMANCE REQUIREMENTS

- A. Fence panels shall be capable of supporting a 400 pound (1780 N) load applied vertically at the center of the top rail without permanent deformation.

1.04 SUBMITTALS

- A. Reference Section 01300–Submittals; submit following items:
 - 1. The manufacturer shall supply a total ornamental metal fencing system of the design, style, strength, and picket spacing defined herein. The system includes all material and finishes as required in the plans and specifications.
 - a. Shop Drawings: Dimensioned plan showing fence location relative to property lines, location of gates, gate swing, and details of post anchorage, accessories, and post foundations.
 - b. Product Data: Manufacturer’s catalog cuts including material compliance and specified options.

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- c. Samples: Color selections for powder coated and / or galvanized finishes. If requested, samples of materials.
- 2. Quality Assurance/Control Submittals:
 - a. Qualifications: Proof of manufacturer and Installer qualifications.
 - b. Certificates: Proof of ISO certification.

- B. Closeout Submittals: Reference Section 01700, Project Closeout; submit following items:
 - 1. Maintenance Instructions.
 - 2. Special Warranties.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Minimum five years experience in producing fences of the type specified.
 - 2. Member American Fence Association, Inc.
- B. Installer Qualifications: Minimum one year experience in installation of similar type fences.
- C. Certifications:
 - 1. Production facilities certified to ISO 9001.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Reference Section 01600, Materials and Equipment.
- B. Follow manufacturer's instructions.

1.07 WARRANTY

- A. Special Warranty: Prorated 21-year limited warranty against defects in material and workmanship and against cracking, chipping, peeling, corroding, and blistering.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Products from manufacturers having a minimum of five (5) years experience manufacturing ornamental iron fencing will be acceptable as equal if approved in writing ten days prior to initial bid date and can demonstrate that they are able to meet all design, material, fabrication and powder coating specifications as described herein.
- B. Approved Manufacturer:
 - 1. Allied Tube & Conduit, 800-643-1523, fence@alliedtube.com.
 - 2. Master-Halco, 800-883-8384, info@fenceonline.com.
 - 3. Security Contractor Services, Inc., 800-843-7893, sales02@scsfence.com.
 - 4. Owner approved equal.

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2.02 MATERIALS

- A. Galvanized Steel Sheet: ASTM A653, G90 coated.
 - 1. Tensile Strength: 58,000 psi (400 MPa) minimum.
 - 2. Yield Strength: 50,000 psi (344 MPa) minimum.
- B. Concrete: Reference Section 03300, Cast-in-Place Concrete; 3,000 psi (20.7 MPa) minimum.

2.03 COMPONENTS

- A. Line, Corner, End, and Gate Posts: 2-1/2 by 2-1/2 inches (64 by 64 mm), 12 gauge (2.8 mm) ASTM A787 steel tubing. Include formed steel cap.
- B. Rails: 1-1/2 by 1-1/2 inches (38 by 38 mm), 14 gauge (2.0 mm) ASTM A787 steel tubing with pre-punched square picket holes.
- C. Pickets: 3/4 by 3/4 inches (19 by 19 mm), 16 gauge (1.6 mm) ASTM A787 steel tubing.
- D. Top of Picket Decoration: Sealed square top.
- E. Flanges: Manufacturer's standard fabricated galvanized steel flange for mounting posts on concrete surfaces.
 - 1. Size and shape flange such that post fits over flange with compression fit.
 - 2. Provide manufacturer recommended number, size, and type of anchor bolts.

2.04 STYLE

- A. Height – ground to top of picket: As indicated on Drawings.
- B. 3-Rail.

2.05 PICKET TERMINATION:

- A. Top: Projected pickets.
- B. Bottom: Flat rail—pickets terminate inside bottom rail.
- C. Post Spacing: As shown on Drawings.

2.06 FABRICATION

- A. Fence Panels: Fabricate components in a manner that allows panel sections to be installed on a 25 percent change in grade over the length of the panel.

2.07 SWING GATES

- A. Swing gates shall be welded fabrication from galvanized steel components having equal or greater dimensions as the steel fencing components. All welded intersections shall be protected by applying zinc-rich paint and powder coated to match fence color.

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B. Gate Posts:

GATE HEIGHT - FROM 4ft. (1.2 m)

Gate leaf width	Post Dimension	Gauge
up to 4 ft. (1.2 m)	3" x 3"	12
4.5 ft. to 10 ft. (1.4 m to 3.1 m)	4" x 4"	11
10.5 ft. to 18 ft. (3.2 m to 5.5 m)	6" x 6"	11

GATE HEIGHT - FROM 6 ft. (1.8 m)

Gate leaf width	Post Dimension	Gauge
up to 4 ft. (1.2 m)	4" x 4"	11
4.5 ft. to 10 ft. (1.4 m to 3.1 m)	4" x 4"	1/4"
10.5 ft. to 18 ft. (3.2 m to 5.5 m)	6" x 6"	3/16"

GATE HEIGHT - FROM 8 ft. (2.4 m)

Gate leaf width	Post Dimension	Gauge
up to 4 ft. (1.2 m)	4" x 4"	1/4"
4.5 ft. to 10 ft. (1.4 m to 3.1 m)	6" x 6"	1/4"
10.5 ft. to 18 ft. (3.2 m to 5.5 m)	6" x 6"	3/8"

C. Hardware:

1. Gates in path of travel must comply with exit door requirements (CBC Section 1133B.1.1.1.4/ADAAG 4.13.3) Provide hardware that does not require pinching, grasping, or twisting motion to operate and provide solid kick plates 10" minimum high. Clear space below gate shall be 3" maximum above paving on both sides of the gate. The maximum effort to operate the gates shall not exceed 5 lbs. (22.2N).
2. Hinge Option: Bommer 4020-6T Steel Single Acting Spring Hinge – 6" hinge size, 4-1/2" template hole pattern, number of holes – 8, powder coated to match fence color, 2 per leaf, welded in place.
3. Hinge Option: Stanley BB855 / BB855(NH) Full Mortise Hinge Application, powder coated to match fence color, 2 per leaf, welded in place.
4. Hinge Option: Guardian Heavy Duty Hinge Model-2000 – Carbon steel material, welded construction, flat mount type, powder coated to match fence color, 2 per leaf, welded in place.
5. Cane Bolt: 1" solid steel cane bolt (18-inch, 24-inch, 36-inch), powder coated to match fence color.

D. Sliding gates and Swing Barricade Gates: Fabricate and install as indicated on Drawings.

2.08 FINISH

A. Finish metal components individually prior to assembly.

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- B. Preparation: 6 stage pretreatment including an alkaline wash, and zinc phosphate surface treatment.
- C. Shop Priming: Electrostatic applied zinc-rich epoxy coating, minimum 2 mils (0.0508 mm) thick.
- D. Shop Finishing: Electrostatic applied polyester color coat, minimum 2 mils (0.0508 mm) thick.
- E. Finished Coating Performance Requirements:
 - Adhesion: ASTM D3359, Method B.
 - Corrosion Resistance: ASTM B117 and D1654.
 - Impact Resistance: ASTM D2794.
 - Weathering Resistance: ASTM D822, D2244, and D523, 60 Degree Method.
- F. Color: Black.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine earthwork and paved surface conditions where fencing is to be installed.
 - 1. Verify that soil is either firm undisturbed or properly compacted at post locations.
 - 2. Verify that sloped grades do not exceed manufacturer's biasable panel limitations.
 - 3. Verify property line locations, legal boundaries, and relative post placement.
- B. Coordinate with responsible entity to correct unsatisfactory conditions.
- C. Commencement of work by installer is acceptance of conditions.

3.02 PREPARATION

- A. Stake fence layout including posts, gates, and terminal posts to be inside property lines. Note locations of underground utilities, irrigation systems, benchmarks, property monuments and other underground structures.

3.03 INSTALLATION

- A. Install posts, rails, and pickets in accordance with manufacturer's installation drawings.
- B. Post Hole Excavation: Excavate holes to diameter and depth shown on shop drawings. Dispose of excavated soil off site unless otherwise approved by Architect.
- C. Post Setting:
 - 1. Set posts in holes and verify that posts are plumb, aligned, and at correct height and spacing. Brace to maintain position until concrete is sufficiently cured.
 - 2. Protect post exposed above finished concrete line from concrete spatter.
 - 3. Place concrete in holes and tamp or vibrate to consolidate. Top of concrete at post shall be 2 inches (50 mm) above finished grade. Smooth top of footing and slope to grade.

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- D. Post Setting with Flanges: Secure flange to surface in accordance with manufacturer's instructions and mount post over flange assuring a tight compression fit.

3.04 GATE INSTALLATION

- A. Assemble and install in accordance with manufacturer's instructions.
- B. Lubricate to assure smooth operation.

3.05 FINISH INSTALLATION PROCEDURES:

- A. Remove concrete spatter protection from posts.
- B. Install post caps.
- C. Touch-up damaged color coatings using galvanizing compound spray paint on bare metal surfaces followed by manufacture supplied color touch-up kit.

3.06 ADJUSTING

- A. Gates: Adjust to operate smoothly and quietly. Verify that latches engage securely.

END OF SECTION

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SECTION 02900 - PLANTING

PART 1 GENERAL

1.01 SUMMARY

- A. Incorporated Documents: Contract drawings, Provisions of the Bid Documents, General and Special Conditions, General Requirements, and Division 1 apply to the Work of this Section.
- B. Section Includes: Furnishing materials, labor, and equipment necessary for the completion of landscaping as indicated on the drawings and specified herein.
- C. Related Sections:
 - 1. Section 02770: Site Concrete Work.
 - 2. Section 02810: Irrigation System

1.02 SUBMITTALS

- A. Comply with provisions of Section 01300, Submittals.
- B. Submit complete lists of landscape materials and equipment, including manufacturers name and address, specific trade names, catalog numbers complete with illustrations and descriptive literature and clearly mark or underline proposed items; list sources of landscape topsoil.
- C. Material List: Landscape materials and plantings.
- D. Certification: In addition to other required certification, furnish a certificate with each delivery of bulk material, including topsoil, stating its source, quantity, type of material furnished and that such item or material conforms to the requirements of this section.
- E. Sample: Submit topsoil sample.

1.03 QUALITY ASSURANCE

- A. Workers: Furnish skilled workers thoroughly trained and experienced in the necessary crafts and familiar with the specified requirements for proper performance of the Work of this section.
- B. Codes and Regulations: All materials and workmanship in this section shall comply with all applicable City, County, Federal and State Codes and Regulations. Deliver all permits and testing certifications to the Project Inspector.
- C. Quality and Size: Comply with current edition of the "Horticultural Standards" for number one nursery stock as adopted by the "American Association of Nurserymen".
- D. All Plants:
 - 1. True to name, with the name of the plants in accordance with the standards of practice of "American Association of Nurserymen."
 - 2. In all cases, botanical names take precedence over common names.

1.04 GENERAL REQUIREMENTS

- A. Reviews by the Architect:
 - 1. All irrigation systems before starting the Work of this section.
- B. Inspection: Notify the Architect at least 72 hours in advance to schedule the following inspections:
 - 1. All plant material at time of delivery to the Project site.
 - 2. Condition of lawn area preparation before seeding or sod installation.
 - 3. All landscape construction items prior to start of maintenance of plant establishment period.

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C. Existing Utilities and Plant Materials:

1. Protect utilities and/or plant materials from damage.
2. Perform modifications only as permitted by the Architect, in accordance with applicable provisions noted or specified on the Drawings, or in other sections of these Specifications.
3. Replace damaged plant material with like type and size material. Architect shall determine the cost of irreplaceable plant material according to the "square inch" method as described by the Council of Tree and Landscape Appraisers' "Manual for Plant Appraisers" handbook, Current Edition, and "Guide for Establishing Values of Trees and Other Plants".

D. Verification of Dimensions and Quantities:

1. Verify all scaled dimensions and quantities before starting landscaping Work.
2. Promptly notify the Architect of any discrepancies between the Drawings and Specifications and/or actual Project site conditions.

E. Pest Management Method and Products:

1. Only pest management methods and products demonstrated to be the safest and lowest risk to children are to be provided. Only provide products that will not cause or will have the least potential health effects such as cancer, neurological disruption, birth defects, genetic alteration, reproductive harm, immune system dysfunction, endocrine disruption, and acute poisoning. Pest management methods and products provided in the performance of this Contract shall be in strict compliance with this Specification.
2. Only pest management products that can be applied in a manner and at a time where no person can inhale, come into direct contact, or be exposed to volatile agents shall be provided.
3. The furnishing of products shall be as reviewed by the Architect.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Plants shall be protected in transit and after delivery to the Project site. Plants in broken containers and plants with broken branches or injured trunks will be deemed defective Work.
- B. Plant materials damaged in planting operations shall be replaced.

1.06 WARRANTY

- A. Shrubs and groundcover shall be guaranteed for growth and health for a period of 90 days after completion of maintenance period. Trees shall be guaranteed to live and grow in upright position for a period of one year after completion of maintenance period.
- B. Within 15 days after notification by the Owner, remove and replace failed plantings. Replacement plantings shall be guaranteed as specified for original plantings.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil: Designated as imported topsoil as specified herein. The soil test will determine the suitability of topsoil before installation. Transport topsoil from the source to its final position unless stockpiling is specified.
 1. Imported Soil:
 - a. From a source outside the Project site and in compliance with this section.
 - b. Architect may make such inspections and perform such tests as deemed necessary to determine the material meets all requirements.
 - c. At least 30 days before scheduled installation, submit the proposed source of topsoil and a Sample to the Architect. Submit a written request for review, accompanied by a written report of a soils testing laboratory registered by the State of California for

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- agricultural soil evaluation which states that the proposed source complies with these Specifications.
- d. Comply with all recommendations of the soils testing laboratory and provide any soil amendments necessary to achieve proper nutrient levels to support healthy plant growth.
 - e. Imported topsoil shall be of a uniform composition and structure, fertile and friable sandy loam garden soil, and be free of roots, clods and stones larger than 1 inch in greatest dimension, pockets of coarse sand, noxious weeds, sticks, brush and other litter and not be infested with nematodes or other undesirable insects and plant disease organisms. Imported topsoil shall meet the following additional requirements:
 - (1) Gradation Limits: Sand – 50-80%, clay – 20% maximum, and silt – 30% maximum. The sand, clay and silt gradation limits shall be as defined in ASTM D 422.
 - (2) Agricultural Suitability and Fertility: The topsoil shall be fertile and friable garden soil suitable for sustaining and promoting the growth of the specified plants.
 - (3) Electrical conductivity less than 3.0 milliohms/centimeter at 25 degrees C.
 - (4) Boron content maximum of 1.0 part per million.
- B. Fertilizers and Conditioning Materials: Comply with the applicable requirements of the State of California Agricultural Code:
1. General:
 - a. All fertilizing materials shall be packaged, first grade, commercial quality products identified as to source, type of material, weight and manufacturer's guaranteed analysis.
 - b. Fertilizing material shall not contain toxic ingredients and fillers in quantities harmful to human, animal, or plant life.
 - c. Submit a certificate of compliance stating the material substantially meets the Specifications in accordance with the provisions of sub-section 1.03B.
 2. Materials:
 - a. Bone Meal: Commercial raw bone meal shall be finely ground, steamed dry material with a minimum analysis of 2.5% nitrogen and 22% phosphoric acid.
 - b. Gypsum: Hydrated calcium sulfate produce containing 23% calcium and 18% sulfur with a guarantee analysis of 84% calcium sulfate.
 - c. Soil Sulfur: Guarantee analysis of 99% sulfur.
 - d. Superphosphates: First grade finely ground phosphate rock used for agricultural purpose, containing minimum 18% phosphoric acid by volume.
 - e. Commercial Fertilizer: Pellets or granular product having a chemical analysis of 15-15-15, unless otherwise specified on the Drawings; free floating material delivered in unopened sacks; do not install material which becomes caked or otherwise damaged.
 3. Planting Tablets:
 - a. Shall be slow-released type with the potential acidity of not more than 5% by weight and containing the following percentages of nutrients by weight:
 - 20% Nitrogen
 - 10% phosphoric Acid
 - 05% Potash
 - 2.6% Combined Calcium
 - 1.6% Combined Sulfur
 - .35% Iron (elemental) from Ferrous Sulfate
 - b. Shall be 21-gram tablets as manufactured by Agriform, or equal, applied per manufacturer's instructions.
 - c. Nitrogen Fortified Wood Product: Derived from redwood, fir or cedar sawdust or from the bark of fir or pine treated with a non-toxic agent to quickly absorb water and comply with the following requirements:

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4. Gradation:

SIEVE SIZE	PERCENT PASSING
¼-inch	95% minimum
#8	80% minimum
#35	30% minimum

5. Nitrogen Content:

NITROGEN CONTENT	% DRY WEIGHT
Redwood	0.4 – 0.6%
Fir	0.56 – 0.84%
Cedar	0.56 – 0.84%
Fir Bark	0.8 – 1.2%
Pine Bark	0.8% - 1.2%

6. Salinity: Maximum saturation extract conductivity 2.5 milliohms/centimeter at 25 degrees Celsius.
7. Absorption: When one teaspoon of water is applied to 4 cubic inches of the air-dried products, the material shall become completely damp in a period of less than 2 minutes. Kellogg KRA, Sequoia Redwood/Cedar Blend or White Fir, Long Beach Soil Preparation, Bandini #101 Redwood Soil Builder or nitrogenized wood amendment.
8. Organic Fertilizer: Treated, relatively dry friable organic compost derived from sewage sludge processed for agricultural use; containing at least 1% nitrogen by dry weight, 2% phosphoric acid and comply substantially with the gradation noted in sub-section 2.1, B6. Milorganic, Kellogg's Nitrohumums, or equal.
9. Plants (General): The plant names indicated or listed on the Drawings shall conform to the Sunset, Western Garden Book, latest edition.
- Type and Size: Plant materials shall be listed on the Drawings.
 - Tag one plant of each variety for identifying purposes.
 - All plantings shall be inspected before installation.
 - Substitutions: When plants of a specified kind or size are not available, substitution may be requested in accordance with the General Conditions.
 - All plants shall have a growth habit normal to the species in accordance with USA Standards for Nursery Stock, latest editions; shall be sound, healthy, vigorous, and free from insect pests, plant disease, sun scalds, fresh bark abrasions, excessive abrasions or other objectionable disfigurements. Tree trunks shall have normal well developed branch systems and vigorous and fibrous root systems, not root bound and shall be free of kinked or girdling roots.
 - No pruning shall be performed before Architect inspection at the nursery other than normal size pruning during the growth period
 - Plantings specified for adverse conditions shall be Project site acclimated before planting, either through purchase from local nurseries or Project site storage for a period of 10 weeks for autumn planting and 6 weeks for spring planting.
10. Plant Material:
- Shrubs: Specified type and size selected from high quality well shaped nursery stock.
 - Flatted Plants: Grown and remain in the flat until transplanted at the Project site. The soil and spacing of the plants in the flat shall insure the minimum disturbance of the root system at time of transplanting. Maximum plants per flat to be 64 to 100 plants, or as indicated in the Drawings.
 - Turf Sod: Mixture of specified proportions of well established lawn grass, vigorous well rooted healthy turf, free from disease, insect pests, weeds, other grasses, stones, and other harmful or deleterious matter.

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- d. Grass Sod: Shall consist of grass varieties as specified on Drawings or as required.
- e. Grass Seed: First quality from a new crop seed. Unless otherwise specified on Drawings or required, shall be a mixture of the following varieties of seed, proportioned by weight:

	Percentage of Purity	Germination	Proportion
Creeping Red Fescue	95%	90%	70%
Bermuda	98%	85%	30%

- f. Use non-hulled seed except during months of May through September. During these months provide hulled seed.

11. General Materials:

- a. Nails, fasteners, etc.: Galvanized and commercial quality materials.
- b. Fabricated metal items: Steel conforming to ASTM A 36.
- c. Concrete items: Standard 2000 psi concrete.
- d. Concrete headers: 6-inch x 6-inch size, complete with pre-molded expansion joint material 10 ft. apart or as indicated on the Drawings.
- e. Redwood Headers: Headers and stakes shall be construction heart rough redwood, as indicated on Drawings and as specified. Nails shall not be less than 12d common, galvanized. Stakes and headers shall be furnished in 14'-0" to 20'-0" lengths and shall be of uniform width and thickness.

12. Pest Management Methods and Products

- a. Pesticides, insecticides, herbicides, fungicides, rodenticides, avicides, and growth regulators shall not contain any ingredients, both active and inert, which are:
- b. Banned, suspended, cancelled, discontinued or withdrawn by United States Environmental Protection Agency or Department of Pesticide Regulation of California Environmental Protection Agency.
- c. Not registered for the intended use with above agencies.
- d. Known or suspected to be a carcinogen according to International Agency for Research on Cancer (IARC), United States Department of Health and Human Services - National Toxicology Program (USDHHD-NTP), United States Department of Labor-Occupational Health and Safety Administration (USDOL-OSHA), California Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop 65)
- e. Known to be mutagenic, teratogenic, oncogenic, neurotoxic, or cause reproductive hazards in humans.
- f. Listed as Class I Pesticides, extremely toxic, or labeled as "Danger."
- g. Classified as Highly Toxic by USDOL-OSHA if mode of application is spraying or broadcast-spreading.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which the Work of this Section will be performed. Correct detrimental conditions before commencing the Work of this section.

3.02 SOIL PREPARATION

- A. Earthwork and Topsoil Placement: Shall include excavation and backfilling for the irrigation system and the preparation for the spreading, densification, cultivation, and raking of topsoil, including fertilization and conditioning.
- B. Preliminary Grading: Scarify the existing soil to a depth of 6 inches before backfilling with topsoil. Scarify and cultivate topsoil to a finely divided condition to a depth of 6 inches

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minimum below finish grade. Remove during preliminary grading operation, all stones over 1-inch in greatest dimension. Prepare grade to within one tenth of a foot of the finish grade.

- C. In Previously Paved Areas: Remove the top 6 inches of existing soil and legally dispose of off the Project site. Replace with imported topsoil to the indicated finish grade.

ED. Topsoil Preparation and Conditioning:

- a. Type and Thickness: Imported topsoil with a minimum depth of 6 inches or as indicated on the Drawings, whichever is greater.
- b. Before installing topsoil, clear all weeds and other extraneous materials from designated planting areas to a depth of 6 inches below the existing grade.
- c. Do not process topsoil when it is so wet or dry as to cause excessive compaction or the forming of hard clods or dust.

- E. Fertilizing and Conditioning: Provide planting areas to finish grades before the installation of specified fertilizer or soil conditioning materials.

1. Mechanically install the following amount of fertilizer and/or soil conditioning materials at a uniform rate per 1,000 sq. ft. of planting area:
 - a. 3 cubic yards of nitrogen fortified wood compost.
 - b. 2 cubic yards of organic fertilizer.
 - c. 100 lbs. of gypsum.
 - d. 30 lbs. of commercial fertilizer.
2. The quantities of such materials required for planting areas shall be at the Project site. Furnish the IOR with delivery tickets before installation to verify the source, kind, and quantities delivered.
3. After installation of fertilizer and/or soil conditioning materials, uniformly cultivate these materials into the upper 6 inches of soil with suitable equipment operated in at least two directions at approximate at right angles. Process the soil until friable.

F. Finish Grading:

1. Provide a finish grade, smooth, uniform, and free of abrupt grade changes and depressions to insure proper surface drainage.
2. Finish grades adjacent to paving curbs or headers shall be 1 inch lower in turf areas and 2 inches lower in shrub or ground cover areas.
3. Irrigate soil after installation of fertilizer and/or soil conditioning materials, and allow it to settle to provide a stable surface. After the soil has dried out to a workable condition, re-grade, rake, and smooth to the required grades and contours. Finished surfaces to be left clean and suitable for planting.

- H. Trenching: After completion of soil conditioning or finish grading operations, backfill the upper portion of the trench so the specified topsoil thickness in the trench is restored.

3.03 HEADER INSTALLATION

- A. Before planting, install at the location and grades shown on the Drawings.

3.04 PLANTING

- A. General: All planting materials, including those tagged at the nursery, shall be inspected before planting.

1. Perform planting with material, equipment and according to procedures favorable to the optimum growth of the plant. Do not plant during windy conditions.
2. Commence all planting operations immediately following the completion of the irrigation system.

B. Protection and Storage:

1. Maintain all plantings delivered to the Project site in a healthy condition.

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2. Do not allow plantings to dry out.
- C. Layout and Plant Locations:
1. Plant locations indicated on the Drawings are approximate.
 2. Plants may be re-spotted before planting as required by the Architect.
 3. Make a detailed layout of plants, etc., in the planting areas and obtain review of the Architect before actual planting operations.
 4. Locate the first row of plantings in areas designated for on center spacing at one-half the designated spacing from the edge of the area.
- D. Backfill Planting Mix: Consists of 60% specified topsoil, and 40% nitrogen fortified sawdust mulch plus the following amounts of an all purpose 15-15-15 commercial fertilizer unless otherwise noted on the Drawings:
- | | | |
|------------|---|---------------------------|
| 1 Gallon | = | 2 Tablespoons |
| 5 Gallons | = | ½ Cup |
| 15 Gallons | = | 1-1/4 Cups |
| 24 in. Box | = | 1 (1 lb.) Coffee Can |
| 36 in. Box | = | 3 (1 lb.) Coffee Cans |
| 48 in. Box | = | 5-3/4 (1 lb.) Coffee Cans |
| 54 in. Box | = | 6-3/4 (1 lb.) Coffee Cans |
| 60 in. Box | = | 9 (1 lb.) Coffee Cans |
- E. Ground Cover Planting:
1. Complete soil preparation and fine grading before installation of ground cover plantings.
 2. Install ground cover in moist soil, spaced as indicated on the Drawings.
 3. Install each plant with its proportionate amount of flat soil to minimize root disturbance.
 4. The degree of soil moisture in the flat shall be such that the soil does not crumble when removing the planting.
 5. Following installation of ground cover, restore finish grade to insure proper surface draining.
- F. Lawn: Complete fine grading and all specified soil preparation before lawn installation.
1. Sod: The type, thickness, and areas of installation shall be in accordance with the Drawings.
 2. Thickness of sod shall be the recommended thickness below finish grade. Complete soil conditioning and fine grading before installation. Do not operate heavy equipment over the completed sub-grade. The sub-grade shall be moist when sod is installed. Install sod with closely fitted joints and stagger the ends of the strips. Plug opening with sod or topsoil.
 3. Lightly irrigate within two hours after installing sod and before rolling. Roll all seams and joints until the sod is well bonded to the sub-grade.
 4. Water the area thoroughly to penetrate the sub-grade at least 8 inches. Repeat watering as necessary to keep the sod moist until rooted in the sub-grade. Protect sod areas against foot traffic until the sod is well established. Replace damaged areas with new sod.
- G. Transplanting of Existing Plant Material: In accordance with current horticulture practices.
1. Box or root system as necessary to maintain plant materials in a healthy, growing condition.
 2. Equivalent size and kind of plantings may be provided instead of transplanting an existing planting.
- H. Fertilizing: At 30 day intervals after lawn or ground cover installation, install an all purpose 15-15-15 commercial fertilizer at the rate of 10 pounds per 1,000 sq. ft. of installed area. Thoroughly water the area after applying fertilizer. All fertilizer applications shall be performed under the observation of the Project Inspector.

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3.05 MAINTENANCE AND PLANT ESTABLISHMENT

- A. Required: Maintain all areas on a continuous basis as they are completed during the progress of the Work and during the establishment period. Maintenance shall include continuous operations of watering, weeding, trimming, rodent control, reseeding, planting replacement irrespective of cause or any other operations necessary to assure normal plant growth.
- B. Keep all planting areas free of debris and weeds. Cultivate at intervals not to exceed 10 days.
- C. Lawn Maintenance:
 - 1. Perform the first mowing of lawn areas when the grass is 2-1/2 inches high and repeat as often as is necessary to maintain the lawn at a height of 2 inches. In no case shall the lawn be cut lower than 1-1/2 inches in height unless otherwise indicated.
 - 2. After each cutting, the edge of the grass shall be trimmed to a neat and uniform line. Where trees occur in lawn areas, the grass shall be removed and neatly edged 18 inches away from the trees.
 - 3. All grass clippings shall be removed and legally disposed of off the Project site.
- D. Plant Establishment Inspection:
 - 1. Request an inspection to begin the plant establishment period after all plantings and related Work has been completed in accordance with the Contract Documents.
 - 2. Upon successful completion of the inspection, the effective commencement date of the plant establishment period shall begin.
 - 3. Plant establishment period shall be 90 calendar days or as otherwise indicated in the Contract Documents.
 - 4. The plant establishment period may extend past Final Completion of the Work.
 - 5. The Architect may recommend extension of the plant establishment period if the planting areas are improperly maintained, appreciable plant replacement is required, or other defective Work.
- E. Damage:
 - 1. Immediately replace failed and/or damaged plantings.
 - 2. Provide replacement plantings of the same type and size to match adjacent plantings. Furnish plantings and fertilizer as specified. New plantings shall be subject to a 30 day establishment period.
 - 3. Damage to planting areas shall be repaired immediately. Depressions caused by vehicles or foot traffic shall be filled with topsoil and leveled.
- F. Final Inspection:
 - 1. Upon completion of the plant establishment period, the Architect will perform a final inspection.
 - 2. If the plant establishment period is completed before Substantial Completion, planting areas shall be maintained until Final Completion.

3.06 FINAL CLEAN-UP

- A. Remove all rubbish, debris, and waste materials and legally dispose of off the Project site.

3.07 PESTICIDE APPLICATION

- A. Only specifically authorized applicators are permitted to bring or apply pesticides on the Project site.
- B. Application rates and methods shall conform to written recommendations of manufacturer and shall comply with regulations of Riverside County Agricultural Commissioner and the Department of Agriculture, State of California. Furnish records of location, quantity and dates of application to the Architect.

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- C. Certified applicators shall be furnished wherever required by regulations of the County of Riverside or the State of California.
- D. Pesticide application shall be performed in accordance with applicable State and Federal laws and regulations. In addition, installation shall be performed under the following, but not limited to conditions:
 - 1. Posting of warning signs.
 - 2. Furnish low pressure spraying.
 - 3. Spraying after school hours with no students present.
 - 4. No indoor spraying of pesticides is permitted.
 - 5. Strict adherence to manufacturer's recommended reentry period after installation.
 - 6. Pesticides shall be furnished in strict conformance to manufacturer's instructions on product labeling.
 - 7. Applicators shall provide required personal protective equipment recommended in accordance with product labeling including but not limited to, body coveralls, respirators, splash goggles, and rubber gloves.

3.08 **PROTECTION**

- A. Unless noted otherwise, protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 03100 - CONCRETE FORMS AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section
- B. Section Includes:
 - 1. Formwork for cast-in-place concrete as indicated.
 - 2. Installation of items to be embedded in concrete, such as anchor bolts, inserts, embeds, and sleeves.
- C. Related Sections:
 - 1. Section 01400: Testing and Inspection.
 - 2. Section 03200: Concrete Reinforcement.
 - 3. Section 03300: Cast-In-Place Concrete.

1.02 SYSTEM DESCRIPTION

- A. Regulatory Requirements: Except as otherwise specified herein, Work of this section shall be in accordance with 2007CBC, Chapter 19, Concrete.

1.03 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating locations of forms, joints, embedded items, and accessories.
- B. Product Data: Submit manufacturer's product data for form materials and accessories.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. Conform to ACI 347, Chapter 1: Design and Chapter 3: Materials for Formwork.
 - 2. Plywood: Conform to tables for form design and strength in APA Form V 345.
- B. Mock-ups: Provide mock-ups for architectural exposed finishes; 100 square feet minimum size. Locate as required by the Architect.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Form materials may be reused during progress of the Work provided they are completely cleaned and reconditioned, recoated for each use, capable of producing formwork of required quality, and are structurally sound.

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- B. Form Lumber: WCLIB Construction Grade or Better, WWPA No. 1 or Better.
- C. Plywood: PS 1-95, Group I, Exterior Grade B-B Plyform or better, minimum 5-ply and 3/4 inch thick for exposed locations and at least 5/8 inch thick for unexposed locations, grade marked, not mill oiled. Furnished plywood with medium or high-density overlay is permitted.
- D. Coated Form Plywood: For exposed painted concrete, plastic overlaid plywood of grade specified above, factory coated with a form coating and release agent Noxcrete", or equal.
- E. Tube Forms: Burke "SmoothTube," Sonoco "Seamless Sonotubes," or Alton Building Products "Sleek Seamless Standard Wall," of the type leaving no marks in concrete, one-piece lengths for required heights.
- F. Joist Forms: Code recognized steel or molded plastic types as required.
- G. Special Forms: For exposed integrally-colored concrete, plywood as above with high density overlay, plywood with integral structural hardboard facing or fibrous glass reinforced plastic facing, providing specified finish.
- H. For Exposed Concrete Finish:
 - 1. Plywood: New, waterproof, synthetic resin bonded, exterior type Douglas fir or Southern pine plywood manufactured especially for concrete formwork and conforming to NIST PS 1, BB grade, class I.
 - 2. Glass-Fiber-Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surfaces.
 - 3. Steel: Minimum 16 gage sheet, well matched, tight fitting, stiffened to support weight of concrete, without deflection detrimental to tolerances and appearances of finished concrete surfaces.
 - 4. Plywood: "Finland Form," distributed by North American Plywood Corporation. The material shall be furnished with hard smooth birch face veneers with phenolic resin thermally fused onto panel sides. Edges shall be factory sealed.
- I. Form Ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type, not leaving metal within 1-1/2 inch of concrete surface.
- J. Form Coating: Non-staining clear coating free from oil, silicone, wax, not grain-raising, "Formshield" by Tamms Industries, or "Cast-Off" by Sonneborn Building Products. Where form liners are furnished, provide form coatings recommended by form liner manufacturer.
- K. Form Liner: Rigid or resilient type by L.M. Scofield, Labrado Forms, Symons, or Greenstreak.
- L. Void Forms: Manufactured by SureVoid Products, Inc, or equal. Forms shall be "WallVoid" for temporary support of concrete walls and grade beams spanning between supports, and "SlabVoid" for creating gaps between concrete slabs or steps and underlying soils. Void forms shall be fabricated of corrugated paper with moisture resistant exterior, and shall be capable of withstanding working load of 1,500 psf. Provide accessories as required.

PART 3 - EXECUTION

3.01 GENERAL

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- A. Forms shall be constructed so as to shape final concrete structure conforming to shape, lines and dimensions of members required by Drawings and Specifications, and shall be sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together to maintain position and shape. Forms and their supports shall be designed so that previously placed structures will not be damaged. Forms shall be true to line within a tolerance of plus-or-minus 1/250 of the span.

3.02 ERECTION

- A. Plywood shall be installed with horizontal joints level, vertical joints plumb and with joints tight. Back joints by studs or solid blocking, and fill where necessary for smoothness. Reused plywood shall be thoroughly cleaned, damaged edges or surfaces repaired and both sides and edges oiled with colorless form oil. Nail plywood along edges, and to intermediate supports, with common wire nails spaced as necessary to maintain alignment and prevent warping.
- B. Openings for Cleaning: Provide temporary openings at points in formwork to facilitate cleaning and inspection. At base of walls and wide piers, bottom form board on one face for entire length shall be omitted until form has been cleaned and inspected.

3.03 REMOVAL OF FORMS

- A. Forms shall not be removed until concrete has sufficiently hydrated to maintain its integrity and not be damaged by form removal operations. Unless noted otherwise and/or permitted by the Architect, columns and wall forms shall not be removed in less than 5 days, floor slabs in less than 7 days, beams and girders in less than 15 days, metal pan forms for joists may be removed after 3 days, but joist centering shall not be removed until after 15 days, and ramp, landing, steps and floor slabs shall not be removed in less than 7 days. Shoring shall not be removed until member has acquired sufficient strength to support its weight, load upon it, and added load of construction.
- B. Compressive strength of in-place concrete shall be determined by testing field-cured specimens representative of concrete location or members, as specified in Section 03300: Cast-In-Place Concrete.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

END OF SECTION

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SECTION 03200 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section
- B. Section Includes:
 - 1. Concrete steel reinforcement as indicated.
- C. Related Sections:
 - 1. Section 01400: Tests and Inspections.
 - 2. Section 03100: Concrete Formwork.
 - 3. Section 03300: Cast-In-Place Concrete.

1.02 SYSTEM DESCRIPTION

- A. Regulatory Requirements: Fabrication and placement of reinforcing shall be in accordance with requirements of 2007 CBC, Chapter 19.

1.03 SUBMITTALS

- A. Shop Drawings: Submit steel reinforcement shop drawings in accordance with ACI 315. Include assembly diagrams, bending charts and slab plans. Indicate lengths and location of splices, size and lengths of reinforcing steel.
- B. Closeout Submittals: Record exact locations of reinforcing that vary from shop drawings.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
 - 2. American Welding Society (AWS).
 - 3. American Concrete Institute (ACI).
 - 4. 2007CBC, Chapter 19, Concrete.
- B. Source Quality Control: Refer to Division 1 sections for general requirements and to following paragraphs for specific procedures. Testing laboratory retained by the Owner shall perform following conformance testing. Select test samples of bars, ties, and stirrups from the material at the Project site or from the place of distribution, with each sample consisting of not less than two 18 inch long pieces. Perform the following tests according to ASTM A 615.
 - 1. Identified Bars: If samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with the identification certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when samples are selected.

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- 2. Unidentified Bars: When positive identification of reinforcing bars cannot be performed and when random samples are obtained, perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.
 - C. Certification of Welders: Shop and Project site welding shall be performed by certified welding operators.
- 1.05 DELIVERY, STORAGE AND HANDLING
- A. Avoid exposure to dirt, moisture or conditions harmful to reinforcing.
 - B. Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated for size and shape.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide reinforcing of sizes, gages and lengths indicated, bent to indicated shapes.

2.02 MATERIALS

- A. Steel Reinforcing Bars: ASTM A 615, or ASTM A 706 deformed grade 40 billet steel unless otherwise specified or indicated.
- B. Bars or Rod Mats: ASTM A 184.
- C. Wire Fabric for Reinforcement: ASTM A 185.
- D. Tie Wire: ASTM A 82, fully annealed, copper-bearing steel wire, 16 gage minimum.
- E. Chairs, Spacers, Supports, and Other Accessories: Standard manufacture conforming to ACI-315 fabricated from steel wire of required types and sizes. For reinforcement supported from grade, provide properly sized dense precast blocks of concrete.

2.03 FABRICATION OF REINFORCING BARS:

- A. Comply with CRSI Manual of Standard Practice for Reinforced Concrete Construction for fabrication of reinforcing steel.
- B. Bending and Forming: Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bend bars No. 6 size and larger in the shop only. Bars with unscheduled kinks or bends are not permitted. Provide only tested and permitted bar materials.
- C. Welding: Provide only ASTM A 706 steel where welding is indicated. Perform welding by the direct electric arc process in accordance with AWS D1.4 and specified low-hydrogen electrodes. Preheat 6 inches each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is not permitted. Do not tack weld bars. Clean metal surfaces to be welded of loose scale and foreign material. Clean welds each time electrode is changed and chip burned edges before placing welds. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds

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or parts of welds deemed defective, using chisel, and replace with proper welding. Prequalification of welds shall be in accordance with CBC requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Bars shall be bent cold. Bars partially embedded in concrete shall not be field bent except as indicated on reviewed shop drawings. Before installation, clean reinforcing of loose scale, rust, oil, dirt and any coating that could reduce bond.
- B. Accurately position, install, and secure reinforcing to prevent displacement during the placement of concrete.
- C. Provide metal chairs to hold reinforcement the required distance above form bottoms. In beams and slab construction, provide chairs under top slab reinforcement as well as under bottom reinforcement. Space chairs so that reinforcement will not be displaced during installation. Provide metal spacers to secure proper spacing. Stirrups shall be accurately and securely wired to bars at both top and bottom. At slabs, footings, and beams in contact with earth, provide concrete blocks to support reinforcement at required distance above grade.
- D. Install and secure reinforcement to maintain required clearance between parallel bars and between bars and forms. Lapped splices shall be installed wherever possible in a manner to provide required clearance between sets of bars. Stagger lapped splices. Dowels and bars extending through construction joints shall be secured in position against displacement before concrete is installed and subsequently cleaned of concrete encrustations while they are still soft.
- E. Do not install reinforcing in supported slabs and beams until walls and columns have been installed to underside of slabs and beams or until construction joints have been thoroughly cleaned. Reinforcing shall be inspected before placement of concrete and cleaned as required.
- F. Use deformed bars unless otherwise indicated, except for spiral reinforcement.

3.02 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Section Includes: Provision of cast-in-place concrete unless specifically noted otherwise.
- B. Related Sections:
 - 1. Section 03100 – Concrete Forms and Accessories.
 - 2. Section 03200 - Concrete Reinforcement.

1.02 REFERENCES

- A. Requirements of General Conditions and Division 1 apply to all Work in this section.
- B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this section where cited by abbreviations noted below (latest editions apply).
 - 1. American Society for Testing and Materials (ASTM).
 - a. No. C-94, "Standard Specification for Ready-Mixed Concrete"
 - 2. American Concrete Institute's:
 - a. "Specification for Structural Concrete for Buildings" (ACI 301).
 - b. "Recommended Practice for Cold Weather Concreting" (ACI 306).
 - c. "Recommended Practice for Hot Weather Concreting" (ACI 305).
 - d. "Recommended Practice for Measuring, Mixing and Placing Concrete" (ACI 304).
 - e. "Building Code Requirements for Reinforced Concrete" (ACI 318).
 - 3. State of California, Business and Transportation Agency Division of Highways' "Materials Manual," (CMM).
 - 4. California Code of Regulations, Part 2, Title 24, 2007 edition, also known as California Building Code (CBC).
 - 5. Uniform Building Code Standards:
 - a. No. 19-1, "Portland Cement and Blended Hydraulic Cements."
 - b. No. 19-4, "Concrete Made By Volumetric Batching and Continuous Mixing."

1.03 QUALITY ASSURANCE

- A. The Contractor's Testing Laboratory Qualifications: The Contractor's Testing Laboratory shall be under direction of a Civil Engineer registered in the State of California, shall have operated successfully for four years prior to this work, and shall conform to requirements of ASTM E329.
- B. Requirements of ACI 301 shall govern work, materials and equipment related to this Section; specifications herein set minimum results required, and references to procedures are intended to establish minimal guides.

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- C. The Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete meets minimum requirements. Contractor shall acquire cement and aggregate from the same source for all work.
- D. Placing of concrete by means of pumping will be an acceptable method of placement providing that the Contractor can demonstrate that:
 - 1. Specified concrete strengths slumps and water-to-cement ratios will be met.
 - 2. Equipment has a record of satisfactory performance under similar conditions and using a similar mix.
 - 3. Trial batches have been made.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Product Data: Provide data on admixtures, finishing and curing compounds, including standards and product characteristics, compatibility and limitations.
- C. Manufacturer's Installation Instructions: Submit criteria for preparation and application procedures.
- D. Mix designs: Prepare mix designs for Architect's review. Include the following information in mix design data:
 - 1. Design
 - a. Project name, address, site location, and location of design usage.
 - b. Contractor, Sub-Contractor, Supplier and Plant Location.
 - c. Mix Number.
 - d. Specified compressive strength, maximum aggregate size, slump, and placement method.
 - e. Application and location in structure.
 - f. Signature and stamp of licensed civil engineer responsible for mix design.
 - 2. Materials
 - a. Design Method.
 - b. Water-Cement Ratio.
 - c. Cement: Type, amount, and compliance with specified criteria statement.
 - d. Aggregates: Source(s), gradations (Individual and combined).
 - e. Admixtures: Brand, classification, dosage, addition method.
 - f. Water source.
 - g. Test Results, Batch Quantities, Yield (calculations).
 - 3. Special Considerations
 - a. Unit Weight.
 - b. Other considerations relative to placement, curing, finish, and testing.
- E. Schedule of placing for the Architect's review before starting Work.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Ensure storage facilities are weather tight and dry.

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- B. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.
- C. Store bulk cement in bins capable of preventing exposure to moisture.
- D. Use sacked cement in chronological order of delivery. Store each shipment so that it may be readily distinguishable from other shipments.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General Requirements:

- 1. Cement and aggregates shall have proven history of successful use with one another. Sources of cement and aggregate shall remain unchanged throughout work unless the Architect approves request for change made at least 10-days prior to anticipated date of casting.
- 2. Ready-mixed concrete shall meet requirements of ASTM C94.
- 3. Deviations in properties of materials tested by the Owner's Testing Agency shall be cause for their rejection pending additional test results and redesign of mix by the Contractor's Testing Laboratory.
- 4. No frozen aggregates will be permitted.

B. Cements:

- 1. ASTM C150, Type II, low alkali. Use one brand of cement throughout project unless otherwise acceptable to Architect. Cements shall conform to Section 1903.1, Chapter 19, Part 2, Title 24, CCR.
 - a. Pozzolan: ASTM C 618 Class F, Fly Ash not to exceed 15 replacement for Portland cement.

C. Aggregates shall conform to Section 1903.1, Chapter 19, Concrete, Part 2 CCR and the following:

- 1. Coarse: ASTM C33. Coarse aggregate shall consist of a clean, hard, fine-grained, sound crushed rock, or washed gravel or a combination of both. It shall be free from oil, organic matter or other deleterious substances and shall not contain more than two percent by weight of shale or cherty material.
 - a. Slabs, Columns, Walls: Class Designation 5S per ASTM C33, Table 3, with 1 inch grading
 - b. Foundations: Class Designation 3S per ASTM C33, Table 3, with 1-1/2 inch grading
- 2. Fines: ASTM, C33. Sand equivalent shall be not less than 75 when tested as per ASTM D2419.
- 3. Provide aggregates from a single source for exposed concrete.

D. Under Slab Moisture Barrier: 15 mil Class A plastic meeting ASTM E 1745 with perm rating less than or equal to 0.018 perms as tested by ASTM E 96. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-98.

E. Water: Clean and potable, free from impurities detrimental to concrete.

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1. Water to cement ratio for substrates shall not exceed 0.55.
- F. Water-Reducing Admixture: ASTM C494, Type A. Same as Grace Construction Materials' "WRDA"; Master Builders "Pozzolith"; Sika Corp.'s "Plastocrete 161"; or equal product substituted per Section 01640.
- G. Other Admixtures: Only as approved by the Architect.
- H. Non-Shrink Grout: Premixed high strength grout requiring only addition of water at the site. Same as Master Builder's "Masterflow 928 Grout"; Burke's "Non-Ferrous, Non-Shrink Grout", or equal product substituted per Section 01631.
- I. Curing Materials:
 1. Waterproof Paper: ASTM C171, Type 1, regular. Same as Sisalkraft Division of St. Regis Paper Co.'s "Orange Label" or equal product substituted per Section 01631.
 2. Sheet Plastic: Polyethylene, four mils thick, fungus-resistant.
 3. Curing Compound: ASTM C309. Same as A.C. Horn's "Horn Clear Seal"; Grimes Co.'s "Sealcrete"; Master Builders "Masterseal W", or equal product substituted per Section 01631, Product Substitutions.
- J. Concrete Sealer: Clear water repellent treatment, blend of six resins containing no silicones or stearates, no darkening or change of color. Same as Tamms Industries' "Chemstop" or equal product substituted per Section 01631, Product Substitutions.

2.02 MIXES

- A. General Requirements:
 1. The Contractor shall perform tests or assemble the necessary data indicating conformance with specifications.
 2. For each mix submit data showing that proposed mix will attain the required strength in accordance with requirements of CBC Section 1905.1.
 3. The Contractor shall instruct laboratory to base mix design on use of materials tested and approved by the Owner's testing agency.
 4. Mix design shall include compression strength test reports per CBC Section 1905.1, 1704.4..
 5. Mix shall be designed, tested, and adjusted if necessary in ample time before first concrete is scheduled to be placed. Laboratory data and strength test results for revised mix design shall be submitted to Architect prior to using in project.
 6. Insure mix designs will produce concrete to strengths specified and of uniform density without segregation.
 7. If mix yield exceeds 1-cubic yard, modify mix design to no more than one cubic yard without changing cement content.
 8. The Contractor's mix designs shall be subject to review by the Architect and by the Owner's Testing Agency.
 9. Introduction of calcium chloride will not be permitted.
 10. Unspecified admixtures will not be permitted unless the Architect reviews, the Contractor modifies mix designs as necessary, and modifications are accepted by the Owner's Testing Agency.
- B. Patching Mortar: Mix in proportions by volume of one part cement to two parts fine sand.
- C. Non-Shrink Grout: Follow approved manufacturer's printed instructions and recommendations.

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2.03 MIXING

A. Batching Plant Conditions:

1. Ensure equipment and plant will afford accurate weighing, minimize segregation and will efficiently handle all materials to satisfaction of the Architect and the Owner's Testing Agency.
2. Moisture meter capable of determining moisture content of sand.

B. General Requirements:

1. Thoroughly clean concrete equipment before use for architectural concrete mixes to avoid contamination.
2. Mix cement, fine and coarse aggregates, admixtures and water to exact proportions of mix designs. Method of mixing shall comply with CBC Section 1905.1.
3. Measure fine and coarse aggregates separately according to approved method that provides accurate control and easy checking.
4. Adjust grading to improve workability; do not add water unless otherwise directed.
5. Maintain proportions, values, or factors of approved mixes throughout work.
6. Mix concrete in transit mixers five minutes immediately prior to discharge in addition to mixing as called for by ACI 304 and ASTM C-94.

C. Admixtures: Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.

2.04 SOURCE QUALITY CONTROL

A. The Owner's Testing Agency will:

1. Review mix designs, certificates of compliance, and samples of materials the Contractor proposes to use.
2. Test and inspect materials, as necessary, in accordance with ACI 318 and CBC Sections 1903, and 1905.6 for compliance with requirements.
3. Take samples as required from the Contractor's designated sources.
4. Take one grab sample for each 100 tons of Portland cement except that, when used in bulk loading ready-mix plants where separate bins for pretested cement are not available, take grab samples for each shipment of cement placed in bin with not less than one sample being taken for each day's pour and subsequently test such samples if required by the Architect.
5. Test both coarse and fine aggregate by use of solution of sodium or magnesium sulfate, or both whenever in the judgment of the Architect such tests are necessary to determine quality of material. Perform such tests in accordance with ASTM C88. Loss shall not exceed 6-percent of either fine or coarse aggregate. Aggregate failing to comply with this requirement may be used in the Work provided it contains less than 2- percent of shale and other deleterious particles and shows a loss in soundness test of not more than 10-percent when tested in the sodium sulphate solution. Test aggregates as required by CBC Section 1903.3.
6. Test for sand equivalent of fine aggregate in accordance with California Test 217.
7. Test for cleanness value of coarse aggregate in accordance with California Test 227.
8. Inspect plant prior to any work to verify following:

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- a. Plant is equipped with approved metering devices for determining moisture content of fine aggregate.
- b. Other plant quality controls are adequate.
9. Continuously inspect quality and quantity of materials used in transit mixed concrete, in batched aggregates and ready-mixed concrete at mixing plant or other location per CBC Section 1905.1 where other materials are measured.

B. Waiver of Batch Plant Inspection:

1. Continuous batch plant inspection may be waived if the plant complies with ASTM C94, Section 8 and 9, and has been certified to comply with the requirements of the National Ready Mix Concrete Association.
2. When batch plant inspection is waived, the following requirements shall apply:
 - a. Testing Agency shall check the first batching at the start of work and furnish mix proportions to the licensed Weigh master.
 - b. Licensed Weigh master shall identify material quantities and certify each load by a ticket.
 - c. Project Inspector shall collect truck mix tickets with load identification and maintain a daily record of placement. Trucks without a load ticket identifying the mix shall be rejected. Copies of daily placement record shall be submitted to Architect.
 - d. At the end of the project, the Weigh master shall submit an affidavit to Architect certifying that all concrete supplied conforms to proportions established by mix designs.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine units of work to be cast and verify that:

1. Construction of formwork is complete.
2. Required reinforcement, inserts, and embedded items are in place and with proper concrete cover.
3. Form ties at construction joints are tight.
4. Concrete-receiving places are free of debris.
5. Dampen subgrade or sand course for slabs-on-grade in accordance with the project geotechnical report. Do not saturate.
6. Depths of depressed slab conditions are correct for delayed finish noted and for its proper bonding to concrete.
7. Conveying equipment is clean and properly operating.
8. The Project Inspector has reviewed formwork and reinforcing steel.

B. Do not begin casting before unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Ensure availability of sufficient labor, equipment and materials to place concrete correctly in accordance with scheduled casting.
- B. Protect finished surfaces adjacent to concrete-receiving places.

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- C. Clean transportation and handling equipment at frequent intervals and flush thoroughly with water before each day's run. Do not discharge wash water into concrete form.
- D. Construction Joints: Clean and roughen all construction joint contact surfaces by removing all surface laitance and exposing sound mortar. Sandblasting and bush-hammering are acceptable methods.

3.03 PLACING

- A. The Project Inspector, Architect, Structural Engineer, and Testing Laboratory shall be notified at least 48 hours before placing concrete.
- B. Place concrete in accordance with CBC Section 1905.
- C. Place concrete in cycles as a continuous operation to permit proper and thorough integration and to complete scheduled placement. Place no concrete where sun, wind, heat, or facilities prevent proper finishing and curing.
- D. Convey concrete as rapidly and directly as practicable to preserve quality and to prevent separation from re-handling and flowing; do not deposit concrete initially set. Cast concrete within ninety (90) minutes after adding water unless otherwise noted. Re-tempering of concrete that has partially set will not be permitted.
- E. Take precautions to avoid damage to under-slab moisture barrier and displacement of reinforcement and formwork.
- F. Deposit concrete vertically in its final position. Avoid free falls in excess of six feet where reinforcement will cause segregation and in typical conditions unless the Architect approves otherwise.
- G. Keep forms and reinforcement clean above pour line by removing clinging concrete with wire brush before casting next lift. Also remove leakage through forms.
- H. Interruption in casting longer than 60-minutes shall be cause for discontinuing casting for remainder of day. In this event, cut back concrete and provide construction joints as the Architect directs; clean forms and reinforcement as necessary to receive concrete at a later time.
- I. Hot Weather Concreting: Conform to ACI 305 and following requirements when mean daily temperature rises above 75 degrees Fahrenheit.
 - 1. An upper temperature limit of concrete mixes shall be established by the Contractor for each class of concrete. Concrete temperature during placing shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints, and shall not exceed 90 deg F. Other project climatic conditions detrimental to concrete quality such as relative humidity, wind velocity, and solar radiation shall also be considered.
 - 2. Trial batches of concrete for each mix design shall be made at the limiting mix temperature selected. In lieu of trial batches, compression strength test reports (20 minimum) at the limiting temperature for each proposed mix shall be submitted to the Owners testing laboratory for review.
 - 3. Practices to maintain concrete below maximum limiting temperature shall be in accordance with ACI 305. Concrete ingredients may be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for part of the mixing water.

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4. Practices to avoid the potential problems of hot weather concreting shall be employed by the Contractor in accordance with ACI 305.
5. When the temperature of the reinforcing steel or steel deck forms is greater than 120°F, reinforcing and forms shall be sprayed with water just prior to placing the concrete.

J. Cold Weather Concreting:

1. No placement of concrete will be allowed at temperatures below 20 degrees Fahrenheit or if mean daily temperature for curing period is anticipated to be below 20 degrees Fahrenheit.
2. No concrete placement will be allowed on frozen sub-grade.
3. Conform to ACI 306 and following requirements when mean daily temperature falls below 40 degrees Fahrenheit.
 - a. Reinforcement, forms or ground to receive concrete shall be completely free from frost.
 - b. Concrete at time of placement for footings shall have temperature no lower than 50 degrees Fahrenheit, for all other concrete this minimum temperature at time of placement shall be 60 degrees Fahrenheit. Maximum temperature shall be 90 degrees Fahrenheit.
 - c. Concrete shall be maintained at temperature no lower than 50 degrees Fahrenheit for minimum 7-day period after placement by means of blanket insulation, heaters, or other methods as approved by the Architect.
 - d. Use of calcium chloride or admixtures containing calcium chloride as accelerators will not be permitted.
 - e. The Contractor shall keep a record of concrete surface temperature for first 7-days after each pour. This record shall be open to inspection by the Architect.

K. Consolidating:

1. Use vibrators for thorough consolidation of concrete.
2. Provide vibrators for each location during simultaneous placing to ensure timely consolidation around reinforcement, embedded items and into corners of forms; ensure availability of spare vibrators in case of failures. Vibrate through full depth of freshly placed concrete.
3. Do not place vibrators against reinforcement, attach to forms, or use to spread concrete.
4. Exposed Concrete: Vibrate with rubber type heads and, in addition, spade along forms with flat strap or plate.

L. Construction Joints:

1. Verify location and conformance with typical details; provide only where designated or approved by the Architect. Comply with CBC Section 1906.4.
2. All horizontal and vertical construction joints to be thoroughly sandblasted to clean and roughen entire surface to minimum 1/4-inch relief exposing clean coarse aggregate solidly embedded in mortar matrix.
3. Just prior to depositing concrete, the surface of the construction joint shall be thoroughly wetted.

M. Contraction (Control) Joints in Slabs-on-Grade:

1. Construct contraction joints in slabs-on-ground to form panels of patterns indicated on Architectural Drawings. Control joints shall be constructed as shown on Structural Drawings.

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N. Finishes for Slabs-on-Grade:

1. Provide a heavy broom finish for walk surfaces in the path of travel with greater than a 6 percent slope
2. Provide a medium broom finish for walk surfaces in the path of travel with less than a 6 percent slope.

O. Walls and Other Formed Elements:

1. Space points of deposit to eliminate need for lateral flow. Placing procedures of concrete in forms permitting escape of mortar, or flow of concrete itself, will not be permitted.
2. Level top surface upon stopping work.
3. Take special care to fill each part of the forms by depositing concrete directly as near final position as possible, and to force concrete under and around reinforcement, embedded items, without displacement
4. After concrete has taken its initial set, care shall be exercised to avoid jarring forms or placing any strain on ends of projecting reinforcement.
5. Where backfill is placed against a wall, it shall be adequately shored until it has attained design strength.

3.04 CURING

A. General Requirements:

1. Take curing measures immediately after casting and for measures other than application of curing compound, extend for seven days. The Architect may recommend longer periods based upon prevailing temperature, wind and relative humidity. Comply with CBC Section 1905.11.
2. Avoid alternate wetting and drying and fluctuations of concrete temperature.
3. Protect fresh concrete from direct rays of sun, rain, freezing, drying winds, soiling, and damage.
4. Do not permit curing method to affect adversely finishes or treatments applied to finish concrete.

B. Curing Method, Typical: Obtain the Architect's approval of alternate measures.

1. Keep forms and concrete surfaces moist during period forms are required to remain in place.
2. Apply curing compound per manufacturers' recommendations.

3.05 CLEANING, PATCHING AND DEFECTIVE WORK

A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing or is otherwise defective, and, in the Architect's judgment, these defects impair proper strength or appearance of the work, the Architect will require its removal and replacement at the Contractor's expense.

B. Immediately after stripping and before concrete is thoroughly dry, patch minor defects, form-tie holes, honeycombed areas, etc., with patching mortar. Patch shall match finish of adjacent surface unless otherwise noted. Remove ledges and bulges.

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- C. Compact mortar into place and neatly file defective surfaces to produce level, true planes. After initial set, dress surfaces of patches mechanically or manually to obtain same texture as surrounding surfaces.
- D. Rock Pockets:
 - 1. Cut out to full solid surface and form key.
 - 2. Thoroughly wet before casting mortar.
 - 3. Where the Architect deems rock pocket too large for satisfactory mortar patching as described, cut out defective section to solid surface, key and pack solid with concrete to produce firm bond and match adjacent surface.
- E. Cleaning
 - 1. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds if permitted and other materials employed in work of concreting which would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.
 - 2. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.

3.06 PROTECTION

- A. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
- B. Protect exposed corners of concrete from traffic or use that will damage them in any way.
- C. Make provisions to keep all exposed concrete free from laitance caused by spillage or leaking forms or other contaminants. Do not allow laitance to penetrate, stain, or harden on surfaces that have been textured.

3.07 FIELD QUALITY CONTROL

- A. The Owner's Testing Agency will:
 - 1. Perform testing in accordance with ACI 318 and CBC Section 1903 and 1905 and Section 01400 of these specifications.
 - 2. Review concrete mix designs.
 - 3. Inspect concrete and grout placement continuously.
 - 4. Test concrete to control slumps according to ASTM C143.
 - 5. Continuously monitor concrete temperature as it arrives on the site.
 - 6. Test concrete for required compressive strength in accordance with CBC Section 1905.6.3:

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- a. Make and cure three specimen cylinders according to ASTM C31 for each 150 cubic yards, or fraction thereof, of each class poured at site each day.
 - b. Retain one cylinder for 7-day test and two for the 28-day test.
 - c. Number each cylinder 1A, 1B, 1C, 2A, 2B, 2C, etc; date each set; and keep accurate record of pour each set represents.
 - d. Transport specimen cylinders from job to laboratory after cylinders have cured for 24-hours on site. Cylinders shall be covered and kept at air temperatures between 60 and 80 degrees Fahrenheit.
 - e. Test specimen cylinders at age 7-days and age 28-days for specified strength according to ASTM C39.
 - f. Base strength value on average of two cylinders taken for 28-day test.
7. Test and inspect materials, as necessary, in accordance with ACI 318, MM Test Method 227 (Coarse Aggregates) and MM Test Method 217 (Fine Aggregates), for compliance with requirements specified in this section.

B. The Contractor shall:

1. Submit ticket for each batch of concrete delivered to job site. Ticket shall bear the following information:
 - a. Design mix number.
 - b. Signature or initials of ready mix representative.
 - c. Time of batching.
 - d. Weight of cement, aggregates, water and admixtures in each batch with maximum aggregate size.
 - e. Total volume of concrete in each batch.
 - f. Notation to indicate equipment was checked for contaminants prior to batching.
2. Pay the Owner's Testing Agency for taking core specimens of hardened structure and testing specimen according to ASTM C88 and C42 when laboratory tests of specimen cylinders show compressive strengths below specified minimum.

3.08 CLEAN UP

- A. Perform Work under this Section to keep affected portions of building site neat, clean, and orderly. Remove, immediately upon completion of Work under this Section, surplus materials, rubbish, and equipment associated with or used in performance. Be aware that failure to perform clean-up operations within 24 hours of notice by Architect will be considered adequate grounds for having work done by others at no added expense to the Owner.

END OF SECTION

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SECTION 03900 - CONCRETE RESTORATION AND CLEANING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section
- B. Section includes epoxy resin adhesive for:
 - 1. Epoxy injection of cracks.
 - 2. Grouting of cracks by gravity flow.
 - 3. Repair of spalling concrete.
- C. Related Division
 - 1. Division 07: Thermal and Moisture Protection

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating areas to receive restoration.
- b. Product Data:
 - 1. Submit manufacturer's product literature and installation procedures.
 - 2. Submit laboratory test reports indicating compliance with the Specifications.

1.03 QUALITY ASSURANCE

- A. Continuous inspection of epoxy repair procedures shall be performed by the Project Inspector in accordance with 2007CBC.
- B. Inspection shall be performed by a representative of a testing laboratory selected by the Owner. The Owner will pay for inspection costs. Notify the laboratory 24 hours in advance of time concrete is to be mixed and notify the laboratory within 24 hours of postponement or cancellation of mixing.
- C. Installer of epoxy resin adhesive and concrete repair shall be certified by the manufacturer.
- D. Manufacturer: Regularly engaged in manufacture of epoxy resin products for at least 10 years. Provide references of at least 5 projects for which epoxy resin adhesive treatment was installed.

1.04 PROJECT CONDITIONS

- A. Materials shall not be installed during existing or forecasted freezing or inclement weather.
- B. Protect adjacent surfaces from damage by equipment, tools, or materials.

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1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project site in manufacturer's unopened containers bearing manufacturer's name and product identification.
- B. Store and condition materials as recommended by product manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Provide products by one of the following manufacturers:
 - 1. Sika Corporation.
 - 2. Fosroc Inc.
 - 3. The Euclid Chemical Co.

2.02 PERFORMANCE COMPLIANCE

- A. Core drill at least one test hole for every 100 feet of cracks, in accordance with CBC requirements. Refer to related Section 01400: Testing and Inspection. Patch holes after core drilling samples.

2.03 MATERIALS

- A. Epoxy Resin Adhesive for Pressure Injection and Gravity Flow Grouting of Cracks:
 - 1. Modified epoxy resin containing suitable viscosity control agents and accelerators.
 - 2. Material shall not contain asbestos.
 - 3. Material shall be approved by the United States Department of Agriculture.
- B. Epoxy Resin Adhesives:
 - 1. Sikadur 35, Hi-Mod LV, by Sika Corporation.
 - 2. Nitobond ULV, by Fosroc Inc.
 - 3. Euco #452 LV System, Euclid Chemical Company.
 - 4. E-396 Series, by Micro Capsule Engineering.
- C. Materials for Repairing Spalling Concrete:
 - 1. Surface Seal Paste: Sika Top/110 Armatec; Nitoprime Zincrich; Euco Zinc Prime.
 - 2. Patching Material: Sika Top 123 Gel; Renderoc HB; Euco Verticoat.
- D. Materials for Patching Test Core Holes: One part Portland cement and 3 parts sand.

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PART 3 - EXECUTION

3.01 PREPARATION

- A. Surfaces adjacent to cracks and spalled concrete shall be cleaned with all dust, grease, foreign particles and disintegrated materials removed by sandblasting, high-pressure water blasting, grinding, chipping or abrasive wheel. Cracks shall be free of standing water and/or frost.
- B. Installation of gravity flow grouting shall be performed by removing a V-notch portion of the crack to a maximum width of 1/4 inch and for the required length. Remove dust and loose debris. Where the underside of the concrete slab is accessible, seal visible cracks with epoxy resin adhesive paste or Portland cement based quick-setting compound to retain installed adhesive until cured.
- C. Remove broken and spalled concrete down to sound material and to a minimum depth of one inch around steel reinforcing bars. Clean steel bars by sand blasting.

3.02 APPLICATION OF EPOXY

- A. Manual application of epoxy resin shall be performed by mixing only that quantity of material that can be installed in 20 to 30 minutes at 73 degrees F. Automated application of high pressure injection shall be performed with a portable unit, equipped with positive displacement type pumps, air-powered or electric, with interlock for positive ratio control of exact material proportioning at the nozzle. Pumps shall provide in-line mixing and metering system and contain drain-back plugs.
- B. Placement Procedure:
 - 1. High Pressure Injection:
 - a. Provide porting devices as required by manufacturer, do not exceed maximum spacing. Spacing shall not exceed thickness of substrate and shall be calibrated to provide travel of material for grouting between ports. Fill cracks to maximum.
 - b. On structures where both sides are accessible, provide porting devices on both sides at staggered elevations. Install mixed epoxy resin sealing adhesive over cracks and around each porting device, to provide an adequate adhesive seal during injection grouting.
 - c. Where required, install sealing adhesive to provide minimal defacing or discoloration of substrate.
 - d. Inject epoxy from bottom-most port. Install until epoxy appears out of next higher port. Plug lower port and start injecting into the port above. Repeat procedure until crack is grouted.
 - 2. Low Pressure Injection: Material installation shall be performed by a manufacturer certified applicator in accordance with the manufacturer's written recommendations.
 - 3. Gravity Flow Grouting: Furnish mixed material into V-notches and install until cracks are completely filled.
- C. If penetration of a crack is not feasible, notify the Architect before discontinuing injection or grouting procedures. If modification of procedure is required to fill cracks, submit proposed modification to the Architect for review before proceeding.
- D. Install materials for repair of spalling concrete in accordance with the manufacturer's written recommendations.

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3.03 FILLING TEST HOLES

- A. Fill holes with mixture of sand, Portland cement, and water. Finish to match existing adjacent surface.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEANING

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

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SECTION 04730 – MANUFACTURED STONE VENEER

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Portland cement based manufactured stone veneer and trim.
- B. Related Sections:
 - 1. Section 06100: Rough Carpentry
 - 2. Section 07600: Flashing and Sheet Metal.
 - 3. Section 07920: Joint Sealants.

1.02 REFERENCES

- A. 2007 CBC, California Building Code.
- B. American National Standards Institute (ANSI)
 - 1. ANSI A118.4 Specifications for Latex-Portland Cement Mortar
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 67–Test Methods for Sampling and Testing Brick and Structural Clay Tile
 - 2. ASTM C 144–Specification for Aggregate for Masonry Mortar
 - 3. ASTM C 177–Test Method for Steady-State Head Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
 - 4. ASTM C 207–Specification for Hydrated Lime for Masonry Purposes
 - 5. ASTM C 270–Specification for Mortar for Unit Masonry
 - 6. ASTM C 482– Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement
 - 7. ASTM C 513–Test Method for Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength
 - 8. ASTM C 567–Test Method for Unit Weight of Structural Lightweight Concrete
 - 9. ASTM C 847–Specification for Metal Lath
 - 10. ASTM C 979–Specification for Pigments for Integrally Colored Concrete
 - 11. ASTM D 226–Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

1.03 SUBMITTALS

- A. Reference Section 01300, Submittals, submit following items:
 - 1. Product Data.
 - 2. Quality Assurance/Control Submittals:
 - a. Qualifications:

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- 1) Proof of manufacturer qualifications.
- 2) Proof of installer qualifications.
- b. Regulatory Requirements: Evaluation reports.
- c. Veneer manufacturer's installation instructions.
- d. Installation instructions for other materials.

B. Closeout Submittals: Reference Section 01700, Project Closeout, submit following items:

1. Maintenance instructions.
2. Special warranties.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Licensee of Eldorado Stone Corporation.
2. Installer Qualifications: Experienced mason familiar with installation procedures for manufactured veneer.

B. Field Sample:

1. Prepare 4 by 4-foot sample at a location on the structure as selected by the Architect. Use approved selection sample materials and colors. Include special shapes.
2. Obtain Architect's approval.
3. Protect and retain sample as a basis for approval of completed manufactured stonework. Approved sample may be incorporated into completed work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Reference Section 01600, Materials and Equipment.
- B. Follow manufacturer's instructions.

1.06 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: When air temperature of 40 degrees F (4.5 degrees C) prior to, during, and 48 hours after completion of work.

1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard warranty coverage against defects in materials when installed in accordance with manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Eldorado Stone, LLC Tel: (800) 925-1491
1370 Grand Ave., Bldg. B Fax: (760) 736-8890
San Marcos, CA 92069 E-Mail: customerservice@eldoradostone.com
Website: www.eldoradostone.com

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1. Approved equal.

B. Product: Veneer types as shown on Drawings.

1. Cliffstone "Ponderosa" veneer. Straight wainscot sill cup.

C. Substitutions: Comply with requirements of Section 01631, Product Substitutions.

2.02 MATERIALS

A. Veneer Units: Precast veneer units consisting of portland cement, sand, lightweight aggregates, and mineral oxide pigments.

1. Physical Properties:

- a. Compressive Strength: ASTM C 513, 5-sample average 2,200 psi (15 MPa).
- b. Shear Test: ASTM C 482, 50 psi (335 kPa).
- c. Water Absorption: UBC Standard 32-12, 22 percent.
- d. Freeze-Thaw Test: ASTM C 67, 0.67 percent.
- e. Thermal Resistance: ASTM C 177 R0.60 (0.11).
- f. Density: ASTM C 567 (Dry density) 75 pcf (1200 kg per m³).

B. Moisture Barrier: UBC Standard 14-1 Kraft waterproof building paper.

C. Reinforcing: ASTM C 847 galvanized expanded metal lath complying with 2007 CBC requirements for the type of substrate over which stone veneer is installed.

D. Mortar:

1. Cement: Any cement complying with ASTM C 270.
2. Lime: ASTM C 207.
3. Sand: ASTM C 144, natural or manufactured sand.
4. Pigment: ASTM C 979, mineral oxide pigments.
5. Water: Potable.
6. Pre-Packaged Latex-Portland Cement Mortar: ANSI A118.4.

E. Bonding Agent: Daraweld®C as manufactured by Grace Construction Products, or equal.

F. Sealer: Water based silane or siloxane masonry sealer, clear.

2.03 MORTAR MIXES

A. Standard Installation (Grouted Joints):

1. Mix mortar in accordance with [ASTM C 270, Type N or S] [or] [Eldorado Stone, LLC mortar preparation instructions].
2. Add color pigment in grout joint mortar in accordance with pigment manufacturer's instructions.

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PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates upon which work will be installed.
- B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- C. Commencement of work by installer is acceptance of substrate.

3.02 PREPARATION

- A. Protection: Protect adjacent work from contact with mortar.
- B. Surface Preparation: Prepare substrate in accordance with manufacturer's installation instructions for the type of substrate being covered.

3.03 INSTALLATION

- A. Install and clean stone in accordance with manufacturer's installation instructions for Standard (Grouted Joint)] installation.
- B. Apply sealer in accordance with sealer manufacturer's installation instructions.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Manufacturer's Field Service Representative shall make periodic site visits for installation consultation and inspection as requested by Owner.

3.05 CLEANING

- A. Comply with Section
 - 1. Remove excess mortar and smears using soft bristle brush or steel wool.
 - 2. Replace defective mortar. Match adjacent work.
 - 3. Clean soiled surfaces with non-acidic solution, acceptable to the stone manufacturer, which will not harm masonry or adjacent materials.
 - 4. Leave surfaces thoroughly clean and free of mortar and other soiling.
 - 5. Use nonmetallic tools in cleaning operations.

END OF SECTION

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SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section
- B. Section Includes:
 - 1. Structural steel.
 - 2. Architecturally exposed structural steel.
- C. Related Sections:
 - 1. Section 01400: Testing and Inspection.
 - 2. Section 03300: Cast-In-Place Concrete.
 - 3. Section 05500: Metal Fabrication.
 - 4. Section 09900: Paints and Coatings.

1.02 REFERENCES

- A. AISC MO15L – Manual of Steel Construction, Allowable Stress Design, 9th edition.
- B. AISC S323 – Quality Criteria and Inspection Standards.
- C. ASTM A36 – Structural Steel.
- D. ASTM A53 – Hot Dipped, Zinc-Coated Welded and Seamless Steel Pipe.
- E. ASTM A108 – Steel Bars, Carbon, Cold-Finished, Standard Quality.
- F. ASTM A123 – Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
- G. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- H. ASTM A307 – Carbon Steel Externally Threaded Standard Fasteners.
- I. ASTM A325 – High Strength Bolts for Structural Steel Joints.
- J. ASTM A500 – Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- K. ASTM A653 – Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated by the Hot-Dip Process.
- L. ASTM C1107 – Packaged Dry, Hydraulic Cement Grout (Non-Shrink).
- M. AWS A2.4 – Standard Welding Symbols.
- N. AWS D1.1 – Structural Welding Code.

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- O. AWS WHB-1 – Qualification and Certification.
- P. AWS A5.1 – Carbon Steel Covered Arc-Welding Electrodes.
- Q. SSPC – Steel Structures Painting Council, SP-2, Hand Tool Cleaning.
- R. CBC Chapter 22, Division III – Allowable Stress Design and Plastic Design for Structural Steel Buildings.
- S. ASTM A572 – Grade 50 – Structural Steel.
- T. ASTM A108 – Standard Specification for Steel Bars, Carbon, Cold-Finish, Standard Quality.
- U. AISC – American Institute of Steel Construction, Code of Standard Practice for Steel Buildings and Bridges, for Architecturally Exposed Structural Steel.
- V. ASTM A992 – Steel for Structural Shapes For Use in Building Framing.
- W. ASTM F1554 – Standard Specification for Anchor Bolts.
- X. ASTM A780 – Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- Y. Federal Emergency Management Agency (FEMA)
 - 1. FEMA 353 – Recommended Specification and Quality Assurance Guidelines for Steel Moment Frame Construction for Seismic Application, July 2000.
 - 2. American Institute of Steel Construction (AISC) Seismic Provisions for Structural Steel Buildings, April 15, 1997 including Supplement No. 2, November 10, 2000.

1.03 SYSTEM DESCRIPTION

A. Regulatory Requirements:

- 1. Structural steel shall conform to 2007 CBC requirements, except that steel manufactured by acid Bessemer process is not permitted for structural purposes.

1.04 SUBMITTALS

A. Shop Drawings:

- 1. Submit shop drawings, including complete details and schedules for fabrication and shop assembly of members, and details, schedules, procedures and diagrams showing the sequence of erection. Fully detail minor connections and fastenings not shown or specified in the Contract Documents to meet required conditions using similar detailing as shown in the Contract Documents. Include a fully detailed, well-controlled sequence and technique plan for shop and field welding that minimizes locked in stresses and distortion; submit sequence and technique plan for review by the Architect.
 - a. Include details of cuts, connections, camber, and holes in accordance with Figure 4.5 of AWS D1.1-02 or AISC Section J1.8, weld position plan and other pertinent data. Indicate welds by standard AWS symbols, and show size, length and type of each weld.

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- b. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed for Work specified in other sections.
- c. Erection and Bracing Plan and Erection Procedure: Submit an erection and framing plan, including columns, beams, and girders, prepared, signed and sealed by a structural engineer registered in the State of California in accordance with Title 8 CCR, Section 1710. Maintain a copy at the Project site as required by the California Division of Industrial Safety.
- d. Submit a list of steel items to be galvanized.

B. Product Data:

1. Submit copies of fabricator's specifications and installation instructions for the following products. Include laboratory test reports and other data required demonstrating compliance with these Specifications:
 - a. Structural steel, each type; including certified copies of mill reports covering chemical and physical properties.
 - b. Welding electrodes.
 - c. Welding gas.
 - d. Unfinished bolts and nuts.
 - e. Structural steel primer paint.
 - f. High-strength bolts, including nuts and washers.

C. Manufacturer's Mill Certificate:

1. Submit, certifying that products meet or exceed specified requirements.

D. Mill Test Reports:

1. Submit manufacturer's certificates, indicating structural yield and tensile strength, destructive and non-destructive test analysis.

E. Charpy-V-Notch (CVN) Impact Test: Submit certified copies of Charpy-V-Notch (CVN) Impact Test by the manufacturer for applicable steel members and components.

1. Charpy-V-Notch (CVN) Impact Test for Base Metal: Moment frame columns, and girders subjected to Charpy-V-Notch impact test in accordance with "Seismic Provisions for Structural Steel Buildings", Part I, Section 6.3, as modified by Supplement 2.
2. Exception: Rolled shapes listed under Groups 4 and 5 of Table 2, Page 1-8 of the 9th edition of the AISC Manual of Steel Construction shall have the Charpy-V-Notch test, as specified above, performed on flange material at the juncture of the web and flange, shown in Figure C-A3 1C in AISC Manual – 9th edition.
3. Charpy-V-Notch test shall be performed by the manufacturer employing Test Frequency (P) in accordance with ASTM A 673 and utilizing standard specimen sizes shown in Figure 6 of ASTM E 23. The absorbed energy in a CVN impact test shall not be less than that specified in Material Part 2 of this section.

F. Submit certified copies of tests by manufacturer for fine grain practice. Structural steel base material, as described above, shall be manufactured using fully killed fine grain practice having grain size number 5 or better as determined by ASTM E 112.

G. Weld Procedures: Submit weld procedures for all welding on project to Owner's testing laboratory for approval. After approval by testing laboratory, submit to Architect for record. Weld procedures shall be qualified as described in AWS D1.5, Section 5.12 or 5.13 for self shielded FCAW, Weld procedures shall indicate joints details and tolerances, preheat and interpass temperature, post-heat treatment, single or multiple stringer passes, peening of

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stringer passes for groove welds except for the first and the last pass, electrode type and size, welding current, polarity and amperes and root treatment. The welding variables for each stringer pass shall be recorded and averaged, from these averages the weld heat input shall be calculated. Submit the manufacturer's product data sheet for all welding material used.

- H. Welder's Certificates: Field welders shall be Project certified in accordance with AWS D1. 1-02. Shop welders shall be Project certified for FCAWS in accordance with AWS D1. 1-02.
- I. Test Reports: Submit reports of tests conducted on shop and field welded and bolted connections. Include data on type of test conducted and test results.
- J. Welding Material Certification: Comply with FEMA 353, Part I, Section 1.4.6.3. Submit to Owner's testing laboratory.

1.05 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement, except as otherwise indicated:
 - 1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges, March 7, 2000", modified as follows:
 - a. Replace "Structural Design Drawings" with "Contract Documents" throughout the document.
 - b. Paragraph 3.2 is hereby modified in it's entirety as follows:

"Contract Documents including but not limited to architectural, mechanical, plumbing, electrical, civil and kitchen design drawings and specifications shall be used as supplement to the structural plans to define configurations and construction information."
 - c. Delete Paragraph 3.3.
 - d. In Paragraph 4.4, delete the following sentence:

"These drawings shall be returned to the Fabricator within 14 calendar days."
 - e. Delete Paragraph 4.4.1.(a) in its entirety.
 - f. Paragraph 4.4.2 is hereby modified in it's entirety as follows:

"No review action, implicit or explicit, shall be interpreted to authorize changes in the Contract Documents."
 - 2. Perform welding in accordance with AWS Standards, AWS D1.1, and 2007 California Building Code Section 2204.1 and approved weld procedure.
 - 3. Welding for Moment Frames:
 - a. Heavy Sections: Comply with FEMA 353, Part I, Section 6.7.4.1.
 - b. Lamellar Tearing: Comply with FEMA 353, Part I, Section 6.7.4.2 modified as follows:

Replace "by Table 6-3" with "by item (a) above".
 - c. Column Webs at Continuity Plates: FEMA 353, Part I, Section 6.7.4.4.
 - d. Column Webs at Doubler Plates: FEMA 353, Part I, Section 6.7.4.5.
 - e. Web Access Hole: FEMA 353, Part I, Section 6.7.4.6.
- B. Shop fabrication shall be inspected in accordance with 2007 CBC.
- C. Erect mock-up panel of fabricated structural steel meeting Architecturally Exposed Structural Steel tolerances for exposed areas. Approval by Architect is required. Mock-up to remain for comparison but may not be left as part of the work.

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1.06 DELIVERY, STORAGE AND HANDLING

- A. Store structural steel above grade on platforms, skids or other supports.
- B. Protect steel from corrosion.
- C. Store welding electrodes in accordance with AWS D 12.1.
- D. Store other materials in a weather-tight and dry place until installed into the Work.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Stock Materials: Provide exact materials, sections, shapes, thickness, sizes, weights, and details of construction indicated on Drawings. Changes because of material stock or shop practices will be considered if net area of shape or section is not reduced thereby, if material and structural properties are at least equivalent, and if overall dimensions are not exceeded.

2.02 MATERIALS

- A. Structural Steel: All wide flange shapes shall conform to ASTM A 992 grade 50. Other steel shall conform to ASTM A36.
- B. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low carbon bolts and nuts.
- C. High-Strength Threaded Fasteners: ASTM A 325, ASTM A490 or ASTM F1852 quenched and tempered, steel bolts, nuts and washers.
- D. Primer: Lead-free metal primer, Thnemec 10-99, Rust-Oleum X-60, or equal.
- E. Steel Pipe: ASTM A 53, Type E or S, Grade B.
- F. Structural Tubing:
 - 1. Hot-formed, ASTM A 501.
 - 2. Cold-formed, ASTM A 500, Grade B.
- G. Galvanizing: ASTM A 123.
- H. Welding Electrodes: Provide electrodes recommended by manufacturer for seismic connections.
 - 1. Comply with FEMA 353, Part I, Section 2.4.1., Supplemental Requirements for Welding Materials.
- I. Shear stud connectors: ASTM A108, Grade 1015 forged steel, headed, uncoated, granular flux filled shear connector or anchor studs by Nelson Stud Welding Division of TRW, Lorain, OH, or equal.

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- J. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

2.03 FABRICATION

- A. Cleaning and Straightening Materials: Materials being fabricated shall be thoroughly cleaned of scale and rust, and straightened before fabrication. Cleaning and straightening methods shall not damage material. After punching or fabrication of component parts of a member, twists or bends shall be removed before parts are assembled.
- B. Cutting, Punching, Drilling and Tapping: Unless otherwise indicated or specified, structural steel fabricator shall perform the cutting, punching, drilling and tapping of Work so that Work of other trades will properly connect to steel Work.
- C. Milling: Compression joints depending on contact bearing shall be furnished with bearing surfaces prepared to a common plane by milling.
- D. Use of Burning Torch: Oxygen cutting of members shall be performed by machine. Gouges greater than 3/16 inch that remain from cutting shall be removed by grinding. Reentrant corners shall be shaped notch free to a radius of at least 1/2 inch. Gas cutting of holes for bolts or rivets is not permitted.
- E. Galvanizing: After fabrication, items indicated or specified to be galvanized shall be galvanized in largest practical sizes. Fabrication includes operations of shearing, punching, bending, forming, assembling or welding. Galvanized items shall be free from projections, barbs, or icicles resulting from the galvanizing process.
- F. Welding:
1. Type of steel furnished in welded structures shall provide chemical properties suitable for welding as determined by chemical analysis. Welds shall conform to the requirements of 2007 CBC Chapter 17. Conform to AWS D1.1, and CBC Chapter 22, Section 2212.3.
 2. Materials and workmanship shall conform to the requirements specified herein and to CBC requirements, modified as follows:
 - a. No welded splices shall be permitted except those indicated on Drawings unless specifically reviewed by the Architect.
 - b. Drawings will designate joints in which it is important that welding sequence and technique be controlled to minimize shrinkage stresses and distortion.
 3. Welding shall be performed in accordance with requirements of the AWS Structural Welding Code.
 - a. Welded Joint Details: comply with FEMA 353, Part I, Section 4, Welded Joint Details and Section 5.5.1, Tack Weld.
 4. Architecturally Exposed Structural Steel: Verify that weld sizes, fabrication sequence, and equipment used for Architecturally Exposed Structural Steel will limit distortions to allowable tolerances. Prevent surface bleeding of backside welding on exposed steel surfaces. Grind smooth exposed fillet welds ½ inch (13 mm) and larger. Grind flush butt welds. Dress exposed welds.
 5. Remove erection bolts on welded, Architecturally Exposed Structural Steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Shop Finish:

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1. Notify the Project Inspector when Work is ready to receive shop prime coat. Work shall be inspected by the Project Inspector before installation of primer.
 2. Structural steel and fittings, except galvanized items, which will be exposed when building is completed, shall receive a coat of primer.
 3. The primer specified shall be spray applied, filling joints and corners and covering surfaces with a smooth unbroken film. The minimum dry film thickness of the primer shall be 2.0 mils.
 4. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete or high strength bolted.
- H. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.
- I. Fabricate Architecturally Exposed Structural Steel with exposed surfaces smooth, square, and free of surfaces blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating and shop priming.
 2. Comply with fabrication requirements, including tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for Architecturally Exposed Structural Steel.
- J. Architecturally Exposed Structural Steel: use special care in unloading, handling and erecting the steel to avoid marking or distorting the steel members. Minimize damage to any shop paint when temporary braces or erection clips are used. Avoid unsightly surfaces upon removal. Grind smooth tack welds and holes filled with weld metal or body solder. Plan and execute all operations in such a manner that the close fit and neat appearance of the structure will not be impaired.
- K. Reduced Beam Sections (RBS's): Fabrication of RBS's as defined in FEMA 350, 3.5.5, shall conform with FEMA 353, Part I, Section 5.1.

2.04 SHOP AND FIELD QUALITY CONTROL

- A. A special inspector shall inspect high-strength bolted connections. The Owner will provide an independent testing laboratory to perform tests and prepare test reports in accordance with CBC. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.
- B. An AWS CWI certified special inspector shall inspect welded connections. The Owner will provide an independent testing laboratory to perform tests and prepare test reports in accordance with CBC. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.
- C. The independent testing laboratory shall conduct and interpret test and state in each report whether test specimens comply with requirements, and specifically state any deviations there from.
- D. Provide access to all places where structural steel Work is being fabricated or produced so required inspection and testing can be performed.

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- E. The independent testing laboratory may inspect and/or test structural steel at plant before shipment; however, Architect reserves the right at any time before Final Completion to deem materials not in compliance with the specified requirements as defective Work.
- F. Correct defects in structural Work when inspections and laboratory test reports indicate noncompliance with specified requirements. Perform additional tests as may be required to reconfirm noncompliance of original Work, and as may be required to show demonstrate compliance of corrected Work.
- G. Welding: Inspect and test during fabrication and erection of structural steel assemblies as follows:
1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the Work. Record Work required and performed to correct deficiencies.
 2. Inspect welds. Welds shall be visually inspected before performing any non-destructive testing. Groove weld shall be inspected by ultrasonic or other approved non-destructive test methods. Testing shall be performed to AWS D1.1 Table 6.3 cyclically loaded non-tubular connections.
 3. Ultrasonic testing shall be performed by a specially trained and qualified technician who shall operate the equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. Repair and test defective welds.
 4. Rate of Testing: Completed welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.
 5. Welds, when installed in column splices, shall be tested by either ultrasonic testing or radiography.
 6. Base metal thicker than 1-1/2 inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected by shear wave methods for discontinuities directly behind such welds. Tests shall be performed at least 48 hours after completed joint has cooled down to ambient air temperature.
 7. Any material discontinuities shall be reviewed based on the defect rating in accordance with the criteria of AWS D1.1 table 6.3 by the Architect.
 8. Other method of non-destructive testing and inspection, for example, liquid dye penetrate testing, magnetic particle inspection or radiographic inspection may be performed on weld if required.
 9. Lamellar Tearing: Lamellar-tearing resulting from welding is a crack (with zero tolerance) and shall be repaired in accordance with AWS D1.1.
 10. Lamination: The rejection criteria shall be based on ASTM A 435.
 11. Where testing reveals lamination or conditions of lamellar tearing in base metal, the steel fabricator shall submit a proposed method of repair for review by the Architect. Test repaired areas as required.
 12. Magnetic Particle Testing: Magnetic particle testing when required shall be provided in accordance with AWS D1.1 for procedure and technique. The standards of acceptance shall be in accordance with AWS D1.1 – Qualification.
- H. Lamellar Tearing: Prior to welding plates 1 to 1-1/2 inches thick and greater and rolled shapes within the distance from 6 inches above the top of the joint to 6 inches below the bottom of the joint shall be checked by ultrasonic testing for laminations in base metal which may interfere with the inspection of the completed joint. Should these defects occur, members will be reviewed by the Architect. Welding procedure specifications in sub-section 1.5G specify welding practices to minimize lamellar tearing.
- I. Prior Testing of Base Material: Test material before fabrication.
- J. Lines and levels of erected steel shall be certified by a State of California licensed surveyor as set forth in related Division 1 section.

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- K. Welded studs shall be tested and inspected by the special inspector in accordance with requirements of AWS D1.1 – Stud Welding.
- L. Record Drawings: After steel has been erected, correct or revise shop drawings and erection diagrams to correspond with reviewed changes performed in the field.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify governing dimensions and conditions of the Work before commencing erection Work.
 - 1. Report discrepancies between drawings and field dimensions to Architect before commencing work.
 - 2. Beginning of installation means erector accepts existing conditions and surfaces underlying or adjacent to work of this section.
- B. Provide temporary shoring and bracing, and other support during performance of the Work. Remove after steel is in place and connected, and after cast-in-place concrete has reached its design strength.

3.02 ERECTION

- A. Install structural steel accurately in locations, to elevations indicated, and according to AISC specifications and CBC requirements.
- B. Clean surfaces of base plates and bearing plates.
 - 1. Install base and bearing plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims; cut off flush with edge of base or bearing plate before packing with grout.
- C. Maintain erection tolerances of structural steel within AISC Code of Standard Practice for Steel Buildings and Bridges.
 - 1. Members and components, plumbed, leveled and aligned to a tolerance not to exceed one-half the amount permitted for structural steel. Contractor to provide adjustable connections between Architecturally Exposed Structural Steel and the structural steel frame or the masonry or concrete supports, in order to provide the erector with means for adjustment.
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact after assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
- E. Do not permit thermal cutting during erection of structural steel.
- F. Where indicated for field connections, provide standard bolts complying with ASTM A 307.

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- G. Install high strength steel bolts at locations indicated. Assembly and installation shall be in accordance with CBC requirements.
 - 1. Allowable hole sizes: 1/16 inch larger than bolt size.
 - 2. Use friction type connection with standard hardened steel circular, square or rectangular washer under bolt nut.
 - 3. Thoroughly clean area under bolt head, nut and washer. Remove all paint, lacquer, oil or other coatings except organic zinc-rich paints in accordance with SSPC, SP-2.
 - 4. Tighten bolts by power torque wrench or hand wrench until twist-off.
- H. Contractor shall be responsible for correcting detailing and fabrication errors and for correct fitting of all members and components.
- I. Erect structural steel plumb and level and to proper tolerances as set forth in the AISC Manual. Provide temporary bracing, supports or connections required for complete safety of structure until final permanent connections are installed.
- J. Install column bases within a tolerance of 1/8 inch of detailed centerlines, level at proper elevations. Support bases on double nuts and solidly fill spaces under bases with dry-pack cement grout.
- K. Provide anchor bolts with templates and diagrams. Contractor shall be responsible for proper location and installation of bolts. Correct deficiencies and errors.
- L. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A780.

3.03 FITTING

- A. Closely fit members, finished true to line and in precise position required to allow accurate erection and proper joining in the field.
- B. Drilling to enlarge unfair holes will not be allowed. Allow only enough drifting during assembly to bring parts into position, but not sufficient enough to enlarge holes or distort the metal. Do not heat rolled sections, unless approved by Architect.

3.04 PUNCHING AND DRILLING

- A. Punch material 1/16 inch larger than nominal diameter of bolt, wherever thickness of metal is equal to or less than the diameter of the bolt plus 1/8 inch.
- B. Drill or sub-punch and ream where metal is equal to or more than the diameter of the bolt plus 1/8 inch. Make diameter for sub-punched and sub-drilled holes 1/16 inch larger than nominal diameter of bolt.
- C. Precisely locate holes to ensure passage of bolt through assembled materials without drifting. Enlarge holes when necessary to receive bolts by reaming; flame cutting to enlarge holes is not acceptable. Structural Steel members with poorly matched holes will be rejected.

3.05 FINISHING

- A. After erection, spots or surfaces where paint has been removed, damaged, or burned off and field rivets, bolts, and other field connections not concealed in the work, shall be cleaned of dirt,

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oil, grease, and burned paint and furnished with a spot coat of the same primer installed during shop priming.

- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Install paint to exposed areas with the same material installed during shop painting. Install by brush or spray to provide a minimum dry film thickness of 1.5 mils.

3.06 FIELD QUALITY CONTROL

- A. Owner will provide a special inspector and independent testing laboratory to perform field inspections and tests and to prepare test reports.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

3.07 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project Site.

3.08 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.09 HANDLING

- A. Both in shop and in the field, transport, handle and erect to prevent damage or overstressing of any component.

END OF SECTION

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SECTION 05500 - METAL FABRICATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes: Metal fabrications as indicated or required, including items such as the following:
 - 1. Steel pipe.
 - 2. Square and rectangular steel tubing.
 - 3. Pipe columns.
 - 4. Steel ladders.
 - 5. Gratings, frames and covers.
 - 6. Miscellaneous fabrications, as indicated on the Drawings.
- C. Related Sections:
 - 1. Section 01400: Testing and Inspection.
 - 2. Section 05120: Structural Steel.
 - 3. Section 08710: Door Hardware.

1.02 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating provided materials, dimensions, anchoring detail, and details of termination or connection to adjacent construction. Indicate items that are purchased from a manufacturer and items that are shop fabricated. Indicate component parts requiring Project site fabrication or assembly.
- B. Product Data: Submit product data for manufactured items. Submit product data for primers and finishes.
- C. Material Samples: Submit samples of primers and finishes on fabricated items.
- D. Installation Instructions: Submit installation instructions for manufactured items.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. Design, fabricate, and install miscellaneous metals in accordance with AISC - Design, Fabrication, and Erection of Structural Steel for Buildings.
 - 2. AWS D-1.1 Code - Welding in Building Construction.
 - 3. Inspection of Welding: Refer to Section 01400, Testing and Inspection.
 - 4. Welding: Refer to Section 01400, Testing and Inspection.
- B. Coordinate installation of accessory items required for metal fabrications.

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1.04 DELIVERY, STORAGE AND HANDLING

- A. Store miscellaneous metal items above grade on platforms, skids, or other required supports.
- B. Protect from corrosion or damage.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Steel Shapes: ASTM A 36.
- B. Steel Pipe:
 - 1. Steel pipe for pipe columns, and other structural purposes shall conform to ASTM A 53, Type E or S, Grade B, as required.
 - 2. Steel pipe other than pipe furnished for structural purposes shall conform to ASTM A 53.
- C. Square and Rectangular Steel Tubing:
 - 1. Steel tubing for structural purposes shall be carbon steel conforming to ASTM A 500 or ASTM A 36.
 - 2. Steel tubing other than tubing furnished for structural purposes shall be hot or cold rolled carbon steel electric welded tubing.
- D. Cast Steel: ASTM A 27, Grade 65-35.
- E. Steel Bolts: ASTM A 307, Grade A, with bolt head and nut dimensions conforming to ANSI B 18.2.1.
- F. Rolled Steel Plates and Shapes:
 - 1. Shapes and plates shall conform to ASTM A 36, except for plates to be bent or cold-formed.
 - 2. Plates to be bent or cold-formed shall conform to ASTM A 283, Grade C.
- G. Chain: Chain shall be 4/0 double loop pattern coil chain.
- H. Grout: Non-shrinking type; Por-Rok, or equal.

2.02 FABRICATION

- A. General:
 - 1. For fabrication of Work exposed to view, provide only materials smooth and free of blemishes. Remove blemishes by grinding or by welding and grinding, before cleaning, treating, and installation of surface finishes including zinc coatings.
 - 2. Form exposed Work true to line and level with accurate angles, surfaces, and straight sharp edges.
 - 3. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated or specified.

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4. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise damaging Work.
 5. Form exposed connections with hairline joints, flush and smooth. Provide concealed fasteners wherever possible.
 6. Remove loose rust, mill scale, cutting, and punching burrs.
 7. Fabricate items in as large sections as practical to minimize assembly at the Project site.
- B. Ladder Extensions: Where vertical ladders are installed for access to roof hatches, provide the following:
1. Roof hatch ladders shall be provided with ladder extensions where required by CBC. Ladder extensions shall be Bilco Model 1, "LadderUP Safety Post," or equal, on fixed ladders below roof hatches where indicated. Device shall be manufactured of high strength steel with telescoping tubular section that locks automatically when fully extended. Upward and downward movement shall be controlled by a stainless steel spring balancing mechanism. Finish shall be black enamel. Unit shall be completely assembled with fasteners for securing to the ladder rungs in accordance with the manufacturer's instructions.
- C. Miscellaneous Framing and Supports:
1. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of necessary dimensions to receive adjacent Work retained by framing.
 2. Except as otherwise indicated, space anchors 2 feet on center, and provide minimum anchor units of 1-1/4 inch x 1/4 inch x 8 inch steel straps.
 3. Shelf angles for exterior construction shall be galvanized steel of sizes indicated.
- D. Welding:
1. Weld connections unless otherwise indicated.
 2. Weld corners and seams continuously and in accordance with requirements of AWS Code. Welds shall be inspected as required in Section 05120: Structural Steel.
 3. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- E. Galvanizing:
1. ASTM A 123, ASTM A 153, or ASTM A 386, as applicable, hot dip with 2.0 ounces per square foot on actual surface and 1.8 ounces per square foot minimum on any specimen, and as specified herein.
 2. Galvanizing Repair Material: All States Galvanizing Powder, Drygalv by American Solder and Flux, or equal. Hot applied repair material, or anodic zinc- rich galvanizing repair paint conforming to Mil Spec DOD-P-21035.
 3. Items to be galvanized shall be hot-dip galvanized in sections as large as possible.
- F. Shop Finish:
1. Metal fabrications shall be provided with a coat of primer, except those indicated to be completed with exposed galvanized finish.
 2. Primer: Lead-free red metal primer complying with Fed Spec TT-P-86G, Type I, II, or III; zinc molybdate complying with Fed Spec TT-P-645A. Minimum dry film thickness of primer shall be 2.0 mils.
 3. Preparation for Primer Painting: Miscellaneous ferrous metal, except items specified galvanized, shall be thoroughly cleaned and prepared for painting, including removal of shipping oils or protective coatings, mill scale, grease, dirt and rust. Prepare in

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accordance with SSPC recommendations. Deliver to Project site primed or galvanized as indicated, and ready to receive Project site applied finishes.

4. Galvanized Metal Work to receive Paint: Clean oil, grease and other foreign materials from surfaces. Apply vinyl wash pretreatment coating. Follow manufacturer's instructions for drying time, and then prime with one coat of metal primer.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Steel Ladders: Provide at locations indicated, fabricated as detailed. Ladders shall be anchored to concrete or masonry with 1/2 inch cinch anchor bolts. Ladders secured to a wood framed wall shall be anchored with 1/2 inch lag screws. Provide provisions for anchoring ladders before lath is applied to plastered walls.
- B. Gratings, Frames and Covers:
 1. Over areas indicated, provide steel gratings and grating frames as detailed. Frames shall have mitered and welded corners, and be fitted with anchors.
 2. Provide steel checkered plate covers and steel frames for sumps, grease traps, and sand traps, and other covers for access where indicated. Frames shall be provided with mitered and welded corners and be fitted with anchors as detailed. Cover shall be perforated. Each section of access cover shall be furnished with steel pull rings and tool operated fastening device. Screws to fasten covers shall be brass.

3.02 ADJUSTING

- A. Touch Up Damaged Surfaces:
 1. Shop Painted Finishes: Comply with SSPC-PA-1 for touch-up; apply with brush to produce a minimum 2.0 mil dry film thickness.
 2. Galvanized Surfaces: Clean field welds, connections and damaged areas. Repair damaged galvanized surfaces with a zinc-rich coating meeting ASTM A780:
 - a. ZRC Cold Galvanizing Compound.
 - b. Sherwin Williams Zinc Clad.
 - c. Approved equal.

3.03 CLEAN UP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Rough carpentry Work.
 - 2. Installation of glued laminated members, plywood web joists or wood chord metal web joists.
- C. Related Sections:
 - 1. Section 01400: Testing and Inspection.
 - 2. Section 03100: Concrete Forms and Accessories.
 - 3. Section 03300: Cast-In-Place Concrete.
 - 4. Section 06200: Finish Carpentry.
 - 5. Section 09250: Gypsum Board.

1.02 SYSTEM DESCRIPTION

- A. Regulatory Requirements:
 - 1. Work of this Section shall comply with 2007 CBC, Chapter 23.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. Redwood structural and framing lumber shall be graded in accordance with Standard Specifications for Grades of California Redwood Lumber of the Redwood Inspection Service.
 - 2. Douglas fir, larch or hemlock structural and framing lumber shall be graded in accordance with the Standard Grading Rules of the West Coast Lumber Inspection Bureau (WCLIB) or the Western Lumber Grading Rules of the Western Wood Products Association (WWPA).
 - 3. Plywood shall conform to requirements of Product Standard PS 1-95, and shall be grade marked by a recognized grading agency (APA and PTL).
- B. Lumber shall bear official grade mark of the association under whose rules it was graded or official grade mark of another recognized grading agency.
- C. Structural and framing members 2 inches in thickness and larger shall be air-dried to moisture content not to exceed 19 percent before installation.
- D. Each piece of preservative treated lumber shall be identified by the Quality Mark of an approved inspection agency in accordance with 2007 CBC, Chapter 23; refer to Section 01400, Testing and Inspection.
- E. Lumber showing visible signs of mold growth:

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1. Any lumber showing visible signs of mold growth shall be removed from the project site or cleaned as outlined below.
2. The contractor is responsible for all costs associated with cleaning, post-cleaning testing, and reporting for lumber with mold.
 - a. Lumber that shows visible signs of mold growth prior to, or after installation, shall be cleaned pursuant to USEPA's guidance publication "Mold Remediation in Schools and Commercial Buildings dated March 2001 (EPA 402-K-01.001).
 - b. A minimum of 10% of the total locations cleaned must be sampled (tape lift method) post cleaning to ensure cleaning effort was successful. Cleaning will be considered acceptable when tape lift sample results evaluated by direct microscopic examination determine that the general abundance of mold is non-detect or rare (normal trapping to 1+).
 - c. A report prepared by a Certified Industrial Hygienist (CIH) that details the sampling and cleaning results shall be prepared and submitted to the Owner's Authorized Representative for review and approval of Owner.
 - d. Cleaned lumber shall not be installed or enclosed by finish materials until approval of test results. Cleaned lumber must meet moisture content requirements as required elsewhere in this specification prior to installation or application of finishes.

1.04 STORAGE, HANDLING AND PROTECTION

- A. The materials supplied as part of the Work of this section shall be protected from exposure to inclement weather before being covered by other Work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Lumber: Structural and framing lumber shall be of following species and grades unless noted otherwise on structural drawings:

	<u>INSTALLATION</u>	<u>SPECIES</u>	<u>GRADE</u>
1.	Subfloor, wall sheathing, roof sheathing and ceiling furring	Douglas fir and larch	Construction Board, WCLIB; WWPA
2.	Posts, (5" x 5" and larger, width not more than 2" greater than thickness).	Douglas fir and larch	No. 1 Structural Posts and Timbers, WCLIB. No. 1 Post and Timbers, WWPA.
3.	Beams, girders and truss members rectangular, (5" and thicker) width more than 2" greater than thickness where exposed as finish members.	Douglas fir and larch	Select Structural Beams and Stringers, WCLIB; WWPA
4.	Items in subparagraph 3 when concealed.	Douglas fir and larch	No. 1 Structural Beams and Stringers, WCLIB No. 1 Beams and Stringers, WWPA.

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| 5. | Joists, rafters, lintels, posts, mullions and members (2" to 4" wide) | Douglas fir and larch | Select Structural; Structural Light Framing, WCLIB; |
| 6. | Other lumber (2 to 4 thick) (2" to 4" wide) not specified in subparagraph 5 above. | Douglas fir and larch | Construction Light Framing WCLIB; WWPA. |
| 7. | Framing lumber (2" to 4" thick, 5" and wider). | Douglas fir and Larch | No. 1 Structural Joists and Planks, WCLIB; WWPA. |
| 8. | Mudsills and plates in contact with earth. | Douglas fir and Larch treated | Same as subparagraphs 6 and 7. |
| 9. | Sills or plates installed on concrete or masonry surfaces 6" or less above earth or finish grade. | Douglas fir and Larch treated | Same as subparagraphs 6 and 7. |
| 10. | Sills, foundation plates & sleepers installed on concrete, masonry foundations, or installed on concrete slab in direct contact with earth. | Douglas fir and Larch treated | Same as subparagraphs 6 and 7. |
| 11. | Miscellaneous nailing strips and blocks embedded in concrete or masonry. | Douglas fir and Larch treated | Same as subparagraphs 6 and 7. |
- B. Plywood: Plywood furnished for structural purposes, when exposed outdoors, shall be exterior type plywood. Other plywood furnished for structural purposes shall be exterior type, or Exposure 1.
- C. OSB Board or Panels:
1. Oriented strand board or panels shall not be furnished as part of the Work of this section.
- D. Preservative Treated Wood:
1. Wood and plywood specified; as treated wood shall be pressure treated wood in accordance with CBC requirements.
 2. Seasoning: Treated lumber shall be air seasoned after treatment, for a minimum of 2 weeks before installation. Moisture content shall be 15 percent maximum.
 3. Creosote or arsenic is not permitted for treating wood.
 4. When treated wood member have been notched, dapped, drilled, or cut, such newly cut surfaces shall be painted with a heavy coat of the same preservative material originally provided for treatment of wood member.
- E. Fire Retardant Protection: Wood and plywood specified as fire retardant protected wood shall be treated by approved methods and materials and shall be dried following treatment to a maximum moisture content as follows:
1. Solid sawn lumber 2 inches in thickness or less: 19 percent.
 2. Plywood: 15 percent.

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- F. Plywood Subflooring: Underlayment, Group 1, Exposure 1; of thickness indicated.
- G. Mineral Fiber Panels: Asbestos-free, thickness as indicated.
- H. Adhesive: Tec, Inc. Sturdi-Bond TA-175, or Top Industrial Inc., Rainbuster 345, elastomeric adhesive conforming to ASTM D 3498 and APA-AFG-01.

PART 3 - EXECUTION

3.01 FASTENINGS

A. Nails and Spikes:

- 1. Furnish only common wire nails or spikes whenever indicated, specified or required.
- 2. Whenever necessary to prevent splitting, holes shall be pre-drilled for nails and spikes.
- 3. Nails in plywood shall not be overdriven.
- 4. Machine Applied Nailing: Use of machine nailing is subject to a satisfactory Project site demonstration for each Project and approval by the Architect or structural engineer retained by the Architect as an Architect Consultant. Installation is subject to continued satisfactory performance. Machine nailing is not permitted for 5/16-inch plywood. Do not permit nail heads to penetrate outer ply. Maintain minimum allowable edge distances when installing nails.

B. Lag Screws:

- 1. When installing lag screws in a wood member, pre-drill hole as required by the CBC.
- 2. Lag screws, which bear on wood, shall be fitted with standard steel plate washers under head. Lag screws shall be screwed and not driven into place.

C. Bolts:

- 1. Lumber and timber to be fastened together with bolts shall be clamped together with holes for bolts bored true to line.
- 2. Bolts shall be fitted with steel plates or standard cut washers under heads and nuts. Bolts shall be tightened when installed and again before completion of the Work of this section.

D. Wood Screws: When installing wood screws, pre-drill holes as required by the CBC.

E. Metal Framing Devices: Framing anchors, joist hangers, ties, and other mechanical fastenings shall be galvanized or furnished with a rust inhibitive coating. Nails and fastenings shall be of the type recommended by manufacturer.

F. Powder Driven Fasteners:

- 1. Loads shall not exceed 75 pounds unless indicated on the Drawings or when reviewed by the Architect.
- 2. The operator, tool, and fastener shall perform the following as observed by the Project Inspector.
 - a. Observe installation of first 10 fasteners.

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- b. Test the first 10 fasteners by performing a pullout test. Load shall be at least twice the design load, or 150 pounds, whichever is greater.
- c. Random testing:
 - 1) Load less than 75 lb. - approximately 1 in 10 pins.
 - 2) Load 75 lb. or greater - 1/2 of the pins.
3. Failure of any test will result in testing of all installed pins.
4. Nail heads shall not break the outer skin of sheathing.
5. Non-compliant pins shall be replaced.

3.02 INSTALLATION

A. Stud Walls, Partitions and Furring:

1. Wood stud walls, partitions and vertical furring shall be constructed of members of size and spacing indicated. Provide single treated plate at bottom and double plate at top unless otherwise indicated. Interior, nonbearing non-shear partitions may be framed with a single top plate, installed to provide overlapping at corners and at intersections with other wall and partitions or by metal ties as detailed.
2. Walls and partitions shall be provided with horizontal staggered blocking at least 2 inch nominal thickness and same width as studs, fitted snugly, and nailed into studs. Blocking shall be installed at mid-height of partition or not more than 7 feet on center vertically. Install wood backing on top of top plate wherever necessary for nailing of lath or gypsum board.
3. Walls, partitions and furred spaces shall be provided with 2-inch nominal thickness wood firestops, same width as space to be firestopped, at ceiling line, mid-height of partition and at floor line. Firestops at floor line are not required when floor is concrete. If width of opening is such that more than one piece of lumber is necessary, provide 2 thicknesses of one inch nominal material installed with staggered joints.
4. Firestops shall be installed in stud walls and partitions, including furred spaces, so the maximum dimension of any concealed space is not over 10 feet.
5. Corners, and where wood stud walls and wood vertical furring meet, shall be constructed of triple studs. Openings in stud walls and partitions shall be provided with headers as indicated and a minimum of 2 studs at jambs, one stud of which may be cut to support header in bearing.
6. Where wood and masonry or concrete walls intersect, end stud shall be fastened at top, bottom and mid-height with one 1/2-inch diameter bolt through stud and embedded in masonry or concrete a minimum of 4 inches. Bolts shall be provided with washers under nuts.
7. Sills under bearing, exterior or shear walls shall be bolted to concrete with 5/8 inch diameter x 12 inch long bolts with nuts and washers, spaced not more than 4 feet on center unless noted otherwise. There shall be a bolt within 9 inches of each end of each piece of sill plate. Sills shall be installed and leveled with shims, washers, with nuts tightened to level bearing. Space between sill and concrete shall be dry packed with cement grout.

B. Floor Joists, Roof and Ceiling Framing:

1. Wood joists shall be of the size and spacing indicated, installed with crown edge up, and shall have at least 4 inch bearing at supports. Provide 2 inch solid blocking, cut in between joists, same depth as joists, at ends and bearings, unless otherwise indicated.
2. Floor joists of more than 4 inches in depth and roof joists of more than 8 inches in depth shall be provided with bridging. Floor joists shall be bridged every 8 feet with solid blocking or metal cross bridging. Roof joists shall be bridged every 10 feet.
3. Joists under and parallel to bearing partitions shall be doubled and nailed or bolted together as detailed. Whenever a partition containing piping runs parallel to floor joists,

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joists underneath shall be doubled and spaced to permit passage of pipes and blocked with solid blocking spaced at not more than 4 feet intervals.

4. Trimmer and header joists shall be doubled, when span of header exceeds 4 feet. Ends of header joists more than 6 feet long shall be supported by framing anchors or joist hangers unless bearing on a beam, partition, or wall. Tail joists over 12 feet long shall be supported at header by framing anchors or on ledger strips at least 2 x 4.
5. Provide solid blocking between rafters and ceiling joists over partitions and at end supports where indicated.

C. Beams, Girders and Joists:

1. Ends of wood beams, girders and joists which are 2 feet or less above finished outside grade and which abut, but do not enter concrete or masonry walls, as well as wood blocking used in connection with ends of those members shall be treated with wood preservative.
2. Where wood beams, girders and joists enter masonry or concrete walls 2 feet or less above outside wall, metal wall boxes or equivalent moisture barriers shall be provided between wood and masonry or concrete.

D. Subflooring:

1. Floor sheathing: Plywood of thickness and nailing indicated. Install with the face grain across supports, end joints staggered and centered over supports. Provide solid blocking under plywood edges where indicated. In addition to nailing, sheets of plywood flooring shall be secured in place with elastomeric adhesive, installed at beams, joints, perimeter supports and panel edges.

E. Roof and Wall Sheathing:

1. Plywood roof sheathing shall be Structural I, Grade C-D, Exposure 1, thickness as indicated.
2. Where exposed roof sheathing is indicated, area shall be sheathed solid with dressed and center matched, V-jointed boards of sizes indicated. Boards shall be installed perpendicular to supports.
3. Soffits of overhanging eaves, where indicated, shall be boxed-in using Group I, Exterior Type, Grade A-C, plywood, thickness as indicated.
4. Plywood for shear walls shall be Structural I, Grade C-D Exterior Type, thickness as indicated. Install with the long dimension parallel or perpendicular to the supports. Blocking shall be provided behind edges not located over supports. Shear wall construction, nailing, and top and bottom anchorage shall be as indicated.
5. Provide and install metal H-clips of required size, midway between rafters at unsupported edge joints of plywood roof sheathing where rafters are spaced at 24 inches on center. Clips shall be Plyclips, by Timber Fasteners Inc., or Panel Clips by Simpson Co., or equal.

F. Attic Space Partitions and Attic Walkways:

1. Attic space partitions shall be constructed of 2x4 wood members spaced at 2 feet on center maximum with 5/8-inch gypsum board.
2. Doors in attic space partitions shall be self-closing, of the same sheathing material as partition, constructed with 2 battens and a diagonal brace across back.
3. Shear walls passing through attic space shall be sheathed with 5/8-inch gypsum board on each side.
4. Attic walkways shall be constructed of 2x12 planks installed one-inch apart and nailed at each support with three 16d. nails.

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G. Furring:

1. Rafters or ceiling joists indicated to be furred for support of materials other than acoustical tile shall be furred with 2x4 wood members installed at right angles to supports, spaced as indicated and nailed in place. Furring shall be aligned, and bottoms shall be leveled by installing wood shims as required, and nailed as indicated.
2. Furring for protective wall padding in gymnasium shall be 1x3 Douglas fir, Construction Boards, S1S1E; applied horizontally to concrete walls at top and bottom of padding panels; and at uniform intermediate spacing not more than 18 inches on center. Stripping shall be shimmed where required, aligned to a true plane, and secured to concrete walls with concrete nails at not more than 18 inches on center.

H. Furring: Where metal furring is not indicated or specified, provide wood furring at points indicated and required for concealing conduit, piping, structural framing or other unfinished materials. Wood furring shall be 2x studs of required width. Vertical members contacting concrete or masonry shall be attached as specified for anchoring interior wood stud partitions.

I. Grounds:

1. Provide and set wood grounds at points where wood trim occurs and work is to be plastered. Grounds at 3/4-inch metal lath shall be 5/8 inch thick, net, 1-1/2 inches wide Douglas fir, S1S. Grounds shall be doubled where trim member exceeds 5 inches width, or wherever indicated. Grounds shall be applied after lath has been installed set plumb, level and true to line.
2. Apply grounds over wood framed surfaces and lath and securely nail to wood backing at each stud or bearing. Grounds applied over steel channel studs and lath shall be securely nailed at each stud or bearing to nail-blocks provided and installed in metal studs.
3. Grounds applied to concrete surfaces shall be securely nailed to woodblocks provided and built into concrete.

J. Nailing Strips and Plates:

1. Provide wood nailing strips, plates and blocking indicated or required. Nailing strips in connection with metal work shall be bolted to metal. Wood nailing blocks for securing grounds shall be built into concrete, or masonry.
2. Nailing schedule shall comply with CBC requirements.
3. Treated wood nailing strips for lightweight insulated concrete roof decks at eaves, ridges, rakes, base of curbs and wherever else indicated, shall be provided and installed. Strips shall be treated Douglas fir, 4 inches (nominal) width by thickness of insulated concrete.

K. Wood Backing: Provide wood backing as indicated and as required to receive plumbing, electrical fixtures and equipment, cabinets, door stop plates and other fixed equipment.

L. Wood Bucks: Furnish and set wood bucks to form openings for doors and other openings in concrete or masonry walls and in steel stud or channel partitions and furring. Bucks shall be Douglas fir, S1S2E, 2 inches (nominal) thickness and of width indicated or required. Bucks in connection with concrete shall be bolted thereto, and bucks in masonry walls shall be attached by means of strap anchors embedded in masonry joints. Bucks in connection with steel studs and metal channels shall be secured with nails or screws spaced not to exceed 24 inches on centers.

M. Bench Tops and Backs: Tops and backs shall be 3/4 inch thick asbestos free board, fabricated to minimize number of joints. Edges shall be neatly cut, smoothly finished and joints accurately

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fitted and butted. Tops and backs shall be secured with countersunk flathead galvanized wood screws. At bench with steel pan, apply with manufacturer's recommended adhesive. Cut and drill as required for Work to be attached to benches.

3.03 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 06180 - STRUCTURAL GLUED LAMINATED MEMBERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Structural glued laminated wood members.
- C. Related Sections:
 - 1. Section 01400: Testing and Inspection.
 - 2. Section 06100: Rough Carpentry.

1.02 SYSTEM DESCRIPTION

- A. Regulatory Requirements: Manufacture and fabrication of structural glued laminated timber shall be in accordance with 2007 CBC, Chapter 23.

1.03 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings for glued laminated members. Indicate areas requiring 6 inch spacing.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. AITC - Product Standard PS 56.
 - 2. AITC 117 - Structural Glued laminated Timber of Softwood Species.
 - 3. ASTM D 3737 - Design and Manufacture of Structural Glued Laminated Timber.
 - 4. NSI/ATC A 190.1 - Standard Specifications for Glued Laminated Timber.
 - 5. WCLIB - Standard Grading and Dressing Rules.
- B. Inspection of structural-glued laminated members shall be performed during fabrication. Inspection shall be performed in accordance with 2007 CBC Chapter 23 and Chapter 17.

1.05 DELIVERY, STORAGE AND HANDLING

- A. After fabrication and prior to shipping, seal surfaces of each member, including ends, with 2 coats of sealer primer, installed in accordance with manufacturers written recommendations.
- B. Each member that will be exposed in completed structure shall be separately wrapped in heavy waterproof paper for protection against weather and damage in shipping and handling. Do not remove wrapping until after members have been installed. Protect all members from damage, whether concealed or exposed in the finished Work.

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PART 2 - PRODUCTS

2.01 MATERIALS

- A. Lumber for Laminating: Conforming to the structural requirements and laminating specifications of PS 56, of stress grades and combination indicated that provides glued laminated members with allowable stress values in bending as indicated.
- B. Glue: Exterior type; waterproof.

2.02 FABRICATION

- A. Appearance grade of members shall be Industrial Grade where concealed and Architectural Grade where exposed.
- B. Weather exposed surfaces of members as defined in CBC shall be protected to prevent decay. When member is protected with pressure treatment, treatment process shall not impair structural integrity of member. When member is protected by flashing or is encased, provide ventilation and prevent moisture entrapment on member.
- C. Joints: End joints in adjacent laminations shall be separated in accordance with CBC requirements. Joints in adjacent laminations of arched members shall be separated as required for bending members.
- D. Maximum moisture content of the wood at time of gluing shall not exceed 16 percent for Projects located in coastal areas, 12 percent for Projects located in interior valleys or 10 percent for Projects located in desert areas. Moisture content of wood for members that will be exposed to direct sunlight in finished structure shall not exceed 10 percent at time of gluing. Range of moisture content of laminations assembled into a single member shall not exceed 5 percent at time of gluing.
- E. Reinforcement for Radial Tension: Where mechanical reinforcement is required to resist radial tension, reinforcement shall be as described in the Timber Construction Manual. Maximum spacing of mechanical reinforcement shall not exceed half effective depth of member at location of reinforcement.
- F. Notches: Notched glued laminated members shall be designed as required for sawn lumber using allowable stress of a combination, with outer lamination being grade of laminations exposed by notch. Where a notch is located on tension face of a member, at least one fully threaded lag bolt, or equal, shall be provided on each side of notch to prevent splitting.
- G. Fabricate and assemble components for laminations in combinations in accordance with requirements of AITC 117 and ASTM D 3737.

PART 3 - EXECUTION

3.01 ERECTION

- A. Provide erection bracing in addition to required lateral bridging. Avoid temporary construction loads in excess of design limits. Maintain members straight and plumb. Provide adequate lateral support for individual members and entire system until permanent bridging and sheathing is installed. Deliver and erect each member in one piece. Field splicing is not permitted unless reviewed by the Architect.

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3.02 CLEANUP

- A. Remove and legally dispose of debris, rubbish and waste material off the Project site.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Finish carpentry.
- C. Related Sections:
 - 1. Section 06100: Rough Carpentry.
 - 2. Section 06400: Architectural Woodwork.
 - 3. Section 08710: Door Hardware.
 - 4. Section 08800: Glazing.
 - 5. Section 09250: Gypsum Board.

1.02 SUBMITTALS

- A. Shop Drawings: Submit shop drawings of each item of finish carpentry and millwork, indicating materials, dimensions, construction, and anchorage details.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. Douglas fir finish lumber shall be manufactured and graded in accordance with WCLIB - Standard Grading and Dressing Rule No. 17.
 - 2. Redwood finish lumber shall be manufactured and graded in accordance with RIS - Standard Specifications for Grades of California Redwood Lumber.
 - 3. Hardwood finish lumber shall be manufactured and graded in accordance with NHLA - Rules for the Measurement and Inspection of Hardwood and Cypress Lumber.
 - 4. Softwood Plywood: Plywood shall comply with APA - Product Standard PS 1-95. Plywood shall be grade marked by APA.
- B. Finish lumber shall be kiln-dried according to recognized methods for the thickness and species. Lumber one inch thick or less shall be dried to average moisture content of not more than 15 percent. Lumber 1-1/4 inches to 2 inches in thickness shall be dried to average moisture content of not more than 19 percent.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to the Project site in undamaged condition, stored in fully covered, well-ventilated areas, and protected from extreme changes in temperature and humidity.
- B. Interior millwork and finish carpentry shall not be installed unless interior building temperature and humidity levels are within the ranges recommended by the manufacturer and/or recognized standards.

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PART 2 - PRODUCTS

2.01 MATERIALS

- A. Douglas Fir: Interior trim, solid lumber shelves, partitions, door frames and other concealed members of interior finish; Woodwork Institute (WI) Economy Grade.
- B. Hardwood: Birch, maple firsts and seconds.
 - 1. Birch: WI Custom Grade.
 - 2. Maple: WI Custom Grade.
- C. Softwood Plywood: Except where otherwise specified, WI Custom Grade, Douglas fir unless otherwise indicated.
- D. Hardwood Plywood: WI Premium Grade, species as indicated.
- E. Redwood: Exterior millwork, except framing lumber, shall be clear heartwood redwood. Where installed in direct contact with earth or provided for exterior storage units, install Foundation Grade.

2.02 FABRICATION

- A. General:
 - 1. The means of fastening various parts together shall be concealed in finished Work. Work, which is curved, shall be fabricated from solid stock, or, if veneered, shall be bent to a uniform radius.

PART 3 - EXECUTION

3.01 GENERAL

- A. Interior and exterior wood, millwork, blocking, and lumber shall be installed level, plumb, and true to line. Members shall be neatly and accurately scribed in place, maintaining full widths of end members, wherever possible. Trim shall be installed in full lengths, without piecing, except where use of single lengths is not required. Butt joints, if necessary, shall be beveled. Exterior angles shall be mitered, and interior angles of molding parts coped. Nails shall be set for putty. Grain and color of adjoining interior finish shall match adjacent finishes. Where Work specified in this section adjoins other Work, provide a neat tight joint.
- B. Interior and exterior finish carpentry and other fixed wooden equipment having hammer marks or other visible damage will be deemed defective Work.
- C. Staff or brick moulds of exterior wood doorframes shall be attached to frames after frames have been set and caulked. Moulds shall be mitered at corners and coped to sills, accurately secured in place with finish nails, and nails set.

3.02 INSTALLATION

- A. Install Work of this section as specified in the WI Manual of Millwork.

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- B. Wood shoe base shall be fitted and temporarily tacked in place until floor covering is installed. Provide and install corner fillets, same contour and materials as shoe base, in corners where shoe base is installed.
- C. Wall Panels: Panels shall be fastened to walls with adhesive in accordance with manufacturer's written recommendations. Where panels are fastened behind sink areas, aluminum moldings shall be caulked with waterproof caulking, Marlite T-627, or T-628.

3.03 CLEAN UP

- A. Remove and legally dispose of debris, rubbish and waste material off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 06400 - ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Architectural woodwork, casework, trim, hardware, countertops, and shelving as indicated on Drawings.
- C. Related Sections:
 - 1. Section 06100: Rough Carpentry.
 - 2. Section 06200: Finish Carpentry.
 - 3. Section 08800: Glazing.
 - 4. Section 09900: Paints and Coatings.
 - 5. Section 10100: Visual Display Boards and Panels

1.02 SECTION DEFINITIONS

- A. "Sustainably managed" is defined as "forests that are being managed through a professionally administered forestry management plan in which timber growth equals or exceeds harvesting rates in both quantity and quality, protecting rivers and streams from degradation, minimizing damage to the forest when harvesting and promoting biodiversity".

1.03 SYSTEM DESCRIPTION

- A. Design Requirements: Provide wood products from certified sustainably harvested sources.
 - 1. Casework Design: WI Style A Frameless.
- B. Minimum standards for the work of this section shall be in conformity with the Woodwork Institute Manual of Millwork, latest edition, standards of the architectural millwork industry as adopted by the Woodwork Institute.

1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings of casework indicating materials and hardware, details of construction, dimensions, methods of fastening and installation details. Shop drawings shall bear a WI Certified Compliance Label indicating that shop drawings fully meet requirements of WI grade specified. Shop drawings shall indicate grounds, backing, blocking, sleepers and other items required for installation of casework, which are to be provided and installed as part of the Work.
 - 1. Submit two copies. One copy will be returned with reviewed notations. Make corrections noted and distribute required copies prior to commencement of work according to Section 01300, Submittals.

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- B. Certificates: Provide WI Certified Compliance Certificate certifying that materials, fabrication and installation will comply with the specified requirements.
- C. Material Samples: Submit 2 inch x 3-inch plastic laminate color samples of manufacturer's entire color range.
- D. Closeout Submittals: Provide a WI Certified Compliance Certificate for Installation.

1.05 QUALITY ASSURANCE

- A. Comply with WI Manual of Millwork, grades as specified herein. Questions regarding the WI Manual of Millwork can be directed to Everett Nelms of the Woodwork Institute, 714-379-0410, Email: everett@woodinst.com.
- B. Each elevation of casework shall bear WI Certified Compliance Label indicating that casework fully meets requirements of WI grade specified.
- C. Each plastic laminate countertop shall bear WI Certified Compliance Label indicating tops fully meet requirements of WI grade specified.
- D. Mock-ups: When required by the Architect, submit a full-scale base cabinet, countertop, and wall-hung cabinet, illustrating joinery and plastic laminate finish. Base cabinet shall incorporate a drawer, an adjustable shelf, and a door. Wall-hung cabinet shall incorporate 2 doors, one adjustable shelf and finished end, including required hardware.
- E. Qualification: Contractors and their personnel engaged in the work of this section shall be able to demonstrate successful experience with work of comparable extent, complexity, and quality to that shown and specified for a minimum of five years.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to the Project site in undamaged condition, stored in fully covered, well-ventilated areas, and protected from extreme changes in humidity and temperature. Refer to WI Manual for recommended care and storage.
- B. In event of damage immediately furnish necessary repairs or replacements.

1.07 PROJECT CONDITIONS

- A. Store indoors, in ventilated areas with constant but minimum temperature of 60 degrees F. and maximum relative humidity of 25 percent to 55 percent. At least seven days before installation, maintain temperature of 70 degrees F. and relative humidity of 50 percent to 55 percent. Acclimate materials to the installation temperature and humidity for at least 72 hours prior to installation. Maintain conditions until Substantial Completion.
- B. Coordinate fabrication, delivery and installation with the other applicable trades.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Plastic Laminate Faced Cabinets:

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1. Plastic laminate: High pressure plastic laminate conforming to NEMA standard LD-3; 0.050 inches at horizontal surfaces, 0.028 inches at exposed vertical surfaces and edge bands, and 0.042 inch minimum for post-formed countertops.
 2. Particle Board Core Material: 45 lb. density, conforming to ANSI A208.1, Table 1, Grade 1-M-2.
 3. Solid Lumber:
 - a. Solid lumber for exposed members, drawers, trays and special details shall be Clear birch or maple.
 - b. Unexposed solid lumber for concealed webs or structural members shall be of Clear Douglas fir.
 4. Softwood Plywood: Rotary cut exterior type A-C grade softwood plywood complying with PS1.
 5. Hardboard: Factory finished pressure sealed hardboard conforming to the requirements of PS 58. Oil tempered hardboard shall conform to CS 251.
 6. Cabinet Liner: Semi-exposed surfaces shall be finished with 0.020 inch high-pressure laminate cabinet liner, conforming to NEMA Standard LD-3.
 7. Edge Banding:
 - a. T-type extruded tenite-butyrate 1/16-inch minimum thickness, with serrated leg 3/8 inch in length.
 - b. 0.028 inch minimum thickness plastic laminate.
 8. Glass Doors: 1/4 inch laminated safety glass.
 9. Adhesive: Type II water-resistant, rigid type glue of formula conforming to PS 51.
 10. Sealer: Thompson Water Seal 101 or Watco Oil.
 11. The Owner will supply tote trays unless otherwise indicated.
 12. Base: Cover toe spaces with typical wall base unless otherwise indicated.
- B. Hardware: Provide U-shaped wire pulls at all accessible casework or equally accessible pull hardware.
1. Drawer Slides for light and medium duty drawers:
 - a. Drawers 24 inches (610mm) wide or less: Accuride 7434 (7432, full extension), all ball bearing rail mount, full extension plus 1 inch (25mm) over travel slides, hold-in detent, with a 100lb./pr. (45kg) load rating and progressive movement.
 - b. Finish: Clear zinc.
 2. Drawer Slides for heavy duty drawers:
 - a. Drawers 48 inches (1067 mm) wide or less: Accuride 3640 all ball bearing, rail/bracket mount, full extension plus 1 inch (25mm) over travel slides, hold-in detent, 200 lb./pr. (90 kg) load rating, and sequential movement.
 - b. Finish: Clear zinc.
 3. Pilaster for built-in shelving and bookcases: Knappe and Vogt (KV) #255 E, zinc coated, 19 gauge steel, 58" w x 3/16" h, with KV # 256 support bracket.
 4. Cabinet Hinges: Concealed type, 5-knuckle, minimum 170 degree opening, self-closing:
 - a. Terry H08-99 Series.
 - b. RPC No. 454.
 5. Cabinet Locks:
 - a. Door Locks: Pin tumbler type – National No. 3713 x 2475-172 strike or Olympus 100DR x 12-1 strike.
 - b. Locks for Sliding Doors: National No. C8142 x thimble strike or Olympus 300 SD x thimble strike.

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- c. Drawer Locks: National 68-3718 x 68-2480C brass strike or Olympus 200 DW x 12-1 strike.
- d. Cabinet locks shall be flush with surface of door and protrude no greater than 3/16".
6. Top-hung Hardware Assembly for Sliding Doors: Grant No. 6064.
7. Track for Sliding Doors: KV 455.
8. Pull Flush Ring at Drawers behind Doors: Safe No. 6116 or BBW 24.
9. Pulls: BBW No. 79P, Quality No. 179 x 180 or Trimco No. 553P.
10. Catches: Magnetic type - EpcO No. 592 or Ives 327.
11. Four-way Tension Catch: Ives CL21A or EpcO 1013.
12. Elbow Catch: Ives 2A, or EpcO E1018.
13. Bolts: Surface type Trimco No. 4878.
14. Hanger Rods: 1-1/16 inches minimum diameter metal tubing, aluminum or stainless steel clad, KV660; heavy wall steel tubing KV770.
15. Hanger Rod Flanges: KV757, or flanges KV734, KV735; Ronther Reiss R44-55; or equal.
16. Hardware Finish: With exception of finish hardware items which have finishes specified, hardware shall be furnished with dull chrome US 26D or dull stainless steel US 32D finish.
18. Keying:
 - a. Key locks inside one room alike. Furnish 3 keys for each lock keyed separately, and 2 keys for each lock in keyed alike groups. Master keys shall be tagged and delivered to the Project Inspector. Locks and keys shall be stamped with coded set number / direct digit.
 - b. Cabinet locks shall be master-keyed and keyed alike. Backside of cabinet lock bolts (on visible side following installation) and change keys shall be stamped with manufacturer's code, either direct digit or coded series. Change keys shall also be stamped with set numbers direct digit.
 - c. Master keys shall be National GM2.

2.02 FABRICATION

- A. Plastic Laminated Casework: Construction of plastic laminated casework shall conform to the material and construction requirements for WI Custom Grade, Type I Style A flush overlay construction.
 1. Exposed Vertical Panels and Doors: Exposed fixed panels and doors, including exposed ends of cabinets and both ends of each cabinet shall be 3 ply laminate construction consisting of plastic laminate with particle board and a balancing sheet, bonded together under pressure with adhesive. Total nominal thickness of panels and doors shall be 0.75 inch unless otherwise indicated.
 2. Exposed bottom of wall-hung cabinets shall be furnished with plastic laminate finish.
 3. All interiors of open cabinets and behind glass doors to be considered exposed.
 4. Semi-exposed Panels: Interior panels, bottoms, and tops shall be 3/4-inch particleboard minimum. Bottoms of upper cabinets spanning 42 inches or more shall be one inch thick.
 5. Webs: Stiles, rails and muntins of web frame shall be tongue and grooved at joints and glued. Top and bottom rails shall be continuous. Use of 8 mm wooden dowels, screws or biscuits shall be in accordance with WI Standards.
 6. Cabinet bases may be integral or separate. Bases shall be 3/4 inch thick plywood securely jointed at 4 corners to a supporting block 1-1/2 inches thick.
 7. Ends: Cabinet ends shall be minimum 3/4 inch thick, lock-jointed, doweled, glued, and screwed to webs or top and bottom of the cabinet.
 8. Backs shall be 1/4 inch thick plywood or 1/4 inch thick particle board, and shall be plowed into sides and top (except countertops) glued and nailed on 4 inch centers. Back shall be braced with horizontal 3/4 inch x 3-1/2 inch backing strips on 3 feet centers maximum. Cabinets with exposed finish backs shall have 3/4-inch backs of laminate construction.

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Where exposed finished cabinet end and back form an external corner, plastic laminates shall meet at corner.

9. Adjustable shelving shall be 3/4-inch thickness particleboard for spans up to 25 inches and one-inch thickness for spans over 25 inches up to 34 inches. Adjustable shelving over 34 inches in span shall be one-inch thick plywood core with 0.020-inch cabinet liner both sides. Shelving hardware shall be adjustable to one-inch centers. Faces and edges of shelving shall be finished with 0.020-inch thickness cabinet liner both sides.
10. Where compliance with CBC seismic regulations is required, an approved method of shelf restraint on all applicable shelves shall be provided and shelves over 24" deep shall have three supports at each end.
11. Drawers:
 - a. Sides, backs, and sub-fronts of drawers shall be of dovetail or dowel construction and made of 1/2 inch thick clear birch or maple solid stock. Drawer bottoms shall be in accordance with WI requirements, glue blocked and nailed.
 - b. Drawers shall be fitted with ball bearing slides accurately installed for smooth drawer operation.
 - c. Drawer fronts shall be of 3/4-inch thick plastic laminate construction, fully edge-banded with plastic laminate T-banding to be used when matching existing. T-banding joint shall occur at center of bottom edge of panel.
12. Doors:
 - a. Doors shall be of overlay type with flush exposed surfaces. Doors shall be fully edge-banded with plastic laminate. Joint in banding shall occur at center of bottom edge. Doors of cabinets within any group of adjacent units shall be in alignment.
 - b. Hinges shall be routed into edge of door. Doors over 40 inches in height shall have 3 hinges.
13. Back Priming: Seal unfinished materials installed for backs, bases, self-edge backing, stripping and other concealed portions with a water-repellent sealer.
14. Banding:
 - a. Exposed edges of interior and exterior laminates shall be edge banded with plastic laminate. Edge banding shall be provided in longest available lengths.
 - b. Edge banding shall be accurately fitted. Where edge band joins plastic surfaces, there shall be no open spaces, voids, or chipping of plastic laminate surface.
 - c. Exposed cabinet surfaces shall be flush, and any protruding edges of banding shall be machined or trimmed to provide a flat smooth corner at intersection of banding and adjoining surfaces. Plastic laminate edge banding shall be installed on tops, webs, bottoms, ends, and inside partitions. T banding may only be installed on drawer fronts and door edges and only as required to match existing.

B. Countertops:

1. Plastic Laminate Tops: Each plastic laminate countertop shall bear the WI Certified Compliance Label.
 - a. Laminated plastic countertops shall be self-edged, except that plastic countertops containing sink cutouts shall have a no-drip waterfall edge. Edge shall rise 1/8 inch above counter surface and back and return splashes shall be 6 inches high measured from exposed countertop surface, unless otherwise indicated.
 - b. Cove and roll front sticking, for plastic laminate back-up, shall be kiln dried clear sugar pine glued to core material. Cove sticking shall be secured in each direction with 2-1/2 inch long wood screws, 3 inches from each end and 10 inches on center.
 - c. Splash shall be end applied and be set in mastic and secured to top with screws 8 inches on centers. Splash edges shall be self-edged and scribed to wall.

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- d. Joints shall be splined and fastened with screw clip fasteners on at least 8-inch centers. Water resisting mastic or glue shall be applied in joints. Joints shall not occur at sink cutouts. Sink cutouts shall be sealed.
- e. Core material for counters and splashes shall be 3/4-inch thick, 7-ply, rotary cut Philippine mahogany 2-4 faces, type 1, or 3/4 inch 1-M-2 grade particleboard.
- f. Metal sink moldings shall be stainless steel, Hudee, Kintrim T-Type or Chromedge Sink-Lok, with bolts and lugs.
- g. Mastic: Metal trim shall have a continuous layer of mastic in voids between metal and plywood and sink. Counter cutout edge shall be waterproofed to prevent delaminating of countertop. Metal trim shall be applied over finished plastic surfaces without kerfing or routing of molding.
- h. Installation of plastic laminate shall be in accordance with published specifications and recommended practices of the plastic laminate manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install Work of this section as specified in the WI Manual of Millwork.
- B. Cabinets: Install cabinets level, plumb, and secure to walls. Exposed screws shall have finish washers.
- C. End Panels and Fillers: Furnish to match exposed surfaces and accurately scribe to walls and neatly and securely fit to cabinets.
- D. Completion: Upon completion of installation, cabinets including drawers and shelves shall be cleaned. Doors and drawers shall operate easily and freely.
- E. Scribe plastic laminated cabinets to walls. Installation of surface-applied moldings is not permitted.

3.02 CLEAN UP

- A. Remove and legally dispose of debris, rubbish and waste material off the Project site.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Thermal batt insulation for exterior walls and under roof decks.
 - 2. Thermal batt insulation in furring at concrete or masonry walls.
 - 3. Acoustical batt insulation in partitions and above acoustical ceilings where indicated.
- C. Related Sections:
 - 2. Section 06100: Rough Carpentry

1.02 SUBMITTALS

- A. Product Data:
 - 1. Material List: Provide a list of materials for installation under this section.
 - 2. Provide manufacturer's printed Product Data for each type insulation and accessory.
- B. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.
- C. Certification: Provide certification that insulation materials conform to requirements of 2007 CBC Section 719.

1.03 QUALITY ASSURANCE

- A. Surface Burning Characteristics: Flame spread rating shall not exceed 25 and smoke density shall not exceed 50.
- B. Comply with following as a minimum requirement:
 - 1. ASTM C 177 - Steady-State Heat Flux-Measurements and Thermal Transmission Properties by Means of Guarded-Heat-Plate Apparatus
 - 2. ASTM C 518 - Steady-State Heat Flux-Measurements and Thermal Transmission Properties by Means of Heat-Flow-Meter Apparatus
 - 3. ASTM C 665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
 - 4. ASTM E 84 - Surface Burning Characteristics of Building Materials
 - 5. ASTM E 119 - Fire Tests of Building Construction and Materials
 - 6. ASTM E 136 - Behavior of Materials in a Vertical Tube Furnace at 750° C.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site and store in a safe, dry place, with labels intact and legible at time of installation.

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- B. Protect building insulation materials from damage.

1.05 PROJECT CONDITIONS

- A. Avoid exposure to humidity and moisture. Protect from exposure to sunlight.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Owens Corning, Four Hutton Centre Dr., Suite 100, Santa Ana, CA.
- B. Johns Manville, 14030 Crest Way, Del Mar, CA.
- C. CertainTeed Corporation, 17775 Avenue 23 1/2, Chowchilla, CA
- D. Fibrex, Inc. and Venture Tape Corp.
- E. USG, Thermafiber Division.

2.02 MATERIALS

A. General:

- 1. Provide unfaced, friction-fit batt insulation where both sides of installation are enclosed.
- 2. Provide batt insulation with integral vapor barrier when one side of installation will be unenclosed.
- 3. Provide batt insulation with integral vapor barrier where at least one side of installation will be exposed to high humidity, such as showers

B. Thermal Insulation:

- 1. Unfaced Fiberglass Batt Insulation: Provide friction-fit, unfaced mineral fiber batts. Insulation shall consist of mineral fibers, glass or slag, and thermosetting resins complying with ASTM C 665, Type I.
- 2. Faced Fiberglass Batt Insulation: Provide mineral fiber batts with vapor barrier consisting of mineral fibers, glass or slag, and thermosetting resins complying with ASTM C 665, Type III, Class A, with vapor-retardant membrane facing.

C. Acoustic Insulation: Fiberglass batts, with or without facing, friction fit, incombustible, minimum 3-1/2" thickness unless otherwise indicated, nominal 0.65 to 2.50 pcf density.

D. Fasteners for Attaching Insulation to Wood Framing:

- 1. For faced batt insulation provide one of following types of staples: Stainless steel, monel, or copper-coated steel, size as required by manufacturer or applicable code.
- 2. For unfaced batt insulation provide 18-gage, minimum, galvanized steel wire where required to maintain proper insulation placement.

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PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine Work to verify suitability to receive insulation. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:

1. Fit batt insulation, of R-value indicated on Drawings, snugly between framing members.
2. Maintain total insulation integrity over entire area to be insulated, including areas between closely spaced members.
3. Extend full thickness insulation over entire area to be insulated. Furnish manufacturer's recommended clips to tightly fit batts at joints.
4. Cut and fit batt insulation tightly around pipes, conduits and penetrations.
5. Do not compress batt insulation in excess of 10 percent (R-19 may be installed in 2x6 stud walls).
6. Prevent batt insulation from sagging during and after installation by installing adequate wire.
7. Metal door and window frames in acoustically insulated walls shall be filled with insulation, unless otherwise indicated.
8. Where vapor barrier is provided, install with vapor barrier facing room.
 - a. Batts In Metal Framing: Provide friction-fit batts tightly fitted to stud webs and to metal furring.
 - b. Batts Under Metal Roof Decks where underside of insulation will be exposed install foil-faced flanged-type insulation batts and staple flanges together at maximum 4" centers and seal joints at abutting vertical surfaces with a pressure-sensitive plastic tape. Where underside of insulation will be inaccessible, install secure with spindle anchors. Provide 18 gage galvanized string wires under batts wherever necessary to prevent sagging. Stretch wire taut.
 - c. Batts In Horizontal or Sloped Applications: Provide tightly stretched string wires along center of horizontal or sloping batts where support spacing exceed 16" on centers.
 - d. Batts in Ceiling Framing: Install batts between joists, so top of insulation is level with top of framing members. Do not install insulation over recessed lighting fixtures, speakers, or other heat producing elements in ceilings. At junction boxes, access panels, and other items requiring access from above or below ceiling, cut insulation on each side to fit item and install loosely on top. Fit insulation snugly around ducts, conduits, pipes, and other items projecting through ceiling construction.

3.03 PROTECTION

- A. Protect Work of this section until Substantial Completion.

3.04 CLEANUP

- A. Remove and legally dispose of rubbish, debris, and waste materials off Project site.

END OF SECTION

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SECTION 07260 - UNDER-SLAB VAPOR BARRIER/RETARDER

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Products supplied under this section:
 - 1. Vapor barrier, seam tape, mastic, pipe boots, detail strip for installation under concrete slabs.

1.02 RELATED SECTIONS

- A. Section 03300 Cast-in-Place Concrete

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM E 1745-97 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
 - 2. ASTM E 154-88 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
 - 3. ASTM E 96-95 Standard Test Methods for Water Vapor Transmission of Materials
 - 4. ASTM E 1643-98 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
- B. American Concrete Institute (ACI)
 - 1. ACI 302.1R-96 Vapor Barrier Component (plastic membrane) is not less than 10 mils thick

1.04 SUBMITTALS

- A. Quality Control / Assurance
 - 1. Independent laboratory test results showing compliance with ASTM & ACI Standards.
 - 2. Manufacturer's samples, literature
 - 3. Manufacturer's installation instructions for placement, seaming and pipe boot installation.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Vapor Barrier
 - 1. Vapor Barrier must have the following qualities:

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- a. Perm rating less than or equal to 0.018 perms (WVTR 0.007) as tested by ASTM E 96.
 - b. ASTM E 1745 Class A (Plastics).
 - c. Puncture Resistance rating minimum 2445 grams as tested by ASTM D 1709, Method B.
2. Vapor Barrier Products
- a. Stego Wrap (15 mil) Vapor Barrier by STEGO INDUSTRIES LLC, San Juan Capistrano, CA, (877) 464-7834 www.stegoindustries.com.
 - b. W.R. Meadows (15 mil) Perminator. www.wrmeadows.com
 - c. Or approved equal.

2.02 ACCESSORIES

A. Seam Tape

1. Tape must have the following qualities:
 - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower
2. Seam Tape
 - a. Stego Tape by STEGO INDUSTRIES LLC, San Juan Capistrano, CA (877) 464-7834 www.stegoindustries.com
 - b. Perminator Tape by W. R. Meadows

B. Vapor Proofing Mastic

1. Mastic must have the following qualities:
 - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower

C. Pipe Boots

1. Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Ensure that subsoil is approved by Architect or geotechnical firm
1. Level and tamp or roll aggregate, sand or tamped earth base.

3.02 INSTALLATION

- A. Install Vapor Barrier/Retarder:
1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-98.

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- a. Unroll Vapor Barrier/Retarder with the longest dimension parallel with the direction of the pour.
- b. Lap Vapor Barrier/Retarder over footings and seal to foundation walls.
- c. Overlap joints 6 inches and seal with manufacturer's tape.
- d. Seal all penetrations (including pipes) per manufacturer's instructions.
- e. No penetration of the Vapor Barrier/Retarder is allowed except for reinforcing steel and permanent utilities.
- f. Repair damaged areas by cutting patches of Vapor Barrier/Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

END OF SECTION

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SECTION 07321 - CLAY ROOF TILES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Clay roofing tile system with secondary waterproofing underlayment.
- C. Related Sections:
 - 1. Section 06100: Rough Carpentry.
 - 2. Section 07600: Flashing and Sheet Metal.
 - 3. Section 07700: Roof Specialties and Accessories.
 - 4. Division 15: Mechanical.
 - 5. Division 16: Electrical.

1.02 SYSTEM DESCRIPTION

- A. Performance Requirements: Install flashing, counter-flashing, and thru-roof penetration flashing as specified in Section 07600, and in accordance with manufacturer's recommendations as approved.
- B. Regulatory Requirements:
 - 1. Testing of tiles as required by 2007CBC, Chapter 17A, Section 1715A.2.
 - 2. Comply with UL requirements for Class A Rating.

1.03 SUBMITTALS

- A. Shop Drawings: Submit plans and details illustrating locations of underlayment, tile, gutter, downspout, and flashing. Submit details of tile installation and fastening procedures, connections to sheet metal and adjoining Work, and specific installation conditions, including eaves, ridges, and gable ends.
- B. Product Data: Submit manufacturer's Product Data for each material and accessory proposed for installation.
- C. Samples: Submit Samples of each type and size of clay roofing tile, grout color, and roof ventilation unit.
- D. Sample Installation: At designated roof area, provide Sample installation for review.
- E. Installation Instructions: Submit manufacturer's recommended installation instructions.
- F. Certificates: Submit manufacturer's certification that installer is certified by manufacturer to install the products of this section.

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- G. Closeout Submittals: Submit manual including manufacturer's recommendations for roof maintenance and repairs.

1.04 QUALITY ASSURANCE

- A. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar roofing materials and certified in writing by the roofing materials manufacturer to install the specified roofing products.
- B. Pre-Installation Conference and Inspection: After review of submittals but prior to starting installation of Work of this section, conduct a meeting at the Project site attended by the Architect, Project Inspector, Owner, Contractor, roofing installer, and a technical representative of the roofing material manufacturer. The roofing installer and material manufacturer's technical representative shall inspect the substrates to receive Work of these section and report defective conditions to Project Inspector, Owner, Architect and Contractor.
- C. Manufacturer's Representative: Provide arrangements necessary to have a trained representative of the manufacturer visit the Project site on a weekly basis to observe the installation of roofing Work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the Project site in unopened packages with legible labels.
- B. Store materials in above grade protected from weather and physical damage in accordance with roofing manufacturer's instructions.

1.06 WARRANTY

- A. Manufacturer shall provide a 5-year material warranty.
- B. Installer shall provide a 5-year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. MCA Superior Clay Roof Tile, 1985 Sampson Avenue, Corona, CA 92879, 800-736-6221.
- B. US Tile Co., 909 Railroad St., Corona, CA, 800-252-9548.
- C. Approved equal.

2.02 MATERIALS

- A. Clay Roofing Tile: Existing tile is U.S. Tile, Mission Style, flashed.
- B. Secondary Waterproofing Membrane: Peel and stick underlayment with a granular surface and self-healing properties: W.R. Grace Vycor Ultra, W. R. Meadows Mel-Rol, or equal.
- C. Birdstop: Clay or metal to match tile. Birdstops formed of mortar are not permitted.

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- D. Nailers: Conform to Section 06100, pressure preservative treated.
- E. Wood Battens Where Occurs (Nailers): Douglas fir, WCLIB, construction grade treated moisture resistant, nominal size as indicated on the Drawings.
- F. Nails: Copper ring shank nails, 10 gage, with minimum 7/16 inch diameter head or 10 gage stainless steel ring shank nails with minimum 3/8 inch head and of sufficient length to penetrate 3/4 inch into substrate. Verify that chemicals used in pressure treatment of ridge and hip boards are compatible with copper nails.
- G. Mastic: Conform to ASTM D 4586.
- H. Hurricane Clips: Strap-type, galvanized steel designed to prevent tiles from moving sideways.
- I. Grout: Composed by volume of 1-part Portland cement, 4-parts sand, and water to form a firm mixture, with pure ground mineral oxide coloring pigments added as required to match the reviewed Sample where grout is exposed.
- J. Roof Tile Adhesive: RT-600 Roof Tile Adhesive, manufactured by Ohio Sealants, Inc.
- K. Flashing Compound: Fed. Spec. SS-C-00153B, Type I, Henry No. 209 solvent-type plastic asphalt without asbestos fibers.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify deck is dry, sound, clean and smooth, free of depressions, waves or projections. Verify that sheathing is supported at all edges and properly nailed, in accordance with requirements of related Section 06100.
- B. Examine substrate to receive roofing system and associated Work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected.
- C. Coordinate installation of roofing with flashing installation specified in Section 07600. Verify that sheet metal is no lighter than 24 gage.

3.02 PROTECTION

- A. Protect building surfaces against damage from roofing Work.
- B. Protect surfaces where additional Work must continue over finished roof.

3.03 MEMBRANE APPLICATION

- A. Comply with 2007CBC, Chapter 15A, and the following.
- B. Install membrane according to manufacturer's instructions as reviewed. Membrane shall be adhered directly to roof deck. Membrane shall be cut into 10 to 15 foot lengths and shall be re-rolled. The release paper shall be peeled back and the membrane shall be pressed in place.

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Lower edges shall be rolled firmly with a wallpaper or hand roller. Ends and edges shall be overlapped a minimum of 6 inches.

- C. Valley and Ridge Application: The membrane shall be cut into 4 to 6 foot lengths, and the sheet centered over the valley or ridge, pressed in place working from the center of the valley or ridge outward in each direction. For valleys, membrane shall be installed starting at the low point and working towards ridge. Sheets shall overlap a minimum of 6 inches.
- D. Vertical Membrane Flashings: Install primer before the application of membrane, at a rate of 250-350 square feet per gallon. Membrane shall be turned up walls and other vertical surfaces. Vertical membrane terminations shall be mechanically fastened. Vertical terminations shall receive a troweling of mastic as required by the membrane manufacturer.
- E. Protection: Membrane underlayment shall not be left permanently exposed to sunlight. Membrane shall be covered with exposed roofing materials as soon as possible. Membrane damaged due to exposure to sunlight shall be patched prior to the application of final roof covering.

3.04 INSTALLATION OF NAILERS AND BATTENS

- A. Cut material to approximate 4-foot lengths, and secure to deck leaving a space of approximately 1/2" between pieces, or provide spacers between battens and underlayment to allow for drainage.

3.05 INSTALLATION OF TILE

- A. Birdstops: Install birdstops at eaves. Install two 3/8" beads of adhesive to the bottom of the birdstop parallel to its length, 3/4" in from long edges and terminating 3/4" from each of the short edges. Install birdstops flush with edge of roof deck and nail in place with 2 nails.
- B. Gables, Hips, and Ridges: Install tiles with nails and adhesive and install cement mortar for decorative purposes only. Soak tiles in contact with mortar, in clean water for not less than 3 minutes immediately before installation. Install tiles in a solid bed of colored grout as required, exposed surfaces finished to match the Sample installation.
- C. Tile Laying: Install clay roofing tile as recommended by manufacturer, as indicated, specified herein, and to match Sample installation. Install the tiles in straight vertical runs with bottom edges on horizontal lines across the roof surfaces. Install runs so areas are symmetrical in pattern. Examine each tile for cracks, chips, or other defects, and discard defective tiles.
- D. Install field tiles with 3-inch minimum head lap over specified waterproofing membrane; tie all tiles as specified. Accurately saw cut tile units as necessary to fit around drains, pipe, and/or duct roof penetrations, at valley intersections and other architectural features. Roof layout, coursing, and any necessary adjustments to spacing of tile courses shall be in accordance with recommended installation instructions of the tile manufacturer.

3.06 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.07 CLEANUP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

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END OF SECTION

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SECTION 07512 - BITUMINOUS MEMBRANE REPAIR AND RESTORATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Bituminous membrane repair and restoration.

1.03 REPAIR DESCRIPTION

- A. Modifications and Repairs.
 - 1. General remedial and preventive roof membrane repairs.
 - 2. Flash new penetrations and equipment curbs per manufacturer's guidelines.

1.04 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.05 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. NRCA Manual for Low-Slope Roofing Construction Details (Fifth Edition).
- D. SMACNA Manual (Fifth Edition).

1.06 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's technical product information, installation instructions, and recommendations for roofing product required. Include data substantiating that materials comply with all requirements specified.
- B. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

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- C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of meeting performance requirements.
- D. Qualification Data: For Installer and manufacturer.
- E. Maintenance Data: For roofing system to include in maintenance manuals.
- F. Warranties: Special warranties specified in this Section.
- G. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Installer shall:
 - 1. Be experienced in multi-ply roofing applications for 10 years minimum.
 - 2. Be acceptable to Owner.
 - 3. Be a manufacturer Certified Contractor.
 - 4. Not have been in Chapter 7 bankruptcy during the last ten (10) years.
 - 5. Acquire inspection service days utilizing manufacturer's technical inspectors.
- C. Manufacturer shall:
 - 1. Be Associate Member in good standing with National Roofing Contractors Association (NRCA) for at least five (5) years.
 - 2. Be nationally recognized in the roofing, waterproofing and moisture survey industry.
 - 3. Be approved by Owner.
 - 4. Has not been in Chapter 11 bankruptcy during the last five (5) years.
 - 5. Furnish a service agreement / warranty.
 - 6. Employ full-time Field Technical Services Representatives for daily job-site monitoring and production of daily reports.
 - 7. Require local Field Representatives to make periodic job-site visits and produce work quality and progress re-ports.
 - 8. Provide a Project Closeout Report upon delivery of the project warranty. This report to include:
 - a. Project specifications.
 - b. Project summary.
 - c. Progress reports as a result of roof inspections.
 - d. Job-site progress photos.
 - e. Warranty document.
 - f. Owners Manual describing maintenance and emergency repair.
 - 9. Source Limitations: Obtain components for roofing system from or approved by roofing system manufacturer.
- D. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by

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UL or FMG. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

E. Pre-installation Conference: Conduct conference at Project site. Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturers written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.09 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

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1.10 WARRANTY

- A. Special Project Warranty: Submit roofing Installer's warranty, covering Work of this section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work:
1. Roof repair and restoration: Tremco, Inc.
 2. Or approved equal.

2.02 BASE-SHEET MATERIALS

- A. Base Sheet: ASTM D 4601, Type II, SBS-modified asphalt-impregnated and -coated sheet, with polyester/glass-fiber/polyester trilaminate-reinforcing mat, dusted with fine mineral surfacing on both sides.
1. BURmastic Modified Composite Ply, or equal
 - a. Weight: 31 lbs/100sq. ft. ASTM D 228
 - b. Tensile Strength 161 lbf/in MD ASTM D 5147
 - c. Tensile Strength 137 lbf/in XMD ASTM D 5147
 - d. Elongation 5.54% MD ASTM D 5147
 - e. Elongation 6.56% XMD ASTM D 5147
 - f. Tear Strength 265 lbf MD ASTM D 5147
 - g. Tear Strength 212 lbf XMD ASTM D 5147

2.03 BASE FLASHING SHEET MATERIALS

- A. Backer Sheet: Exceeds ASTM D 6509, APP-modified coated base sheet, with glass-fiber reinforcing mat:
1. POWERply APP Base Sheet, or equal
 2. Thickness 0.087 in (2.2 mm) ASTM D 6509
 3. Tensile Strength 106 lbf/in MD ASTM D 6509
 4. Tensile Strength 102 lbf/in XMD ASTM D 6509
 5. Elongation 3.9% MD ASTM D 6509
 6. Elongation 3.7% XMD ASTM D 6509
 7. Tear Strength 95 lbf MD ASTM D 6509
 8. Tear Strength 95 lbf XMD ASTM D 6509
- B. Flashing Sheet: ASTM D 6222, Type I, Grade S polyester-reinforced, APP-modified asphalt sheet; smooth surfaced; suitable for application method specified and as follows:
1. POWERply APP Smooth, or equal

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- a. Tensile Strength 181 lbf/in MD, 121lbf/in XD ASTM D 6222
- b. Tear Strength 179 lbf MD, 149 lbf XD ASTM D 6222
- c. Elongation 425% MD, 46% XD ASTM D 6222

C. Glass-Fiber Fabric: Woven glass-fiber mesh, vinyl coated.

- 1. Burmesh, or equal

D. Elastomeric Mastic: single component roof elastomer asbestos free.

- 1. Polyroof LV, or equal

2.04 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

B. Asphalt Primer: ASTM D 41.

C. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

D. Mastic Sealant: Polyisobutylene, plain or modified bitumen, no hardening, no migrating, no skinning, and nondrying.

E. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

F. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."

G. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

H. Walkway Pads: 3/4-inch rubber based walk pad.

- 1. Diamond Tred, or equal

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

- 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
- 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

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3.02 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. All roofing applicators using open flame tools or equipment must be trained and registered in the MRCA CERTA (Certified Roofing Torch Applicator) program. Each applicator shall carry his card as evidence of proper training.
- D. All roofing applicators must follow the safety guidelines and procedures written in "Torch Applied/Do's and Don'ts", published and distributed by the Asphalt Roof Manufacturers Association (ARMA). Do not begin application until roofing applicators fully understand these safety guidelines and procedures.
- E. Identify potential combustible materials in and around the roof system construction area. Remove or protect these materials prior to beginning roofing material installation using open flames or heated air.
- F. Do not heat weld near or into vents, openings, cracks, corners, voids or other penetrations or near equipment. Instruct owner to shut off fans and cover openings.
- G. Do not leave lighted torches unattended.
- H. Maintain at least one (1) twenty(20) pound ABC type dry chemical fire extinguisher immediately available on the roof for each roofing employee on the project.
- I. Conduct a fire watch for at least one (1) hour after the last torch has been turned off. Conducting the fire watch must be in the primary activity of the person conducting the fire watch. The fire watch must be an active process, with the employee walking and monitoring the entire area, which was installed that day. Contact the local fire department immediately for all smolders and fires detected before attempting to extinguish.

3.03 ROOFING MEMBRANE REPAIR, GENERAL

- A. Install roofing repairs, restoration and flashing details according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
- B. Start installation of repairs to membrane in presence of roofing system manufacturer's technical personnel.
- C. Where roof slope is $\frac{1}{4}$ per foot or less, installation of one ply of polyester shall be incorporated into the restorative system per manufacturer's written instructions.
- D. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.
- E. Coordinate installing roofing system/flashing so components of the system or building are not exposed or subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

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1. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 2. Remove and discard temporary seals before beginning work on adjoining roofing.
- F. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.04 ROOF MEMBRANE REPAIRS

A. At perimeter edges:

1. Provide five-course seal/reinforcement to flashing flange: Install two (2) polyester flashing reinforcement to metal edge. Extend bottom reinforcement course from edge to 4 inches (100 mm) beyond metal flange; extend top reinforcement course from edge to 2 inches (50 mm) beyond edge of bottom ply. Lap ends 4 inches (100 mm). Set both plies and laps in alternating courses of rubberized emulsion applied in continuous applications. Ensure complete bond and continuity without wrinkles or voids.

B. At wall flashings:

1. Provide five-course seal/reinforcement to primed area: Install two (2) ply flashing reinforcement. Extend bottom reinforcement course from top edge of flashing to 4 inches (100 mm) onto existing roofing; extend top reinforcement course from top edge of flashing to 2 inches (50 mm) beyond edge of bottom ply. Lap ends 4 inches (100 mm). Set both plies and laps in alternating courses of asphalt mastic applied in continuous 1/16-inch (1.6 mm) thick applications. Ensure complete bond and continuity without wrinkles or voids.

C. At plumbing vents:

1. Trowel flashing adhesive to roof surface 15 inches (380 mm) wide, 1/16 inch (1.6 mm) thick. Extend flashing adhesive up plumbing vent 2 inches (50 mm). Seal base into new roofing with reinforcing membrane embedded between alternate courses of specified mastic.

3.05 FLASHING SHEET INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Mechanically fasten base sheet to all combustible walls, curbs and parapets.
3. Backer Sheet Application: Heat weld backer sheet over roofing membrane at cants as specified by manufacturer.
4. Flashing Sheet Application: Heat weld flashing sheet to backer sheet as required by roofing system manufacturer.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.

1. At parapets walls, extend flashing sheet up entire wall and mechanically fasten at outside edge of nailer below coping cap.

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2. At high walls, mechanically fasten top of base flashing securely at terminations and perimeter of roofing using butyl tape and termination bar.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
- D. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.

3.06 FLASHING INSTALLATION

A. At equipment/sign support(s):

1. Extend new roofing to top edge of cant. Nail 8 inches (200 mm) o.c. with spiral or annular shank nails, with a 1-inch (25 mm) cap. Install modified bitumen base flashing as described in general flashing requirements section. Extend base flashing over vertical blocking to create a single piece flashing. Secure top edge of flashing membrane to substrate with spiral or annular shank nails, with a 1-inch (25 mm) cap, 8 inches (200 mm) o.c. Fabricate and install two-piece counter flashing. Mechanically fasten to vertical portion of curb with neoprene grommets screws 12 inches (305 mm) o.c.

B. At wood curb flashings:

1. Remove mechanical equipment from curb. Install new roofing to top edge of cant. Nail 8 inches (200 mm) o.c. with spiral or annular nails, with a 1-inch (25 mm) cap. Install modified bitumen base flashing as described in general flashing requirements section. Secure top edge of flashing to substrate with spiral or annular shank nails, with a 1 inch (2.54 cm) cap, 8 inches (20.3 cm) o.c. Wipe top of bar clean with metal cleaner. Prime metal surface to receive sealant with metal primer. Allow to dry. Caulk top of bar. Provide watershed. Tool neatly. Fabricate and install counter-flashing. Reinstall mechanical equipment onto curb. Refasten.

C. At plumbing vents:

1. Wedge plumbing vent tight against deck. Apply 1/16-inch (1.6 mm) uniformly thick layer of asphalt mastic to surface receiving metal flange. Fabricate and install plumbing vent flashing from lead. Flange: 4 inches (100 mm) wide minimum; extend completely around periphery of vent flashing. Set flange into mastic. Neatly dress flange with wood block. Prime metal flange with asphalt primer. Pipe outside diameter greater than 2 inches (50 mm): Bend lead inside pipe 1-inch (25 mm) minimum with pliers or rubber/plastic mallet; replace cracked lead. Pipe outside diameter 2 inches (50 mm) or less: Cut lead at vent top; fabricate and install integral lead cap. Mechanically fasten plumbing vent to substrate, 3-inch (75 mm) o.c. staggered. Install two (2) ply stripping for metal flanges as described in general flashing requirements section.

D. At equipment stands (pipe):

1. Apply 1/16-inch (1.6 mm) uniformly thick layer of asphalt mastic to surface receiving metal flange. Fabricate and install sleeve flashing. Height: 8 inches 200 mm. Flange width: 4 inches (100 mm). Flange to extend completely around flashing periphery. Solder all joints. Double solder vertical joints. Nail flange to substrate 3 inches (75 mm) o.c., staggered. Prime flange with asphalt primer. Install two (2) ply stripping described in general flashing requirements section. Fabricate umbrella and install drawband; cover sleeve flashing 3 inches (75 mm) minimum. Install immediately above sleeve flashing. Tighten drawband. Wipe clean top of umbrella and projection with metal cleaner. Prime

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surface with metal primer. Caulk projection/sheet metal interface. Provide watershed. Tool neatly.

E. At metal sleeve and storm collar(s):

1. Apply 1/16-inch (1.6 mm) uniformly thick layer of asphalt mastic to surface receiving metal flange. Fabricate and install sleeve flashing. Height: 8 inches (200 mm). Flange width: 4 inches (100 mm). Flange to extend completely around flashing periphery. Solder all joints. Double solder vertical joints. Nail flange to substrate 3 inches (75 mm) o.c., staggered. Prime flange with asphalt primer. Install two (2) ply stripping described in general flashing requirements section. Fabricate storm collar with bolted connection. Cover sleeve flashing 3 inches (75 mm) minimum. Tighten bolts. Wipe clean top of storm collar and projection with metal cleaner. Prime surface with metal primer. Caulk projection/sheet metal interface. Provide watershed. Tool neatly.

F. At piping through roof deck:

1. Apply 1/16-inch (1.6 mm) uniformly thick layer of asphalt mastic to surface receiving metal flange. Fabricate and install two-piece pipe box. Bottom portion fabricated with 4-inch (100 mm) flange. Top section notched to fit over piping. Set flange in mastic, nail flange to wood blocking 3 inches (75 mm) o.c. Prime flange. Fill box interior with batt insulation. Fasten top and closure detail to bottom. Wipe clean metal surfaces of box and piping with metal cleaner. Prime metal with metal primer. Caulk joint between box and piping. tool neatly. Install two (2) ply stripping described in general flashing requirements section.

G. At conduit/electrical piping through roof deck:

1. Apply 1/16-inch (1.6 mm) uniformly thick layer of asphalt mastic to surface receiving lead flange. Fabricate and install split lead flashing. Bottom portion fabricated with 4-inch flange. Prime flange. Secure top of flashing with a drawband. Install integral bonnet detail. Wipe clean surfaces of split lead and piping with metal cleaner. Caulk between split lead flashing and piping. tool neatly. Install two (2) ply stripping described in general flashing requirements section.

3.07 BITUMINOUS MEMBRANE INSTALLATION

A. Install bituminous roofing membrane according to roofing manufacturer's written instructions. Extend roofing membrane sheets over existing roof, installing as follows:

1. Mechanically fasten modified composite base sheet of decking. Heat weld APP Base plies over modified composite base sheet. Heat weld APP modified bitumen smooth membrane over base ply. Additional ply may be needed. Membrane patch must match thickness of existing membrane. Surface smooth modified membrane with rubberized emulsion.

3.08 SURFACING TREATMENT ON FLASHINGS

A. Coat flashing surface with 2 coats of reflective aluminum paint applied at 130 sq. ft. per gallon (3.2 m²/L) per coat.

3.09 FIELD QUALITY CONTROL

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- A. Testing Agency: Owner may engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
- B. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
 - 1. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
 - 2. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
 - 1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
- D. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of re-placed or additional work with specified requirements.

3.10 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

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SECTION 07552 - MODIFIED BITUMINOUS MEMBRANE ROOFING (Hot Applied)

PART 1 – GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. SBS Modified bituminous roofing, installed using hot asphalt applied system over plywood decks.
- C. Related Sections:
 - 1. Section 03300: Cast-in-Place Concrete.
 - 2. Section 06100: Rough Carpentry.
 - 3. Section 07210: Building Insulation.
 - 4. Section 07600: Flashing and Sheet Metal.
 - 5. Section 07920: Joint Sealants.
 - 6. Division 15: Mechanical

1.02 SYSTEM DESCRIPTION

- A. Roofing systems shall be as follows:
 - 1. Roofing on Plywood Decks:
 - a. Mechanically fasten Rosin Paper and Type II base sheet.
 - b. Hot apply two Type IV base plies.
 - c. Hot apply SBS-modified cap sheet, 135 mil – Stressply FR Mineral.
 - d. Hot apply SBS-modified flashing plies in all flashing areas – Stressply.
 - e. Wait 3-5 days. Powerwash roof. Spray apply Title 24, reflective white coating at 2 gal/sq – Pyramic. No moisture on roof prior to application.
 - f. Coat all existing walls with a Title 24, white sealant – Concretite White
 - g. Coat all existing equipment a rust preventative coating – Rust Go VOC Top Coat White.
- B. Regulatory Requirements:
 - 1. Comply with 2007 CBC, Title 24, Part 2.
 - 2. Comply with requirements of UL: Class A Fire Hazard Classification.

1.03 SUBMITTALS

- A. Shop Drawings: Submit roof plans and details. Include roof dimensions, drain and scupper locations, gutter locations, and the layout of insulation boards. Provide details indicating components, attachment, and insulation thickness. Provide calculations indicating the average R-value for the system. Indicate drainage patterns and slopes required.
- B. Product Data: Submit manufacturer's Product Data, including physical and mechanical properties for each component and detailed specifications.

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- C. Samples: Submit physical samples of all membrane components, with the manufacturer's name and product name clearly identified for each item. Samples are to be no smaller than 6 inches square.
- D. Installation Instructions: Submit manufacturer's printed substrate preparation and installation procedures.
- E. Maintenance and Repair Procedures: Submit manufacturer's printed maintenance and repair recommendations.
- F. Test Reports:
 - 1. Submit reports from a recognized independent testing laboratory, indicating conformance with specified performance requirements.
 - 2. Submit report of field tests indicating compliance with moisture content limitations of concrete decks.
- G. Sample copy of roofing manufacturer's warranty.
- H. Sample copy of installers' warranty.

1.04 QUALITY ASSURANCE

- A. Unless otherwise specified, all roofing will be provided in accordance with the NRCA fifth edition recommendations.
- B. Qualifications of Manufacturer: Roofing materials shall be product of a manufacturer regularly engaged in manufacture of this product for not less than 10 years. Manufacturer shall supply references of at least 5 satisfactory installations in which roofing materials have been in service for at least 5 years.
- C. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar roofing materials, and certified in writing by the roofing materials manufacturers to install the roofing products.
- D. Pre-Installation Conference and Inspection: After review of submittals but prior to starting installation of Work of this section, conduct a meeting at the Project site attended by the Architect, Project Inspector, Owner's Authorized Representative, Contractor, roofing materials installer, and a technical representative of the roofing material manufacturer. The installer and material manufacturer's technical representative shall inspect the substrates to receive Work of this section, and report defective conditions to the Architect, Project Inspector, Owner, and Contractor, prior to the commencement of the Work.
- E. Manufacturer's Representative: Provide arrangements necessary to have a trained representative of the manufacturer visit the Project site on a weekly basis during application of roofing materials to review installation procedures.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the Project site in unopened packages bearing the manufacturer's labels.
- B. Store materials above grade and protected from moisture and humidity, in accordance with manufacturer's recommendations.

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1.06 PROJECT CONDITIONS

- A. Protection: Install suitable impervious type masking to preclude staining of surfaces to remain exposed wherever roofing abuts or laps on to other finish surfaces, and provide additional protection as necessary to supplement masking; cover entire area of building subject to damage or staining.
- B. Protection During Installation: Roofing installer shall protect roof decks and roofing during installation of Work of this section. Furnish plywood, planks, or similar suitable forms of protection to protect the roofing. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during the same day.

1.07 MANUFACTURER'S INSPECTIONS

- A. When the project is in progress, the Roofing System Manufacturer will provide the following:
 - 1. Keep Client informed as to the progress and quality of the work as observed.
 - 2. Provide job site inspections a minimum of four days a week.
 - 3. Report to Client in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 - 4. Confirm after completion of the project and based on manufacturer's observation and tests that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.08 WARRANTY

- A. Manufacturer shall provide a 30 year material warranty for the built up system, and a 10-year material warranty on the coating.
- B. Installer shall provide a 5-year labor warranty for the complete system.
- C. Single source warranty from the same manufacturer that supplies all the material (sheets, metal, coating, zinc jacks, etc.) for the project.
- D. Membrane manufacturer will provide an annual inspection for the life of the warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The design is based upon roofing systems engineered and manufactured by The Garland Company:

The Garland Company
216 36th Place,
Manhattan Beach, CA 90266
Casey Sheahan & Miles Taylor
310-367-7655

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- B. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted 10 days prior to bid date and be in accordance with the criteria specified in general conditions. Substitution requests for material submitted after this time will be rejected.
1. Proposals shall be accompanied by a copy of the manufacturer's standard specification section. That specification section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
 2. Include a list of three (3) projects of similar type and extent, located within a one hundred mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by Client or Client Representative.
 3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
 4. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.02 DESCRIPTION

- A. Modified bituminous roofing work including but not limited to:
1. System:
 - a. Type II flash sheet mechanically fastened with Rosin Paper.
 - b. Two Type IV plies set in hot asphalt.
 - c. Cap Sheet applied in hot asphalt.
 - d. All flashings applied per details.
 2. Concretite White – Wall Sealant
 3. Rust Go VOC Top Coat White – Rust preventative white coating
 4. Silver Flash – Aluminized asphalt-fibered roof mastic
 5. Flashing Bond - Mastic
 7. Tuff Stuff Natural Stone – Caulking
 8. Butyl Tape

2.03 BITUMINOUS MATERIALS

- A. Bitumen Primer: VOC compliant, ASTM D-41
- B. Hot Bitumen: ASTM D312, Type III steep bitumen having the following characteristics:
1. Softening Point 185_ F – 205 _ F
 2. Flash Point 500_F
 3. Penetration @ 77 F 15-35 units
 4. Ductility @ 77F 2.5 cm

2.04 SHEET MATERIALS – PERFORMANCE CHARACTERISTICS

A. STRESSPLY IV MINERAL

ASTM D 6163 Type III Grade G
Tensile Strength (ASTM D-5147)
2 in/min. @ 73.4 ± 3.6°F MD 225 lbf/in CMD 225 lbf/in

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Tear Strength (ASTM D-5147)

2 in/min. @ 73.4 ± 3.6°F MD 300 lbf CMD 300 lbf

Elongation at Maximum Tensile (ASTM D-5147)

2 in/min. @ 73.4 ± 3.6°F MD 4.7% CMD 5.5%

Low Temperature Flexibility (ASTM D-5147) Passes -15°F (-23°C)

2.05 SURFACINGS

- A. White Elastomeric Roof Coating: Pyramic; Energy Star approved white acrylic roof coating:
1. Weight/Gallon 12 lbs./gal. (1.44 g/cm³)
 2. Non-Volatile % (ASTM D 1644) 66 min
 3. Reflectance 81%

2.06 RELATED MATERIALS

- A. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel, in addition plates should be used. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the deck material. Nails and fasteners shall be flush-driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one (1) inch diameter are used.
- B. Walkway Pads: As recommended and furnished by the membrane manufacturer set in approved adhesive to control foot traffic on roof top surface and give a durable system compliant non-slip walkway.
- C. Walkway Pad Adhesive: Adhesive used to adhere approved walk way pads as recommended and furnished by the membrane manufacturer.
- D. Wall Sealant – All existing walls to be coated with a Title 24, sealant -- Concretite White. Apply at 1 gal per square over walls - roll apply.
- E. Equipment Coating -- All existing equipment to be coated with a rust preventative, Title 24, white coating – Rust Go VOC Top Coat White. Apply at 1 gal per square to equipment.
- F. Urethane Sealant: One part, non-sag sealant as approved and furnished by the membrane manufacturer for moving joints. Tuff Stuff Caulking
1. Tensile Strength (ASTM D412): 250 psi
 2. Elongation (ASM D412): 950%
 3. Hardness, Shore A (ASTM C920): 35
 4. Adhesion-in-Peel (ASTM C920): 30 pli
- G. Structural Adhesive: Single component, 100% solids structural adhesive as furnished and recommended by the membrane manufacturer for items that need adhered to the roof surface. Silver Flash
1. Elongation (ASTM D412) 300%
 2. Hardness, Shore A (ASTM C920) 50

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- 3. Shear Strength (ASTM D1002) 300 psi
- H. Butyl Tape: 100% solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrate surfaces to receive modified bitumen sheet roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Roof System Manufacturer and Installer.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
- B. Insurance/Code Compliance: Where required, install and test the roofing system to comply with governing regulation and specified insurance requirements.
- C. Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore other work damaged by installations of the modified bituminous roofing system work.
- D. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- E. Apply roofing materials as specified herein unless recommended otherwise by manufacturer's instructions. Keep roofing materials dry before and during application. Do not permit phased construction. Complete application of roofing plies, modified sheet and flashing in a continuous operation. Begin and apply only as much roofing in one day as can be completed that same day.
- F. Cut-Offs: At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of two (2) plies of #15 organic roofing felt set in full moppings of bitumen with joints and edges sealed or other jointly agreed upon tie-in detail.

3.03 UNDERLAYMENT INSTALLATION

- A. Hot Applied System
 - 1. Fiberglass Plies: Install (2) two base sheets in twenty five (25) lbs (11.3kg) per square of bitumen shingled uniformly to achieve one ply over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof. Do not step on base rolls until bitumen has cooled, fish mouths should be cut and patched<or>
 - 2. Lap ply sheet ends eight (8) inches (203mm). Stagger end laps twelve (12) inches (304mm) minimum

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3. Extend plies two (2) inches (50mm) beyond top edges of cants at wall and roof projections and equipment bases.
4. Install base flashing ply to all perimeter and projection details after membrane application.

3.04 APPLICATION OF SURFACING

- A. Prior to installation of surface, obtain approval from manufacturer as to work completed. Roof besides mastic can be coated immediately upon approval of punch list items.
- B. Reflective Coating:
 1. Allow all cold applied mastics and coating to properly dry and cure before installing the aluminum coating.
 2. Coat roof field and flashing with Title 24, white, Pyramic coating at 2 gallons per square.

END OF SECTION

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SECTION 07600 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Sheet metal flashings in connection with roofing.
 - 2. Reglet and counter flashing assemblies.
 - 3. Miscellaneous metal flashing and counter flashing as required, except where provided under Division 15 or Division 16.
 - 4. Coping caps.
 - 5. Gravel stops and metal edging.
 - 6. Gutters and downspouts.
 - 8. Splash pans where downspouts empty onto roofing.
 - 7. Conductor heads.
 - 8. Drip flashings.
 - 9. Roof pipe flashings.
 - 10. Roof expansion joint covers.
 - 11. Metal louvers not specified in Division 15.
 - 12. Other sheet metal items, not necessarily specified herein or in other sections, but required to prevent penetration of water into building.
- C. Related Sections:
 - 1. Section 07512: Bituminous Membrane Repair and Restoration.
 - 2. Section 07920: Joint Sealants.
 - 3. Section 09220: Portland Cement Plaster and Metal Lath
 - 4. Division 15: Mechanical.
 - 5. Division 16: Electrical.

1.02 SUBMITTALS

- A. Shop Drawings: Submit for fabricated sheet metal indicating shapes, details, methods of joining, anchoring and fastening, thicknesses and gages of metals, concealed reinforcement, expansion joint details, sections, and profiles.
- B. Samples: Submit samples for materials or assemblies as requested.
- C. Product Data: Submit brochures of manufactured items.

1.03 QUALITY ASSURANCE

- A. Drawings and requirements specified govern. Provide the Work of this section in conformance with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.
- B. Materials shall conform to following standards:

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1. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 2. ASTM A 653 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 3. ASTM B 370 - Copper Sheet and Strip for Building Construction.
 4. ASTM B 749 - Lead and Lead Alloy Sheet, Strip and Plate Products.
- C. Pre-installation Meetings: Refer to Division 7 roofing sections as appropriate. Attend the pre-installation and inspection meetings for roofing Work.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Do not install bent and/or otherwise damaged materials.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Galvanized Sheet Steel: ASTM A 653, coating designation G90, hot-dip galvanized.
- B. Copper Plate, Sheet and Strip: ASTM B 370, cold-rolled, tempered. Copper sheet and strip shall be cold-rolled-temper.
- C. Sheet Lead: ASTM B 749, Type L50049 or L51121, weighing not less than 4 pounds per square foot.
- D. Stainless Steel: Plate, sheet and strip shall conform to ASTM A 167, Type 304 or Type 316, No. 4 finish on exposed surfaces and No. 2 finish on concealed surfaces unless otherwise specified or indicated. Furnish Type 304 for general applications and Type 316 where exposed to acidic or alkaline conditions.
- E. Fastenings:
1. Galvanized Steel: Nails, rivets, and other fastenings furnished in connection with galvanized sheet steel Work shall be sealed with rust resistive coating. Rivets shall be tinned. Nails and other fastenings shall be zinc-coated.
 2. Copper: Nails, rivets, and other fastenings furnished in connection with copper sheet metal Work, shall be manufactured from hard-temper copper or hard brass.
 3. Stainless Steel: Nails, rivets and other fastenings furnished in connection with stainless steel Work, shall be 300 series alloy to match alloy of stainless steel being fastened.
- F. Soldering Flux: Raw muriatic acid for galvanized steel; rosin for tin, lead and tinned copper; non-corrosive soldering salts for uncoated copper and acid-type flux formulated for soldering stainless steel.
- G. Solder: ASTM B 32, Grade 50A. Name of product manufacturer and grade designation shall be stamped or cast onto each bar.

2.02 FABRICATION

- A. General:

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1. Accurately form sheet metal Work to dimensions and shapes indicated and required. Cope finish molded and brake metal shapes with true, straight, sharp lines and angles and, where intersecting each other, to a precise fit. Unless otherwise specified, all galvanized sheet steel shall be 22 gage. Exposed edges of sheet metal shall have a 1/2 inch minimum hemmed edge.
2. Soldering of sheet steel or copper shall be performed with well-heated copper soldering iron or soldering torch, joints full flowing, neat and consistent. Thoroughly clean materials at joints before soldering, and tin coppers before soldering. Exposed soldering on finished surfaces shall be scraped smooth. Lock seam Work shall be fabricated flat and true to line and soldered along its entire length. Acid-fluxed Work shall be neutralized after fabrication.
3. Form and install sheet metal Work to provide proper allowances for expansion and contraction, without causing undue stresses in any part of completed Work. Installation shall be water and weathertight.

B. Gutters and Downspouts:

1. Gutters: Fabricate from 22 gage galvanized steel to match existing size and design unless otherwise indicated. Drain gutter towards nearest downspout and provide an expansion joint at mid-point between downspout outlets, but not to exceed 50 feet on center. Gutters shall not pond water. Rivet joints and ends with a minimum of 6 rivets per joint or maximum rivet spacing not to exceed 1-1/2 inch on center. Sweat solder from inside of gutter and in horizontal position where possible. Neatly fit downspouts to gutter using a slip joint. Provide expansion joints, consisting of 3 inch lap joints at not over 30 feet.
2. Form and install sheet metal Work to provide allowance for expansion and contraction without causing undue stresses in the completed Work.
3. Downspouts: Fabricate downspouts from 3 inch round, or 3 inch by 4 inch rectangular shapes, 16 gage steel tubing with butt joints and mitered elbows, sized as indicated. Downspouts exceeding 30 feet in length may be fabricated with a slip joint or leader head. Downspout shall be fabricated with elbows at bottom discharge or connected to drains as indicated. Joints, except expansion joints shall be sealed with a continuous weld. Galvanize downspouts after fabrication.
4. Outlets: Fabricate outlets of 22 gage galvanized sheet steel with a 1/4 inch rolled flanged soldered continuously to gutter. Outside diameter shall be 1/8 inch less than the diameter of the downspout and extend into downspout 3 inches. Install a 1/4 inch galvanized rod over center of outlet opening, lapping 1 inch over each side of outlet and soldered in place. Galvanize rod after fabrication, before installation.

C. Conductor Heads:

1. Fabricate conductor heads and outlets from 22-gage galvanized sheet steel. Cover tops of the conductor heads with 22-gage galvanized 1/4 inch wire mesh soldered securely to separately fabricated frame and mechanically fastened to top conductor head with a minimum of 2 fasteners.

- D. Gravel Stops:** Provide 24 gage galvanized sheet steel gravel stops wherever roof area drops to a lower level; at the eaves and rake of roof, where roof comes to an abrupt edge, and where indicated. Stops shall be of height indicated and shall be fabricated with 2 flanges. Horizontal flange shall be not less than 4 inches wide, and vertical flange shall extend down over vertical surfaces of trim or gutter. Gravel stops shall lap 4 inches at ends and corners, and shall be fabricated by notching and interlocking vertical face flanges. Contact surfaces of lapped flanges, including raised areas, vertical face and corners, shall be completely covered with flashing compound. Fabricate lap joints so that they will be in the direction of water flow. Where flanges are over 5 inches wide, provide 20-gage continuous cleats fastened at 24 inches on center.

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- E. Overflow Outlets: Provide galvanized sheet steel overflow outlets at locations and of sizes indicated. Outlets shall extend through full thickness of wall in one continuous piece and completely line the opening. On outside face of wall, top and sides of outlet shall finish 1/2 inch on surface of wall. Bottom of outlet shall project 1-1/2 inch beyond face of wall, and shall be bent down slightly. Outlets shall be sealed on the surface of the building. On inside face, side and bottom flanges shall extend not less than 8 inches beyond edge of opening, and not less than 6 inches at top. Outlets shall be installed at time roof is being installed.
- F. Reglet Type Counterflashing: Where roof comes in contact with vertical surfaces, provide counterflashing. Set top of counterflashing 8 inches above roof deck unless otherwise indicated, and extend down at least 5 inches or to top of cant strip. Counterflashing and reglet shall be 22-gage galvanized sheet steel. Lap counterflashing and reglet 3 inches minimum at splices and miter at angles, or supply special metal corner fittings. Reglet and method of securing flashing shall be so constructed that flashing is firmly locked in place, but may be readily removed for replacement.
- G. Splash Pans: Provide splash pans for all downspouts, which empty onto lower roofs. Pans shall be galvanized sheet steel 12 inches by 18 inches, unless otherwise indicated, and turned up 2 inches on at least 3 sides.
- H. Roof Expansion Joint Covers: Fabricate of 22-gage galvanized sheet steel, as detailed. One side of joint shall be zee shaped, with 3 inch standing leg extended over the joint and turned down. The other side shall be box shaped, fabricated to extend over the joint, over the standing leg, and turn down to form a water barrier. Prefabricated bellows type joint covers are not permitted.
- I. Louvers, Fixed: For sizes 2' x 3' maximum (Provide heavier gages as required for sizes indicated on Drawings).
 - 1. Gages: #22 gage for spans to 24", #20 gage for spans to 36".
 - 2. Type: Similar to SMACNA Plates #102, #103A-2 frame, #103D-1 louvers, folded U-frame Plate #108B
 - a. Insect Screen: 8 mesh with #27 gage galvanized wire
- J. Miscellaneous Flashing: Unless otherwise indicated, miscellaneous flashing shall be fabricated of galvanized steel. Exterior doors and windows, unless covered by overhangs shall be provided with 22 gage galvanized steel drip flashing as detailed. At wood construction, nail flashing to framing before paper backed lath is installed.
- K. Roof Pipe Flashings: Provide welded seam 4 pound lead flashings. Field fabricated flashings shall also be welded.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Concrete and masonry materials in contact with sheet metal shall be painted with alkali resistant coating, such as heavy-bodied bituminous paint. Wood in contact with sheet metal shall be painted with 2 coats of aluminum paint or one coat of heavy-bodied bituminous paint.

3.02 INSTALLATION

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- A. General: Coordinate with installation of underlayment indicated in the Drawings and specified in Section 09220, Portland Cement Plaster and Metal Lath.
- B. Gutters and Downspouts:
 - 1. Anchor gutters to structure with 10-gage steel straps, galvanized after fabricating. Secure straps with galvanized fasteners at 3 feet on center. Drill pilot holes and use 12 x 2 inch pan head screws.
 - 2. Install 1/4 inch galvanized wire mesh continuous cover on gutter where indicated.
 - 3. Secure downspouts to walls with 1/8 inch x 2 inch galvanized steel straps. Straps shall be located at top, bottom, and at not over 10 feet on center. Block downspouts out 1/2 inch from the finish wall surfaces. Secure straps to wall framing with 1/4 inch by 2 inch long galvanized anchors. Expansion type anchors shall be provided when anchoring to concrete and masonry. Provide toggle bolts for attachment to masonry or plaster. At steel columns, provide fasteners as indicated. Plastic anchors are not permitted.
 - 4. Anchor conductor heads to walls with 1/4 inch x 2-1/2 inch galvanized lag screws or 1/4 inch expansion type anchors.
- C. Reglets: Install reglets at constant height above cant or as indicated. Provide minimum 3-inch lap at end splices of reglets. Caulk laps solidly.
- D. Counterflashing:
 - 1. Install at constant horizontal elevation across roof slope and slope at constant height above cant or as indicated.
 - 2. Provide minimum 3-inch lap at all end splices of counterflashing.
- E. Galvanized sheet steel parapet coping and flashing shall be continuous over top of parapet to form a watertight cap, with waterproof seams at approximately 10 feet on center, or as indicated. Anchor coping to outside of wall with a continuous cleat face nailed at 24-inch centers. Coping shall be fastened on inside wall with hex head screws and bonded sealing washers through oversized holes in the back of the coping. Corners and angles shall be lapped and soldered; do not install joint sealant.
- F. Prefabricated Louvers: Install plumb and level; securely anchor; seal watertight to adjoining construction. Install screens, cranks, and blackout plates where required.

3.03 TESTING

- A. Perform field water testing to demonstrate installation is watertight. Continue testing with a continuous hose stream applied at base of installation for at least 30 minutes. If leaking is observed, discontinue test and repair installation, then test until satisfactory results are obtained.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEANING

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 07700 - ROOF SPECIALTIES AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Roof hatches.
 - 2. Gravity ventilators.
- C. Related Sections:
 - 1. Section 06100: Rough Carpentry.
 - 2. Section 07552: Modified Bituminous Membrane Roofing
 - 3. Section 07600: Flashing and Sheet Metal.

1.02 SUBMITTALS

- A. Shop Drawings: Submit for fabricated sheet metal indicating details, methods of joining, anchoring and fastening, thicknesses and gauges of metals, concealed reinforcement, sections, and profiles.
- B. Samples: Submit samples for materials or assemblies as requested. Provide finish samples of exposed items.
- C. Product Data: Submit brochures of manufactured items.
- D. Installation Instructions: Provide manufacturer's recommended installation methods and instructions for each item. Instructions shall be prepared to indicate exact conditions of roofing, structure and adjoining construction.

1.03 QUALITY ASSURANCE

- A. Drawings and requirements specified govern. Provide the Work in accordance with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.
- B. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar sheet metal specialties on roofing systems similar to the roofing systems specified.
- C. Coordinate opening sizes and installation with roofing and related Work to ensure fit and installation.
- D. Pre-installation Meetings: Refer to Division 7 roofing sections as appropriate. Attend the pre-installation and inspection meetings for roofing Work.

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1.04 DELIVERY, STORAGE AND HANDLING

- A. Protect roof specialties and accessories by storing above grade on required skids or supports. Protect from physical damage and do not install bent and/or damaged materials.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Roof Hatches:
 - 1. Babcock Davis.
 - 2. Bilco Company.
 - 3. Lane-aire
 - 4. Dur-Red Products.
- B. Ventilators: Briedert, or equal.

2.02 PRODUCTS

- A. Roof Hatches: Provide roof hatches of indicated sizes. Hatches shall be fabricated of galvanized steel, 14 gage curb and cover, 22 gage cover liner, and 1 inch thick insulation in cover and curb. Cover shall operate by a compression spring enclosed in a telescopic case or enclosed torsion spring, with automatic hold-open arm. Provide padlock hasp on inside of unit.
- B. Gravity Ventilators: Briedert, "Air-X-Hauster", Type L. Provide ventilators at locations and of sizes indicated. Mount ventilators on round to square Type FR-4 transitions, securely fastened to roof curbs as indicated in manufacturer's details. Base and ventilators shall be manufactured from not less than 24 gauge galvanized sheet steel. Ventilators shall have removable 1/2 inch mesh galvanized hardware cloth bird screen.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrate to receive roofing accessories and associated Work and conditions under which accessories will be installed. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install roof accessories in accordance with SMACNA and manufacturer's recommendations as required.

3.03 FIELD QUALITY CONTROL

- A. Upon request of the Project Inspector or Architect, perform field water testing to demonstrate that installation is watertight. Continue testing with a continuous hose stream applied at base of installation for at least 30 minutes. If leaking is observed, discontinue test and repair installation, then test until satisfactory results are obtained.

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3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 07710- ARCHITECTURAL EXTRUDED POLY-STYRENE FOR PARAPETS

PART I GENERAL

1.01 SECTION INCLUDES

- A. Labor, materials and equipment necessary to install architectural extruded poly-styrene for parapets (*STYRO-loc®* System) as indicated.

1.02 RELATED SECTIONS

- A. 03300 – Cast-in-Place Concrete
- B. 06100 – Rough Carpentry
- C. 07920 – Joint Sealants
- D. 09220 – Portland Cement Plaster and Metal Lath.
- E. 09250 – Gypsum Board

1.03 DEFINITIONS

- A. Architectural EPS Shape: Extruded Poly-Styrene cut into a desired shape.
- B. Metal Cap: A sheet metal item formed to fit over the parapet for protection from weather and other detrimental elements.
- C. Metal Straps: A sheet metal piece, minimum 2" x 16 gauge, attached to the *STYRO-loc®* used for attaching the metal cap, and reinforcing the *STYRO-loc®* system.
- D. Adhesive: A material used to attach an Architectural EPS Shape to the substrate.
- E. Base Coat: The initial wet-state material used to embed a non metallic reinforcing mesh and encapsulate the Architectural EPS Shape.
- F. Non Metallic Reinforcing Mesh: A non metallic woven mesh used to increase the rigidity of an Architectural EPS Shape.
- G. *STYRO-loc®*: A specifically designed galvanized metal piece inserted into the Architectural EPS Shape.
- H. Substrate: The material to which the Architectural EPS Shape is attached.
- I. Expansion Joint: A structural separation between building elements that allows independent movement without damage to the assembly.
- J. Wrap: The process by which the nonmetallic reinforcing mesh is utilized to protect any exposed edges of the insulation board by encapsulation in a base coat.

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1.04 SYSTEM DESCRIPTION

- A. General: The *STYRO-loc*® system is designed to provide anchoring of a sheet metal cap, increase load resistance, induce rotational load transfer, and create architectural appeal in parapet construction.
- B. Application Methods: The *STYRO-loc*® system is applied directly to a structure at the construction site or directly to a panel prior to attachment to structure in panelized construction.
- C. Design Requirements and Limitations:
 - 1. Compatible substrates with the *STYRO-loc*® System:
 - a. Sound, unpainted concrete, Portland Cement Plaster, brick, or masonry.
 - 2. Expansion Joints: Placed at all Architect/Engineer placed expansion joints throughout the structure.
 - 3. Terminations: Minimum 1/2" at all terminations.
 - 4. Sealant and backer rod:
 - a. Shall be supplied by a manufacturer approved by Foam Concepts, Inc.
 - b. Shall be compatible with all materials to which sealant will bond.
 - c. Backer rod shall be of a closed cell type.
- D. Performance Requirements:
 - 1. Negative Uniform Load Testing: Ultimate failure shall not occur under 59 psf.
 - 2. Pull Out Capacity of Metal Insert: When loaded from a minimum of 12 inches from any end shall ultimately fail at no less than 227 pounds, and no less than 88 pounds when loaded at 1- inch from the end.
 - 3. Vertical Load Testing: Ultimate failure on 12" shape shall not occur under 3200 lbs. at edges and 6330 lbs. at the interior location - see ICC report # ESR 1823.
 - 4. Structural Performance Test: Ultimate failure on 24" Shape shall not occur under 2963 lbs. at edges and 3181 at the interior location – see ICC report # ESR 1823.
 - 5. Fire Performance Test: Necessary to sustain conditions of acceptance as described in the ICC –ES Acceptance criteria for Foam Plastic (Section 4.7)

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Shop Drawings: Submitted upon request.
- C. Reports and Certificates: Copies of third party independent laboratory's test report verifying the performance of the *STYRO-loc*® System submitted upon request.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. System component materials shall be manufactured or approved by Foam Concepts, Inc. and shall be distributed by the same or its authorized dealers.
 - 2. Desired shapes shall bare *STYRO-loc*® name on ends ensuring that the metal insert slot has been inspected.
 - 3. Metal Cap shall be a minimum of 24-gauge galvanized sheet metal.
 - 4. Metal Straps shall be a minimum of 16-gauge galvanized sheet metal.

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5. Sheet Metal Contractor knowledgeable in the proper application of the metal cap and metal straps.
6. Base coat, adhesive, and non metallic reinforcing mesh shall be provided by Omega Products International, Inc. or equivalent manufacturer.
7. EIFS Contractor knowledgeable in the proper application procedures of Architectural EPS Shapes.
8. Sealant contractor experienced and competent in the installation of elastomeric construction sealant.

B. Mock-Ups: Produced upon request.

1. Prior to commencement of work, provide a mock-up for approval:
 - a. Size suitable to represent the products to be installed and each color and texture, constructed using the same tools and techniques to be utilized on the project.
 - b. Retain approved mock-up at job site throughout the application process.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to the construction site in their originally manufactured state.
- B. Inspect the materials upon delivery to assure that specified products have been received. Report defects or discrepancies to the responsible party according to the contract agreement; do not use reported material for application.
- C. Store materials in a cool, dry place, protected from weather and other damage. Do not store materials in direct contact with the ground.

1.08 PROJECT CONDITIONS

- A. Existing Conditions: Access to electrical outlets, clean, potable water, and a suitable work area at the construction site throughout the application of the EIF System.

1.09 SEQUENCING AND SCHEDULING

- A. The installation of the *STYRO-loc®* System shall be coordinated with all other construction trades.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Foam Concepts, Inc. (888) 693-1037
 1. Owner approved equal.

2.02 COMPONENTS

- A. Architectural EPS Shapes: M.V. min 1lb. Density at parapet locations EPS foam must be listed and be manufactured under a quality control program using a third part inspection agency
- B. *STYRO-loc®*: 24 gauge metal insert placed a minimum of 2.5 inches from end of Architectural EPS Shape
- C. Metal Cap: Minimum 24 gauge galvanized sheet metal

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- D. Metal Straps: Minimum 2 inches x 16 gauge galvanized sheet metal placed a maximum of 24 inches on center
- E. Adhesives: Omega Drybond, Styro-Glue, Styro-Glue DM, Styro Bond, or equivalent.
- F. Base Coat: Omega Drybond, Styro-Glue, Styro-Glue BG, Styro-Glue DM, Styro-Glue TF, or equivalent.
- G. Sealant: Shall be installed in a timely manner

PART 3 EXECUTION

3.01 EXAMINATION

- A. Prior to installation of *STYRO-loc*® System the installer shall ensure that the substrate:
 - 1. Is of the same type as that listed in under Section 1.05 Design Requirements of this specification.
 - 2. Shall be true, flush, and free of any irregularities within 1/4" in a 4' radius.
 - 3. Shall be sound, dry, properly abutted, and have no surface voids, projections or other discrepancies that may interfere with the application of the system.
- B. Ensured that all flashing or other waterproofing materials have been properly installed.
- C. The installer shall notify the owner and architect of any discrepancies found.

3.02 SURFACE PREPARATION

- A. Clean the substrate to which the System is to be applied, ensuring that there are no foreign materials present.
 - 1. Foreign materials include, but are not limited to, oil, dirt, dust form release agents, efflorescence, paint, wax, water repellants, moisture, frost.

3.03 INSTALLATION

- A. Install the System in accordance to this specification.
- B. Architectural EPS Shape Application:
 - 1. Wrap all areas with the appropriate nonmetallic reinforcing mesh.
 - 2. Apply to the substrate tightly butting all joints.
 - 3. Attach using an approved adhesive.
 - 4. Ensure the Architectural EPS Shapes are true and aligned.
- C. Metal inserts shall be inserted continuous into desired Architectural EPS Shapes.
- D. Adhesive: Applied according to adhesive manufacturer's written specifications.
- E. Base Coat: Applied according to base coat manufacturer's written specifications.
- F. Metal Straps: Screw into *STYRO-loc*® Metal Insert and into parapet using a hex head self drilling screw (0.125 inch shank minimum).

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- G. Metal Cap: Installed according to metal cap manufacturer's written specifications.
- H. Sealant: Applied according to sealant manufacturer's written specifications.

3.04 FIELD QUALITY CONTROL

- A. Assume responsibility for the proper application of the *STYRO-loc*® System; provide written certification of workmanship relative to the substrate, system materials, installation procedures, and details as requested.
- B. If requested provide written certification from the sealant installer that the sealant and backer rod and their applications are in accordance with that of the sealant manufacturer and Foam Concepts, Inc.

3.05 CLEANING

- A. Remove and legally dispose all refuse and debris.
- B. Clean all adjacent materials, surfaces and their work area of any excess materials produced as a result of their application

3.06 PROTECTION

- A. Protect the *STYRO-loc*® System from weather or other damage until flashings, sealants, etc., are installed.
- B. Protect all surrounding areas and surfaces during application of the System.

END OF SECTION

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SECTION 07840 - FIRESTOPS AND SMOKE SEALS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Firestops and smoke seals.
 - 2. Mineral fiber insulation firesafing.
 - 3. Damming material, clips, and closures.
- C. Related Sections:
 - 1. Section 03300: Cast-in-Place Concrete.
 - 2. Section 07210: Building Insulation.
 - 3. Section 09250: Gypsum Board.

1.02 SYSTEM DESCRIPTION

- A. Provide firestops and smoke seals to prevent the passage of fire, smoke, toxic gasses or water from one floor or area to another. Seal openings in floors, fire rated walls and permanent partitions penetrated by pipes, ducts, conduits and other items as shown, specified, and as required for the type of construction.
- B. Mineral fiber insulation shall be installed as firesafing at non-rated penetrations not containing pipes, ducts, conduits, and other items in floor slabs, wall partitions, construction-joint conditions between slabs and adjacent construction, and where indicated or required.
- C. Provide damming material, clips, and closures as required for support and containment of dams, and other insulation materials required for tested and rated firestop systems.

1.03 QUALITY ASSURANCE

- A. Performance Criteria:
 - 1. Provide materials and Work to conform to source quality control criteria specified herein and 2007 CBC requirements in fire resistant wall and floor assemblies to prevent the passage of fire, smoke, and toxic gases.
 - 2. Installed firestops shall be of sufficient thickness, width, and density to provide a fire resistance rating at least equal to the floor, wall, or partition construction into which it is installed.
- B. Comply with 2007 CBC requirements for fire rated construction.
- C. Qualifications of Manufacturer: Products furnished for firestopping and smoke seals shall be manufactured by a firm which has been continuously and regularly employed in the manufacture of these materials for a period of at least 5 years; and that can provide evidence

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of these materials being satisfactorily installed on at least 5 projects of similar size and type within such period.

- D. Qualifications of Installer: The Work of this section shall be installed by a firm that has been in the business of installing similar materials for at least 5 consecutive years; and can provide evidence of satisfactory completion of 5 projects of similar size and scope. Installer shall have applicators trained and certified by manufacturer for performing this Work.

1.04 SUBMITTALS

A. Product Data:

1. Submit manufacturer's product data for each type of firestop and smoke seal material proposed for installation. Indicate product characteristics, typical installations, performance, and limitation criteria and test data.
2. Submit manufacturer's printed installation instructions for each type of product, system, and construction required for the Work. Indicate fire resistance rating of each installation.
3. Submit fire test reports from independent testing agency indicating the following:
 - a. Fire test report of firestop material installed to substrate and penetration materials similar to the Work of this section. Test to indicate both Flame (F) and Temperature (T) Ratings.
 - b. Test reports of products to be installed shall indicate conformance to ASTM E 814, UL rating with UL classified system description, and UL classified system detail.

- B. Field Samples: No less than 10 days before commencing the Work of this section, provide field installed samples of firestop materials and systems.

1. Apply one sample of firestop material for each different penetration and related fire rating required for the Work.
2. Sample areas shall comply with thickness, fire resistance ratings, and finished appearance.

- C. Manufacturer's Qualifications: Submit evidence of conformance with qualification requirements specified above.

- D. Installer's Qualifications: Submit evidence of conformance with qualification requirements specified above.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to the Project site in manufacturer's original, unopened containers bearing correct UL labeling.

- B. Firestop material shall be stored above grade in an area protected from detrimental weather and moisture conditions.

- C. Firestop and seal materials shall be installed before expiration of shelf life.

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PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Unless otherwise noted, products of this section shall be as manufactured by Bio Fireshield Inc.(Bio), Concord, Massachusetts; 3M Fire Protection Products; General Electric (GE).
- B. Provide materials and systems of specified manufacturers to suit penetration and substrate as determined by various conditions of installation.

2.02 MATERIALS

- A. Firestop Sealant: Single component, noncombustible firestop sealant Biotherm "S" gun grade, or Biotherm "T" self leveling silicone by Bio, Pensil 100 by GE, CP25WB by 3M, or equal.
- B. Firestop Putty: One-part intumescent type FSP by Nelson, MPS/MPP by 3M, or equal.
- C. Cementitious Firestop Mortar: Novasit K-10 (55 lb. density) by Bio, 3M mortar by 3M, or equal. Cementitious mortar shall be non-shrinking, asbestos free type.
- D. Firestop Pillows: Manufactured by Bio Fireshield, Nelson, or equal.
- E. Firesafing, Mineral Fiber or Ceramic Wool Non-Combustible Insulation:
 - 1. Mineral Fiber: Density 4 pounds per cubic foot, USG Thermafiber, Fibrex "FBX Safing Insulation," or equal.
 - 2. Ceramic Wool: Density 6 pounds per cubic foot, Johns Manville "Ceramic Fiber Insulation", Carborundum "Fiberfrax" ceramic fiber, or equal. Provide material in tested thickness for required hour rating.
 - a. Flame Spread: 0.
 - b. Smoke developed: 0.
 - 3. For mineral fiber, provide 20-gage minimum size metal retainer clips and plates for firesafing support in vertical applications and in compliance with tested rating.
- F. Supplemental Material: Provide supplementary materials required for complete, fire rated, installation.

2.03 SOURCE QUALITY CONTROL

- A. Firestop and smoke seal material shall be tested by an independent testing agency for conformance to Flame (F) and Temperature (T) requirements of ASTM E-814/UL 1479.
- B. Conform to UL Fire Hazard Classification Requirements. Material shall be classified as a fill, void, or cavity material and system for UL Through Penetration Firestop System. Comply with UBC 43-6.
- C. Material shall be tested and classified noncombustible per ASTM E 84.

PART 3 - EXECUTION

3.01 APPLICATION REQUIREMENTS

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- A. Provide single component, noncombustible, firestop sealant or putty:
 - 1. Within penetrations subject to movement including conduit, cable bundles, buss duct, and noncombustible pipe.
 - 2. As a sealant or caulking for smoke barrier construction, fire, and smoke dampers, mechanical/electrical framed elements in masonry and gypsum board partition systems, and other conditions.
- B. Provide mineral fiber insulation for firesafing at joints and openings through floor slabs, walls, and partitions not indicated to be grouted, gaskets, sealed or otherwise made sound or air tight in this or other sections. Firesafing shall be packed and wedged solidly from both sides of walls and partitions, and from both top and bottom sides of slabs with noncombustible mineral fiber insulation.

3.02 PREPARATION

- A. Examine the areas and conditions where firestops and smoke seals are to be installed for conditions detrimental to the proper completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected for rated fire protection.
- B. Surface to receive firestops or smoke seals shall be free of dirt, dust, grease, form release agents, or other matter that would impair the bond of the firestop material to the substrate or penetrating items. Substrate shall be frost free and when required, dry.
- C. Voids and cracks in substrate shall be filled and unnecessary projections removed before installation of firestops.
- D. Penetrating items shall be permanently installed before firestop and smoke seal installation.
- E. Assure that all pipes, conduit, cable, and other items, which penetrate fire rated construction, have been permanently installed before installation of firestops. Schedule and sequence the Work to assure that partitions and other construction, which would conceal penetrations, are not installed before the installation of firestops and smoke seals.

3.03 INSTALLATION

- A. General: Provide installation in accordance with manufacturer's installation procedures, as required. Install firestops in accordance with fire test reports, UL fire resistance requirements, and reviewed sample installations.
- B. Dam Construction:
 - 1. Install dams when required to properly contain firestopping materials within openings and as required to achieve fire resistance rating as tested and rated.
 - 2. Provide in conformance with installation requirements for type of floor, wall, and partition construction, and as recommended by firestop manufacturer.
 - 3. Combustible damming material shall be removed after appropriate curing. Noncombustible damming material may be left as a permanent component of the firestop system.
 - 4. Placement of dams shall not interfere with function, or adversely affect the appearance, of adjacent construction.
- C. Installation of Single Component Firestop Sealant:

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1. Provide noncombustible insulation as required to achieve fire resistance rating.
2. Install with manual or powered caulking gun. For up to 3 hour rating, install in 1/2 inches total thickness to both sides of wall penetrations, and to one side in floor penetrations.
3. Surface of gun grade firestop sealant shall be tooled with clean potable water.
4. Remove excess materials from adjacent surfaces within 10 minutes with either water or other material compatible with sealant and recommended by sealant manufacturer, leaving the Work in a neat, clean condition.

D. Installation of Cementitious Firestop Mortar:

1. Mixing: Add dry powder to water and mix with mechanical mixer or hand mixing tools. Ratio and duration of mix shall be as instructed by firestop mortar manufacturer. Average wet density of mortar shall be 70 pounds per cubic foot (+/- 5).
2. Wet surfaces before installation of firestop mortar. Mortar may be hand installed or pumped into the opening.
3. When installing around layered and/or grouped cables, vibrate or move the cables slightly to prevent voids from forming between the cables.
4. Exposed surfaces shall be finished with conventional plastering tools before curing.
5. Allow at least 48 hours for initial cure before form removal. For full cure allow 27 days.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Joint sealants as indicated or required.
- C. Related Sections:
 - 1. Section 06200: Finish Carpentry.
 - 2. Section 07600: Flashing and Sheet Metal.
 - 3. Section 07840: Firestops and Smoke Seals.
 - 4. Section 08110: Hollow Metal Doors, Windows and Frames.
 - 5. Section 08520: Aluminum Windows.

1.02 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating sealant joint locations, with full-size sealant joint details.
- B. Product Data: Submit manufacturer's literature for each sealant material.
- C. Material Samples: Submit samples indicating color range available for each sealant material intended for installation in exposed locations.
- D. Certifications: Submit manufacturer's certification materials comply with requirements specified.
- E. Site Samples: At locations required, provide a sample of sealant for each typical installation, approximately 24" long, including joint preparation, backing, sealant and tooling. Allow backing to extend 6" beyond end of sealant for inspection of substrate.
- F. Test Reports: Submit manufacturer's adhesion compatibility test reports according to ASTM C 794 for each substrate.

1.03 QUALITY ASSURANCE

- A. Qualifications of Installer: The Work of this section shall be installed by a firm which has been in the business of installing similar materials for at least 5 consecutive years; and can show evidence of satisfactory completion of 5 projects of similar size and scope. Installer shall have applicators trained and approved by manufacturer for performing this Work.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store in accordance with manufacturer's recommendations. Provide a uniform ambient temperature between 60 and 80 degrees F.

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1.05 WARRANTY

- A. Manufacturer shall provide a 5-year material warranty.
- B. Installer shall provide a 2-year labor warranty.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Furnish sealants meeting following in-service requirements:
 - 1. Normal curing schedules are permitted.
 - 2. Non-staining, color fastness (resistance to color change), and durability when subjected to intense actinic (ultraviolet) radiation are required.
- B. Furnish the products of only one manufacturer unless otherwise required. Sealant colors as selected to match the adjoining surfaces.

2.02 MATERIALS

- A. Sealants:
 - 1. Sealant 1: Acrylic latex, one-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C 834, Type S, Grade NS, formulated to be paintable.
 - a. Tremco Inc., Acrylic Latex Caulk.
 - b. Bostik Construction Products Division, Chem-Calk 600.
 - c. Pecora Corporation, AC-20.
 - 2. Sealant 2: Butyl sealant, one-part, non-sag solvent-release-curing sealant complying with FS TT-S-001657 for Type 1 and formulated with a minimum of 75 percent solids.
 - a. Tremco Inc., Tremco Butyl Sealant.
 - b. Bostik Construction Products Division, Chem-Calk 300.
 - c. Pecora Corp., BC-158.
 - 3. Sealant 3: Silicone sealant, one-part non-acid-curing silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25.
 - a. Dow Corning Corp., Dow Corning 790, 791, 795.
 - b. General Electric Co., Silpruf.
 - c. Tremco, Inc., Spectrem 1.
 - d. Pecora Corp., 864.
 - 4. Sealant 4: One-part mildew-resistant silicone sealant, complying with ASTM C 920, Type S, Grade NS, Class 25.
 - a. Dow Corning Corp., Dow Corning 786.
 - b. General Electric Co., Sanitary 1700.
 - c. Tremco, Inc., Proglaze White.
 - d. Pecora Corp. 863 White.
 - 5. Sealant 5: One-part non-sag urethane sealant, complying with ASTM C 920, Type S, Grade NS, Class 25.
 - a. Bostik Construction Products Div., Chem-Calk 900.

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- b. Mameco International, Inc., Vulkem 116.
- c. Tremco, Inc., Dymonic.
- d. Sika Corporation, Sikaflex 1-A.
- 6. Sealant 6: Multi-part pouring urethane sealant, complying with ASTM C 920, Type M, Grade P, Class 25.
 - a. Tremco, Inc., HPL.
 - b. Mameco International, Inc., Vulkem 255.
 - c. Sika Corporation, Sikaflex 2C NS/SL.
- 7. Sealant 7: Acoustical sealant, non-drying, non-hardening permanently flexible conforming to ASTM D 217.
 - a. Pecora Corp., BA-98 Acoustical Sealant.
 - b. Tremco, Inc., Tremco Acoustical Sealant.
 - c. United States Gypsum Co., Sheetrock Acoustical Sealant.
- B. Penetrations Through Fire Barriers: Refer to Section 07840: Firestops and Smoke Seals.
 - 1. 3M Brand Fire Barrier Calk CP-25.
 - 2. 3M Brand Fire Barrier Putty 303.
- C. Joint Backing: ASTM D 1056; round, closed cell Polyethylene Foam Rod; oversized 30 to 50 percent larger than joint width, reticulated polyolefin foam.
- D. Primer: Non-Staining Type. Provide primer as required and shall be product of manufacturer of installed sealant.
- E. Lacquer sealer shall be clear, as recommended by sealant manufacturer.
- F. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.
- G. Sealants shall have normal curing schedules, shall be nonstaining, color fast and shall resist deterioration due to ultraviolet radiation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that joint openings are ready to receive Work and field tolerances are within the guidelines recommended by sealant manufacturer.

3.02 SURFACE PREPARATION

- A. Joints and spaces to be sealed shall be completely cleaned of all dirt, dust, mortar, oil, and other foreign materials which might adversely affect caulking Work. Where necessary, degrease with a solvent or commercial degreasing agent. Surfaces shall be thoroughly dry before application of sealants.
- B. If recommended by manufacturer, remove paint and other protective coatings from surfaces to be calked before priming and installation of sealants.
- C. Preparation of surfaces to receive sealant shall conform to the sealant manufacturer's specifications. Provide air pressure or other methods to achieve required results. Provide masking tape to keep sealants off surfaces that will be exposed in finished Work.

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- D. Etch concrete or masonry surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.
- E. Perform preparation in accordance with ASTM C 804 for solvent release sealants, and ASTM C 962 for elastomeric sealants.
- F. Protect elements surrounding Work of this section from damage or disfiguration.

3.03 SEALANT APPLICATION SCHEDULE

	<u>Location</u>	<u>Type</u>	<u>Color</u>
A.	Exterior & Interior joints in horizontal surfaces of concrete; between metal & concrete masonry and mortar.	Sealant 6	To match adjacent material
B.	Exterior door, entrance & window frames. Exterior & interior vertical joints in concrete & masonry metal flashing.	Sealant 3 or 5	To match adjacent material
C.	Joints within glazed curtain wall system. Skylight framing system. Aluminum entrance system glass and glazing.	Sealant 3	Translucent or Black
D.	Interior joints in ceramic tile and at plumbing fixtures.	Sealant 4	Translucent or White
E.	Under thresholds.	Sealant 2	Black
F.	All interior joints not otherwise scheduled	Sealant 1	To Match Adjacent Surfaces
G.	Heads and sills, perimeters of frames and other openings in insulated partitions	Sealant 7	Match Adjacent Surfaces

3.04 APPLICATION

- A. Provide sealant around all openings in exterior walls, and any other locations indicated or required for structure weatherproofing and/or waterproofing.
- B. Sealants shall be installed by experienced mechanics using specified materials and proper tools. Preparatory Work (cleaning, etc.) and installation of sealant shall be as specified and in accordance with manufacturer's printed instructions and recommendations.
- C. Concrete, masonry, and other porous surfaces, and any other surfaces if recommended by manufacturer, shall be primed before installing sealants. Primer shall be installed with a brush that will reach all parts of joints to be filled with sealant.

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- D. Sealants shall be stored and installed at temperatures as recommended by manufacturer. Sealants shall not be installed when they become too jelled to be discharged in a continuous flow from gun. Modification of sealants by addition of liquids, solvents, or powders is not permitted.
- E. Sealants shall be installed with guns furnished with proper size nozzles. Sufficient pressure shall be furnished to fill all voids and joints solid. In sealing around openings, include entire perimeter of each opening, unless indicated or specified otherwise. Where gun installation is impracticable, suitable hand tools shall be provided.
- F. Sealed joints shall be neatly pointed on flush surfaces with beading tool, and internal corners with a special tool. Excess material shall be cleanly removed. Sealant, where exposed, shall be free of wrinkles and uniformly smooth. Sealing shall be complete before final coats of paint are installed.
- G. Comply with sealant manufacturer's printed instructions except where more stringent requirements are indicated on Drawings or specified.
- H. Partially fill joints with joint backing material, furnishing only compatible materials, until joint depth does not exceed 1/2 inch joint width. Minimum joint width for metal to metal joints shall be 1/4 inch. Joint depth, shall be not less than 1/4 inch and not greater than 1/2 inch.
- I. Install sealant under sufficient pressure to completely fill voids. Finish exposed joints smooth, flush with surfaces or recessed as indicated. Install non-tracking sealant to concrete expansion joints subject to foot or vehicular traffic.
- J. Where joint depth prevents installation of standard bond breaker backing rod, furnish non-adhering tape covering to prevent bonding of sealant to back of joint. Under no circumstances shall sealant depth exceed 1/2 inch maximum, unless specifically indicated on Drawings.
- K. Prime porous surfaces after cleaning. Pack joints deeper than 3/4 inch with joint backing to within 3/4 inch of surface. Completely fill joints and spaces with gun applied compound, forming a neat, smooth bead.

3.05 MISCELLANEOUS WORK

- A. Sealing shall be provided wherever required to prevent light leakage as well as moisture leakage. Refer to Drawings for condition and related parts of Work.
- B. Install sealants to depths as indicated or, if not indicated, as recommended by sealant manufacturer but within following general limitations:
 - 1. For joints in concrete walks, slab and paving subject to traffic, fill joints to a depth equal to 75 percent of joint width, but not more than 3/4 inch deep or less than 3/8 inch deep, depending on joint width.
 - 2. For building joints, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.

3.06 CLEANING

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

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3.07 CURING

- A. Sealants shall cure in accordance with manufacturer's printed recommendations. Do not disturb seal until completely cured.

3.08 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 08110 - HOLLOW METAL DOORS, WINDOWS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Hollow metal doors and frames or hollow metal doors as indicated.
 - 2. Hollow metal window frames or hollow metal door and window frames.
- C. Related Sections:
 - 1. Section 07920: Joint Sealants.
 - 2. Section 08710: Door Hardware.
 - 3. Section 08800: Glazing.
 - 4. Section 09900: Paints and Coatings.

1.02 SYSTEM DESCRIPTION

- A. Design Requirements: Door-and-frame assemblies or frames shall include all reinforcing and provisions for hardware as shown and specified. Drawings indicate profile and general details of steel frame fabrication and installation.

1.03 SUBMITTALS

- A. Shop Drawings: Submit composite shop drawings indicating detailed relationships of installation including Work of adjacent construction, finish hardware, security, fire and life safety devices, glazing, caulking, and requirements for field installation. Include elevations of each hollow metal door type, details of each frame type, location schedule of doors and frames indicating same reference for details and openings as indicated on Drawings, conditions of openings of various wall sections and materials, typical and special details of construction, methods of assembling sections, location and installation requirements for hardware, material size, shape, and thickness, and all joints and connections.
- B. Product Data: Submit manufacturer's product data indicating composition and construction for each fabricated item including louvers, coatings, finishes, and other components demonstrating compliance with referenced standards.
- C. Certification: Submit certification of compliance with referenced standards and specified criteria, including but not limited to fire ratings in accordance with UL 10C, Physical Endurance in accordance with ANSI A250.4 and Prime Paint performance in accordance with ANSI A250.10.
- D. Samples: Hollow Metal Frame: Corner section of typical exterior and interior frame, of sufficient composite size to illustrate corner joint construction, hinge reinforcement, closer reinforcement, floor anchor, dust cover, and jamb anchors, and showing galvanizing and prime coat finishes. Hollow Metal Door: Section of typical interior door of sufficient composite size to illustrate edge, top, bottom, and core construction, hinge reinforcement and face stiffening,

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closer reinforcement and kick plate reinforcement, and corner of vision opening construction with glazing beads.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum documented experience of more than five years in work of this section.
- B. Installer Qualifications: Minimum documented experience of more than five years in work of this section
- C. Coordinate with hardware supplier for fabrication of doors and frames to receive hardware items.
- D. Coordinate with intrusion alarm supplier for fabrication of doors and frames to receive intrusion detection devices.
- E. References: Work shall comply with physical and performance requirements of following standards, including all standards referenced in them, except for more stringent provisions specified herein or required by regulatory agencies:
 - 1. ANSI/SDI A250.8 - 2003, SDI 100 Recommended Specifications for Standard Steel Doors and Frames.
 - 2. ANSI/NFPA 252, Fire Tests of Door Assemblies.
 - 3. ANSI/UL 10B, Fire Tests of Door Assemblies.
 - 4. ANSI/UL 10C, Positive-Pressure Fire Tests of Door Assemblies.
 - 5. ANSI/NFPA 80, Fire Doors and Fire Windows
 - 6. HMMA, Guide Specifications for Commercial Hollow Metal Doors & Frames (Standard of National Association of Architectural Metal Manufacturers).
 - 7. ANSI/SDI A250.4, Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcing.
 - 8. ANSI A250.10, Test Procedure and Acceptance Criteria for Prime Painted Steel Doors and Frames.
- F. Standards of Workmanship and Installation:
 - 1. Finished Work shall be of uniform profile, accurately fabricated, rigid and strong, square and true, neat in appearance, smooth and free from dents, waves, warps, buckles, open joints, tool marks and/or other defects.
 - 2. Steel sheet shall be clean with smooth surfaces free of scale, pitting or other defects.
 - 3. Construction joints shall be flush, tight and welded their full length, ground flush and smooth on exposed surfaces.
 - 4. All frame and door reinforcing and hardware provisions shall be performed in fabrication shop. Provide all cuts, welds, and other fabrications before galvanizing or shop priming.
 - 5. Lines and molded members shall be straight and true with angles as sharp as practical for thickness involved, surfaces flat, and fastenings concealed.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Frames: Before shipment, install temporary spreaders at bottom of bucks and do not remove until frames are installed.
- B. Doors: Provide protection as required to protect doors during shipping and storage. Damaged doors will be rejected.

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- C. Inspect hollow metal Work upon delivery for damage. Remove and replace damaged items with new Work as required.
- D. Store doors and frames in an upright position at Project Site under cover and protected from weather-related elements. Store units on minimum 4" high wood blocking with ½" air spaces between stacked doors to provide circulation. Do not store doors and frames under plastic or canvas shelters that can create a humidity chamber. If shipping packaging becomes wet, immediately remove packaging.

1.06 WARRANTY

- A. Manufacturer shall provide a 1 year material and workmanship warranty.
- B. Installer shall provide a 2-year labor warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. All doors and frames shall be products of a single manufacturer.
- B. The following are acceptable manufacturers, as are others that can demonstrate their products are equivalent in quality, performance and compliance with these specifications.
 - 1. Security Metal Products Corp.
 - 2. Curries Manufacturing, Inc.
 - 3. Steel craft
 - 4. Amweld Metal Doors and Frames
 - 5. Stiles Steel Doors and Window Systems, Inc.
- C. All materials, fabrication and installation must comply with requirements of standards referenced in Paragraph 1.04, Quality Assurance.

2.02 MATERIALS

- A. Steel
 - 1. Exterior Doors and Frames: Galvanized Carbon Sheet Steel, Commercial Quality, A60 zinc coating (0.30 ounces per square foot per side), ASTM A 653.
 - 2. Interior Doors and Frames: Cold-Rolled Steel Sheets, Commercial Quality Carbon Steel, ASTM A 1008
 - 3. Steel shall be free of scale, pitting, coil breaks or other surface blemishes, and free of buckles, waves or other defects.
 - 4. Steel thicknesses expressed in steel gages (MSG) is for reference only. Actual steel thicknesses must meet minimum requirements of ASTM standards and as described in ANSI/SDI A250.8.
- B. Sound Deadening Core Insulation: Furnish rigid, unsetting, vermin-proof, and non-combustible fiberglass or rockwool type material to provide required STC and thermal ratings within door fabrications. Doors shall have a minimum sound transmission classification of 28 as tested under ASTM E 90 and ASTM E 413 unless noted otherwise.

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- C. Supports and Anchors: Fabricate from a minimum 16 gauge galvanized sheet steel unless noted otherwise.
- D. Fasteners: Provide as shown on Drawings and to suit conditions of secure installations. Furnish 304 Grade stainless steel types at exterior doors.
- E. Door Louvers:
 - 1. Louver free airflow shall be 50% free area.
 - 2. Louvers for exterior doors shall be galvanized and furnished with not less than 12-gage frame and security grille welded to 18-gage steel blades, fully galvanized, with removable galvanized or bronze insect screen on inside. Install louver with tamperproof-head through-bolts. Anemostat PLSL, Air Louvers Inc. Model 1500-A or equal.
 - 3. Fusible link louvers: Listed by State Fire Marshal, UL labeled and installed with tamperproof fasteners.
 - 4. All louvers shall be furnished with factory primer.
- F. Vision panels: Manufacturer's standard, U.L. approved, finished flush with door face, with no visible fasteners on either door face.
- G. Shop Paint:
 - 1. Conform to Steel Structures Painting Council (SSPC) for all steel components.
 - 2. Pretreatment/priming coatings shall be compatible with Project site finish painting system in accordance with Section 09900, Paints and Coatings.
 - 3. At frames to be grouted, all surfaces that are inaccessible after installation shall be coated with bituminous or asphalt base paint.

2.03 FABRICATION GENERAL

- A. General: Fabricate hollow metal units to be rigid, neat in appearance, and free from defects including warp or buckle.
 - 1. Accurately form metal to required sizes and profiles. Fit and assemble all units in manufacturer's plant. Where practical, factory or shop fit and assemble units for shipment.
 - 2. Weld all joints continuously and grind, dress, and make smooth, flush, and invisible. Filler to conceal manufacturing defects or damage is not permitted.
 - 3. Corner Joints: Finish corner joints by mitering, or coping and butting, or a combination of both. Trim and backbend shall be continuous around corner.
 - 4. Continuously weld joints for full depth and width of frame, trim, and backbends.
 - 5. Clearances for Fire-Rated Doors: As required by NFPA 80.

2.04 FRAMES

- A. General: Provide fully welded steel frames with integral stops and trim for doors, transoms, sidelights, borrowed lights, and other openings, and with details indicated for type and profile. Use concealed fastenings, unless otherwise indicated.
- B. Metal Thickness of Frames (minimum):
 - 1. Interior hollow metal frames up to 4'-0" wide 16-gage
 - 2. Interior hollow metal frames wider than 4'-0" 14-gage
 - 3. Exterior hollow metal frames 14-gage

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4. Borrowed lights up to 4'-0" wide 16-gage
- C. Supports and Anchors: Fabricate from at least 16-gage, galvanized steel sheet. Frame anchors shall comply with fire rated label requirements of opening.
1. Floor Anchors:
 - a. Minimum thickness: 12-gage galvanized steel sheet or bent steel plate, securely fastened inside each jamb, with two holes in anchor at each jamb for 3/8" floor anchorage fasteners. For preframed wood stud walls provide and additional wood stud anchor located as close to the bottom of the jamb as is practical.
 - b. Where required at sloping and uneven floor conditions, or to coordinate adjustments for trim alignments, provide adjustable floor anchors, providing at least 2" height adjustments.
 2. Jamb Anchors:
 - a. Locate anchors near top and bottom and at intermediate points not to exceed 24 inches on center. Provide 2 anchors per head for openings up to 48 inches wide. Openings over 48 inches wide provide anchors at 24 inches on center maximum.
 - b. Anchors in masonry construction: Provide manufacturers standard jamb anchors. Steel wire complying with ASTM A510, 0.177 inch in diameter, may be furnished.
 - c. Anchors in Stud Partitions: Provide steel anchors, 16-gage minimum sheet steel, of design to suit partition construction, securely welded inside each jamb.
 - d. Through-Frame Anchors: At frames indicated to be anchored with bolts through frame, provide countersunk holes for bolts with 16-gage minimum sheet steel stiffeners full thickness of frame, and securely welded inside each frame at each hole.
- D. Inserts, Bolts, and Fasteners: Provide manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153 Class C or D as required.
- E. Head Reinforcing: Reinforcing shall not act as lintel or load-carrying member and shall comply with fire rating requirements. Provide at all frames regardless of whether or not closer is specified.
- F. Hardware Reinforcement and Accessories:
1. Butt Hinge: 7-gage minimum.
 2. Continuous hinge: 14-gage continuous strip reinforcing.
 3. Head assemblies: Reinforced internally with full length, 10-gage angles on each side of frame and bar at bottom of stop for closer reinforcement in all frames.
 4. Reinforcing for other items of finish hardware shall be accomplished according to ANSI A250.6
 5. Plaster Guards: Provide 26-gage galvanized steel plaster guards or dust cover boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
- G. Mullion and Transom bars: Furnished and fabricated as specified for frames.
- H. Glazed Openings: Applied stops with mitered or butted corners, of minimum 18-gage galvanized steel, one-piece lengths, secured within 3" of ends and at 12" centers with oval head countersunk tamper resistant screws. Corner joints shall be furnished with contact edges closed tight, with trim faces mitered and continuously welded. Frames for multiple openings shall be provided with mullion and/or rail members, fabricated of closed tubular shapes with no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth. Provide condensate weeps 4 inches on centers, maximum.

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- I. Door Silencers: Except for exterior doors, drill and punch frames for three silencers at lock jamb of single swing doors or in double doors with astragal and one silencer per leaf in heads of doubled door frames.
- J. Where frames are installed in walls sitting on a concrete curb, provide a closure plate or extend backbends to provide closure where frame abuts concrete curb.

2.05 DOORS

- A. General: Custom-made, flush-panel "seamless type" with one-piece face panels; continuous weld, seamless edge construction with no visible seams or joints on faces or on vertical edges.
 - 1. Provide type and size of doors shown with louvers and openings for glazing where indicated.
 - 2. Minimum Door thickness: 1- $\frac{3}{4}$ inches.
 - 3. Face Sheet Minimum Gage: 16-gage.
 - 4. Stiffeners: Stiffen door face sheets with continuous vertical-formed steel (rib) sections, minimum 20 gage, full thickness of interior space between door faces, spaced 6" on center maximum, and spot welded to both faces 4" on center maximum.
 - 5. Core Insulation: Provide sound deadening and insulating material through entire core of door (full height, width, and thickness of door). Provide STC ratings where indicated on Drawings, scheduled, or for partition ratings indicated on Drawings.
 - a. Doors shall have a minimum sound transmission classification of 28 as tested under ASTM E 90 and ASTM E 413, unless noted otherwise.
 - b. Exterior doors shall meet or exceed required thermal rating indicated on Drawings, scheduled, or for wall rating.
 - 6. Door Edges: Join door face sheets at vertical edges of door with continuous weld full height of door. Grind, fill, and dress welds smooth to provide invisible seam with smooth, flush surface.
 - a. Close ends of doors with continuous recessed channels, 16 gage steel minimum, spot-welded to both face sheets. Close top and bottom edges of doors with an internal steel channel, screw attached into top and bottom of door. Channel shall be galvanized at exterior doors. No screws are allowed on visible faces of door. Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture.
 - b. Profile of Door Edges:
 - 1.) Single-acting swing doors: Bevel both vertical edges 1/8" in 2"
 - 2.) Pairs of single acting swing doors: Bevel hinge edge 1/8" in 2". Provide surface mounted astragals for labeled or unlabeled doors unless otherwise shown on Drawings or required.
 - 3.) Double-acting swing doors: Round both vertical edges on 2" minimum radius.
 - 7. Door Louvers: Install according to manufacturers recommendations.
 - 8. Glass Stops:
 - a. Furnish fixed stops integral with and welded at security side of door.
 - b. Finish: Factory primer.
 - 9. Transom: Fabricate to requirements specified for flush doors.
 - 10. Labeled Doors: Where fire-rated openings and conditions are indicated.

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- a. Labeled doors shall be provided with fire-resistance rating indicated and shall be constructed as tested and approved by Underwriters' Laboratories (U.L) for installation in labeled frame and door assemblies.
- b. Gaskets: Gaskets are supplied under Section 08710 Door Hardware. Gaskets and installation shall conform to requirements of NFPA 105, "Installation of Smoke and Draft Control Door Assemblies."
- c. Fabricate labeled doors with same finished appearance as specified for non-labeled hollow metal doors; with welded door edges, filled and ground smooth; with label affixed to door.
- d. Where fire labels are required and continuous hinge is specified, install label on top of door within 6" of hinge side of door.

K. Hardware Reinforcement and Accessories:

1. Provide sheet steel or plate reinforcement for finish hardware items wherever necessary. Mortise, drill and tap to template requirements for mortise type hardware.
2. Butt reinforcing: 7-gage minimum, of length 4" longer than length of butt. Minimum 3 spot-welds at top and bottom.
3. Door closer reinforcement: 14-gage minimum steel channel, 6" high on each side of door. Reinforcement to extend full width of door.
4. Other Hardware Requirements: Cut, reinforce, drill, and tap doors and frames for other hardware, including energy management switches or contacts and security devices, in accordance with furnished hardware templates for accessory items. Thickness and size of reinforcement shall be as required by ANSI A250.6.

2.06 SHOP PRIMING

- A. All exposed and concealed metal surfaces of all hollow metal doors, frames and other hollow metal Work of this section shall be bonderized and then shop primed.
- B. Exposed surfaces of doors, frames and accessories shall be filled, sanded smooth, and cleaned before painting.
- C. All exposed surfaces shall be shop primed after assembly.

PART 3 - EXECUTION

3.01 FRAME INSTALLATION

- A. Install steel frames accurately in location, perfect alignment, plumb, straight and true. Brace frames to prevent displacement.
- B. Anchor frames in concrete and concrete unit masonry with galvanized anchor bolts; 3/8-inch diameter, counter-sunk at 24 inches on center at head and jamb unless noted otherwise.
- C. Anchor frames in steel and wood frame partitions with manufacturer recommended anchors.
- D. Install frame at fire rated openings in accordance with NFPA Standard No. 80.
- E. Furnish filler for anchor attachment screws, and sand smooth.

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3.02 DOOR INSTALLATION

- A. Install steel doors in accordance with manufacturer's instructions and as indicated on Drawings and in Finish Hardware Specifications. Coordinate with Work of other trades.
- B. Ensure that all door and jamb clearances comply with requirements of ANSI/NFPA 80. When wood doors are being installed in metal frames constructed pursuant to this section, allowable door and jamb clearances shall be as specified in Section 08210, Wood Doors.
- C. Adjust operable parts for correct function.
- D. Remove hardware, except primer-coated items, tag, box and install after finish painting has been completed.

3.03 PRIME COAT TOUCH-UP

- A. Immediately after installation, remove rust, repair damaged surfaces to new condition, sand smooth, and install touch-up primer.

3.04 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off Project site.

3.05 PROTECTION

- A. Protect Work of this section until Substantial Completion.

END OF SECTION

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SECTION 08210 - WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Wood doors.
- C. Related Sections:
 - 1. Section 06200: Finish Carpentry.
 - 2. Section 08110: Hollow Metal Doors, Windows and Frames
 - 3. Section 08710: Door Hardware.
 - 4. Section 08800: Glazing.
 - 5. Section 09900: Paints and Coatings.

1.02 SYSTEM DESCRIPTION

- A. Design Requirements: Drawings indicate sizes, locations and general details of wood door construction and installation.
- B. Regulatory Requirements:
 - 1. Fire rated doors shall be listed by a nationally recognized testing and certification agency in accordance with local building codes and acceptable to the authorities having jurisdiction. The listed doors shall meet or exceed the requirements of UL10B, NFPA 252 and NFPA 80. All door requiring fire-rating shall carry either a UL or ITS (Intertek Testing Services-Warnock Hersey) label.
 - 2. Comply with CBC requirements. Provide products that have been tested and passed as an assembly in compliance with CBC Standard 7-2 positive pressure smoke testing requirements.
 - 3. ASTM E 2074 – Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure on Side-Hinged and Pivoted Swinging Door Assemblies.

1.03 SUBMITTALS

- A. Shop Drawings: Submit schedules, plans, elevations and details indicating door construction details, opening identification symbols, sizes, door type and grade, fire classification, swing, light and louver cutout size and locations, and undercuts.
- B. Product Data: Submit manufacturers technical data for each specified door type, including details of wood species, design and construction, factory finishing specifications and installation instructions.
- C. Construction Samples: Submit 3 samples of not less than 6 inches by 6 inches for each type of door to be furnished, showing face, edge and core construction.

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- D. Color/finish Samples: Submit 3 samples of not less than 4 inches by 6 inches on representative door finish and 3 samples of 3 inches by 8 inches for the exposed edges. Each sample shall bear a label identifying the job name, Architect, Contractor and the Woodwork Institute finish system number.
- E. Certificates:
 - 1. Submit Certificate that solid core fire doors comply with all requirements of ANSI/WDMA I.S. 1A-97..
 - 2. Submit certification that doors comply with CBC 7-2 or UL 10B.

1.04 QUALITY ASSURANCE

- A. Wood doors shall conform to industry standard and all requirements of the American National Standards Institute, Inc., the Window & Door Manufacturers Association's Architectural Wood Flush Door Section standard ANSI / WDMA I.S. 1A-97 including the latest revisions, and special requirements herein specified.
- B. All doors shall be fabricated by the manufacturer to the dimensions specified.
- C. Doors shall be products of one manufacturer.
- D. Door modifications are not permitted, unless reviewed by the Architect.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturers original, unopened, undamaged containers with identification labels intact.
- B. Deliver doors to the Project site only after building has been provided with design temperature and humidity.
- C. Store and handle in accordance with ANSI / WDMA I.S.1A-97. Store doors protected from exposure to harmful conditions and at temperature and humidity conditions recommended by the manufacturer.

1.06 PROJECT CONDITIONS

- A. Do not install doors until building is enclosed and ambient conditions are within the temperature and humidity range recommended by door manufacturer.

1.07 WARRANTY

- A. Manufacturer shall provide a 2 year material warranty for exterior doors.
- B. Manufacturer shall provide a life time material warranty for interior doors.
- C. Installer shall provide a 2 year labor warranty for all doors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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A. Provide products manufactured by one of the following:

1. Algoma Hardwood Inc.
2. Eggers Industries.
3. Mohawk Flush Door, Inc.
4. Western Oregon Door.

2.02 DOOR CONSTRUCTION

A. Exterior Flush Doors:

1. Exterior doors shall be furnished as follows:
 - a. Opaque Finished (Painted): Custom Grade. Solid wood core flush veneered, 5 ply, faced both sides with smooth resin fiber medium density overlay, bonded to core.
2. Staved Lumber Core shall be low density, thoroughly kiln-dried wood blocks not more than 2-1/2 inches wide, with joints staggered, and random lengths.
3. Edge strips: Shall be kiln-dried birch or maple
 - a. Opaque Finished Doors: Closed grain hardwood.
4. Full stile edge strip shall be not less than 2 inches wide. Stiles shall be fully bonded to the core. The outer face stiles shall be full length 3/4 inch birch or maple. The inner back stile shall be 1-1/4 inches, 2 ply of similar species which may have four finger joints well staggered or be full lengths.
5. Top rail shall be a minimum of 2 inches with a maximum of 3 plies. Bottom rail shall be a minimum of 5 inches with a maximum of 6 plies. The outer rail faces shall be full length 7/8 inch of same species as edge strips. The inner rails shall be full length of similar species. Rails shall be fully bonded to core.
6. Crossbanding: Doors shall be furnished with full width crossbanding of properly dried hardwood, 1/16 inch thick, with a density of 52 pounds or higher per cubic foot.
7. Face Veneer for Opaque Finished Doors: Custom grade "A" medium density overlay.
8. Adhesive and Bonding: Bonding between veneer plies of wood face panels, and between door faces, frame and core unit shall be fabricated with type I waterproof cross-linking emulsion PVA adhesive.
9. Openings: Openings for lights, louvers and grilles, shall be fabricated by manufacturer, or in a certified door service mill in accordance with manufacturer's details, and in compliance with approved testing agency.
10. Louvers:
 - a. Louvers for exterior doors, where indicated, shall be furnished with at least 12 gage frame and security grill welded to 18 gage steel blades, fully galvanized, with removable galvanized or bronze insect screen on inside. Install louver with tamperproof-head through-bolts: Anemostat PLSL, Air Louvers Inc. Model 1500-A, or equal.
 - b. All louvers shall be furnished with factory primer.
12. Vision Panels: Vision panels in exterior doors, where indicated, shall be framed with Security Grille Glass Stop: Anemostat SI-IS, Air Louvers Inc. VLF-SG, or equal. Install vision panels with tamperproof-head through bolts. Security Grille shall be supplied with manufacturer's standard baked-on enamel finish.

B. Interior Flush Doors:

1. Interior doors shall be furnished as follows:

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- a. Opaque Finished (Painted): Custom grade. Solid wood core flush veneered, 5 ply minimum, faced both sides with smooth resin fiber medium density overlay, fully bonded to core.
2. Staved Lumber Core shall be low density, thoroughly kiln-dried wood blocks not more than 2-1/2 inches wide, with joints staggered, and random lengths.
3. Edge strips: Kiln-dried birch, maple or other material as indicated.
 - a. Opaque Finished Doors: Closed grain hardwood.
4. Full stile edge strip shall be not less than 1-1/2 inches wide, 2 ply stile. Stiles shall be fully bonded to the core. The outer face stile shall be full length 3/4 inch birch or maple. The inner back stile shall be 3/4 inch of similar species which may have two finger joints fully bonded to core.
5. Top and bottom edge rails shall be full length and may be of glued up stock of similar species as edge strip, white fir or douglas fir, minimum density 24.33 pounds or higher per cubic foot. Top rail shall be minimum of 2 inches. Bottom rail shall be minimum of 5 inches fully bonded to core.
6. Crossbanding: Doors shall be furnished with full width crossbanding of properly dried hardwood or engineered fiber composite material, 1/16 inch thick, with a density of 52 pounds or higher per cubic foot.
7. Face Veneer for Opaque Finished Doors: Custom grade "A" medium density overlay.
8. Adhesive and Bonding: Bonding between veneer plies of wood face panel, and between door faces, frame and core unit shall be fabricated with type I or II waterproof adhesives for interior doors.
9. Openings: Openings for lights, louvers and grilles shall be performed by the manufacturer, or in a certified door service mill in accordance with manufacturer's details, and in compliance with testing agency requirements.
10. Louvers:
 - a. Louvers for interior doors, where indicated, shall be furnished with at least 12 gauge cold rolled steel frames and security grill welded to 18 gauge blades: Anemostat PLSL, Air Louvers Inc. Model 1500-A, or equal.
 - b. For fire rated doors: Anemostat FLDL-UL-SG2, Air Louvers Inc. Model 1900-ASG, or equal.
 - c. Install louvers with tamperproof-head through bolts.
12. Vision Panels: Vision panels in fire labeled doors shall be framed with FGS-75 Fire Glass Stop by Anemostat, Air Louvers Inc. Model VLF, or equal and shall be State Fire Marshall listed. Frame shall be supplied with manufacturer's standard baked-on enamel finish. Install with tamperproof-head through bolts.

C. FireRated Doors:

1. All fire doors must meet the requirements of recognized fire door tests and bear certifying labels of an approved independent testing agency.
2. With exception to the requirements that would adversely affect the fire rating, rated doors shall meet the specifications listed in this section.
3. Door shall be constructed that when installed as an assembly and tested it will pass ASTM E-2074 "Standard Test Method for Fire Test of Door Assemblies Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies," and can be rated as required.
4. Reinforcement Blocking: Provide hardware reinforcement blocking of size as required to secure specified hardware. Reinforcement blocking shall be in compliance with the manufacturer's labeling requirements and shall not be of mineral material.

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2.03 FINISHING:

A. Factory Finishing::

1. Factory finishing shall be Custom Grade and include all necessary preparation, materials and labor to complete an Opaque finish.

B. Job Site Finishing:

1. Doors indicated to be job site finished shall be factory back primed.
 - a. Doors Scheduled for Opaque Paint finish: Prime with one coat of wood primer indicated on Section 09900, Paints and Coatings.
2. Door Finish: Per Section 09900, Paints and Coatings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install Work of this section as specified in the Woodwork Institute Manual of MillWork, and provide a Woodwork Institute Certified Compliance Certificate for Installation at Substantial Completion. Install fire doors in accordance with NFPA 80.
- B. Provide each door accurately cut, trimmed, and fitted to its frame and hardware. Clearance at lock and hanging stile and at top shall be 1/8 inch and bottom of door to bottom of frame shall be 3/4" at toilet rooms and 5/8" elsewhere except where otherwise indicated. Arises shall be rounded to a 1/16 inch radius, and lock rail edges shall be slightly beveled. Screws for hardware shall not be driven but screwed into pre-drilled holes.
- C. Doors shall operate freely, but not loosely, without sticking or binding, without hinge-bind conditions and with hardware properly adjusted and functioning.

3.02 CLEAN UP

- A. Remove and legally dispose of rubbish, waste and debris off the Project site.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 08311 - ACCESS PANELS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Steel access panels, except those specified under Divisions 15 or 16.
- C. Related Sections:
 - 1. Section 06100: Rough Carpentry.
 - 2. Section 09220: Portland Cement Plaster and Metal Lath.
 - 3. Section 09250: Gypsum Board.
 - 4. Section 09300: Tile.
 - 5. Division 15: Mechanical
 - 6. Division 16: Electrical

1.02 SUBMITTALS

- A. Shop Drawings:
 - 1. Indicate sizes, materials, thickness, fabrication methods, panel door and frame reinforcement, anchorage, and installation details.
 - 2. Provide layout drawings, indicating dimensioned locations of proposed access panels, size of each panel, and installation details. Determine and indicate required access panels in finished surfaces, whether furnished under this section or as part of the Work of Divisions 15 and 16.

1.03 QUALITY ASSURANCE

- A. Panels shall be provided with UL listings and labels.
- B. Access panels and frames shall be products of one manufacturer.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Panels and Frames: Provide protection as required by manufacturer to protect panels from damage during shipping and storage.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Access Panels:

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<u>Non-Rated</u>	<u>Milcor</u>	<u>Karp</u>	<u>Nystrom</u>
Ceramic Tile	MS	DSC214M	MT
Plaster	K	DSC214M	MP
Drywall, Plaster Veneer	DW	DSC214M	MW
<u>Rated B-Label</u>			
Ceramic Tile	MS	KRP150FR	ST
Plaster	M	KRP150PR	SP
Drywall, Plaster Veneer	M	KRP150FR	SW

- B. Unless otherwise indicated, provide brushed stainless steel finish for panels installed in ceramic tile. Provide prime coat finish suitable for field painting for panels installed in other finishes.

PART 3 - EXECUTION

3.01 GENERAL

- A. Provide access panels in finish construction where indicated on the Drawings, wherever required for access to concealed mechanical and electrical equipment, and where required by codes. Panels indicated on architectural Drawings shall be furnished under this section. Required panels for access to equipment, but not indicated on architectural Drawings, shall be furnished as part of the Work requiring the access.

3.02 INSTALLATION

- A. Install panels accurately in location, perfect alignment, plumb, straight and true. Brace to prevent displacement by adjacent Work.
- B. Examine panels after installation for proper opening, closing and clearances. Replace damaged or defective panels.

3.03 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 08400 – ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contract Drawings, Division 0, Conditions of the Contract, and Division1, General Requirements, apply to the Work of this Section.
- B. Section Includes:
 - 1. Provide materials, labor, and equipment necessary for the completion of entrances and storefronts as indicated on the Drawings and specified herein.

1.02 TESTING AND PERFORMANCE REQUIREMENTS

- A. Test Units
 - 1. Air test unit shall be minimum size of 3'-0" x 7'-0".

1.03 QUALITY ASSURANCE

- A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.02.
- B. Test reports shall be accompanied by the entrance door manufacturer's letter of certification stating that the tested door meets or exceeds the referenced criteria for the appropriate AAMA door type.

1.04 SUBMITTALS

- A. Contractor shall submit shop drawings, finish samples, test reports, and warranties.
 - 1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.

1.05 WARRANTIES

- A. Total Storefront System:
 - 1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total door installation that includes that of the manufacturer supplied doors, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air and structural adequacy as called for in the specifications and approved shop drawings.
 - 2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at his expense during the warranty period.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Aluminum
 - 1. Extruded aluminum shall be 6063-T5 or T6 alloy and temper.
- B. Fasteners
 - 1. All exposed fasteners shall be aluminum or stainless steel.
- C. Glass
 - 1. Glass shall be ¼". Provide tempered glass as indicated on drawings.

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2.02 MANUFACTURERS

- A. Framing system shall be as manufactured by RPS Architectural Systems, Kawneer Co., or United States Aluminum Corporation. Framing sections shall be 2 inches x 4-1/2 inches, glazing system as indicated on Drawings. Provide tubular framing section around all hollow metal door installations in the storefront system.
 - 1. United States Aluminum, 200 Singleton Drive, Waxahachie, Texas 75165; (972) 937-9651 (voice); (972) 937-0405 (data).
 - a. Storefront Series 451.

2.03 FABRICATION

- A. General
 - 1. Major portions of the door sections shall have .125" wall thickness. Glazing stop sections shall have .050" wall thickness.
- B. Glazing
 - 1. All units shall be dry glazed with extruded pressure fitting aluminum glazing stops, and EPDM gasket.
- c. Finish
 - 1. Organic:
 - a. Finish all exposed areas of aluminum windows and components with electrolytically deposited color in accordance with Aluminum Association Designation AA-M10-C22-. Color shall be clear.

AA Description	Description	Arch. Class	AAMA Guide Spec.
AA-M10-C22-A41 or A31	Clear Anodized I or II		611-98
AA-M10-C22-A44 or A34	Color Anodized I or II		611-98

PART 3 EXECUTION

3.01 INSPECTION

- A. Job Conditions
 - 1. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface and are in accordance with approved shop drawings.

3.02 INSTALLATION

- A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.
- B. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

3.03 PROTECTION AND CLEANING

- A. After completion of storefront installation, work shall be inspected, and left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the general contractor.

END OF SECTION 08400

Door/Hdwe Index

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HwSet

Door Number	HwSet	Door Number	HwSet	Door Number	HwSet
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101A	07	129B	16
102A	07	130A	11
103A	07	131A	13
104A	07	132A	11
105A	07	133A	03
106A	08	134A	18
107A	08	134B	04
108A	08	135A	17
109A	08	135B	15
110A	08	136A	09
111A	19	137A	24
111B	01	138A	22
112A	08	138B	25
113A	08	139A	09
114A	20	140A	17
114B	20	141A	06
116A	08	143A	02
116B	08	143B	14
117A	08	144A	18
119A	21	145A	05
119B	02		
120A	22		
120C	25		
121A	22		
121B	02		
122A	09		
123A	21		
125A	10		
126A	21		
127A	11		
128A	12		
129A	17		

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SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Door Hardware, including electric hardware.
 - 2. Storefront and entrance door hardware.
 - 3. Digital keypad access control devices.
 - 4. Key cabinets.
- B. Related Sections:
 - 1. Section 06200 - Finish Carpentry: Finish Hardware Installation
 - 2. Section 07920 - Joint Sealers – exterior thresholds
 - 3. Section 08110 - Metal Doors and Frames
 - 4. Section 16200 - Electrical Power
 - 5. Section 16722 - Fire/Life-Safety System
 - 6. Section 16724 - Security Access Systems
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
 - 1. Windows.
 - 2. Cabinets, including open wall shelving and locks.
 - 3. Signs, except where scheduled.
 - 4. Toilet accessories, including grab bars.
 - 5. Installation.
 - 6. Rough hardware.
 - 7. Conduit, junction boxes & wiring.
 - 8. Folding partitions, except cylinders where detailed.
 - 9. Sliding aluminum doors, except cylinders where detailed.
 - 10. Access doors and panels, except cylinders where detailed.

1.02 REFERENCES

Use date of standard in effect as of Bid date.

- A. American National Standards Institute – ANSI 156.18 – Materials and Finishes.
- B. BHMA – Builders Hardware Manufacturers Association
- C. DHI – Door and Hardware Institute

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- D. NFPA – National Fire Protection Association
 - 1. NFPA 80 – Fire Doors and Windows
 - 2. NFPA 105 – Smoke and Draft Control Door Assemblies
 - 3. NFPA 252 – Fire Tests of Door Assemblies
- E. UL – Underwriters Laboratories
 - 1. UL10C – Positive Pressure Fire Tests of Door Assemblies.
 - 2. UL 305 – Panic Hardware
- F. WHI – Warnock Hersey Incorporated
- G. 2007 State of California Building Code
- H. Local applicable codes
- I. SDI – Steel Door Institute
- J. WI – Woodwork Institute
- K. AWI – Architectural Woodwork Institute
- L. NAAMM – National Association of Architectural Metal Manufacturers

1.03 SUBMITTALS & SUBSTITUTIONS

- A. SUBMITTALS: Submit six copies of schedule per Section 01300. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
 - 1. Type, style, function, size, quantity and finish of hardware items.
 - 2. Use BHMA Finish codes per ANSI A156.18.
 - 3. Name, part number and manufacturer of each item.
 - 4. Fastenings and other pertinent information.
 - 5. Description of door location using space names and numbers as published in the drawings.
 - 6. Explanation of abbreviations, symbols, and codes contained in schedule.
 - 7. Mounting locations for hardware.
 - 8. Door and frame sizes, handing, materials, fire-rating and degrees of swing.
 - 9. List of manufacturers used and their nearest representative with address and phone number.
 - 10. Catalog cuts.
 - 11. Wiring Diagrams.
 - 12. Manufacturer’s technical data and installation instructions for electronic hardware.
- B. Bid and submit manufacturer’s updated/improved item if scheduled item is discontinued.
- C. Deviations: Highlight, encircle or otherwise identify deviations from “Schedule of Finish Hardware” on submittal with notations clearly designating those portions as deviating from this section.

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- D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.
- E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.
- F. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.
 - a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.
- B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.
- C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
- D. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C / California State Fire Marshal Standard 12-7-4 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.
 - 1. Note: scheduled resilient seals may exceed selected door manufacturer's requirements.
 - 2. See 2.06.E for added information regarding resilient and intumescent seals.
- E. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery: coordinate delivery to appropriate locations (shop or field).
 - 1. Permanent keys and cores: secured delivery direct to Owner's representative.
- B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.
- C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.06 PROJECT CONDITIONS AND COORDINATION

- A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.

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- B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:
1. Location of embedded and attached items to concrete.
 2. Location of wall-mounted hardware, including wall stops.
 3. Location of finish floor materials and floor-mounted hardware.
 4. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
 5. Manufacturer templates to door and frame fabricators.
- C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation. Do not order hardware until the submittal has been reviewed by the frame and door suppliers for compatibility with their products.

1.07 WARRANTY

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:
- | | |
|---------------------------------------|---|
| 1. Locksets: | Three years |
| 2. Extra Heavy Duty Cylindrical Lock: | Seven Years |
| 3. Exit Devices: | Three years mechanical
One year electrical |
| 4. Closers: | Ten years mechanical
Two years electrical |
| 5. Hinges: | One year |
| 6. Other Hardware | Two years |

1.08 COMMISSIONING

- A. Conduct these tests prior to request for certificate of substantial completion:
1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
 2. With installer, access control contractor and electrical contractor present, test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.
 3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

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PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives	Bommer
Continuous Hinges	(IVE) Ives	Zero
Key System	(SCH) Schlage	
Locks	(SCH) Schlage	
Exit Devices	(VON) Von Duprin	
Closers	(LCN) LCN	
Auto Flush Bolts	(IVE) Ives	DCI
Coordinators	(IVE) Ives	DCI
Silencers	(IVE) Ives	Hiawatha
Push & Pull Plates	(IVE) Ives	Hiawatha
Kickplates	(IVE) Ives	Hiawatha
Stops & Holders	(IVE) Ives	Hiawatha
Overhead Stops	(GLY) Glynn-Johnson	None available
Thresholds	(NGP) NGP	Zero
Seals & Bottoms	(NGP) NGP	Zero
Key Cabinets	(LUN) Lund	TelKee

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- A. Manufacturers and their abbreviations used in this schedule:
- | | |
|-----|-------------------------|
| IVE | H. B. Ives |
| GLY | Glynn-Johnson Hardware |
| LCN | LCN Closers |
| NGP | National Guard Products |
| SCH | Schlage Lock Company |
| VON | Von Duprin |
| LUN | Lund |

2.02 HINGING METHODS

- A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.
- B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.
- C. Conventional Hinges: Steel or stainless steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.
1. Outswinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.
 2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.
- D. Continuous Hinges:
1. Geared-type aluminum.
 - a) Use wide-throw units where needed for maximum degree of swing, advise architect if commonly available hinges are insufficient.

2.03 LOCKSETS, LATCHSETS, DEADBOLTS

- A. Extra Heavy Duty Cylindrical Locks and Latches: as scheduled.
1. Chassis: cylindrical design, corrosion-resistant plated cold-rolled steel, through-bolted.
 2. Locking Spindle: stainless steel, integrated spring and spindle design.
 3. Latch Retractors: forged steel. Balance of inner parts: corrosion-resistant plated steel, or stainless steel.
 4. Latchbolt: solid steel.
 5. Backset: 2-3/4" typically, more or less as needed to accommodate frame, door or other hardware.
 6. Lever Trim: accessible design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to door face.
 7. Electric operation: Manufacturer-installed continuous duty solenoid.
 8. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
 9. Lock Series and Design: Schlage ND series, "Sparta" design.

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10. Certifications:
 - a) ANSI A156.2, 1994, Series 4000, Grade 1.
 - b) UL listed for A label and lesser class single doors up to 4ft x 8ft.

2.04 EXIT DEVICES / PANIC HARDWARE

A. General features:

1. Independent lab-tested 1,000,000 cycles.
2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
3. 0.75-inch throw deadlocking latchbolts.
4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
5. No exposed screws to show through glass doors.
6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
7. Releasable in normal operation with 15-lb. maximum operating force per California State Fire Marshal Standard 12-10-3, and with 32 lb. maximum pressure under 250-lb. load to the door.
8. Exterior doors scheduled with XP-series devices: Static load force resistance of at least 2000 pounds.
9. Where devices span over door lite frame and the face of the selected lite manufacturer's frame is raised from the face of the door, furnish panic hardware manufacturer's fitted shims or glass-bead kits at no additional cost to the project.
10. Comply with CBC Section 1003.3.1.9.

B. Specific features:

1. Non-Fire Rated Devices: cylinder dogging.
2. Lever Trim: breakaway type, forged brass or bronze escutcheon min .130" thickness, compression spring drive, match lockset lever design.
3. Rod and latch guards with sloped full-width kickplates for doors fitted with surface vertical rod devices with bottom latches.
4. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware". Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.
5. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

2.05 CLOSERS

A. Surface Closers: [4041]

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.

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2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Adjustable to open with not more than 5.0lbs pressure to open at exterior doors and 5.0lbs at interior doors. As allowed per California Building Code, Section 1133B.2.5, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15lbs.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
11. Non-flaming fluid, will not fuel door or floor covering fires.
12. Pressure Relief Valves (PRV) not permitted.

2.06 OTHER HARDWARE

- A. Automatic Flush Bolts: Low operating force design.
- B. Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- C. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.
- D. Door Stops: Provide stops to protect walls, casework or other hardware.
 1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
 2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.
- E. Seals: Finished to match adjacent frame color. Resilient seal material: polyurethane, polypropylene, nylon brush, silicone rubber or solid high-grade neoprene as scheduled. Do not furnish vinyl seal material. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material's thickness and durability.
 1. Proposed substitutions: submit for approval.
 2. Solid neoprene: MIL Spec. R6855-CL III, Grade 40.
 3. Non-corroding fasteners at in-swinging exterior doors.

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4. Sound control openings: Use components tested as a system using nationally accepted standards by independent laboratories. Ensure that the door leaves have the necessary sealed-in-place STC ratings. Fasten applied seals over bead of sealant.
 5. Fire-rated Doors, Resilient Seals: UL10C / UBC Standard 7-2 compliant. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements. Where rigid housed resilient seals are scheduled in this section and the selected door manufacturer only requires an adhesive-mounted resilient seal, furnish rigid housed seal at minimum, or both the rigid housed seal plus the adhesive applied seal. Adhesive applied seals alone are deemed insufficient for this project where rigid housed seals are scheduled.
 6. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C / UBC Standard 7-2. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required
- F. Automatic door bottoms: low operating force units. Doors with automatic door bottoms plus head and jamb seals cannot require more than two pounds operating force to open when closer is disconnected.
- G. Thresholds: As scheduled and per details. Comply with CBC Section 1133B.2.4.1. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.
1. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).
 2. Fire-rated openings, 90min or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, request direction from Architect.
 3. Fire-rated openings, 3hour duration: Thresholds, where scheduled, to extend full jamb depth.
 4. Acoustic openings: Set units in full bed of Division-7-compliant, leave no air space between threshold and substrate.
 5. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
 6. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.
- H. Exposed Through-Bolts: Do not use SNB, grommet nuts, sleeve nuts or other such clamping type fasteners, intent is for minimal exposed hardware. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.
- I. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

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2.07 FINISH

- A. Generally BHMA 626 Satin Chromium.
 - 1. Areas using BHMA 626 to have push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise noted.
- B. Door closers: factory powder coated to match other hardware, unless otherwise noted.
- C. Aluminum items: match predominant adjacent material. Seals to coordinate with frame color.

2.08 KEYING REQUIREMENTS

- A. Key System: Schlage Classic keyway, interchangeable core. For estimate use factory GMK charge. Initiate and conduct meeting(s) with Owner to determine system keyway(s), keybow styles, structure. Furnish Owner's written approval of the system.
Keys
 - 1. Existing factory registered master key system.
 - 2. Construction keying: furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cylinders/cores in Owner's presence. Demonstrate that construction key no longer operates.
 - 3. Furnish 10 construction keys.
 - 4. Furnish 2 construction control keys.
- B. Key Cylinders: furnish utility patented, 6-pin solid brass construction.
- C. Cylinder cores: furnish keyed at factory of lock manufacturer where permanent records are maintained. Locks and cylinders same manufacturer.
- D. Permanent keys: use secured shipment direct from point of origination to Owner.
 - 1. For estimate: 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.
 - 2. For estimate: VKC stamping plus "Do Not Duplicate".
- E. Bitting List: use secured shipment direct from point of origination to Owner upon completion.

PART 3 EXECUTION

3.01 ACCEPTABLE INSTALLERS

- A. Can read and understand manufacturers' templates, suppliers' hardware schedules and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.02 PREPARATION

- A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation.
- B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
 - 1. Notify Architect of code conflicts before ordering material.

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2. Locate levers, key cylinders, t-turn pieces, touchbars and other operable portions of latching hardware between 30 inches to 44 inches above the finished floor, per CBC Section 1133B.2.5.1.
 3. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
- C. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

3.03 INSTALLATION

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.
1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
 2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.
 3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.
 4. Replace fasteners damaged by power-driven tools.
- B. Locate floor stops no more that 4 inches from walls and not within paths of travel. See paragraph 2.02 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.
- C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.
- D. Locate overhead stops for minimum 90 degrees and maximum allowable degree of swing.
- E. Drill pilot holes for fasteners in wood doors and/or frames. Centerpunch hole locations before using self-drilling type screws to prevent skating. Replace screws that are not centered in their holes.
- F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

3.04 ADJUSTING

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.
 2. Adjust doors to fully latch with no more than 1 pound of pressure.
 3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.
 4. Adjust door closers per 1.9 this section.

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- B. Inspection: Use hardware supplier's consultant or consultant's agent. Include supplier's report with closeout documents.
- C. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:
 - 1. Re-adjust hardware.
 - 2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.
 - 3. Identify items that have deteriorated or failed.
 - 4. Submit written report identifying problems

3.05 DEMONSTRATION

- A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.06 PROTECTION/CLEANING

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.07 SCHEDULE OF FINISH HARDWARE

- A. See door schedule in drawings for hardware set assignments.
- B. Provide all materials in the misc. heading to the owner.
- C. Miscellaneous Material:

SPECWORKS # 98086

HW SET: 01

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	ENTRANCE LOCK	L9453T 17A L583-363	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	4041 DEL SHCUSH	689	LCN
1	SET	SEALS	9700E	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	513 MS& A OR AS DETAILED	AL	NGP
1	EA	LOCK GUARD	LG10	630	IVE
1		MEMO	MOUNT SEALS BEFORE INSTALLING CLOSER		

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HW SET: 02

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	CLASSROOM LOCK	L9077T 17A	626	SCH
2	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	4041 DEL SCUSH	689	LCN
1	SET	SEALS	9700E	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	513 MS& A OR AS DETAILED	AL	NGP
1	EA	LOCK GUARD	LG10	630	IVE
1		MEMO	MOUNT SEALS BEFORE INSTALLING CLOSER		

HW SET: 03

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	CD98NL-OP	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061 XQ11-948	626	SCH
2	EA	CORE ONLY	23-030	626	SCH
1	EA	DOOR PULL	VR910NL	630	IVE
1	EA	SURFACE CLOSER	4041 DEL SCUSH	689	LCN
1	SET	SEALS	9700E	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	513 MS& A OR AS DETAILED	AL	NGP
1	EA	LOCK GUARD	LG10	630	IVE
1		MEMO	MOUNT SEALS BEFORE INSTALLING CLOSER		

HW SET: 04

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	CORE ONLY	23-030	626	SCH
1	EA	ELECTRONIC LOCK	AD-200-MD-70-PRK-SPA-JD-8B	626	SCE
1	EA	SURFACE CLOSER	4041 DEL SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	9700E	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	513 MS& A OR AS DETAILED	AL	NGP
1	EA	LOCK GUARD	LG10	630	IVE
1		MEMO	MOUNT SEALS BEFORE INSTALLING CLOSER		

HW SET: 05

1	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	98NL-OP	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	DOOR PULL	VR910NL	630	IVE
1	EA	SURFACE CLOSER	4041 DEL SHCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	9700E	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	513 MS& A OR AS DETAILED	AL	NGP
1	EA	LOCK GUARD	LG10	630	IVE

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HW SET: 06

2	EA	CONTINUOUS HINGE	224HD	628	IVE
1	EA	MULLION	KR4954	689	VON
1	EA	PANIC HARDWARE	CD35A-EO	626	VON
1	EA	PANIC HARDWARE	CD35A-NL-OP	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
2	EA	MORTISE CYLINDER	20-061 XQ11-948	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX (KR)	626	SCH
2	EA	OFFSET DOOR PULL	8190-0-0	630	IVE
2	EA	SURFACE CLOSER	4041 DEL SCUSH	689	LCN
2	EA	MOUNTING PLATE	4040-18PA	689	LCN
2	EA	DOOR SWEEP	C607A	AL	NGP
1	EA	THRESHOLD	513 MS& A OR AS DETAILED	AL	NGP
1	EA	MEMO	SEALS BY ALUM FRAME MFGR		

HW SET: 07

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	WALL STOP	WS406/WS407 AS REQUIRED	630	IVE
1	SET	SEALS	2525B	BRN	NGP
1	EA	DBL WARDROBE HOOK	582	626	IVE

HW SET: 08

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	WALL STOP	WS406/WS407 AS REQUIRED	630	IVE
1	SET	SEALS	2525B	BRN	NGP
1	EA	DBL WARDROBE HOOK	582	626	IVE

HW SET: 09

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	WALL STOP	WS406/WS407 AS REQUIRED	630	IVE
1	SET	SEALS	2525B	BRN	NGP
1	EA	DBL WARDROBE HOOK	582	626	IVE

**HEMET SERVICE CENTER
RIVERSIDE COUNTY ECONOMIC DEVELOPMENT AGENCY**

HW SET: 10

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	OVERHEAD STOP	450S	630	GLY
1	SET	SEALS	2525B	BRN	NGP

HW SET: 11

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302-0 6" X 16"	630	IVE
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	OVERHEAD STOP	450S	630	GLY
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	MEMO	SIGNAGE BY OTHERS		

HW SET: 12

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302-0 6" X 16"	630	IVE
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	SECURITY FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	MEMO	SIGNAGE BY OTHERS		

HW SET: 13

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	SECURITY FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 14

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS406/WS407 AS REQUIRED	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HEMET SERVICE CENTER
RIVERSIDE COUNTY ECONOMIC DEVELOPMENT AGENCY**

HW SET: 15

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	CD98L 996L	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061 XQ11-948	626	SCH
2	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	SECURITY FLOOR STOP	FS18S	BLK	IVE
1	SET	SEALS	9700E	AL	NGP

HW SET: 16

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	CD98L 996L	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061 XQ11-948	626	SCH
2	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	4041 DEL SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	9700E	AL	NGP

HW SET: 17

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	SECURITY FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 18

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	98L-BE 996L-BE	626	VON
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	SECURITY FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HEMET SERVICE CENTER
RIVERSIDE COUNTY ECONOMIC DEVELOPMENT AGENCY**

HW SET: 19

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	CORE ONLY	23-030	626	SCH
1	EA	ELECTRONIC LOCK	AD-200-MD-70-PRK-SPA-JD-8B	626	SCE
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS406/WS407 AS REQUIRED	630	IVE
1	SET	SEALS	2525B	BRN	NGP

HW SET: 20

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	SECURITY FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 21

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	WALL STOP	WS406/WS407 AS REQUIRED	630	IVE
1	SET	SEALS	2525B	BRN	NGP

HW SET: 22

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	WALL STOP	WS406/WS407 AS REQUIRED	630	IVE
1	SET	SEALS	2525B	BRN	NGP

HW SET: 23

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	4041 DEL EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS406/WS407 AS REQUIRED	630	IVE
1	SET	SEALS	2525B	BRN	NGP

**HEMET SERVICE CENTER
RIVERSIDE COUNTY ECONOMIC DEVELOPMENT AGENCY**

HW SET: 24

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	OVERHEAD STOP	450S	630	GLY
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	2525B	BRN	NGP

HW SET: 25

1 ALL HARDWARE BY DOOR MANUFACTURER

MISCELLANEOUS:

1	EA	KEY CABINET	1201-A 90 CAP	GRY	LUN
1	EA	EXPRESS SOFTWARE	56-063		SCE
1	EA	HANDHELD DEVICE	HHD KIT		SCE
15	EA	PROX CARD	PRX1		SCE

END OF SECTION

Door Schedule

Qty	Mark	Arch Door No	HwSet	Mode	Width	Height	Thick	Door	Frame	Rating	Outside Location	Inside Location
1	101A	101A	07	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	102A	102A	07	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	103A	103A	07	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	104A	104A	07	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	105A	105A	07	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	106A	106A	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	107A	107A	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	108A	108A	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	109A	109A	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	110A	110A	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	111A	111A	19	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	BREAK
1	111B	111B	01	SGL	30"	70"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	BREAK
1	112A	112A	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	113A	113A	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	114A	114A	20	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	OFFICE
1	114B	114B	20	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	CONFERENCE
1	116A	116A	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	CONFERENCE
1	116B	116B	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	117A	117A	08	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	119A	119A	21	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	OFFICE
1	119B	119B	02	SGL	30"	70"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	SKILLS LAB
1	120A	120A	22	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	SKILLS LAB
1	120C	120C	25	FLD	verify	verify		UNK	UNK	NON-RTD	CONFERENCE	CONFERENCE
1	121A	121A	22	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	CONFERENCE
1	121B	121B	02	SGL	30"	70"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	CONFERENCE ROOM
1	122A	122A	09	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	COMPUTER LAB	INTERVIEW
1	123A	123A	21	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	COPY - STORAGE
1	125A	125A	10	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	ADMINISTRATION
1	126A	126A	21	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	COPY - STORAGE
1	127A	127A	11	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	RESTROOM
1	128A	128A	12	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	RESTROOM
1	129A	129A	17	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	HALL
1	129B	129B	16	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	LOBBY	HALL
1	130A	130A	11	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	RESTROOM
1	131A	131A	13	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	JANITOR
1	132A	132A	11	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	HALL	RESTROOM
1	133A	133A	03	SGL	30"	70"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	CUBICLES
1	134A	134A	18	SGL	30"	70"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	SECURE STORAGE

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Door Schedule

1	134B	04	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	SECURE STORAGE
1	135A	17	SGL	3'0"	7'0"	1-3/4"	WD	HMF	NON-RTD	HALL	HALL
1	135B	15	SGL	3'0"	7'0"	1-3/4"	WD	HMF	NON-RTD	LOBBY	HALL
1	136A	09	SGL	3'0"	7'0"	1-3/4"	WD	HMF	NON-RTD	CUBICLES	OFFICE
1	137A	24	SGL	3'0"	7'0"	1-3/4"	WD	HMF	NON-RTD	HALL	CONFERENCE
1	138A	22	SGL	3'0"	7'0"	1-3/4"	WD	HMF	NON-RTD	HALL	CONFERENCE
1	138B	25	FLD	verify	verify		UNK	UNK	NON-RTD	CONFERENCE	CONFERENCE
1	139A	09	SGL	3'0"	7'0"	1-3/4"	WD	HMF	NON-RTD	HALL	OFFICE
1	140A	17	SGL	3'0"	7'0"	1-3/4"	WD	HMF	NON-RTD	HALL	HALL
1	141A	06	PR	6'0"	7'0"	1-3/4"	A/G	ALF	NON-RTD	EXTERIOR	LOBBY
1	143A	02	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	COMPUTER LAB
1	143B	14	SGL	2'0"	7'0"	1-3/4"	WD	HMF	NON-RTD	LAB	FSR
1	144A	18	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	HALL	DATA ROOM
1	145A	05	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	ELECTRICAL

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Job Name: HEMET SERVICE CENTER

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Catalog Cuts

for

HEMET SERVICE CENTER
CITY OF HEMET

Sorted by Manufacturer

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Catalog Cut Summary

Mfgr	Description	Item#	Catalog Number	PAGE
GLY	OVERHEAD STOP		450S	5
IVE	OFFSET DOOR PULL		8190-0-0	9
IVE	PUSH PLATE		8200 4" X 16"	10
IVE	PULL PLATE		8302-0 6" X 16"	11
IVE	SECURITY FLOOR STOP		FS18S	12
IVE	WALL STOP		WS406/WS407 AS REQUIRED	13
IVE	SILENCER		SR64	14
IVE	LOCK GUARD		LG10	15
IVE	DBL WARDROBE HOOK		582	16
IVE	KICK PLATE		8400 10" X 2" LDW	17
IVE	DOOR PULL		VR910NL	18
IVE	HINGE		3CB1 4.5 X 4.5	19
IVE	HINGE		3CB1HW 4.5 X 4.5	19
IVE	CONTINUOUS HINGE		224HD	20
IVE	GLOBAL CUT		GLOBAL CUT	21
IVE	GLOBAL CUT		GLOBAL CUT	22
IVE	GLOBAL CUT		GLOBAL CUT	23
LCN	SURFACE CLOSER		4041 DEL SCUSH	24
LCN	SURFACE CLOSER		4041 DEL SHCUSH	24
LCN	MOUNTING PLATE		4040-18PA	24
LCN	SURFACE CLOSER		4041 DEL EDA	24
SCE	PROX CARD		PRX1	33
LUN	KEY CABINET		1201-A 90 CAP	34
NGP	THRESHOLD		513 MS& A OR AS DETAILED	35

Catalog Cut Summary

Mfgr	Description	Item#	Catalog Number	PAGE
NGP	SEALS		2525B	36
NGP	DOOR SWEEP		C607A	37
NGP	DOOR SWEEP		C627A	37
NGP	SEALS		9700E	38
SCE	HANDHELD DEVICE		HHD KIT	39
SCE	ELECTRONIC LOCK		AD-200-MD-70-PRK-SPA-JD-8B	41
SCH	CORE ONLY		23-030	45
SCH	RIM CYLINDER		20-057-ICX	46
SCH	MORTISE CYLINDER		20-061 XQ11-948	47
SCH	MORTISE CYLINDER		20-061-ICX (KR)	47
SCH	PASSAGE SET		ND10S SPA	48
SCH	OFFICE LOCK		ND50TD SPA	48
SCH	CLASSROOM LOCK		ND70TD SPA	48
SCH	STOREROOM LOCK		ND80TD SPA	48
SCH	CLASSROOM LOCK		L9077T 17A	54
SCH	ENTRANCE LOCK		L9453T 17A L583-363	54
VON	MULLION		KR4954	72
VON	PANIC HARDWARE		CD98L 996L	73
VON	PANIC HARDWARE		CD98NL-OP	73
VON	PANIC HARDWARE		98NL-OP	73
VON	PANIC HARDWARE		98L-BE 996L-BE	73
VON	PANIC HARDWARE		CD35A-EO	75
VON	PANIC HARDWARE		CD35A-NL-OP	75
VON	GLOBAL CUT		GLOBAL CUT	77

Catalog Cut Summary

Mfgr	Description	Item#	Catalog Number	PAGE
VON	GLOBAL CUT		GLOBAL CUT	78
VON	GLOBAL CUT		GLOBAL CUT	79
VON	GLOBAL CUT		GLOBAL CUT	80
VON				81
VON	GLOBAL CUT		GLOBAL CUT	82
VON	GLOBAL CUT		GLOBAL CUT	83
VON	GLOBAL CUT		GLOBAL CUT	84
VON	GLOBAL CUT		GLOBAL CUT	85
VON	GLOBAL CUT		GLOBAL CUT	86
VON	GLOBAL CUT		GLOBAL CUT	87

450 Series Surface Overhead Door Holders/Stops



450 Series Medium-Duty

Glynn-Johnson provides the most complete line of overhead holders and stops, offering solutions for the most demanding door control problems. These surface-mounted holders and stops offer the widest variety of functions, materials and finishes to fit all medium- to light-duty applications.

Glynn-Johnson 450 series holders and stops provide reliable and versatile surface-mounted overhead door control for all medium to light-duty applications. The visible components are available in a wide variety of architectural finishes to complement any design. The 450 series holders and stops are designed for installation in virtually all types of doors and frames including doors with conventional butt hinges, offset pivots, continuous hinges, swing clear hinges and many other specialty hinges. The templates provided allow for variable mounting positions, ranging from 85° - 110° of opening.

Four Models:

- 450H Series Hold-Open Model
- 450S Series Stop-Only Model
- 450F Series Friction Hold-Open Model
- 450SE Series Special Stop-Only Model

Five Sizes:

- Simple
- Standardized
- Each model is available in five sizes

Three Options:

- J—Angle Jamb Bracket
- SHIM—Blade Stop Shim Kit
- SOC—Pin-in-Socket Security Screw Package

Unmatched Convenience:

- Non-Handed
- Improved Compatibility with Door Closers
- Improved Jamb Bracket Design
- Single Acting Doors
- Interior Applications
- Durable
- Easy to Install
- Improved Corrosion Resistance

Materials and Finishes:

In Brass, 300 series stainless steel or steel, these models offer the broadest range of finishes in the industry to complement any design. Brass and Stainless Steel offer the highest resistance to corrosion, while all these base materials are suitable for normal interior use.

Finish	Description
US3	Polished Brass
US4	Satin Brass
US10	Satin Bronze
US10B	Oil Rubbed Bronze
US32	Polished Stainless Steel
US32D	Satin Stainless Steel
SP4	Powder Coat Brass
SP10	Powder Coat Bronze
SP28	Powder Coat Aluminum
SP313	Powder Coat Dark Bronze
SPBLK	Powder Coat Black
652	Chrome-like Coating

Models

Glynn-Johnson 450 series holders and stops are designed for medium to light-duty applications. They're ideal for openings that are subject to normal activity, providing protection for the door, frame, hinges and surrounding walls or obstructions.

Designed for improved compatibility with most door closers, all models incorporate popular channel/slide arm design and offset jamb brackets. The improved design makes it easier to change functions in the field, should user requirements change.

450H Series Hold-Open

(Suffix H) These models conveniently hold doors open at a predetermined position, permitting unobstructed traffic flow.

These models feature an adjustable automatic Hold-Open that is activated when the door is opened to a preset angle. The Hold-Open tension can be adjusted using an allen wrench through the end of the slider located in the channel at the top of the door. Each meets the 250,000 test cycles required for Grade 1 classification.

450S Series Stop-Only

(Suffix S) When the Hold-Open function is not required, the Stop-Only function provides the same effective door control without keeping the door held open. The Stop-Only model may be used on fire doors.

450F Series Friction Hold-Open

(Suffix F) Friction Hold-Open models provide an alternative holding method ideal for patient room doors, wardrobe or closet doors, or similar applications where multiple Hold-Open positions are desired. The friction tension can be adjusted using an allen wrench on the slider located in the channel at the top of the door.

450SE Series Special Stop-Only

(Suffix SE) When Stop-Only models are used in conjunction with single point Hold-Open electronic door closers, the function may be ordered without the shock absorbing mechanism. Used as an auxiliary stop with these closers, they will prolong the life of the closer. The stop location is adjusted using an allen wrench on the stop block located in the channel.

Note: Caution should be taken when using this option in other applications, as the elimination of the shock-absorbing spring can put added stress on the door and frame.

Application Information

Closer Applications

Glynn-Johnson 450 series models require minimal door and frame preparation. They may be used in conjunction with most surface-applied door closers. In some cases, optional drop brackets may need to be mounted on the closers. These brackets are available from the closer manufacturer.

UL Classification

The 450 series Stop-Only models are classified by Underwriters Laboratories (UL) as Miscellaneous Fire Door Accessories. This classification applies to use on either Hollow Metal Fire Doors or Wood Fire Doors. These units may be used on doors of any rating. As a reminder, the Miscellaneous Fire Door Accessories (GVUX) section is defined by UL as: "Miscellaneous fire door accessories are intended in the individual Listings. The accessories have been investigated to determine that when installed in accordance with the manufacturer's instructions, the accessories do not adversely affect the fire rating of the fire door and/or fire door frames."

Dead-Stop Templating:

For situations where a wall or similar obstruction is in place at an opening angle of 110° or less (e.g. doors that open back-to-back), dead stop templating should be used. This includes all Hold-Open, Friction and Stop-Only models, except when the "SE" option is used. The Dead Stop position is reached when the shock-absorbing spring is fully compressed, allowing an initial degree of opening of 5° to 7° less than the Dead Stop opening.

Example: If the holder is templated for 100° Dead Stop, the door will hold open somewhere between 93° to 95°, and no further than 100°.

Note: Do not use dead-stop templating on the 450SE Series since there is no shock-absorbing spring.

Environmental Conditions:

To assure a long operating life for holders and stops, consider the environment where they will be used. Doors that open to the exterior of a building or are subject to corrosive conditions should have a holder constructed primarily of stainless steel, brass or bronze materials. For interior doors, steel material may be acceptable, although brass and bronze substrates will provide a more attractive architectural grade finish.

Heavy-Use Applications:

Where doors and frames are subject to heavy use and abuse, a heavy-duty holder or stop should be considered. Also heavy-duty units should be considered on exterior doors subject to wind.

Options

Suffix J (Angle Jamb Bracket):

An additional option on the 450 Series is the Angle Jamb Bracket for hinge-side or flush transom mounting. The angle jamb bracket affixes to the standard jamb bracket. If ordered with the overhead add suffix J. If needed separately order 450J-Finish.

Suffix SHIM (Blade Stop Shims):

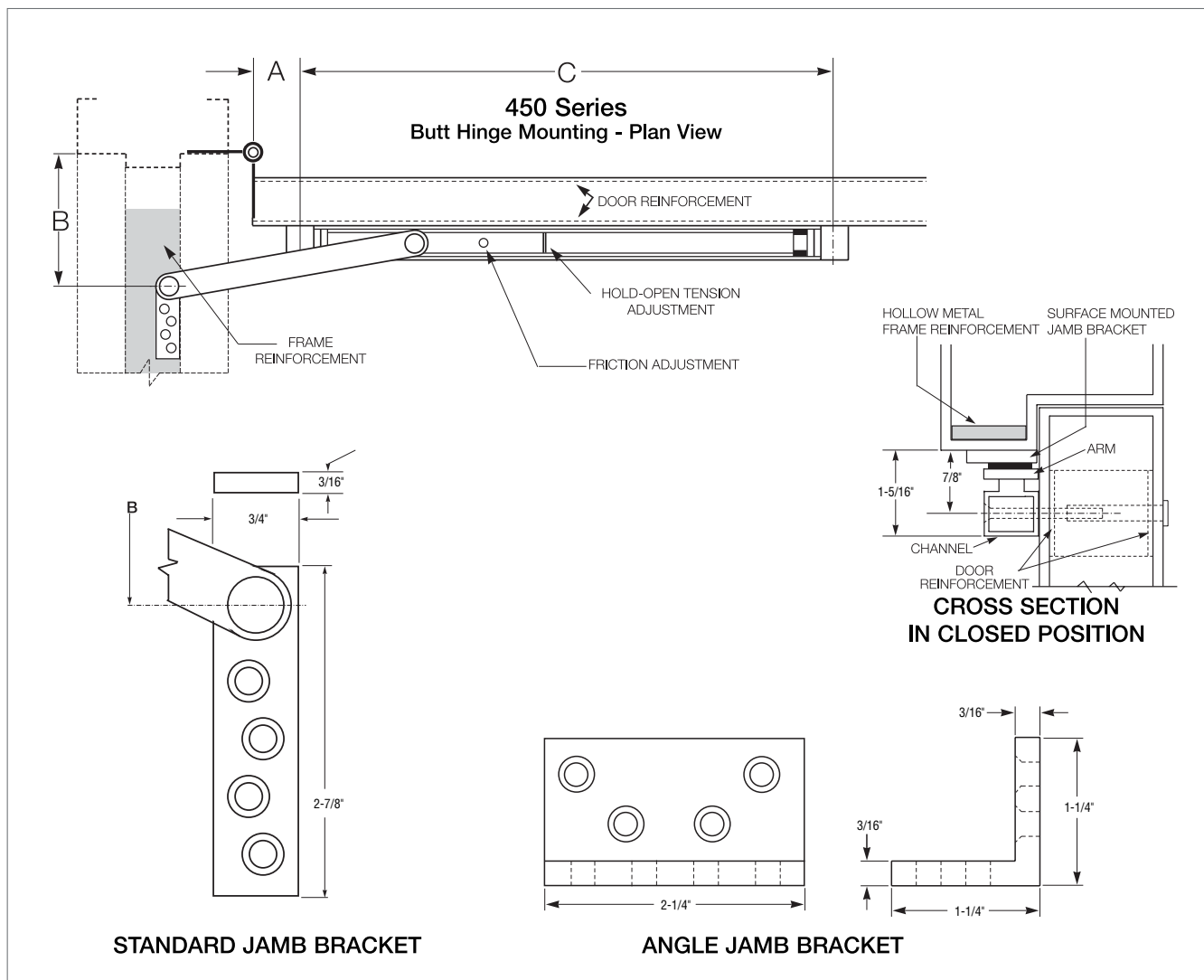
Shim kits are available in 3 sizes:
 450 SHIM1 is a 3/16" Shim Kit
 450 SHIM2 is a 3/8" Shim Kit
 450 SHIM3 is a 9/16" Shim Kit

If ordered with overhead, add suffix SHIM (1, 2 or 3). If needed separately order 450SHIM (1, 2 or 3)-Finish.

Suffix SOC (Pin-in-Socket Security Screw Package):

A screw package with pin-in-socket screws for mounting the channel to the door and the jamb bracket to the frame is provided instead of the standard screw package.

450 Series Surface Overhead Door Holders/Stops



SIZE	BUTTS/OFFSET PIVOTS				CENTER HUNG			
	DOOR OPENING	STOP ONLY	HOLD OPEN	FRICTION	DOOR OPENING	STOP ONLY	HOLD OPEN	FRICTION
1	18"-23"	451S	451H	451F	23-1/16"-27"	451S	451H	451F
2	23-1/16"-27"	452S	452H	452F	27-1/16"-33"	452S	452H	452F
3	27-1/16"-33"	453S	453H	453F	33-1/16"-39"	453S	453H	453F
4	33-1/16"-39"	454S	454H	454F	39-1/16"-45"	454S	454H	454F
5	39-1/16"-45"	455S	455H	455F	45-1/16"-51"	455S	455H	455F

Note: This chart illustrates the most common types of hinging and door opening sizes. For unusual door details, contact Glynn-Johnson for availability.

G-J Model	BHMA*	FED. Spec.
451-455 H	C05511	1166
451-455 S	C05541	1166A
451-455 F	C05531	1164

* First numeral (0) designates optional material.

To specify:
 Brass/bronze material, change 0 to 1 (i.e. C15511)
 Stainless Steel Material, change 0 to 5 (i.e. C55511)
 Steel material, change 0 to 8 (i.e. C85511)

The template information on this page is for reference only and is not intended to serve as an installation template. For complete dimensional information, refer to Glynn-Johnson template book.



How to Order

45 **1** **H** **-** **US32D** **-** **J**

Overhead Series:

45

Size (Door Opening Using Butts or Offset Pivots):

- 1** (18"-23")
- 2** (23-1/16"-27")
- 3** (27-1/16"-33")
- 4** (33-1/16"-39")
- 5** (39-1/16"-45")

Function:

- H** Hold-Open
- F** Friction Hold-Open
- S** Stop-Only
- SE** Special Stop-Only

Finishes:

- US3** Polished Brass
- US4** Satin Brass
- US10** Satin Bronze
- US10B** Oil Rubbed Bronze
- US32** Polished Stainless Steel
- US32D** Satin Stainless Steel
- SP4** Powder Coat Brass
- SP10** Powder Coat Bronze
- SP28** Powder Coat Aluminum
- SP313** Powder Coat Dark Bronze
- SPBLK** Powder Coat Black
- 652** Chrome-like Coating


Options:

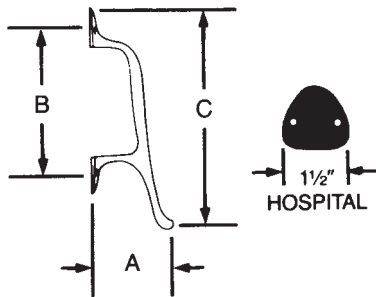
- J** Angle Jamb Bracket
- SHIM** Blade Stop Shims—
 - SHIM1-3/16" Kit
 - SHIM2-3/8" Kit
 - SHIM3-9/16" Kit
- SOC** Pin-in-Socket Security Screws

Architectural Door Trim

8100 Series Door Pulls

- Made from the finest architectural brass, stainless steel and aluminum available.
- Each pull is carefully machined, polished and inspected before being individually wrapped and packaged.
- Door pulls are packed with standard type fasteners for 1-3/4" doors. For special mounting methods other than standard, see pages C11 - C13.
- For sizes and finishes not listed in this catalog, contact our Customer Service Department for availability.






8121 Door Pull

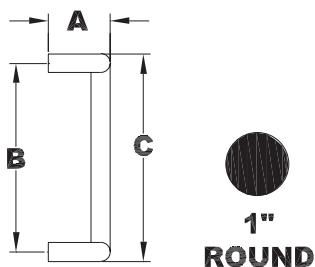
Prod. No.	Proj. "A"	Center to Center "B"	Overall Length "C"
8121-5	3-1/2"	5-3/4"	8-3/4"

How to Order 8121-5 - - -

Finishes:
 US3, US10, US10B, US15, US15A, US26, US26D, US28

Mounting Type:
Blank Standard
F Concealed wood door w/push plate (special)
K Back to back pulls. Furnished is Pairs (PR).





8190 90° Offset Door Pull

Prod. No.	Proj. "A"	Center to Center "B"	Overall Length "C"
8190	3-1/4"	8"	9"
8190	3-1/4"	10"	11"
8190	3-1/4"	12"	13"
8190	3-1/4"	18"	19"

How to Order 8190 - - -

Size:
 8 for 8"
 0 for 10"
 2 for 12"
 18 for 18"

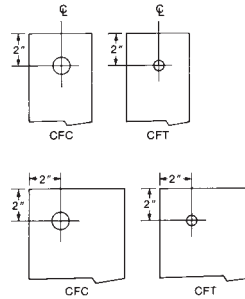
Finishes
 US3, US4, US10, US10B, US15, US15A, US26, US26D, US32, US32D

Mounting Type:
Blank Standard
L Surface Concealed Two-Anchor
M Back-To-Back with Spanner Collar. Furnished in Pairs. (PR)
M1 Single (SGL) Pull. Back-to-Back With Spanner Collar. RH Thread.
M2 Single (SGL) Pull. Back-to-Back With Spanner Collar. LH Thread.
N Back-to-Back Two-Anchor. Furnished in Pairs. (PR)
N2 Single (SGL) Pull, Back-to-Back Two Anchor.
O Decorative Blind Thru-Bolt

Architectural Door Trim

8200 Series Push Plates and 8300 Series Pull Plates

- Made from the finest architectural aluminum, brass, and stainless steel.
- For Push Plate sizes other than listed, contact our Customer Service Department or your local sales representative.
- All aluminum, brass, and stainless steel Push Plates meet ANSI A156.6 requirements for .050" thickness.
- Each Push Plate is packaged individually wrapped with mounting screws.
- For special mounting methods other than standard, see pages C11 - C13.



Push and Pull Plates Cut for Cylinder or Thumbturns

- All plates may be ordered with cutout for cylinder or thumbturn. Standard cutouts are positioned 2" from top of plate and centered on plates up to 4" wide or 2" from edge on plates over 4" wide. Specify hand of door when ordering cutout for plates wider than 4". On pull plates, if the pulls center-to-center dimension interferes with the cutout for the cylinder or thumbturn, please provide drawing of cutout location when ordering.
- Standard size for cylinder cutouts is 1-1/4" diameter and for thumbturn cutout is 3/8" diameter.
- When ordering, add suffix CFC for cut for cylinder, and CFT for cut for thumbturn to product number.



8200 Push Plate
8300 Pull Plate (less pull)

Available Sizes

- 3" x 12"
- 3.5" x 15"
- 4" x 16"
- 6" x 16"
- 8" x 16"

How to Order

8 - - - - -

Model:
200 Push Plate,
300 Pull Plate, less pull

Hole Spacing: (for Pull Plate only)
5 for 5-1/4"
6 for 6"
8 for 8"
0 for 10"

Finishes:
 US3, US4, US5, US10, US10B, US15, US15A,
 US26, US26D, US28, US32, US32D

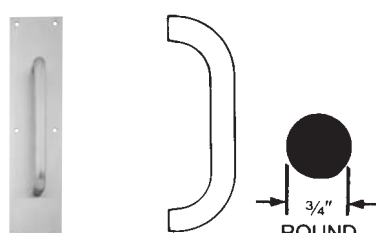
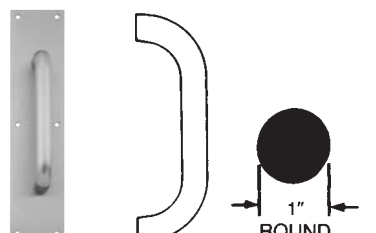
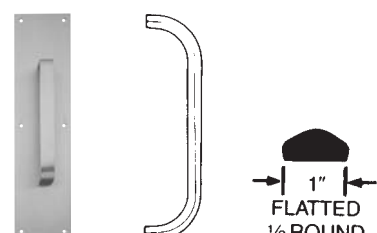
Size:
 3 x 12, 3-1/2 x 15, 4 x 16, 6 x 16, 8 x 16

Special Options: (specify handing for plates over 4" wide)
CFC Cylinder cutout
CFT Thumbturn cutout

Architectural Door Trim

8300 Series Pull Plates

- Made from the finest architectural aluminum, brass and stainless steel.
- For Pull Plate sizes other than listed, contact our Customer Service Department or your local sales representative.
- All aluminum, brass, and stainless steel Pull Plates meet ANSI A156.6 requirements for .050" thickness.
- Each Pull Plate is packaged individually wrapped with mounting screws.
- Pulls are centered on plates up to 4" wide and offset 2" from edge of plates wider than 4".
- For special mounting methods other than standard, see pages C11 - C13.

 <p>8302 Pull Plate</p> <ul style="list-style-type: none"> • 8300 Plate 3-1/2" x 15" 4" x 16" 6" x 16" • 8102 Pull 6" centers 8" centers 10" centers 	 <p>8303 and 8303EZ Pull Plate</p> <ul style="list-style-type: none"> • 8300 Plate 3-1/2" x 15" 4" x 16" 6" x 16" • 8103 Pull 8" centers 10" centers 	 <p>8305 Pull Plate</p> <ul style="list-style-type: none"> • 8300 Plate 3-1/2" x 15" 4" x 16" 6" x 16" • 8105 Pull 6" centers 8" centers 10" centers
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How to Order

83 - - - - -

Pull Style:

- 02** for 8102
- 03** for 8103
- 05** for 8105

Pull Center to Center:

- 6** for 6" (not available on 8303)
- 8** for 8"
- 0** for 10"

Finishes:

US3, US4, US5, US10, US10B, US15, US15A, US26, US26D, US28, US32D

Size:

3-1/2" x 15", 4" x 16", 6" x 16"

Special Options: (Handing needed for 6" x 16", LH or RH)

- CFC** Cylinder cutout
- CTC** Thumbturn cutout

Mounting:

- Blank** Standard
- F** Concealed pull wood doors w/push plate (special. Not available 8303EZ.)
- G** Concealed pull plate (Only available 8302, 8303 and 8303EZ)
- I** Concealed pull wood door (not available 8305 and 8303EZ)
- J** Back to back pull (not available 8305 and 8303EZ)

Floor Stops

FS18S FS18L

Features:

- Security Door Stops designed for use in high vandalism areas.
- Molded from flame resistant, resilient material around a heavy-duty stud.
- Once grouted in concrete, leaves no exposed fasteners to be tampered with or removed.
- Ideal for jail or security cell areas where floor mounted stops are required.
- FS18L also ideal for concrete wall applications.
- Finish: Black.

Product No.	Stop Height	Stop Diameter	Stud Length
FS18S	1-1/2"	2"	2-1/2"
FS18L	3-1/2"	2"	2-1/2"



FS18S



FS18L

FS434

Features:

- Burnished wrought steel.
- Soft, resilient gray rubber.
- For undercut doors up to 1-1/2".
- Packed with screws and plastic anchors.
- Finishes: US2C, US10.

Product No.	Overall Height	Base Size
FS434	2-5/8"	1-1/2" W x 2-3/4" L



Wall Bumpers

WS406CVX & WS407CVX WS406CCV & WS407CCV

Features:

- Constructed in sturdy yet economical wrought base of brass, aluminum or stainless steel construction.
- Feature concealed tamper-proof mounting.
- Shipped factory preassembled backplate to reduce installation cost.
- Easy installation by inserting screwdriver through small hole in rubber.
- The WS406CVX unit is designed with a convex rubber bumper, packed with wood screw and plastic anchor.
- The WS406CCV unit is designed with a concave rubber bumper, which avoids damage to locks with projecting buttons, packed with wood screw and plastic anchor.
- The WS407CVX unit is designed with a convex rubber bumper packed with screw and drywall anchor.
- The WS407CCV unit is designed with a concave rubber bumper which avoids damage to locks with projecting buttons and is packed with screw and drywall anchor.
- WS406CVX & WS407CVX meets ANSI/BHMA 156.16 L22201 for brass, L42101 for aluminum and L52101 for stainless steel.
- WS406CCV & WS407CCV meets ANSI/BHMA 156.16 L22251 for brass and L42251 for aluminum, and L52251 for stainless steel.
- Finishes: US3, US4, US5, US10, US10B, US14, US15, US15A, US26, US26D, US28, US32D.



WS406CVX & WS407CVX



WS406CCV & WS407CCV

Product No.	Mounting Hardware	Base Diameter	Base Thickness	Overall Projection
WS406CVX	Wood screw, plastic anchor	2-1/2"	3/8"	1"
WS406CCV	Wood screw, plastic anchor	2-1/2"	3/8"	1"
WS407CVX	Screw, Drywall Anchor	2-1/2"	3/8"	1"
WS407CCV	Screw, Drywall Anchor	2-1/2"	3/8"	1"

Door Silencers



SR64

Features:

- For use on metal frames featuring pneumatic design that, once installed, forms an air pocket to absorb shock and reduce noise of door closing.
- Tamper-proof once installed on the frame.
- Proper installation also eliminates door rattle and provides constant tension for door latches or locks.
- Packed in bags of 100. Grey also available in bulk pack of 2500.
- Each bag has an installation tool included.
- Meets ANSI/BHMA 156.16, L03011.
- Finish: grey is standard. Black optional.

Product No.	Diameter	Thickness
SR64	1/2"	1/8"



SR65

Features:

- For use on wood frames, also feature pneumatic design to cushion shock and absorb noise.
- To prevent removal, a small brad should be driven into stop strip and through stem of silencer, as shown in the detail.
- Packed in bags of 100.
- Meets ANSI/BHMA 156.16, L03021
- Finish: grey.

Product No.	Height	Width	Thickness
SR64	3/4"	3/8"	1/8"



SR66

Features:

- Self Adhesive Rubber Silencers.
- Economical installation requires no drilling of frames.
- Packed in sheets of 100.
- Finishes: brown, grey, white.

Product No.	Diameter	Thickness
SR66	1/2"	1/8"

Lock Guards

LG10 thru LG12

LG10

- Ideally suited for use with rose or escutcheon 2-3/4" wide or less.
- For use with Type 86 Mortise and Type 161 Cylinder Locks (ANSI 156.13 Series 1000 and ANSI 156.2 Series 4000).
- No exposed fasteners on face of unit.
- Unique design provides maximum security, virtually eliminating the opening between door and frame at the latch point.
- Available in 13 Gauge Stainless Steel or 12 Gauge Steel.
- Finishes: Stainless Steel—US32D
Steel—USP



Dimensions:

9-1/2" Tall x 2-1/2" Wide

LG11

- Designed for use on aluminum doors with latch-type locks or doors equipped with electric strikes.
- Unit is Handed - Specify left or right hand when ordering.
- No exposed fasteners on face of unit.
- Unique design provides maximum security, virtually eliminating the opening between door and frame at latch point.
- Available in 13 Gauge Stainless Steel or 12 Gauge Steel.
- Finishes: Stainless Steel—US32D
Steel—SP313 (Dark Bronze)



Dimensions:

9-1/2" Tall x 3" Wide

LG12

- Narrow design unit for use on rose or escutcheon 3-1/2" or less.
- For use with Type 86 Mortise and Type 161 Cylinder Locks (ANSI 156.13 Series 1000 and ANSI 156.2 Series 4000).
- No exposed fasteners on face of unit.
- Unique design provides maximum security, virtually eliminating the opening between door and frame at the latch point.
- Available in 13 Gauge Stainless Steel or 12 Gauge Steel
- Finishes: Stainless Steel—US32D
Steel—USP



Dimensions:

9-1/2" Tall x 1-1/2" Wide

Hooks and Brackets

580 Ceiling Hook

- Ideal for use in closets, attached to underside of shelves, or in storage lockers.
- Made from cast brass or cast aluminum.
- Brass Finishes: B3, B4, B5, B10, B10B, B14, B15, B15A, B26, B26D.
- Aluminum Finishes: A3, A4, A5, A10, A14, A92.



Dimensions:

Base, Brass: 7/8" H x 1-15/16" W

Base, Aluminum: 1" H x 1-7/8" W

Projection: 2-1/4"

581 Wardrobe Hook

- Compact hook is perfect where space is limited, such as behind doors where low profile is needed.
- Made from cast brass, cast aluminum or epoxy-coated aluminum.
- Brass Finishes: B3 (B-605), B4, B5, B10, B10B (B-613), B14, B15 (B-619), B15A (B-620), B19, B26 (B-625), B26D.
- Aluminum Finishes: A3, A4, A5, A10, A14, A92.
- Epoxy-Coated Aluminum Finishes: White A-W, Black A-BLK, Almond A-A.



Dimensions:

Base: 1-1/4" H x 1-1/4" W

Projection, Brass: 1-11/16"

Projection, Aluminum: 1-5/8"

582 Double Wardrobe Hook

- Compact double hook is perfect where space is limited, such as behind doors where low profile is needed.
- Made from cast brass, cast aluminum or epoxy-coated aluminum.
- Brass Finishes: B3 (B-605), B4, B5, B10, B10B (B-613), B14, B15 (B-619), B15A (B-620), B19, B26 (B-625), B26D.
- Aluminum Finishes: A3, A4, A5, A10, A14, A92.
- Epoxy-Coated Aluminum Finishes: White A-W, Black A-BLK, Almond A-A.



Dimensions:

Base, Brass: 1-1/8" H x 1-1/4" W

Base, Aluminum: 1-1/16" H x 1-3/16" W

Projection, Brass: 1"

Projection, Aluminum: 1-3/32"

Architectural Door Trim

Series 8400 Door Protection Plates

.050" Thickness

Features:

- Door Protection Plates are fabricated from the finest architectural aluminum, brass, and stainless steel, or 1/8" thick clear acrylic plastic or black or brown high impact polyethylene.
- All aluminum, brass, bronze and stainless steel Door Protection Plates meet ANSI A156.6 requirements for .050" thickness.
- Optional Beveling—For beveling of top and two sides of plates suffix with B3E, and for beveling of four sides suffix with B4E. Plastic plates are beveled on all four sides as standard.
- Each plate is packaged carefully wrapped in strong kraft paper with #6 x 5/8" oval head, undercut sheet metal screws plated to match, for easy installation on hollow metal, laminate, or wood doors. All plates are packaged in heavy duty corrugated cardboard; larger plates are enclosed in a wooden frame.



- Use No. 8401 Kickplate Gasket Tape as a buffer between brass kickplates and metal doors to help prevent tarnishing which may result from electrolytic oxidation. One package provides enough double-sided adhesive-backed foam tape for the perimeter of an 8" x 34" plate.
- Finishes:
 Brass: B3, B4, B5, B10, B10B (for heights over 24", check with customer service)
 Stainless Steel: S32D, S32
 Aluminum: PA28
 Plastic: BLK, BRN, CLR

<p>Mop Plates</p> <ul style="list-style-type: none"> • Protect the bottom of the pull side of door subject to cleaning and mopping procedures. • Size Ranges: 4" to 6" high, 22" to 48" wide 	<p>Kick Plates</p> <ul style="list-style-type: none"> • Protect the bottom of the push side of doors subject to scuffing from foot traffic. • Recommended for all doors subject to normal use (especially doors using a closer). • Size Ranges: 8" to 24" high, 22" to 48" wide 	<p>Stretcher Plates</p> <ul style="list-style-type: none"> • Protect doors at specific areas where consistent contact is made by stretchers, service carts or other equipment. • Usually applied to push side of doors. • Specify "B4E" Option for beveled edges. • Size Ranges: 6" to 8" high, 22" to 48" wide 	<p>Armor Plates</p> <ul style="list-style-type: none"> • Protect lower half of doors from abuse by hard carts, trucks and rough usage. • Usually applied to push side of single doors and both sides of double acting doors. • Size Ranges: 26" to 48" high, 22" to 48" wide

How to Order

8400 - X -

Finish

Height:

4" up to 48" in 1/2" increments
(For brass kick plates over 24", check with customer service.)

Width:

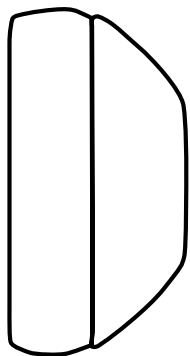
22" up to 48" in 1/2" increments

Options: (Only for metal plates)

- B3E for Bevel Top and 2 Edges
- B4E for Bevel 4 Edges
- CS for Counter Sink Holes
- ES for Extra row of Screws



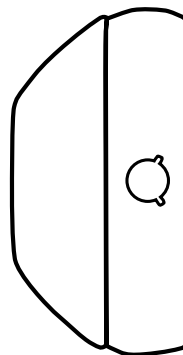
Vandal Resistant Trim



VR910-DT

- For use with Von Duprin 98/99 Series Rim and Vertical exit devices.
- Thru-bolts directly to device.
- Pull operation only. No cylinder cutout.

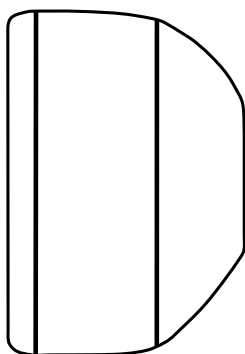
Prod. No.	Width	Height	Thru-Bolt Pattern	Clearance Grip to Door	Proj.
VR910DT	5-1/4"	11"	1-3/8" W X 7" H	1-1/2"	1-7/8"



VR910-NL

- For use with Von Duprin 98/99 Series Rim and Vertical exit devices.
- Thru-bolts directly to device.
- Includes cylinder cutout.
- Tailpiece guide and cylinder cup provided.

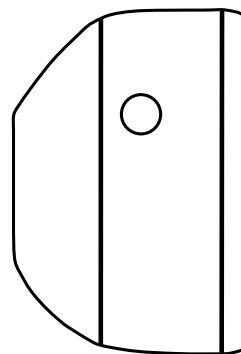
Prod. No.	Width	Height	Thru-Bolt Pattern	Clearance Grip to Door	Proj.
VR910NL	5-1/4"	11"	1-3/8" W X 7" H	1-1/2"	1-7/8"



VR910M-DT

- For use with Von Duprin 98/9975 Series Mortise exit devices.
- Thru-bolts directly to device.
- Includes built-in lock protector.
- Pull operation only. No cylinder cutout.

Prod. No.	Width	Height	Thru-Bolt Pattern	Clearance Grip to Door	Proj.
VR910M-DT	7-1/4"	11"	1-3/8" W X 7" H	1-1/2"	1-7/8"



VR910M-NL RHR VR910M-NL LHR

- For use with Von Duprin 98/9975 Series Mortise exit devices.
- Thru-bolts directly to device.
- Includes built-in lock protector and cylinder cutout.

Prod. No.	Width	Height	Thru-Bolt Pattern	Clearance Grip to Door	Proj.
VR910M-NL	7-1/4"	11"	1-3/8" W X 7" H	1-1/2"	1-7/8"

Full Mortise Hinges - 3 Knuckle

3PB1

3 Knuckle, Plain Bearing



PLAIN BEARING • LOW FREQUENCY • STANDARD WEIGHT

For use on Standard Weight Doors with Low Frequency Usage, not intended for use with door closing devices

3PB1 Steel with steel pin

3PB1 Brass with stainless steel pin

3PB1 Stainless steel with stainless steel pin (630 finish only)

- Dimensions & tolerances conform to ANSI - A156.7
- 3PB1 Steel description conforms to ANSI - A8133
- 3PB1 Stainless description conforms to ANSI - A5133
- 3PB1 Brass description conforms to ANSI - A2133
- Packed with wood and machine screws

Size (Inches)	Size (mm)	Gauge
4.5 x 4	114 x 102	0.134
4.5 x 4.5	114 x 114	0.134

3CB1

3 Knuckle, Concealed Bearing



CONCEALED BEARING • MEDIUM FREQUENCY • STANDARD WEIGHT

For use on Standard Weight Doors with Medium Frequency Usage

3CB1 Steel with steel pin

3CB1 Brass with stainless steel pin

3CB1 Stainless steel with stainless steel pin (630 finish only)

NRP = Non-Removable Pin

- Dimensions & tolerances conform to ANSI - A156.7
- 3CB1 Steel description conforms to ANSI - A8112
- 3CB1 Stainless description conforms to ANSI - A5112
- 3CB1 Brass description conforms to ANSI - A2112
- Packed with wood and machine screws

Size (Inches)	Size (mm)	Gauge
4.5 x 4	114 x 102	0.134
4.5 x 4.5	114 x 114	0.134

3CB1HW

3 Knuckle, Concealed Bearing, Heavy Weight



CONCEALED BEARING • HIGH FREQUENCY • HEAVY WEIGHT

For use on Heavy Weight Doors or High Frequency Usage

3CB1HW Steel with steel pin

3CB1HW Brass with stainless steel pin

3CB1HW Stainless steel with stainless steel pin (630 finish only)

NRP = Non-Removable Pin

- Dimensions & tolerances conform to ANSI - A156.7
- 3CB1HW Steel description conforms to ANSI - A8111
- 3CB1HW Stainless description conforms to ANSI - A5111
- 3CB1HW Brass description conforms to ANSI - A2111
- Packed with wood and machine screws

Size (Inches)	Size (mm)	Gauge
4.5 x 4	114 x 102	0.180
4.5 x 4.5	114 x 114	0.180
5 x 4.5	127 x 114	0.190

Aluminum Geared Continuous Hinges

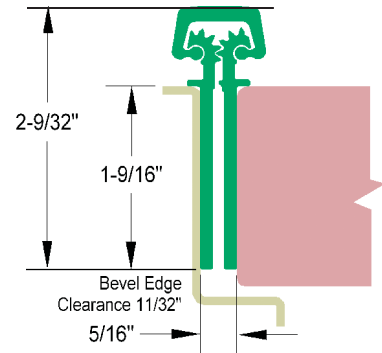
Ives 112HD

Full Mortise



Concealed Hinge
Flush Mounted, No Inset
Non Handed

Standard Mounting Hardware
12-24 X 1/2" Steel Self Tapping Screws
#12 x 1-1/2" Flathead Wood Screws
Optional Security Fasteners Available



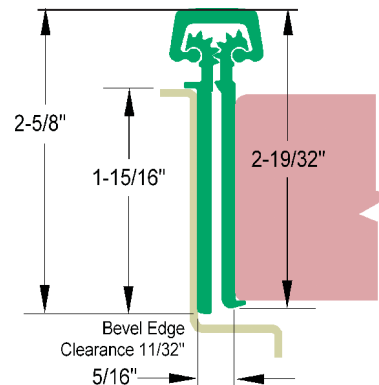
Ives 224HD

Full Mortise



Concealed Hinge
Door Edge Protector
1/16" Door Inset
Non Handed

Standard Mounting Hardware
12-24 X 1/2" Steel Self Tapping Screws
#12 x 1-1/2" Flathead Wood Screws
Optional Security Fasteners Available

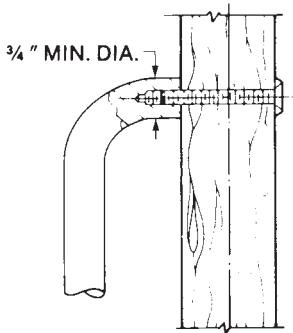


C O N T I N U O U S H I N G E S

Architectural Door Trim

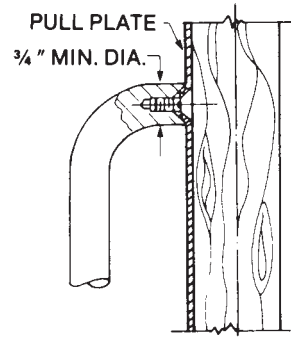
Mounting

- All mounting hardware is for standard 1-3/4" door.
- Consult Customer Service if other than standard.



Standard Mounting

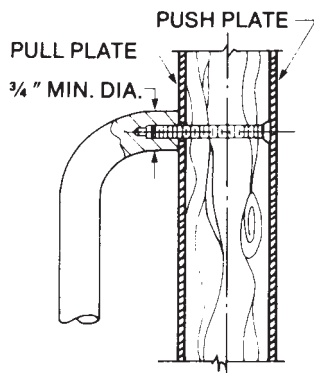
- (2) 1/4-20 x 2-1/4" brass, oval head machine screws; plated to match.
- (2) No. 14 countersunk washers; plated to match



Type G

Concealed Pull Plate Mounting

- Available only for 8302, 8303, 8311 and 8314 Pull Plates.
- (2) 1/4-20 x 5/8" steel flat head machine screws; zinc plated.
- Pull mounts directly onto plate. Plate is attached to door by 6 screws.

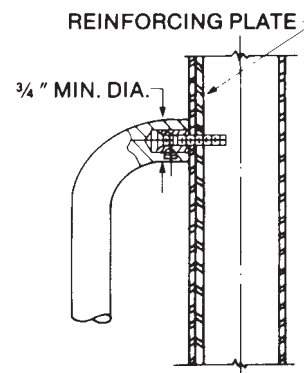


Type F-Special

Wood Doors Concealed Pull Mounting With Push Plate

- (2) 1/4-20 x 2-1/4" steel flat head machine screws; zinc plated.

Available only for 8102, 8103, 8105, 8111, 8113, 8114, 8302, 8303, 8305, 8311, 8313 and 8314. Plate on opposite side of door must be ordered separately.



Type H-Special

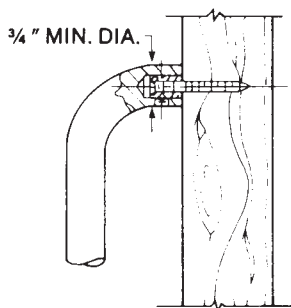
Reinforced Hollow Metal Door Concealed Pull Mounting

- Available only for 8102 and 8103 Pulls.
- (2) Steel screw sleeves; zinc plated.
 - (2) 1/4-20 x 1-1/4" steel countersunk trim head machine screw; zinc plated.

Architectural Door Trim

Mounting

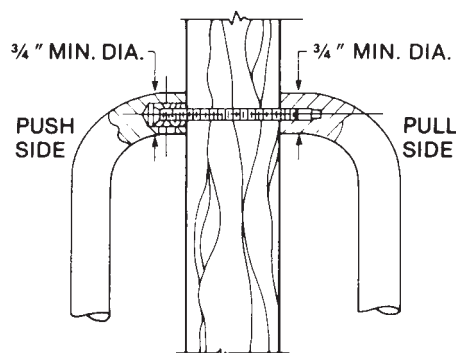
- All mounting hardware is for standard 1-3/4" door.
- Consult Customer Service if other than standard.



Type I
Wood Doors
Concealed Pull Mounting

Available only for 8102 and 8103 Pulls.

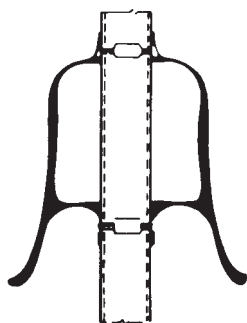
- (2) 10 x 1-1/2" No. 10 steel countersunk trim head sheet metal screws; zinc plated.



Type J
Back to Back Pull Mounting

Available only for 8102, 8103, 8302 and 8303 Pulls.

- (2) Steel screw sleeves; zinc plated.
 - (2) 1/4-20 x 2-3/4" No. 10 steel countersunk trim head machine screws; zinc plated.
- Pulls furnished in pairs (PR) unless single (SGL) specified.



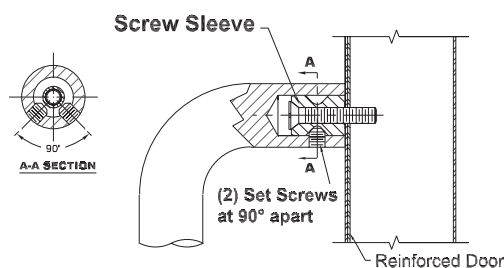
Type K
Back to Back Pull Mounting

Available only for 8121-5 Pulls.

- (4) Steel screw sleeve nuts; steel zinc plated.
- (8) No. 8-32 x 1" brass oval head machine screws; plated to match.

Pulls furnished in pairs (PR).

Surface Concealed "Two-Anchor"



Type L
Reinforced Hollow Metal Door

Available only for 8103EZ and 8190 Pulls.

- (2) 1/4-20 x 1-1/4" steel countersunk trim head machine screws with (4) set screws for maximum anchoring force
- (2) Steel screw sleeves; zinc plated.

Architectural Door Trim

Mounting

- All mounting hardware is for standard 1-3/4" door.
- Consult Customer Service if other than standard.

Back-to-Back with Spanner Collar

Type M
Wood or Metal Door

Available only for 8103EZ and 8190 Pulls.

- (2) 3/8-16 x 2-7/8" RH/LH bolts with finish matching spanner collars for tight, durable back-to-back mounting.

Fastener Guide

- Through bolt fasteners are for standard 1-3/4" thick doors.
- For fasteners other than shown contact our Customer Service Department for availability.

Back-to-Back "Two-Anchor"

Type N
Wood or Metal Door

Available only for 8103EZ, 8190 and 9100 series Push/Pull Combinations.

- (2) 1/4-20 x 2-3/4" steel countersunk trim head machine screws with (4) set screws for maximum anchoring force.
- (2) Steel screw sleeves; zinc plated.

Decorative Blind Thru - Bolt

Type O
Wood or Metal Door

Available only for 8103EZ, 8190 and 9100 series Push/Pull Combinations.

- (2) 1/4-20 x 2-1/4" blind thru - bolts; plated to match.

Type NS-Standard Push/Pull Mounting

Type N & Standard

Pushbar to Pull

- (1) 1/4-20 X 3" steel countersunk trim head machine screws with (2) set screws.
- (1) steel screw sleeve, zinc plated.

Free End Pushbar & Pull

- (2) 1/4-20 X 2-1/4" brass, oval head mach screws; plated to match.
- (2) No. 14 countersunk washers; plated to match.

Type NO Push/Pull Mounting

Type N & Type O

Pushbar to Pull

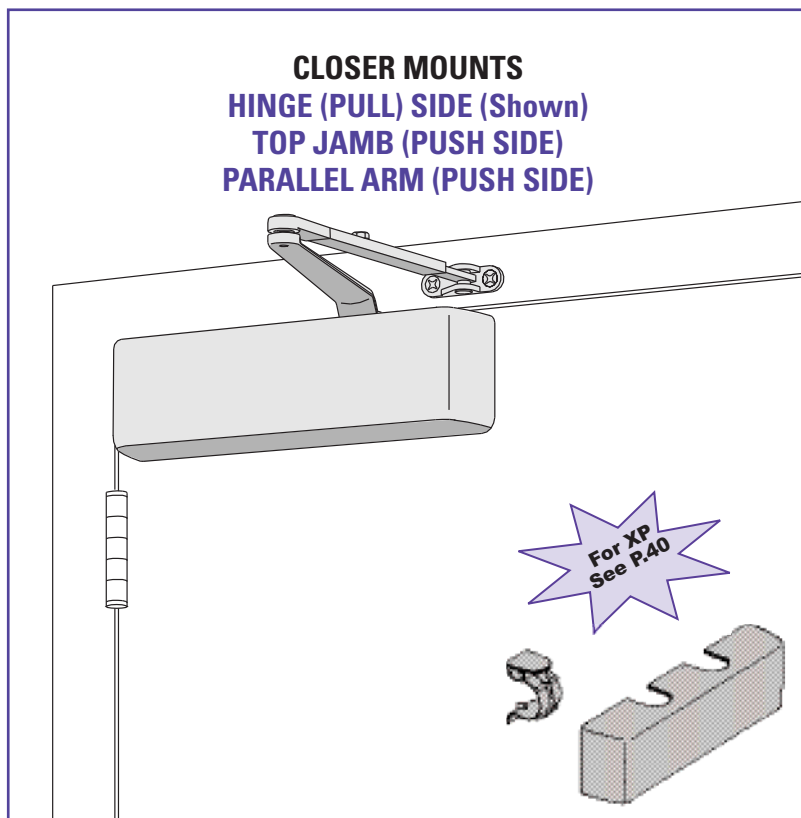
- (1) 1/4-20 X 3" steel countersunk trim head machine screws with (2) set screws.
- (1) steel screw sleeve, zinc plated.

Free End Pushbar & Pull

- (2) 1/4-20 X 2-1/4" blind thru-bolts; plated to match.

LCN 4040 SERIES

FEATURES



The 4040 SUPER SMOOTHIE® is LCN's most flexible heavy duty closer designed for institutional and other rugged high traffic applications.

- ▶ Ten Million Cycles
- ▶ Cast Iron
- ▶ Forged Steel Arm
- ▶ Double Heat Treated Steel Pinion
- ▶ All Weather Fluid
- ▶ Non-Handed
- ▶ LCN® Fast™ Power Adjust
- ▶ Fast & Accurate Installation
- ▶ UL & cUL Listed
- ▶ For XP See Page 40

- ▶ Standard 4040 series closer shipped with regular arm, standard plastic clip-on cover, and self reaming and tapping screws. See 4040 Series pages 45-47 for options.
- ▶ Non-sized cylinder is adjustable for interior doors to 5'0" and exterior doors to 4'0".
- ▶ Closer mounts hinge side, top jamb, and parallel arm w/PA Shoe on either right or left swinging doors.
- ▶ Closers to meet ADA requirements. See 4040 Series page 48.
- ▶ Standard or optional custom powder coat finish.
- ▶ Optional plated finish on cover, arm, and fasteners.
- ▶ Optional SRI primer for installations in corrosive conditions.
- ▶ Optional designer series metal cover
- ▶ UL and cUL listed for self-closing doors without hold-open.
- ▶ Tested and certified under ANSI Standard A156.4, grade one.



MOUNTING					FINISH		COVER	CYLINDER				**ARM FUNCTION										
HINGE (PULL) SIDE	TOP JAMB (PULL)	TOP JAMB (PUSH)	PARALLEL ARM	STOP FACE	POWDER COAT	PLATED	PLASTIC	METAL	DESIGNER METAL	NON-HANDED	NON-SIZED	ACCESSIBILITY	DELAYED ACTION	AVB***	XP	REGULAR (DOUBLE)	STANDARD (SINGLE)	HOLD-OPEN	FUSIBLE LINK	EDA/HEDA	CUSH/HCUSH	SCUSH/SHCUSH
●	○	●	○	○	●	●	●	●	●	●	○	○	○	○	○	120°	○	120°	○	180°	110°	110°

● Available
 ○ Not available

♿ Closer available with less than 5.0 lbs. opening force on 36" door.
 **Maximum opening/hold-open point with standard template.
 *** Advanced Variable Backcheck

LCN 4040 SERIES

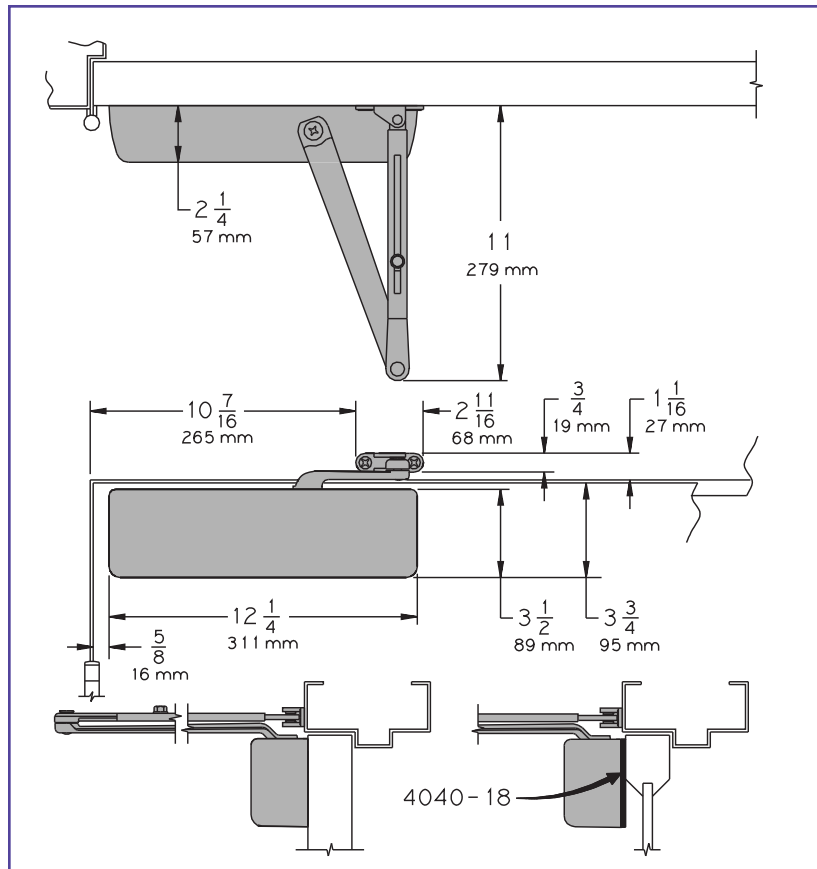
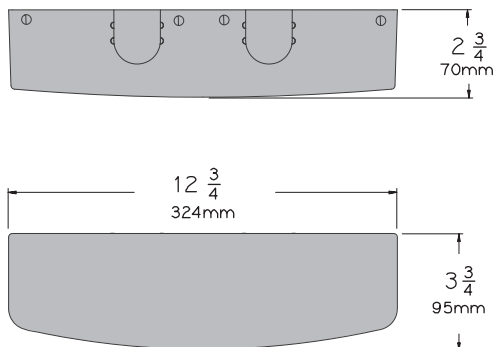
HINGE (PULL) SIDE MOUNTING

MAXIMUM OPENING

Templating allows up to 120°.

Hold-open points 90° up to 120° with hold-open arm.

Optional, Non-handed Designer Series Metal Cover



MOUNTING DETAILS

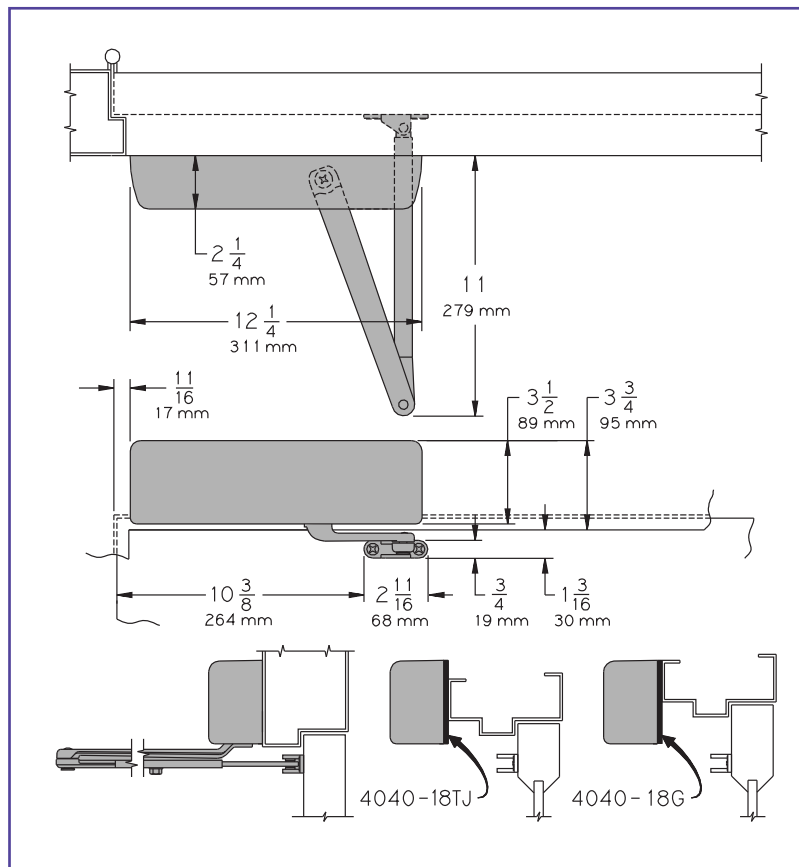
Options

- ▶ 4040XP cylinder
- ▶ 4041 Delayed action cylinder.
- ▶ Hold-open arm.
- ▶ Metal or lead lined cover.
- ▶ Corner bracket.
- ▶ Designer Series metal cover.

Special Templates

Customized installation templates or products may be available to solve unusual applications. Contact LCN for assistance.

- ▶ **Butt Hinges** should not exceed 5" (127 mm) in width.
- ▶ **Auxiliary Stop** is recommended at hold-open point or where a door cannot swing beyond 120°.
- ▶ **Reveal** should not exceed 3/4" (19 mm) for regular arm or hold-open arm.
- ▶ **Top Rail** less than 3 3/4" (95 mm) requires PLATE, 4040-18. Plate requires 2" (51 mm) minimum. With Designer Series metal cover, use PLATE, 4040-18DS1
- ▶ **Clearance** of 2 3/8" (60 mm) behind door required for 90° installation. 2 7/8" (73 mm) for Designer Series metal covers
- ▶ **Delayed Action** (not available on 4040XP) Add suffix "DEL" to selected cylinder (eg. 4041 DEL). Delays closing from 120° to 70°. Delay time adjustable up to approximately 1 minute.
- ▶ **Bull Nose Trim** requires SOFFIT SHOE, 4040-65.
- ▶ **Corner Bracket** available for doors where top jamb or parallel arm mounting can not be used. 4040-16 allows 110° opening. Projects 5" (127 mm) from stop, 12 13/16" (325 mm) from frame. 4040-17 allows 100° opening with certain auxiliary door holders (consult factory). Projects 6 3/8" (162 mm) from stop, 13 11/16" (348 mm) from frame.



- ▶ **Butt Hinges** should not exceed 5" (127 mm) in width.
- ▶ **Auxiliary Stop** is recommended at hold-open point or where the door cannot swing 120°.
- ▶ **Reveal** of 2 9/16" (65 mm) allows 120° opening for REGULAR ARM or standard HOLD-OPEN ARM. 4 13/16" (122 mm) allows up to 120° opening with LONG ARM where standard rod and shoe is replaced with optional LONG ROD AND SHOE 4040-79LR. Use H-LONG ARM with LONG HEAD AND TUBE, 4040-78HL for hold-open. 8" (203 mm) allows up to 120° opening with EXTRA LONG ARM where standard rod and shoe is replaced with optional EXTRA LONG ROD AND SHOE, 4040-79ELR.
- ▶ **Top Rail** requires 1 1/4" (32 mm) minimum.
2 1/4" (57 mm) minimum with closer on PLATE, 4040-18TJ.
3" (76 mm) minimum with closer on PLATE, 4040-18G. With Designer Series metal cover, use PLATE, 4040-18TJDS1
- ▶ **Head Frame** less than 3 1/2" (89 mm) requires PLATE, 4040-18TJ. With flush ceiling, use PLATE, 4040-18G. Either plate requires 1 3/4" (44 mm) minimum.
- ▶ **Delayed Action** (not available on 4040XP) Add suffix "DEL" to selected cylinder (eg. 4041 DEL). Delays closing from 120° to 80°. Delay time adjustable up to approximately 1 minute.

LCN 4040 SERIES

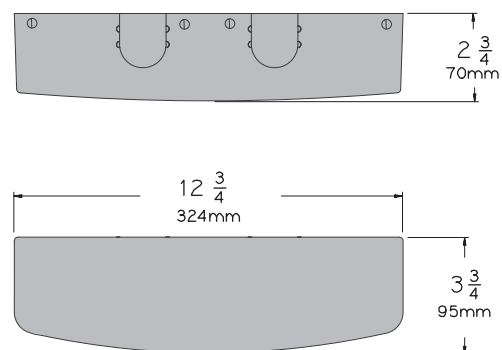
TOP JAMB (PUSH SIDE) MOUNTING

MAXIMUM OPENING

Templating allows up to 120°.

Hold-open points 85° up to 120° with hold-open arm.

Optional, Non-handed Designer Series Metal Cover



Options

- ▶ 4040XP cylinder
- ▶ 4041 Delayed action cylinder.
- ▶ Long arm, extra long arm, hold-open arm, long hold-open arm.
- ▶ Metal or lead lined cover.
- ▶ Designer Series metal cover.

Special Templates

Customized installation templates or products may be available to solve unusual applications. Contact LCN for assistance.

LCN 4040 SERIES

PARALLEL ARM (PUSH SIDE) MOUNTING

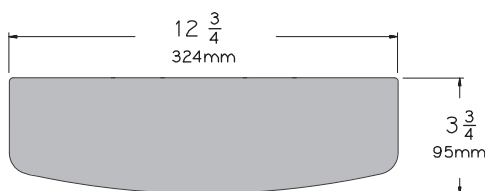
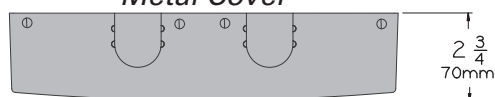
Optional mounting requires PA SHOE, 4040-62PA for REGULAR or HOLD-OPEN arms. Add prefix "P" to closer description (eg. P4041). P4041 closer includes 4040-201 FIFTH HOLE SPACER to support PA SHOE.

MAXIMUM OPENING

180° opening/hold-open points with all except CUSH arms.

110° opening/hold-open with CUSH arms.

Optional, Non-handed Designer Series Metal Cover

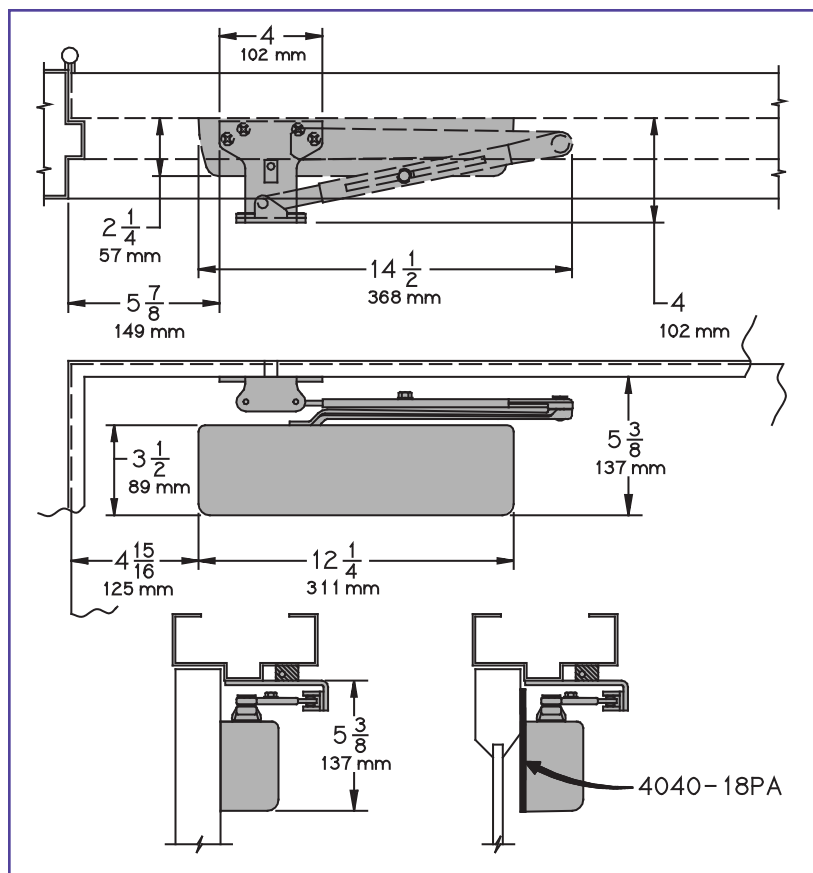


Options

- ▶ 4040XP cylinder
- ▶ 4041 Delayed action cylinder.
- ▶ Hold-open, EDA, HEDA, CUSH, HCUSH, SPRING CUSH, or SPRING HCUSH arm.
- ▶ Metal or lead lined cover.
- ▶ Designer Series metal cover.

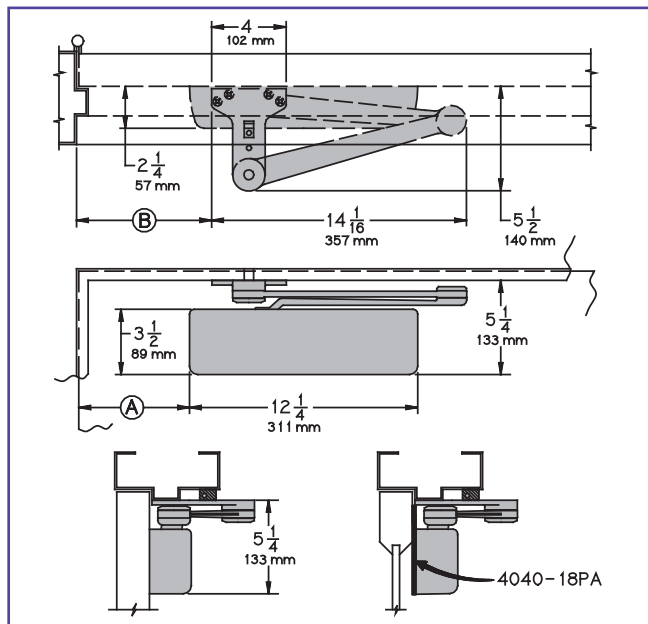
Special Templates

Customized installation templates or products may be available to solve unusual applications. Contact LCN for assistance.

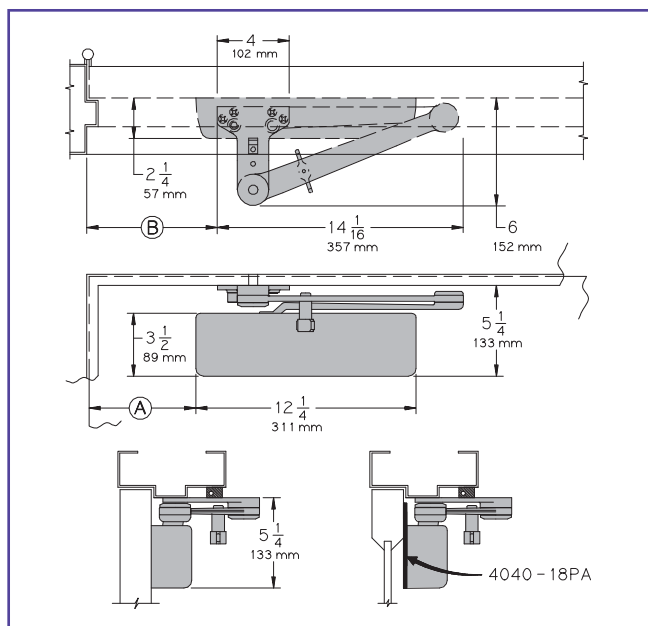


- ▶ **Butt Hinges** should not exceed 5" (127 mm) in width.
- ▶ **Auxiliary Stop** is recommended at hold-open point, where the door cannot swing 180°, or where CUSH-N-STOP arm is not used.
- ▶ **Clearance** for 4040-62PA shoe is 4" (102 mm) from door face. EDA shoe projects 5 1/2" (140 mm) from door face. CUSH shoe projects 6" (152 mm) from door face.
- ▶ **Top Rail** less than 5 3/8" (137 mm) measured from the stop requires PLATE, 4040-18PA. Plate requires 2" (51 mm) minimum from the stop. With Designer Series metal cover, use PLATE, 4040-18PADS1
- ▶ **Head Frame** flush or rabbeted requires PA SHOE ADAPTER, 4040-418.
- ▶ **Stop Width** minimum 1" (25 mm).
- ▶ **Blade Stop** clearance requires 1/2" (13mm) BLADE STOP SPACER, 4040-61.
- ▶ **Delayed Action** (not available on 4040XP) Add suffix "DEL" to selected cylinder (eg. P4041 DEL). Delays time adjustable up to approximately 1 minute.

4040 SERIES EDA MOUNT



4040 SERIES CUSH MOUNT



- ▶ **Clearance** for 4040-62EDA is 5 1/2" (140 mm) from door face. 6" (152 mm) for CUSH.
- ▶ **Head Frame** flush or rabbeted requires CUSH FLUSH PANEL ADAPTER, 4040-419.
- ▶ **CUSH ARM** requires SHOE SUPPORT, 4040-30 for fifth screw anchorage for narrow frames.
- ▶ **Delayed Action** (not available on 4040XP) Add suffix "DEL" to selected cylinder (eg. 4041 DEL). Delays closing from maximum opening to; 115° with 180° template. 95° with 110° template. 85° with 100° template. 75° with 90° template. Delay time adjustable up to approximately 1 minute.

LCN 4040 SERIES

Mounting details are the same as 4040 Series REGULAR or HOLD-OPEN except as listed below. 4040 Series closers ordered with EDA or CUSH arms include 4040-201 FIFTH HOLE SPACER to support the shoe.

MAXIMUM OPENING

EDA arm can be templated for points at: 110°,

$$\textcircled{A} = 6 \frac{3}{8}" (162 \text{ mm})$$

$$\textcircled{B} = 7 \frac{3}{4}" (197 \text{ mm})$$

or 180°.

$$\textcircled{A} = 2 \frac{7}{8}" (73 \text{ mm})$$

$$\textcircled{B} = 4 \frac{1}{4}" (108 \text{ mm})$$

Hold-open points up to maximum opening with HEDA arm.

CUSH arms can be templated for opening/hold-open point at: 85°,

$$\textcircled{A} = 7 \frac{15}{16}" (202 \text{ mm})$$

$$\textcircled{B} = 9 \frac{1}{8}" (232 \text{ mm})$$

90°,

$$\textcircled{A} = 7 \frac{3}{16}" (183 \text{ mm})$$

$$\textcircled{B} = 8 \frac{1}{2}" (216 \text{ mm})$$

100°,

$$\textcircled{A} = 6 \frac{1}{16}" (154 \text{ mm})$$

$$\textcircled{B} = 7 \frac{1}{4}" (184 \text{ mm})$$

or 110°.

$$\textcircled{A} = 5 \frac{1}{16}" (129 \text{ mm})$$

$$\textcircled{B} = 6 \frac{3}{8}" (162 \text{ mm})$$

Spring Cush dead stop points are approximately 5° more than templated stop point. Hold open at templated stop points.

LCN 4040 SERIES

CYLINDERS

CYLINDER, 4041-3071

Standard, non-handed cast iron cylinder assembly.

CYLINDER, 4040XP-3071

Heavy duty, non-handed cast iron cylinder assembly.

COVERS

COVER, 4040-72

Standard, non-handed plastic clip-on cover.

METAL COVER, 4040-72MC

Optional, handed cover. Required for plated finishes and custom powder coat finishes.

LEAD LINED COVER, 4040-72LL

Optional non-handed plastic clip-on cover.

DESIGNER SERIES METAL COVER, 4040-72DS1

Optional, non-handed designer series metal cover.

ARMS

REGULAR ARM, 4040-3077

Non-handed arm mounts pull side or top jamb with shallow reveal. P4041 closer includes PA SHOE, 4040-62PA required for parallel arm mounting.

PA SHOE, 4040-62PA

Required for parallel arm mounting.

LONG ARM, 4040-3077L

Optional non-handed arm includes LONG ROD AND SHOE, 4040-79LR for top jamb mount.

EXTRA LONG ARM, 4040-3077ELR

Optional non-handed arm includes EXTRA LONG ROD AND SHOE, 4040-79ELR for top jamb mount with deep reveal.

HOLD-OPEN ARM, 4040-3049

Optional, non-handed arm mounts pull side or top jamb with shallow reveal, hold-open adjustable shoe. P4041 closer includes 4040-62PA shoe required for parallel arm mounting.

LONG HOLD-OPEN ARM, 4040-3049L

Optional non-handed arm includes LONG HEAD AND TUBE, 4040-3048L for top jamb mount.

EXTRA DUTY ARM, 4040-3077EDA

Non-handed parallel arm features forged, solid steel main and forearm for potentially abusive installations.

HOLD-OPEN EXTRA DUTY ARM, 4040-3049EDA

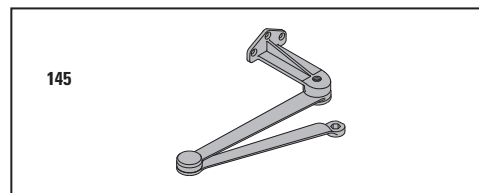
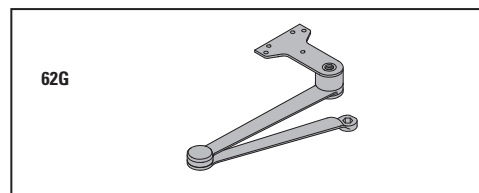
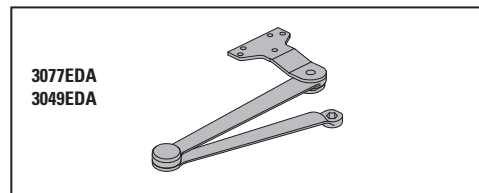
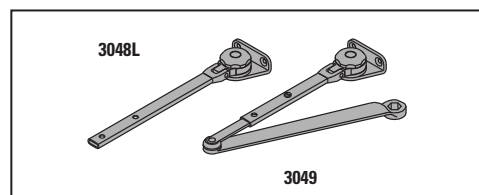
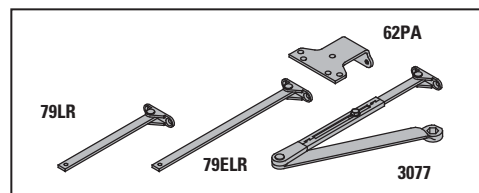
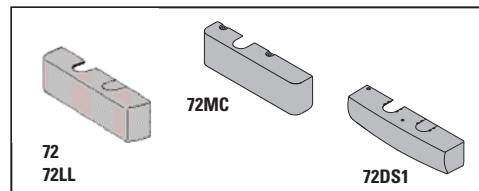
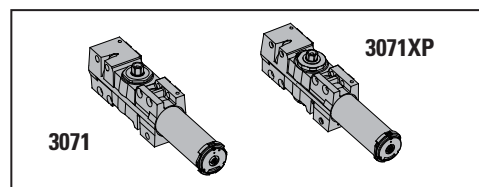
Optional handed arm provides hold-open function, adjustable at the shoe.

THICK HUB SHOE, 4040-62G

Optional for blade stop clearance, requires special templating.

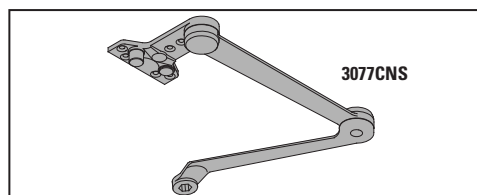
FLUSH TRANSOM SHOE, 4040-145

Optional for single rabbetted installations, requires special templating.

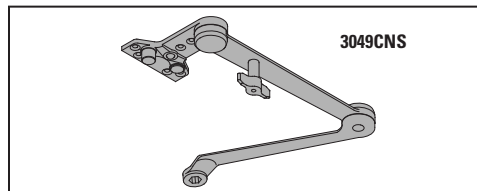


ARMS cont.**CUSH-N-STOP® ARM, 4040-3077CNS**

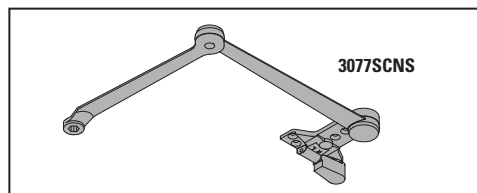
Optional, non-handed parallel arm features solid forged steel main arm and forearm with stop in soffit shoe.

**HCUSH ARM, 4040-3049CNS**

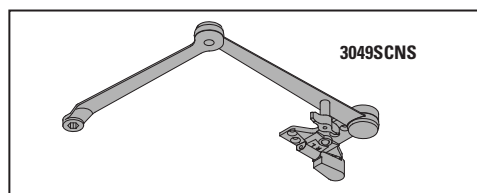
Provides hold-open function with templated stop/hold-open points. Handle controls hold-open function.

**SPRING CUSH ARM, 4040-3077SCNS**

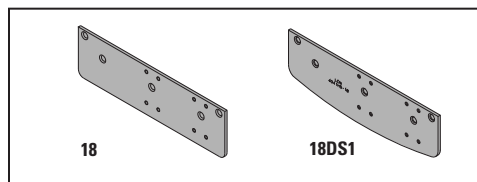
Optional, non-handed parallel arm for abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe.

**SPRING HCUSH ARM, 4040-3049SCNS**

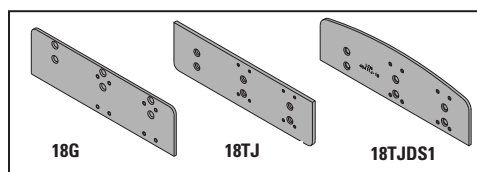
Optional, non-handed parallel arm for abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe. Handle controls hold-open function.

**INSTALLATION ACCESSORIES****PLATE, 4040-18/4040-18DS1**

Required for hinge side mount where top rail is less than 3 3/4" (95 mm). Plate requires minimum 2" (51 mm) minimum top rail. With Designer Series metal cover, use PLATE, 4040-18DS1

**PLATE, 4040-18G**

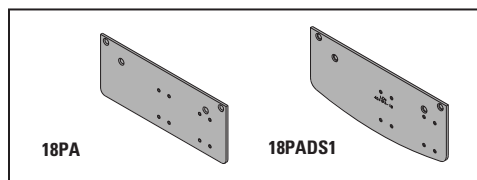
Locates top jamb mounted closer flush with top of head frame face in flush ceiling condition. Plate requires 1 3/4" (44 mm) minimum head frame.

**PLATE, 4040-18TJ/4040-18TJDS1**

Centers top jamb mounted closer vertically on head frame where face is less than 3 1/2" (89 mm). Plate requires 1 3/4" (44 mm) minimum head frame. With Designer Series metal cover, use PLATE, 4040-18TJDS1

PLATE, 4040-18PA/4040-18PADS1

Required for parallel arm mounting where top rail is less than 5 1/2" (140 mm), measured from the stop. Plate requires 2" (51 mm) minimum top rail. With Designer Series metal cover, use PLATE, 4040-18PADS1

**LCN 4040 SERIES**

LCN 4040 SERIES

INSTALLATION ACCESSORIES cont.

CORNER BRACKET, 4040-17

Designed to lower closer for clearance of certain auxiliary holders (consult factory).

CORNER BRACKET, 4040-16

For doors where top jamb or parallel arm mounting cannot be used (consult factory).

CUSH SHOE SUPPORT, 4040-30 provides anchorage for fifth screw used with CUSH arms, where reveal is less than 3 1/16" (78 mm).

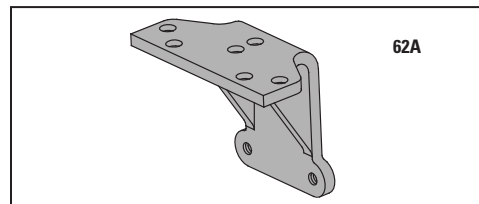
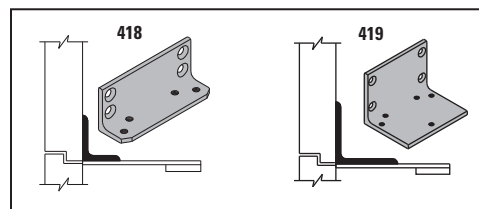
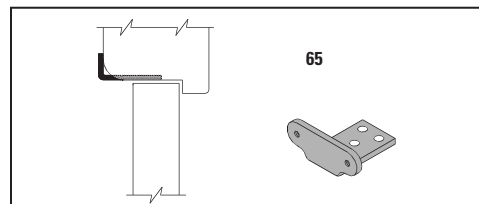
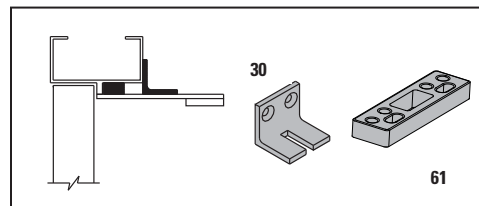
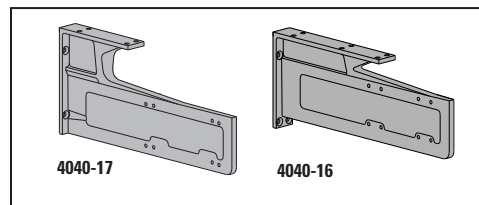
BLADE STOP SPACER, 4040-61 required to lower parallel arm shoe to clear 1/2" (13 mm) blade stop.

SOFFIT SHOE, 4040-65 adapts hinge side shoe to rounded or bull nose trim.

PA SHOE ADAPTER, 4040-418 provides horizontal mounting surface for parallel arm shoe on single rabbeted or flush frame.

CUSH FLUSH PANEL ADAPTER, 4040-419 provides horizontal mounting surface for CUSH shoe on single rabbeted or flush frame.

AUXILIARY SHOE, 4040-62A requires a top rail of 7" (178 mm). Optional shoe replaces -62PA for parallel arm mounting of regular arm with overhead holder/stop.



LCN 4040 SERIES

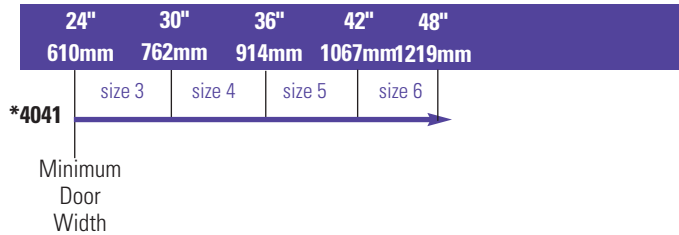
ORDERING INFORMATION

TABLE OF SIZES

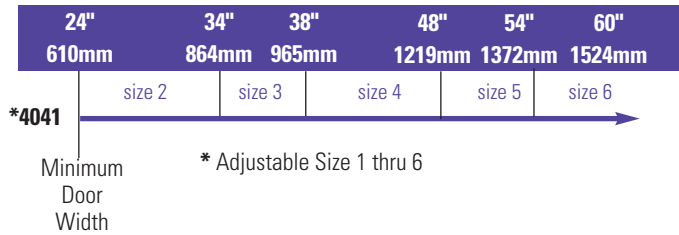
4041 cylinders are adjustable from size 1 through size 6 and is shipped set to size 3.
Closing power of 4040 series closers may be adjusted 50%.

→ Indicates recommended range of door width for closer size.

EXTERIOR (and VESTIBULE) DOOR WIDTH




INTERIOR DOOR WIDTH



REDUCED OPENING FORCE 4040 SERIES CLOSERS

CAUTION! Any manual door closer, including those certified by BHMA to conform to ANSI Standard A156.4, that is selected, installed and adjusted based on ADA or other reduced opening force requirements may not provide sufficient power to reliably close and latch a door.

Refer to POWER OPERATORS section for information on systems that meet reduced opening force requirements without effecting closing power.

	DOOR WIDTH	36"	42"	48"
	8.5* lbs.	4041	4041	4041
	5.0* lbs.	4041	4041	4041

* Maximum opening force

HOW-TO-ORDER 4041 SERIES CLOSERS

1. SELECT FINISH.

- Standard Powder Coat _____
Aluminum, Dark Bronze, Tan, Statuary, Light Bronze, Black, Brass.

Closer will be shipped with:

- STANDARD CLIP-ON COVER,
- REGULAR ARM,
- SELF-REAMING and TAPPING SCREWS,
- unless options listed below are selected.

CLOSER OPTIONS

CYLINDER

- Delayed Action (DEL)

COVER

- Lead Lined (LL)
- Metal (specify right or left hand) (MC)
- Designer Series Metal (non-handed) (DS1)

FINISH

- Custom Powder Coat (RAL) _____
(handed metal cover required)
- Plated Finish, US _____
(handed metal cover required)
- SRI primer

ARM

- Regular w/62PA (Rw/PA)
- Regular w/62A (R/62A)
- Long (LONG)
- Extra Long (XLONG)
- Hold-Open (H)
- Hold-Open w/62PA (Hw/PA)
- Long Hold-Open (HLONG)
- EDA (optional -62G or -145)
- HEDA (specify right or left hand, optional-62G or -145)
- Cush-N-Stop (CUSH)
- HCush-N-Stop (HCUSH)
- Spring Cush (SCUSH)
- Spring HCush (SHCUSH)

OPTIONAL SCREW PACKS

- TB* w/Self-Reaming and Tapping (TBSRT)
- Wood & Machine Screw (WMS)
- TB*, Wood & Machine Screw (TBWMS)
- TORX Machine Screw (TORX)
- TB* & TORX Machine Screw (TBTRX)
- * Specify door thickness if other than 1 3/4".

INSTALLATION ACCESSORIES

- Plate, 4040-18
- Plate, 4040-18TJ
- Plate, 4040-18G
- Plate, 4040-18PA
- Plate, 4040-18DS1
- Plate, 4040-18TJDS1
- Plate, 4040-18PADS1
- CUSH Shoe Support, 4040-30
- Blade Stop Spacer, 4040-61
- Auxiliary Shoe, 4040-62A
- Soffit Shoe, 4040-65
- PA Shoe Adapter, 4040-418
- CUSH Flush Panel Adapter, 4040-419

SPECIAL TEMPLATE

- ST- _____

Access Credential Choices



IBA Versatile iButton electronic key, adhesive-backed for application to cards, bracelets (supplied by others), etc.

IBF iButton on Key Fob



PF1 Prox Fob



MAG1 Magnetic Stripe Card – Blank

MAG2 Magnetic Stripe Card – Encoded



PRX1 Prox Card

PRX2 Adhesive-backed for photo application

PRX3 ISO – credit card size

PRX4 Dual Technologies – magnetic stripe and prox

Choose from 3- to 8-digit user codes, iButtons, HID prox credentials, ABA-standard, Track 2 or Track 3 magnetic stripe cards, or combinations of these credentials. Even existing HID prox credentials or ABA-standard magnetic stripe cards can be easily integrated with Locknetics' systems, allowing the easiest transition into facilities that currently use either of those technologies. And, utilizing computer programming, higher security applications have the option of Linked Access™, which requires a combination of card, iButton, or prox fob and a keypad code. An additional benefit of Linked Access is that multiple functions can be associated with the same credential, eliminating the need to carry multiple credentials. The choice is yours, and it can vary from one user to another, and one door to the next.

Multiple Access Credential Readers

Whether you need to manage a single door system or virtually unlimited numbers of doors, Locknetics provides a complete line of access control systems. Capable of supporting keypad codes, iButtons, ABA-standard magnetic stripe cards, and HID prox credentials, Locknetics allows end-users the greatest

flexibility when designing and managing their facilities. A single source solution, Locknetics can provide the credential, device, controller, door hardware, and multiple programming options in an integrated package or as system components in facilities with existing investments.

Keypads

- 6-button keypads with integral iButton reader
- LED indicators
- Rugged construction, including high-traffic, anti-vandal models
- All-purpose, narrow-style and single-gang, box-mount models
- Models available with various architectural finishes



KP74+

Keypad: Stainless steel buttons

Housing: Cast stainless steel

Keypad Size: 6¾" H x 1¾" W x ¼" D

Application: High-traffic, anti-vandal

Lund De Luxe WALL CABINETS

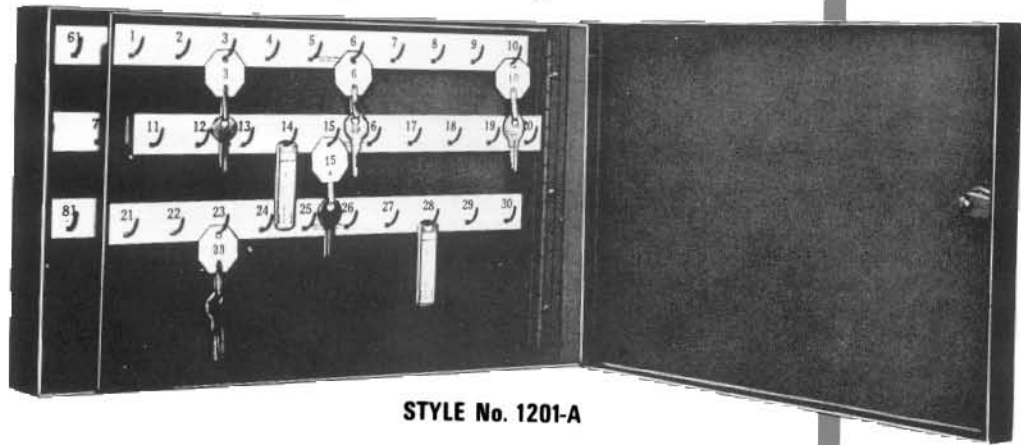
A book index (No. 511-B) is furnished with all Lund De Luxe Wall Cabinets with the Two Tag Key System. This index is to be filed in the office letter file cabinet for key security.

Pane hooks and key tags are numbered consecutively from No. 1 up. Hooks on panels are 1/2" long.

See Page 4 for Two Tag Key System
See Page 15 for Color Tags.

Wall cabinets are made from 18 gauge office furniture steel with electrically welded construction. Finish is light office gray baked-on enamel. Doors have chrome plated cylinder locks and continuous piano type hinges. Cabinets can be furnished with dual locks and combination locks as a special feature at extra cost. Index pockets on the door can also be furnished as a special feature at extra cost.

Special: Your present cabinet may be expanded. See Page 5 in Price List.

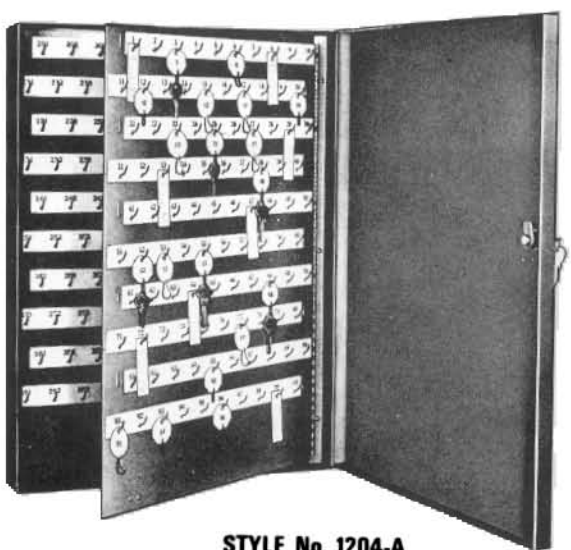


STYLE No. 1201-A

WALL KEY CABINETS

Size 17 3/4" W x 11" H x 2 1/2" D

- No. 1200 — 30 cap. Expand up to 90 cap.
- No. 1201 — 60 cap. Expand up to 90 cap.
- No. 1201-A — 90 cap. No expansion.
- No. 1201-B — 120 cap. No expansion.

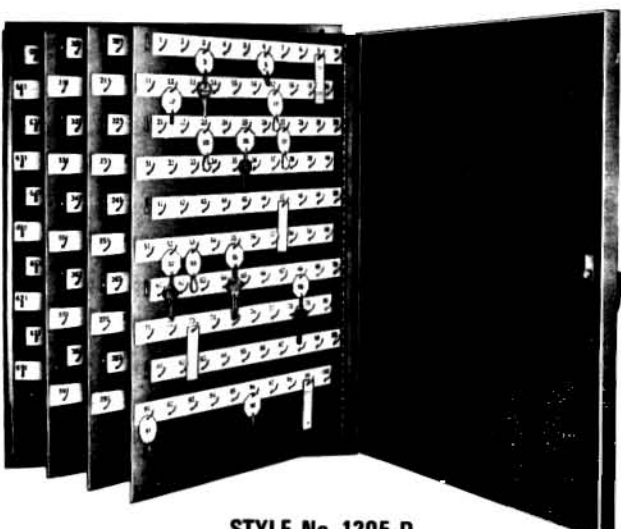


STYLE No. 1204-A

WALL KEY CABINETS

Size 17 3/4" W x 25" H x 2 1/2" D

- No. 1202 — 130 cap. Expand up to 300 cap.
- No. 1203 — 160 cap. Expand up to 300 cap.
- No. 1203-A — 200 cap. Expand up to 300 cap.
- No. 1204 — 250 cap. Expand up to 300 cap.
- No. 1204-A — 300 cap. No expansion.



STYLE No. 1205-D

WALL KEY CABINETS

Size 19 7/16" W x 25" H x 5" D

- No. 1205 — 350 cap. Expand up to 700 cap.
- No. 1205-A — 400 cap. Expand up to 700 cap.
- No. 1205-AA — 450 cap. Expand up to 700 cap.
- No. 1205-B — 500 cap. Expand up to 700 cap.
- No. 1205-C — 600 cap. Expand up to 700 cap.
- No. 1205-D — 700 cap. No expansion.



Saddle Thresholds

All thresholds this page.

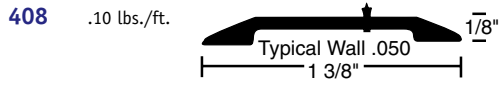
- mill finish aluminum
- DKB - aluminum dark bronze finish

NON-SLIP SURFACE
 All thresholds are available with a slip resistant, non-skid surface for better traction. Specify SIA finish.

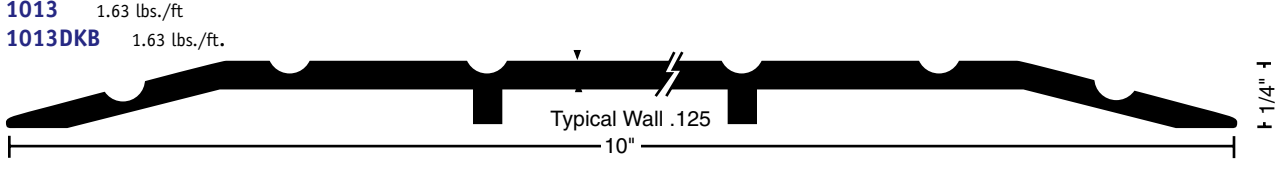
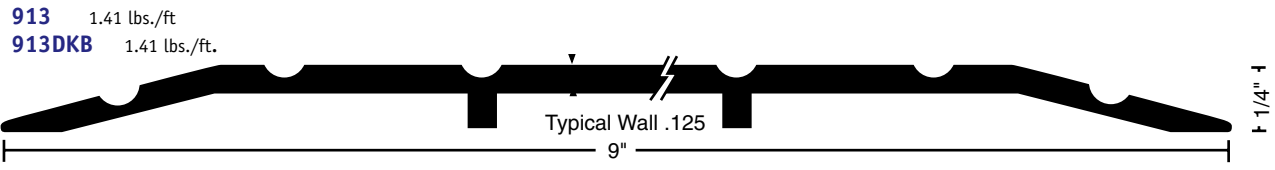
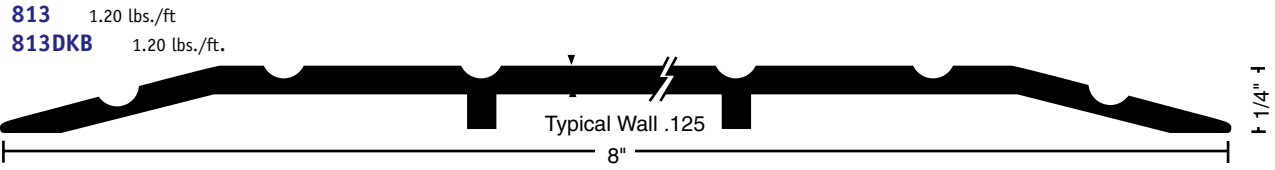
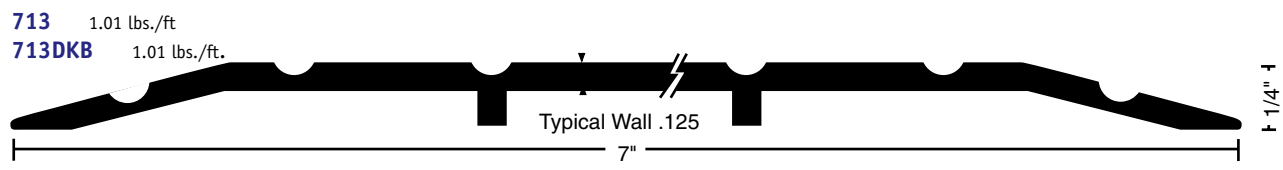
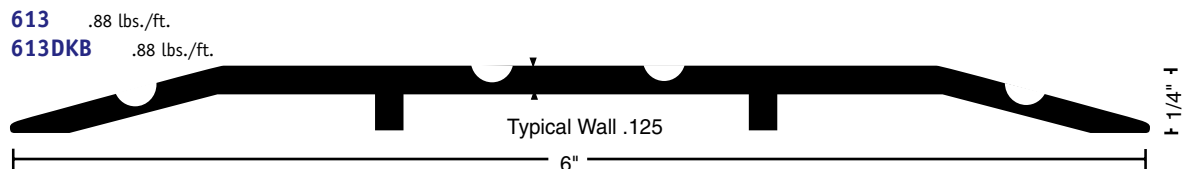
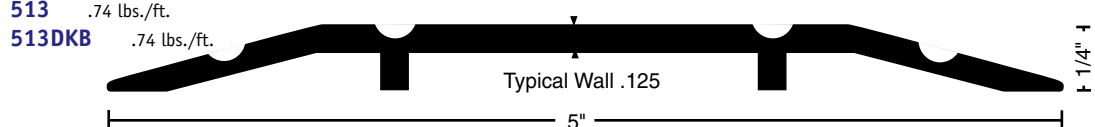
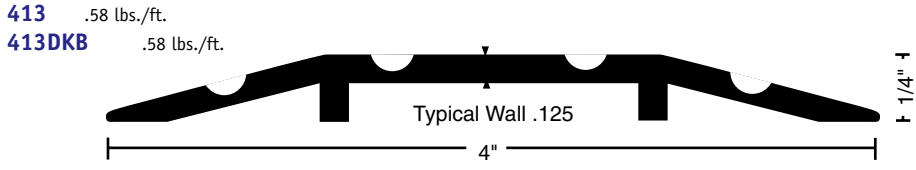
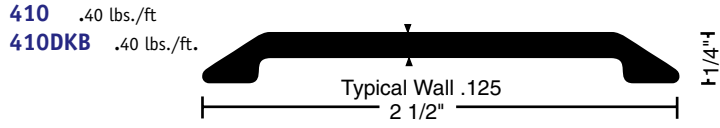
Drilling and notching details should be included with order.

#10 x -1-1/2" FH zinc plated wood screws are included on mill finish thresholds. Chemically treated stainless steel screws are provided to match DKB finish.

1/2" added to thresholds under 61"
1" added to thresholds over 61"

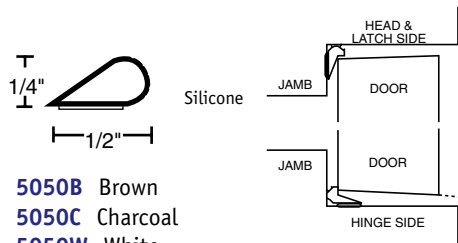


All drawings are actual size except as noted.





Self Adhesive Seals

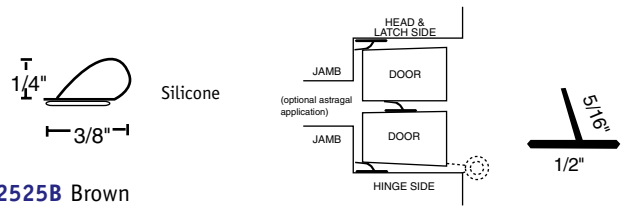


- 5050B** Brown
- 5050C** Charcoal
- 5050W** White
- 5050T** Tan
- 5050CL** Clear



ESS * Edge Sealing System on 20 min rated wood doors up to 4'0 x 8'0 single, 8'0 x 8'0 std. pair with 9800 or 9500 at meeting edge.

Available in 17', 20', 21', 25' and 300' rolls.



- 2525B** Brown
- 2525C** Charcoal
- 2525W** White
- 2525T** Tan

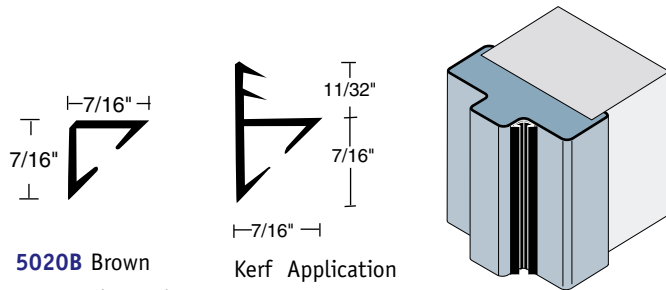


Available in 17', 20', 21', 25' and 300' rolls.

- 5060B** Brown
- 5060CL** Clear



Available in 7', 8', 9', 17', and 21' rolls



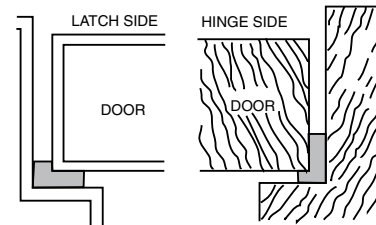
- 5020B** Brown
 - 5020C** Charcoal
 - 5020W** White
- Kerf Application**
- 5021B** Brown
 - 5021C** Charcoal
 - 5021W** White



Available in 36", 48", 84", 96" and 108" lengths.

Neoprene Gasketing

	width	thickness
361	18', 21', 50' rolls	3/8" x 3/16"
362	18', 50' rolls	1/2" x 1/4"
363	18', 50' rolls	3/8" x 1/8"



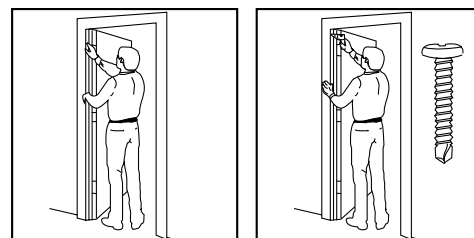
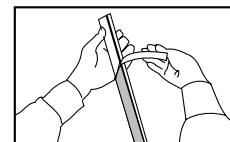
"FATT"

Fast Attach Two-Way Tape

Fast attach two way tape provides an easy and effective alternative to gasketing installation. A 1/2" wide 2-way tape is applied to the metal housing insuring a quick and easy installation. Then for security, 3 tek-type self drilling screws are used to further secure each piece of material to the frame stop. A no problem installation with no holes to drill.

To order add suffix "FATT" to product number. See price list for products available with this feature.

FATT IS NOT CLASSIFIED FOR USE ON FIRE DOORS.





National Guard Products, Inc.

PROTECTION, INSIDE OUT

Toll Free Phone 1-800-647-7874

Toll Free Fax 1-800-255-7874

Wild Hair® - Nylon Brush Seals

C627A
C627B
C627DKB

600
600A
600B
600DKB

601
601A
601B
601DKB

602A
602DKB

603A
603DKB

A617A

A605A
A605B
A605DKB

B606A
B606B
B606DKB

OV633A
OV633B
OV633DKB

OV634A
OV634B
OV634DKB

C607A
C607B
C607DKB

D608A
D608B
D608DKB

E609A
E609B
E609DKB

G610A
G610B
G610DKB

H612A
H612B
H612DKB

I-615A
I-615B
I-615DKB

G611A
G611DKB

H614A
H614DKB

I-616A
I-616DKB

All Products this page.

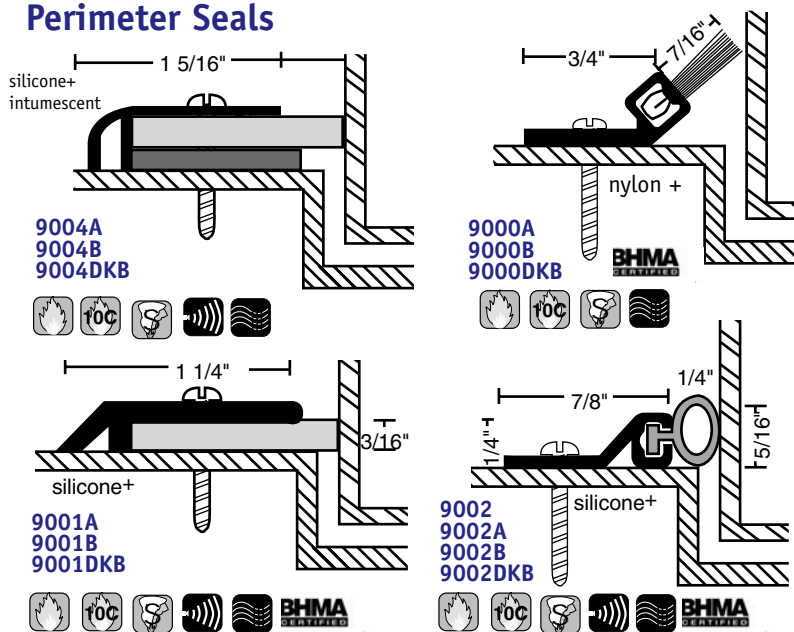
#6 x 3/4" Stainless Steel Sheet Metal Screws furnished.

Dimensions shown in drawings:
 C627A: 1 7/16" (total), 9/16" (brush), 1" (flange)
 600: 7/8" (total), 1/2" (brush), 1" (flange)
 601: 7/8" (total), 1" (flange)
 602A: 7/8" (total), 1/2" (brush), 1" (flange)
 603A: 7/8" (total), 1" (flange)
 A617A: 1/2" (total), 7/16" (brush), 45° angle
 A605A: 5/8" (total), 7/16" (brush), 1/2" (flange)
 B606A: 3/4" (total), 1/2" (brush), 1" (flange)
 OV633A: 5/8" (total), 1" (brush), 3/4" (flange)
 OV634A: 5/8" (total), 3/4" (brush), 1" (flange)
 C607A: 3/4" (total), 9/16" (brush), 1 3/8" (flange)
 D608A: 1 1/16" (total), 1" (brush), 1 3/4" (flange)
 E609A: 1 3/16" (total), 1 3/8" (brush), 2 1/2" (flange)
 G610A: 1 3/4" (total), 1 3/8" (brush), 2" (flange)
 H612A: 1 3/8" (total), 1 3/8" (brush), 4" (flange)
 I-615A: 1 3/8" (total), 4" (brush), 1 3/4" (flange)
 G611A: 5 1/2" (total), 2 1/2" (brush), 4" (flange)
 H614A: 5 1/2" (total), 2 1/2" (brush), 4" (flange)
 I-616A: 5 1/2" (total), 4" (brush), 4" (flange)

Allseal® Gasketing

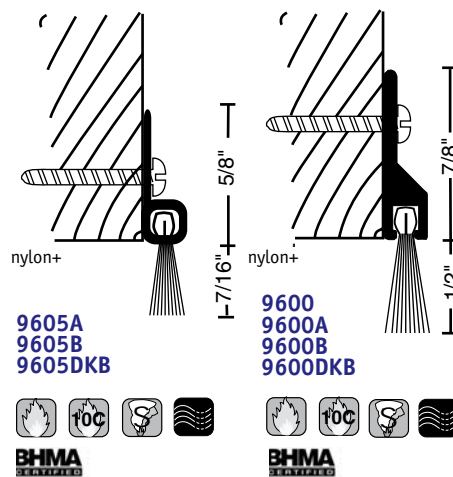
Specially formulated to withstand greater temperature extremes while providing maximum protection against air infiltration. Color of Allseal gasket material is Tan.

Perimeter Seals

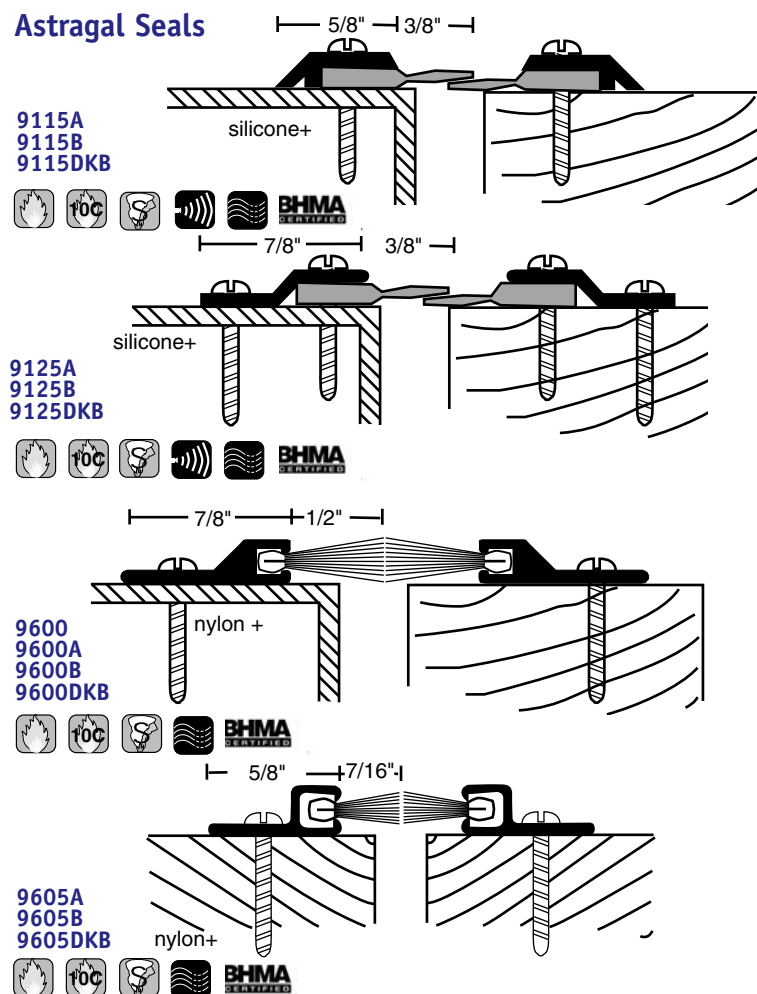


#6 x 3/4" Stainless Steel Sheet Metal Screws furnished.

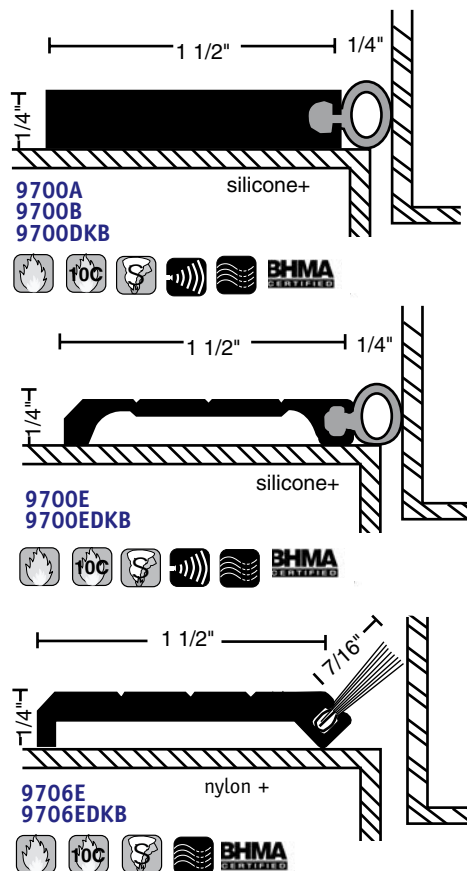
Perimeter Seals or Sweeps



Astragal Seals



Seals for Use with Parallel Arm Door Closers





Schlage Utility Software (SUS) on the Handheld Device (HHD)

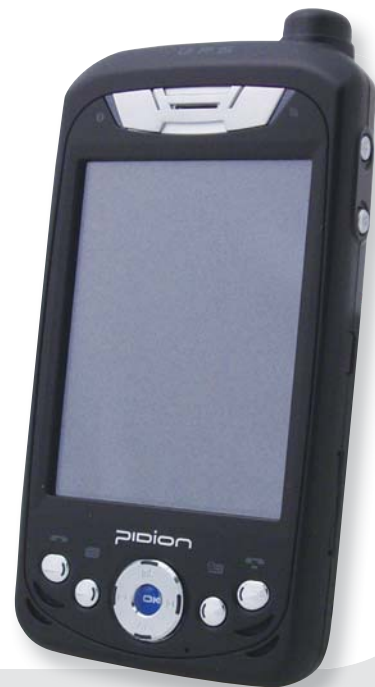
Schlage Utility Software (SUS) is designed specifically for use on the Handheld Device (HHD) as the link between your access control management software and Schlage electronic offline and networked locks and accessories. This solution consolidates and simplifies programming and managing your access control system.

The SUS and HHD is used to initialize, configure and test product operation, and also provides an easy way to manage people, audits, locks and other network panel interface devices for simple access control. The intuitive screen layout for the SUS provides easy navigation during use.

For offline products the SUS is utilized to transfer access control data, such as authorized user lists, via the HHD to the locks. The SUS is also utilized to download audit trail information from offline devices to the HHD and then transfer that data to the access control management software.

In addition the SUS can configure other networked electronic devices (including PIM and PIB) and update firmware revision updates to the devices as desired.

The HHD connects with Schlage AD-Series electronic locks and accessories via a USB interface and utilizes Active Synch or Win Mobile Device Manager to communicate with your PC via the USB port. The HHD is also able to connect to the SPED, KC2, CM, CL, CT500, CT1000, CL Controller and WA-Series PIMs via a serial cable connection.



Features

- Handheld Device with Schlage Utility Software installed
- Touch Screen operation
- Initialize Lock and Accessories with SUS
- Configure and Test Devices

FEATURES AND SPECIFICATIONS

Schlage Utility Software

- Initialize Lock and Accessories
- Field Configure Devices
 - Credential Reader Formats
 - Lock Function
 - Unlock Period
 - Failure Mode
 - Audible Alarm ON/OFF
- Off-line Devices
 - Manage up to 100 unique door files
 - Retrieve Audit trails from up to 100 devices
- Networked Devices
 - Communication Settings
 - Validate Status Monitor
- Service & Diagnostics
 - Battery Status
 - Validate hardware and software revision
 - Troubleshooting Status Signals
 - Firmware Upgrades

HHD Specifications

- 3.5 in LCD display
- Touch Screen with Backlit Keypad
- 32-bit processor
- Operating System: Windows Mobile 5.0
- Memory: 128 MB RAM / 256 MB ROM
- Battery: Rechargeable 3.7 V, 1,230mAh, Li-ion
- Dimensions (HWD): 5.3" X 2.9" X 0.7" (13.5 cm x 7.3 cm x 1.8 cm)
- Weight: 0.42 lbs (190 g)
- 4 ft. (1.2 m) drop to steel surface, 2 drops per 6 sides

HHD Compatible Devices and Required Cable and Adaptors

Devices	Cable and Adaptors
AD-Series Locks and Accessories	HH-USB
BE367, KC-2, CM, CL, CT500, CT1000, CL-Controller	HH-Serial + CIP
WA-Series PIM	HH-Serial + PIMWA-CV

ORDERING INFORMATION

HHD – Handheld Device with SUS installed and HH-USB cable

HH-USB – USB Cable

HH-SERIAL – Serial Cable used to connect HHD to CIP

PIMWA-CV – Converter used to connect HH-SERIAL to WA-Series PIM

P512112 – CIP, utilized with HH-SERIAL to connect to CM, CL and KC-2 locks





AD-200 Offline Electronic Lock

AD-Series electronic locks from Schlage are designed to be modular and provide more options to choose from, more functionality in the lock and more compatibility with existing systems. Its patent-pending modular design allows the lock to be customized to fit the needs of an application now, and can change to meet future needs without removing it from the door.

Factory orderable options include choices of credential readers, chassis type, network configurations, locking functions, power options, lever styles and finishes. It also offers a wide selection of features that can be configured in the field to customize your openings.

The AD-200 is a simple, economical solution if no access control system currently exists in facility, or for openings that don't require the control of a networked solution. The AD-200 is easily upgradable to a networked lock if requirements change in the future.

On all AD-Series offline locks, Schlage has built in many of the incremental features needed in a networked system such as request-to-exit and -enter sensors, interior cover tamper guard, as well as the door position switch. This way, if the customer chooses to network this opening in the future, all the components will be there to make the transition an easy one.



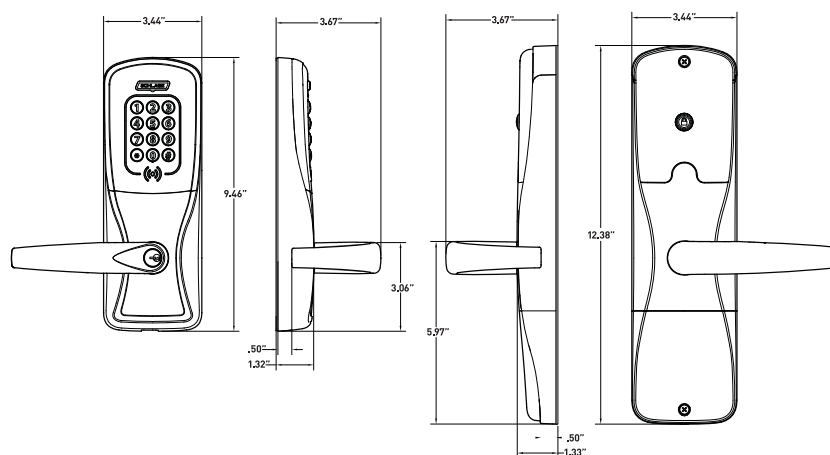
Features

- Security that's more intelligent and convenient than traditional mechanical locking devices
- Audit trail reports that allow you to track usage and events
- Update users and access rights at the lock using the keypad or handheld device
- The ability to upgrade to a networked solution without removing the lock from the door
- Available in cylindrical, mortise, mortise with deadbolt and exit trim
- Compatible with major brands of master key systems and exit devices

AD-200 Electronic Lock Specifications	
Users	Up to 5,000
Audits	Up to 5,000
Credential Verification Time	≤ 1 second
Visual/Audible Communications	Tri-colored LED's & audible indicators (field configurable)
System Interface	Handheld Device
Power Supply	4AA, 8AA, 12 VDC or 24 VDC
Voltage Range	4 VDC to 26 VDC
Max Current Requirement	Up to 250 mA
Battery Life	Up to 2 yrs with 4AA (8AA option available for extended battery life)
Operating Temperature - Exterior	-31° to 151°F (-35° to 66°C) (no battery)
Operating Temperature - Interior	32° to 120°F (0° to 49°C) (battery)
Operating Humidity	0 - 100% condensing
Certifications	ANSI/BHMA A156.25 Grade 1, UL294*, UL10 C, FCC Part 15, ADA, RoHS
Accessories	Handheld Device (HHD)

*Pre-launch datasheet. UL294 certification pending. Certification will be achieved prior to shipment.
 **Activation based on capabilities of access control software.

Dimensions



Functions

- ▶ Classroom/Storeroom
- ▶ Office
- ▶ Privacy
- ▶ Apartment

Note: Office function not available with Mortise Deadbolt option. To ensure safety all functions always allow for free egress.

Standard Status Signals

- ▶ Lock/Unlock Status (Clutch Position)
- ▶ Request-to-Exit Switch**
- ▶ Door Position Switch**
- ▶ Mechanical Key Override
- ▶ Deadbolt Position**
- ▶ Interior Cover Tamper Guard**
- ▶ Battery Status
- ▶ Request-to-Enter**

Schlage Utility Software on Hand Held Device

The Schlage Utility Software (SUS) on the Hand Held Device (HHD) provides an easy way to manage people, audits and locks for simple access control management.

Schlage Utility Software

- Initialize Lock and Accessories
- Field Configure Devices
 - Credential Reader Formats
 - Lock Function
 - Unlock Period
 - Failure Mode
 - Audible Alarm ON/OFF
- Service & Diagnostics
 - Battery Status
 - Validate hardware and software revision
 - Troubleshooting Status Signals

HHD

- 3.5 in LCD display
- Touch Screen/Keypad Backlit
- 32-bit processor
- OS: Windows Mobile 5.0
- Memory: 128 MB RAM/256 MB ROM
- Battery: Rechargeable 3.7 v, 1,230 mA, Li-ion
- Dimensions: 5.3" x 2.9" x 0.7" (13.5 cm x 7.3 cm x 1.8 cm)
- Weight: 0.42 lbs. (190 g)
- 4 ft. (1.2 m) drop to steel surface, 2 drops per 6 sides



The HHD connects with AD-Series locks via the USB interface

Mechanical Specifications		
Chassis	Cylindrical (Based on Schlage ND-Series)	Mortise (Based on Schlage L-Series)
Handing	Handed to Order, Field Reversible	
ANSI Standard	Meets or exceeds A156.25 and A156.2 Series 4000, Grade 1 strength and operational requirements	Meets or exceeds A156.25 and A156.13 Series 1000, Grade 1 Operational and Security
Door Thickness	1-3/4" standard, 1-3/8" to 2-3/4" optional (available in 1/8" increments)	
Backset	2-3/4" standard, 2-3/8", 3-3/4" and 5" optional	2-3/4" only
Latch Bolt	1/2" throw security latch standard 3/4" throw optional	3/4" throw with anti-friction tongue standard 1" throw deadbolt on Mortise Deadbolt option
Levers	Pressure cast zinc, plated to match finish symbols	Steel, plated to match finish symbols
Strike	ANSI curved lip strike 1-1/4" x 4-7/8" x 1-3/16" lip to center standard, optional strikes, lip lengths and ANSI strike box available	ANSI curved lip strike 1-1/4" x 4-7/8" x 1-3/16" lip to center with dust box standard, optional strikes lip lengths available
Cylinder & Keys	6-pin Everest C123 keyway cylinder with two patented keys standard Additional options available including SFIC, FSIC and competitor brands	

AD-Series Exit Trim

The AD-Series Exit Trim (installed with a universal mounting plate) is compatible with the following exit devices:

- Von Duprin 98/99**
Rim, Concealed Vertical Rod, Surface Vertical Rod, Mortise. Request-to-Exit Switch optional for future network migration.
- Von Duprin 22/22F**
Rim, Surface Vertical Rod
- Falcon 25** - Rim
- Sargent 80 Series** - Rim
- Corbin Russwin 5000 Series** - Rim
- Yale 7000** - Rim
- Dorma 9000** - Rim

Reader Specifications			
	Multi-Technology*	Smart Card*	Proximity
Frequency or Track	125 kHz proximity and 13.56 MHz smart card	13.56 MHz	125 kHz
Standards	ISO 15693 and ISO 14443		None
Maximum Read Range	up to 0.75"		
Compatibility (secure sector)	Schlage, XceedID ISO-X, MIFARE, ISO-X Lite, my-d, DESFire 8-EV1		
Compatibility (serial number only)	MIFARE, DESFire, iCLASS, Inside Pictotag, ST Micro, TI Tagit		Schlage, XceedID, HID, GE/CASI ProxLite and AWID
Compatible Schlage Credentials	Reads same credentials as AD-Series smart card and proximity readers	13.56 MHz Clamshell (SXF9420 & SXF9440), 13.56 MHz Smart card ISOX or MIFARE Glossy White (SXF9520, SXF9540, SXF9551, SXF9558 & SXF9574), 13.56 MHz Key Tag (SXF9640 & SXF9651), 13.56 MHz PVC Patch (SXF9740, SXF9751 & SXF97), Schlage EV1	125 kHz Clamshell Proximity (SXF7410), 125 kHz ISO Card Proximity (SXF7510), 125 kHz ISO Card w/ Magnetic Stripe (SXF7510MS)
Certifications/Standards	FCC, Canadian FCC, UL294 Listed,** ISO 15693 and ISO 14443	FCC, Canadian FCC, UL294 Listed,** R&TTE Directive (15 EU Countries), CE Mark	FCC, Canadian FCC, UL294 Listed,** R&TTE Directive (15 EU Countries), CE Mark
Style/Layout	Option for 12-button, 3x4 matrix backlit keypad		

Additional Readers

Magnetic Stripe

- Triple Track Reader (1, 2 or 3), field configurable
- Illuminated Card Slot
- ABA, ISO76XX Standard
- Reader can be cleaned without removing lock from door
- Option for 12 button, 3x4 matrix backlit keypad

Keypad

- Backlit keypad
- 12 button, 3x4 matrix

*Smart Card functionality dependant on access control software. Schlage SMS Select, Premier and Enterprise offer Smart Card functionality.
**Pre-launch datasheet. UL294 certification pending. Certification will be achieved prior to shipment.

Available AD-Series Reader Modules



- Proximity
- Smart Card
- Multi-Technology
- + KEYPAD



- Proximity
- Smart Card
- Multi-Technology



- Magnetic Stripe
- + KEYPAD



- Magnetic Stripe



- Keypad

Ordering Information

AD-200-CY-70-MG-SPA-626-PD-C123-RH-4B-13-047-10-025-1-3/4													
Series	Class	Chassis	Function	Reader	Lever Style	Finish	Lever Cylinder	Keying Type	Handing	Battery	Backset & Latch	Strike	Door Thickness
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Selections Correspond With the Numbers Above

Standard options are indicated in bold.

3 Chassis

CY	Cylindrical
MS	Mortise
MD	Mortise Deadbolt
993R	Exit Trim – Rim/CVR
993S	Exit Trim – SVR
993M	Exit Trim – Mortise

4 Function

70	Classroom/Storeroom
50	Office
40	Privacy
60	Apartment

5 Reader

KP	Keypad
MG	Magnetic Stripe
MGK	Magnetic Stripe + Keypad
PR	Proximity
PRK	Proximity + Keypad
SM	Smart Card
SMK	Smart Card + Keypad
MT	Multi-Technology
MTK	Multi-Technology + Keypad

6 Lever

SPA	Sparta
RHO	Rhodes
ATH	Athens
TLR	Tubular

Available with knurled surface

7 Finish

626	Satin Chrome
605	Bright Brass
606	Satin Brass
612	Satin Bronze
619	Satin Nickel
625	Bright Chrome
643e	Aged Bronze
626AM	Satin Chrome

8 Lever Cylinder Type

PD	6-pin Full Cylinder
----	---------------------

See price book for other SFIC, FSIC and Less Cores options available. Compatible with Schlage, Sargent, Corbin, Medeco and Yale

9 Keyway Type

C123	Everest
------	---------

See price book for other available keyway options including master keying

10 Handing

RH	Right Handed
LH	Left Handed

Field reversible

11 Battery

4B	4AA
8B	8AA

12 Backset and Latch

13-047 2-3/4" Backset, Deadlatch, square corner, 1-1/8" x 2-1/4"
See price book for other backset and latch options

13 Strike

Cylindrical
10-025 1-3/16 Lip, ANSI, no box, 1-1/4" x 4-7/8"
See price book for other available cylindrical strikes

Mortise Options
10-072 1-3/16" Lip, 1-1/4" x 4-7/8" square corner, box
See price book for other available mortise strikes

14 Door Thickness

1-3/4"
Other thicknesses available between 1-3/8" and 2-3/4"
See price book for detail

Lever styles

Standard cylinders shown, SFIC and FSIC also available.



Sparta



Rhodes



Athens



Tubular

Warm tone finishes



605
Bright Brass



606
Satin Brass



612
Satin Bronze



643e
Aged Bronze

Cool tone finishes



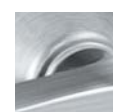
619
Satin Nickel



625
Bright Chrome



626
Satin Chrome

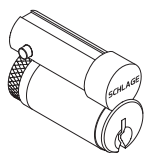


626AM
Satin Chrome
with Antimicrobial

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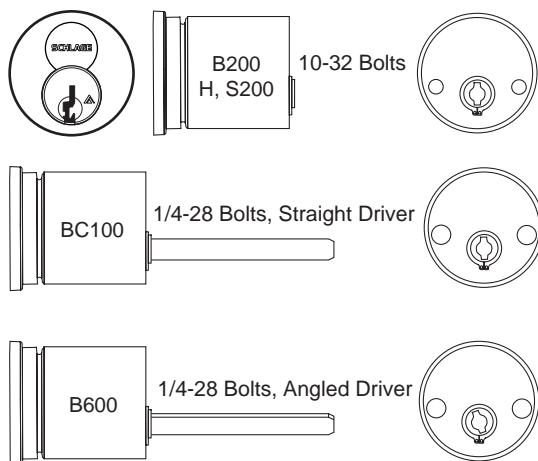
Full Size Interchangeable Core Cylinders for Schlage Locksets



Full Size Core Only

Number	Mechanism
23-030	Conventional core
30-120	Conventional core for hotel function (specify hand)
20-740	Primus core (not available in hotel function)

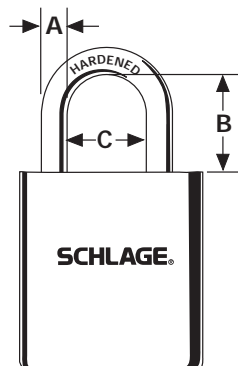
Available 606 and 626 finish only. Everest C123 keyway standard. Order control keys separately.



Full Size IC Housing for Bored Deadlocks, Less Core

Lockset Series	Description	Number	Specify Finish
BC100-Series	Outside	B220-203	605, 609, 612, 613, 625, 626
	Inside	B220-204	See Note Below
B250, H, S200-Series	Outside	22-061	605, 606, 609, 610, 611, 612, 613, 616, 625, 626
	Inside of B252	22-062	
B600 / 700-Series	Outside	B610-027	605, 606, 609, 612, 613, 625, 626
	Inside	B610-028	See Note Below

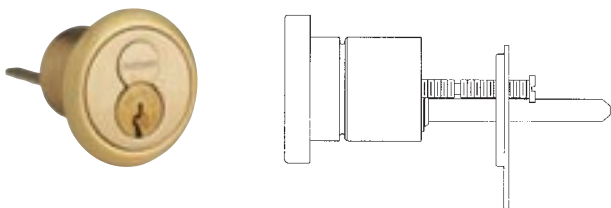
Specify finish of B610-031 inside snap-on faceplate ordered separately for BC162 and B662/762.



Interchangeable Core Padlocks

Padlock Series	Shackle Dimensions			Padlock with Core	
	A	B	C	Conventional	Primus
PL4000 2" x 2¼" x 7/8"	3/8"	1½"	3/4"	PL4001	PL4741
	3/8"	2"	3/4"	PL4002	PL4742
	3/8"	3"	3/4"	PL4003	PL4743

Full Size Interchangeable Core Cylinders for Exit Devices, Aluminum Doors, etc.



Interchangeable Core Rim Cylinders for Exit Devices

Number	Core Mechanism
20-057	Conventional core
20-757	Primus core
20-079	Housing only, less core

Available 605, 606, 612, 613, 625 and 626 finish.
Everest C123 keyway standard.



Cylinders for Adams Rite MS and 4700 Series Lori 4500 Series and Corbin Russwin DL3000 Series

Number	Core Mechanism	Collar
26-098	Conventional core	Compression ring & spring
20-062	Conventional core	$\frac{3}{16}$ " + $\frac{3}{8}$ " blocking rings
20-766	Primus core	$\frac{3}{16}$ " + $\frac{3}{8}$ " blocking rings
20-060	Housing less core	None

These cylinders include set screw pack B220-050 for Adams Rite locks.



K510-711
Adams Rite
MS Cam

Cylinders for Adams Rite 4070 Series Deadlocks

Number	Core Mechanism	Collar
20-091	Conventional core	$\frac{3}{16}$ " + $\frac{3}{8}$ " blocking rings
20-722	Primus core	$\frac{3}{16}$ " + $\frac{3}{8}$ " blocking rings
20-090	Housing less core	None

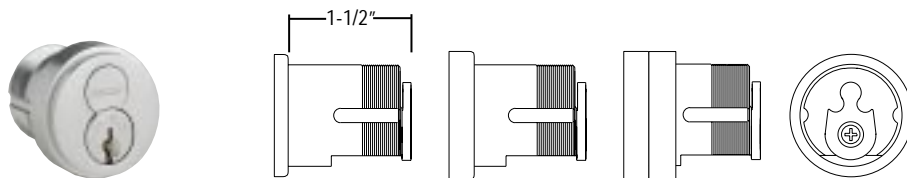


B520-378
Adams Rite
4070 Cam

- Notes
1. Mortise cylinders available 605, 606, 612, 613, 625, and 626 finish. Cores furnished 606 and 626 only.
 2. To differentiate between Classic and Everest, specify keyway. Example: C or CP (Classic), C123 (Everest). Everest C123 keyway standard.
 3. All cylinders are 1 $\frac{1}{2}$ " long.
 4. Specify LKB if 0-bitted Primus cylinders are required less key blanks.

CYLINDERS, KEYS AND KEY CONTROL

Full Size Interchangeable Core Mortise Cylinders



Cylinders for Schlage L-Series Mortise Locks

Design	Function	Core Mechanism		
		Conventional	Primus	Housing Less Core
	All Except Below	30-008	20-798	30-007
	L9060P Outside	30-030	20-782	30-032 + 36-083
	L9485P, L9486P Hotel Functions	30-010*	N/A	30-007
	All Except Below	30-138	20-776	30-137
	L9060P Outside	20-061	20-783	30-032 + 36-083 + 35-082-037
	L9485P, L9486P Hotel Functions	30-140*	N/A	30-137

* Hotel function cores are handed. Specify hand of door.



L583-255
Cam for All Functions
Except L9060 Outside



K510-680
Cam for
L9060 Outside

Mortise Cylinders with Straight Cam for Exit Devices and Most Old Black Cast Iron Mortise Locksets

Number	Core Mechanism	Collar
26-091	Conventional core	Compression ring & spring
20-061		3/16" + 3/8" blocking rings
20-763	Primus core	Compression ring & spring
20-771		3/16" + 3/8" blocking rings
20-059	Housing less core	None
26-064		Compression ring & spring
26-094		3/16" + 3/8" blocking rings



K510-730
Straight Cam,
Other Applications

- Notes
1. Available 605, 606, 612, 613, 625, and 626 finish. Cores furnished 606 and 626 only.
 2. To differentiate between Classic and Everest, specify keyway. Example: C or CP (Classic), C123 (Everest). Everest C123 keyway standard.
 3. All cylinders are 1-1/2" long.
 4. Specify LKB if 0-bitted Primus cylinders are required less key blanks.

Specifications

Handing:

All D-Series lever locksets are non-handed.

Door Thickness:

1 $\frac{3}{8}$ " to 2 $\frac{1}{8}$ " (41mm–54mm) standard including Vandlgard® functions. 1 $\frac{3}{4}$ " - 2" for function D85. See accessories (Page 11) for spacers required for 1 $\frac{3}{8}$ " doors.

Backset:

2 $\frac{3}{4}$ " (70mm) standard. 2 $\frac{3}{8}$ ", 3 $\frac{3}{4}$ " and 5" (60mm, 95mm, 127mm) optional.

Faceplate:

Brass, bronze or stainless steel. 1 $\frac{1}{8}$ " x 2 $\frac{1}{4}$ " (29mm x 57mm) square corner, beveled.

Lock Chassis:

Zinc plated for corrosion resistance.

Latch Bolt:

Steel, $\frac{1}{2}$ " (12mm) throw, deadlocking on keyed and exterior functions. $\frac{3}{4}$ " (19mm) throw anti-friction latch available for pairs of fire doors.

Exposed Trim:

Levers: Pressure cast zinc, plated to match finish symbols.
Roses: Solid brass.

Strike:

ANSI curved lip strike 1 $\frac{1}{4}$ " x 4 $\frac{7}{8}$ " x 1 $\frac{3}{16}$ " lip to center standard. Optional strikes, lip lengths and ANSI strike box available. See page 10.

Cylinder & Keys:

6-pin Everest C123 keyway standard with two patented nickel silver keys per lock.

Keying Options:

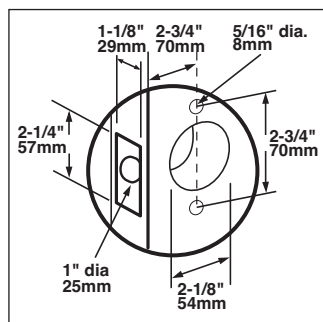
Interchangeable core and Primus® high security cylinders. Master keying, grand master keying and construction keying.

Warranty:

Seven-year limited for all functions including Vandlgard®.

Door Preparation

Lever Designs



Certifications

ANSI

Meets or exceeds A156.2 Series 4000, Grade 1 strength and operational requirements. Meets A117.1 Accessibility Code.

Federal

Meets FF-H-106C Series 161.

California State Reference Code (CSFH)

(Formerly Title 19, California State Fire Marshal Standard)

All levers with less than $\frac{1}{2}$ " (64mm) returns comply; levers return to within $\frac{1}{2}$ " of door face.

MEA Certification

All electrified locking (fail-safe, unlocked by switch or power failures) functions accepted for use in New York City by the City of New York, Department of Buildings (MEA 24-04-E).

All levers with less than $\frac{1}{2}$ " (64mm) returns comply with California Fire Safety Codes.

3/4" and 1/2" throw latch approved for Hurricane Resistance with Miami-Dade County, Florida and the Florida Building Commission.

UL / cUL:

All locks listed for A label single doors, 4' x 8'. Letter F and UL symbol



D SERIES LEVERS

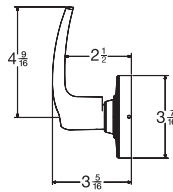
Lever Designs & Finishes



606

ATHENS

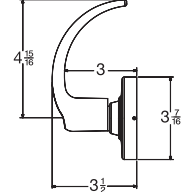
Symbol: ATH (L-Series 07)
 Material: Pressure cast zinc lever; wrought brass rose
 Finishes:
 605, 606, 612, 613, 619, 625, 626



626

SPARTA

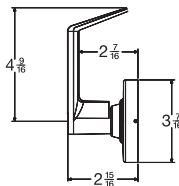
Symbol: SPA (L-Series 17)
 Material: Pressure cast zinc lever; wrought brass rose
 Finishes:
 605, 606, 612, 613, 619, 625, 626



612

RHODES

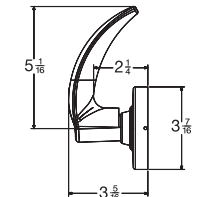
Symbol: RHO (L-Series 06)
 Material: Pressure cast zinc lever; wrought brass rose
 Finishes:
 605, 606, 612, 613, 619, 625, 626



619

OMEGA

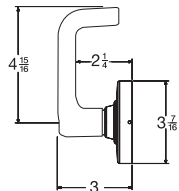
Symbol: OME (L-Series Omega)
 Material: Pressure cast zinc lever; wrought brass rose
 Finishes:
 605, 606, 612, 613, 619, 625, 626



626

TUBULAR (L-Series 03)

Symbol: TLR
 Material: Pressure cast zinc lever; wrought brass rose
 Finishes:
 605, 606, 612, 613, 619, 625, 626



605
Bright Brass



606
Satin Brass



612
Satin Bronze



613
Oil Rubbed Bronze



619
Satin Nickel



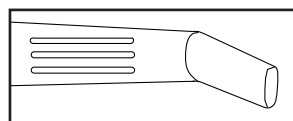
625
Bright Chromium Plated



626
Satin Chromium Plated

Keyed functions available with Full Size Interchangeable Core options.

Keyed functions available with Small Format Interchangeable Core options.



TACTILE WARNING (KNURLING)

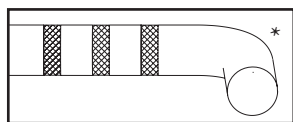
Change symbol designation as follows:

8AT for Athens

8RO for Rhodes

8SP for Sparta

8TR for Tubular*



*Only available with Tubular lever.

Only outside lever is knurled unless otherwise specified.

Not available with Omega trim

Extended Factory Lead Time

Finishes

605 Bright Brass

606 Satin Brass

612 Satin Bronze

613 Oil Rubbed Bronze

619 Satin Nickel

625 Bright Chromium Plated

626 Satin Chromium Plated

D-SERIES WITH VANDLGARD™

Schlage D-Series keyed lever locks with Vandlgard provide vandal resistant technology. Designed for maximum accessibility, security and durability, Vandlgard sets the standard for door hardware in educational facilities and other applications subject to heavy traffic or abuse. The unique features of Vandlgard prevent damage to internal lock components caused by excessive force from persons kicking, hitting or standing on the lever to gain access. Vandlgard functions maintain total key system and architectural design compatibility with Schlage's regular D-Series cylindrical locks.

Levers have virtually replaced knobs in the marketplace for handicap accessibility. The added grip and leverage has created an increased opportunity for abuse or vandalism. This abuse often renders locks inoperable. In some cases the security of the door is violated leaving computer and laboratory equipment susceptible to theft. While this type of abuse is commonly associated with junior and senior high schools, it also occurs in universities, office buildings, commercial buildings, and public buildings.



Locked lever freely rotates up and down while remaining securely locked. The Vandlgard function also increases resistance to over-rotation of the lever.

Benefits & Features

Superb warranty.

All Vandlgard functions have a 7-year warranty.

Reduce lever wobble and play.

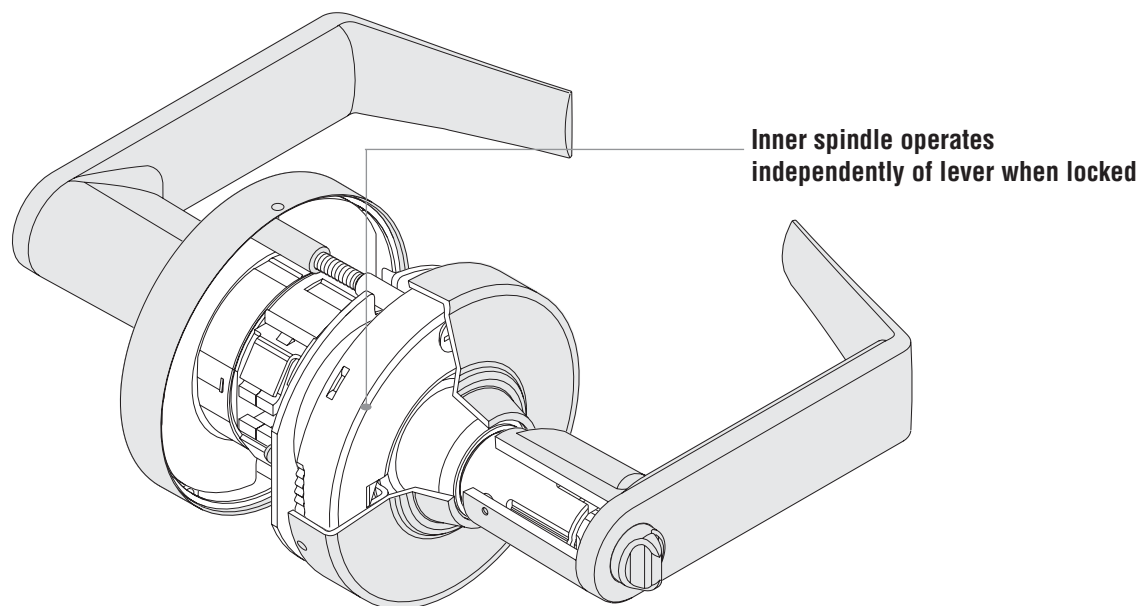
Integrated spindle and spring cage greatly reduces lever sag and wobble.

Resists vandalism.

Free-wheeling lever eliminates the ability to stand or exert excessive force on the end of the lever.

Ease of installation.

Installs in under 2 minutes.



D-Series Vandlgard levers comply with ADA requirements. &

D SERIES LEVERS

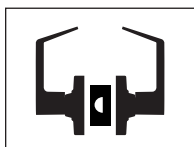
Functions

ANSI A156.2 Series 4000 Grade 1

Non-Keyed Locks

SCHLAGE ANSI

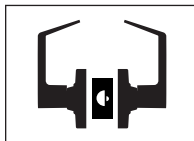
ND10S F75



Passage Latch

Both levers always unlocked. Inside lever is always free for immediate egress.

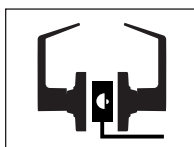
ND12D F89



Exit Lock

Outside lever always fixed. Inside lever always unlocked. Inside lever is always free for immediate egress.

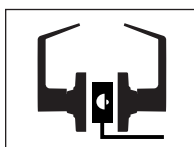
ND12DEL



Electrically Locked (Fail Safe)

Outside lever continuously locked electrically. Unlocked by switch or power failure. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Inside lever is always free for immediate egress.

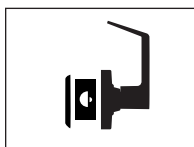
ND12DEU



Electrically Unlocked (Fail Secure)

Outside lever continuously locked until unlocked by electric current. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Inside lever is always free for immediate egress.

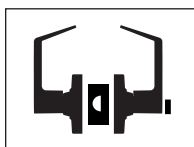
ND25D



Exit Lock

Blank plate outside. Inside lever always unlocked. Inside lever is always free for immediate egress.

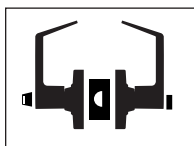
ND40S F76



Bath/Bedroom Privacy Lock

Push-button locking. Can be opened from outside with small screwdriver. Turning inside lever or closing door releases button. Inside lever is always free for immediate egress.

ND44S



Hospital Privacy Lock

Push-button locking. Unlocked from outside by turning emergency turn-button. Turning inside lever or closing door releases button. Inside lever is always free for immediate egress.

ND170



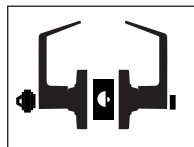
Single Dummy Trim

Dummy trim for one side of door. Used for door pull or as matching inactive trim. Inside lever is always free for immediate egress.

Keyed Locks

SCHLAGE ANSI

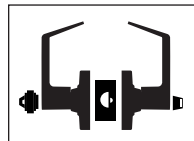
ND50PD F82



Entrance/Office Lock †

Push-button locking. Push-button locks outside lever until unlocked with key or by turning inside lever. Inside lever is always free for immediate egress.

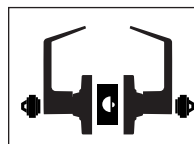
ND53PD F109



Entrance Lock †

Turn/push-button locking; pushing and turning button locks outside lever, requiring use of key until button is manually unlocked. Push-button locking; pushing button locks outside lever until unlocked by key or by turning inside lever. Inside lever is always free for immediate egress.

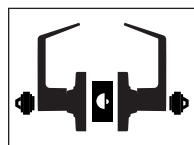
ND60PD F88



Vestibule Lock †

Latch retracted by key from outside when outside lever is locked by key in inside lever. Inside lever is always unlocked. Inside lever is always free for immediate egress.

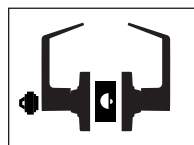
ND66PD F91



Store Lock † *

Key in either lever locks or unlocks both levers.

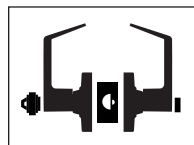
ND70PD F84



Classroom Lock †

Outside lever locked and unlocked by key. Inside lever always unlocked. Inside lever is always free for immediate egress.

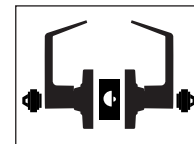
ND73PD F90



Corridor Lock †

Locked or unlocked by key from outside. Push-button locking from inside. Turning inside lever or closing door releases button. When outside lever is locked by key it can only be unlocked by key. Inside lever is always unlocked. Inside lever is always free for immediate egress.

ND75PD



Classroom Security Lock †

Key in either lever locks or unlocks outside lever. Inside lever is always unlocked. Inside lever is always free for immediate egress.

Safe School Locks

† Keyed functions available with 6-pin (PD/LD), SFIC(GD/BD), or FSIC(RD/JD) cylinder.

* **Caution:** Double cylinder locks on residences and any door in any structure which is used for egress are a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.

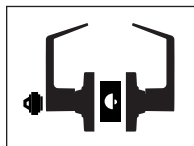
Functions

ANSI A156.2 Series 4000 Grade 1

Keyed Locks

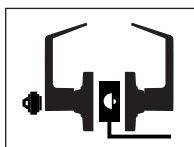
SCHLAGE ANSI

ND80PD F86



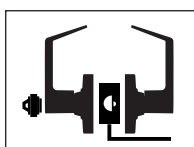
Storeroom Lock †
 Outside lever fixed. Entrance by key only. Inside lever always unlocked. Inside lever is always free for immediate egress.

ND80PDEL



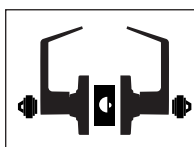
Electrically Locked (Fail Safe) †
 Outside lever continuously locked electrically. Unlocked by key outside or by switch or power failure. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Inside lever is always free for immediate egress.

ND80PDEU



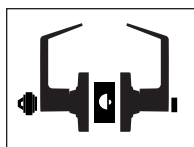
Electrically Unlocked (Fail Secure) †
 Outside lever continuously locked until unlocked by key or electric current. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Inside lever is always free for immediate egress.


ND82PD F87



Institution Lock † *
 Both levers fixed. Entrance by key in either lever.

ND85PD



Faculty Restroom Lock ** 
 Outside lever fixed. Entrance by key only. Push-button in inside lever activates visual "occupancy" indicator, allowing only emergency master key to operate. Turning inside lever or closing door releases visual occupancy indicator. Rotation of inside spinner-button provides lock-out feature by keeping indicator thrown. Inside lever is always free for immediate egress.

 *Safe School Locks*

† Keyed functions available with 6-pin (PD/ILD), SFIC(GD/BD), or FSIC(RD/JD) cylinders.

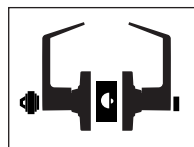
* *Caution: Double cylinder locks on residences and any door in any structure which is used for egress are a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.*

** 85 function locks are not available in Full Size & Small Format Interchangeable Cores.

Vandlgard Functions

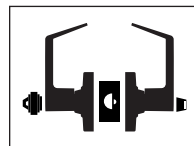
SCHLAGE ANSI

ND91PD F82



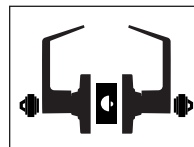
Entrance/Office Lock †
 Push-button locking. Push-button disengages outside lever until unlocked with key or by turning inside lever. Vandlgard is designed to disengage outside spindle from latch when in locked condition. Inside lever is always free for immediate egress.

ND92PD F109



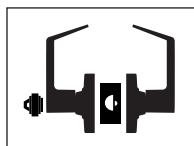
Entrance Lock †
 Turn/push-button locking; pushing and turning button disengages outside lever, requiring use of key until button is manually unlocked. Push-button locking; pushing button disengages outside lever until unlocked by key or by turning inside lever. Vandlgard is designed to disengage outside spindle from latch when in locked condition. Inside lever is always free for immediate egress.


ND93PD F88



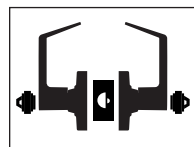
Vestibule Lock †
 Latch retracted by key from outside when outside lever is disengaged by key in inside lever. Inside lever is always unlocked. Vandlgard is designed to disengage outside spindle from latch when in locked condition. Inside lever is always free for immediate egress.


ND94PD F84



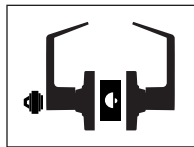
Classroom Lock † 
 Outside lever disengaged and unlocked by key. Inside lever always unlocked. Vandlgard is designed to disengage outside spindle from latch when in locked condition. Inside lever is always free for immediate egress.

ND95PD



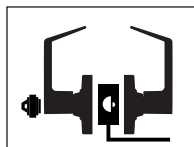
Classroom Security Lock † 
 Key in either lever locks or unlocks outside lever. Inside lever is always unlocked. Inside lever is always free for immediate egress.

ND96PD F86



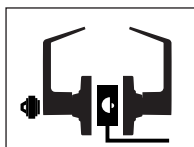
Storeroom Lock †
 Outside lever always disengaged. Entrance by key only. Inside lever always unlocked. Vandlgard is designed to disengage outside spindle from latch when in locked condition. Inside lever is always free for immediate egress.

ND96PDEL



Electrically Locked (Fail Safe) †
 Outside lever continuously disengaged electrically. Unlocked by key outside or by switch or power failure. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Vandlgard is designed to disengage outside spindle from latch when in locked condition. Inside lever is always free for immediate egress.

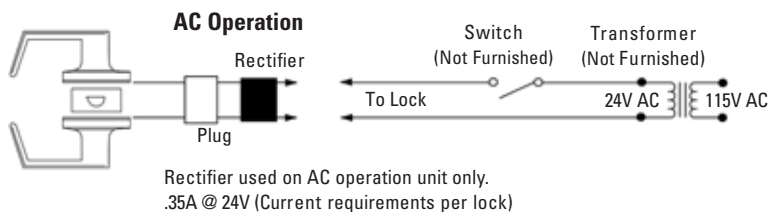
ND96PDEU



Electrically Unlocked (Fail Secure) †
 Outside lever continuously disengaged until unlocked by key or electric current. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever always free for immediate exit. Vandlgard is designed to disengage outside spindle from latch when in locked condition. Inside lever is always free for immediate egress.

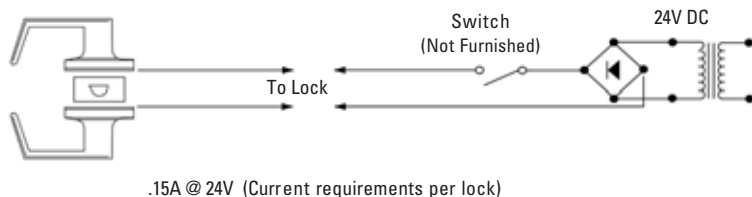
Typical Wiring Diagram for Electrified Locks

AC Power Source – EL or EU

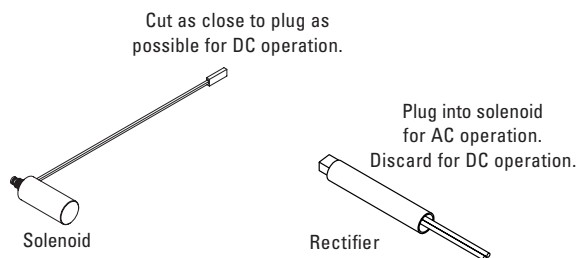


DC Power Source – EL or EU

DC Operation



AC and DC Application



Accessories

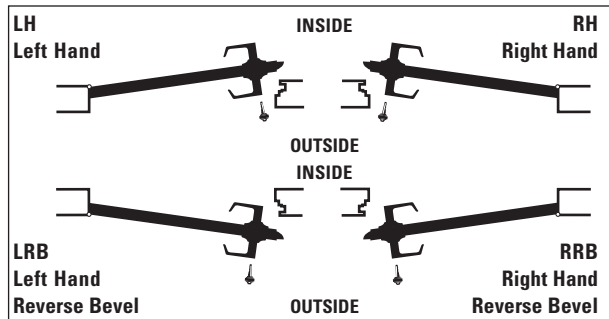
1-3/8" D-Series Lever Door Spacer*



*For installation on 1 3/4" doors, two (2) spacers are required. Specify finish.

Door Handing

All Schlage® locks are reversible. Hand information is necessary to ensure proper finish of latchbolt and strike for split-finish locks. Follow the diagram to determine the hand of the door. The outside is the secure side or the corridor side.





L-Series Commercial Locks

Nothing is tougher.

At Schlage we know that every product you specify has to stand up to constant use and abuse. Your building's locking systems face an additional challenge – keeping people and other assets safe while delivering constant, reliable performance. Schlage L-Series Extra Heavy Duty Mortise Locks are built to withstand the rigors of daily use without fail.

We don't compromise on security.

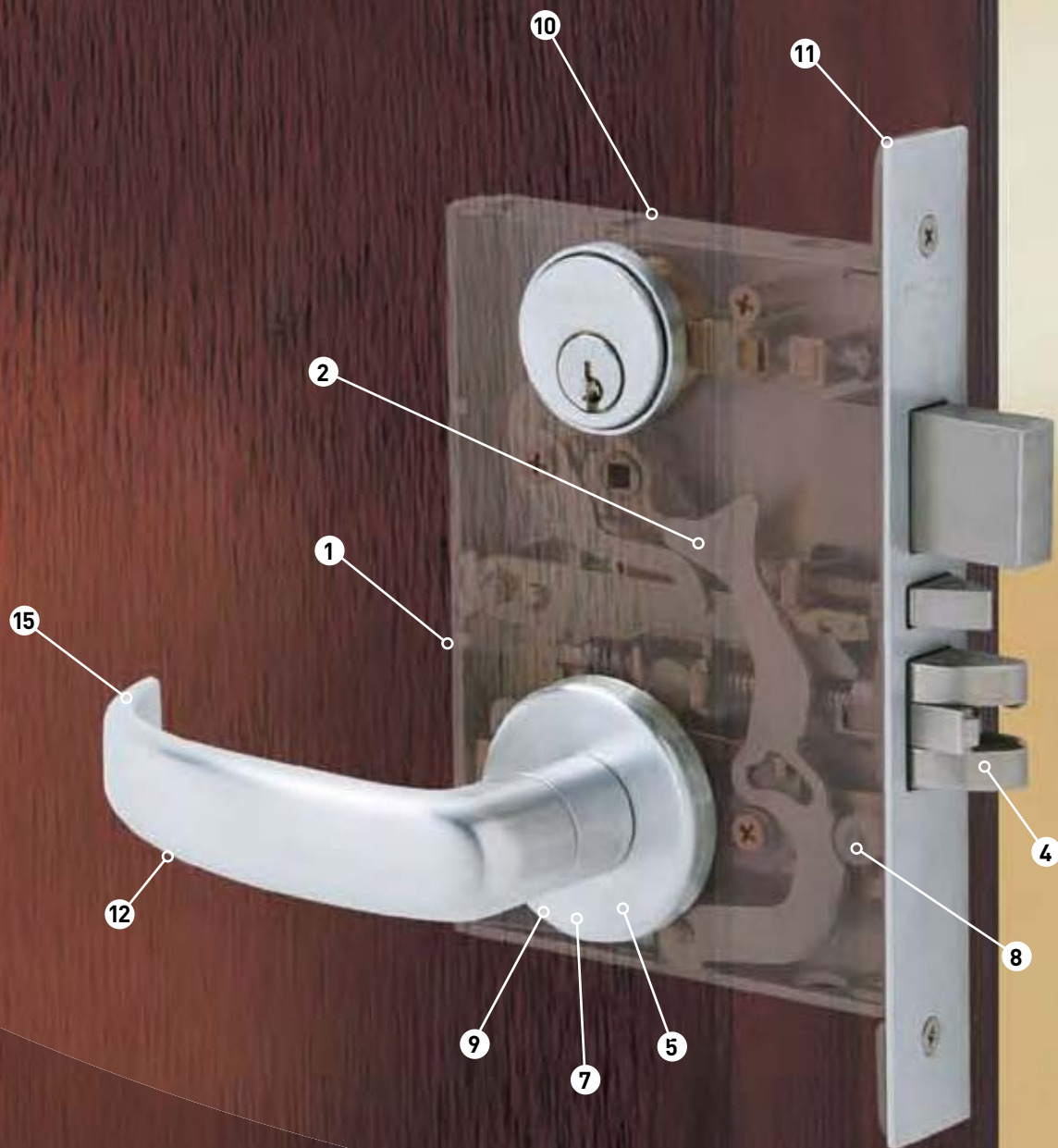
The safety and security of your clients' buildings is something we take very seriously. That's why every Schlage lock and deadbolt undergoes intensive testing to determine its ANSI grade level:

- Cycle tests
- Door impact tests
- Bolt strength tests
- Resistance tests
- Warped door tests

We pay attention to these details so you can focus on creating a functional and aesthetically pleasing environment for your clients. In fact, every one of our L-Series locks meets ANSI Grade 1 standards for safety.



Real Security Sets You Free.™



Vandlgard®

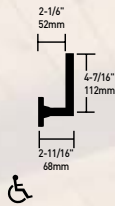
The L-Series Vandlgard is ideal for areas subject to abuse or anywhere vandalism is likely to be present. Vandlgard prevents damage to internal lock components caused by excessive force from kicking, hitting or standing on the lever to gain access.

It's easy to retrofit standard L-Series locks with Vandlgard using the Vandlgard Retrofit Kit and an instructional DVD that shows installation on existing hardware.

danmark Lever Designs

615

Material: Forged brass and cast stainless steel



621

Material: Forged brass and cast stainless steel



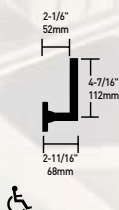
695

Material: Forged brass and cast stainless steel



615

Material: Forged brass and cast stainless steel



690

Material: Forged brass and cast stainless steel



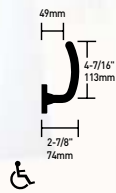
Finish Key



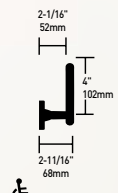
630
Stainless Steel



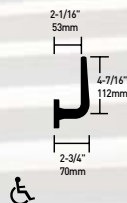
660
Material: Forged brass and cast stainless steel



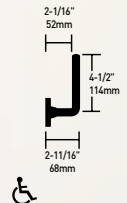
650
Material: Forged brass and cast stainless steel



696
Material: Forged brass and cast stainless steel



640
Material: Forged brass and cast stainless steel



L-Series Commercial Levers

High Performance Meets High Style

Bright and brushed finishes in brass, bronze, chromium, stainless steel and more.

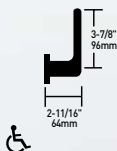
Knobs or levers. Sleek sophistication or classic elegance. The L-Series collection offers the choices you need – and a few that might surprise you.

Lever Designs and Finishes



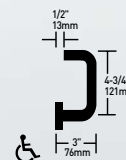
01

Material: Forged brass and cast stainless steel
Finishes: 605, 606, 609, 610, 619, 625, 626, 629, 630



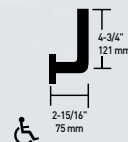
03

Material: Forged brass, bronze and cast stainless steel
Finishes: 605, 606, 609, 610, 611, 612, 613, 616, 619, 625, 626, 629, 630



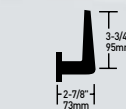
02

Material: Forged brass and cast stainless steel
Finishes: 605, 606, 609, 610, 619, 625, 626, 629, 630



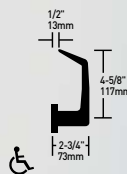
05

Material: Forged brass, bronze and cast stainless steel
Finishes: 605, 606, 609, 610, 619, 625, 626, 629, 630

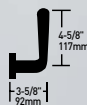




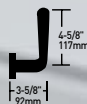
06
Material: Forged brass, bronze and cast stainless steel **Finishes:** 605, 606, 609, 610, 611, 612, 613, 616, 619, 625, 626, 629, 630



07
Material: Forged brass, bronze and cast stainless steel **Finishes:** 605, 606, 609, 610, 611, 612, 613, 616, 619, 625, 626, 629, 630



12
Materials: Forged brass, bronze and cast stainless steel **Finishes:** 605, 606, 609, 610, 611, 612, 613, 616, 619, 625, 626, 629, 630 Specify door hand



Finish Key



605
Bright Brass



606
Satin Brass



609
Antique Brass



610
Bright Brass, Blackened



611
Bright Bronze



612
Satin Bronze



613
Oil Rubbed Bronze



616
Antique Bronze



619
Satin Nickel



625
Bright Chromium Plated



626
Satin Chromium Plated



629
Bright Stainless Steel



630
Satin Stainless Steel

Lever Designs and Finishes



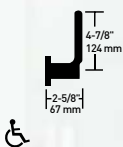
17
Material: Forged brass, bronze and cast stainless steel
Finishes: 605, 606, 609, 610, 611, 612, 613, 616, 619, 625, 626, 629, 630



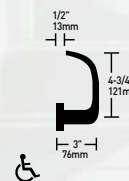
93
Material: Extruded brass, bronze or stainless steel
Finishes: 605, 606, 609, 610, 611, 612, 613, 616, 619, 625, 626, 629, 630



18
Material: Forged brass, bronze and cast stainless steel
Finishes: 605, 606, 609, 610, 619, 625, 626, 629, 630



Omega
Material: Forged brass, bronze and cast stainless steel
Finishes: 605, 606, 609, 610, 613, 619, 625, 626, 629, 630





ASTI
Material:
 Solid forged brass
Finishes: 605, 606,
 609, 610, 611, 619,
 625, 626



41 (D Orbit)
Material: Heavy wrought
 bronze, or stainless steel
Finishes: 605, 606, 612, 613,
 625, 626, 629, 630



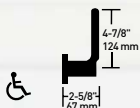
Merano
Material:
 Solid forged brass
Finishes: 605, 606,
 609, 610, 611, 619,
 625, 626



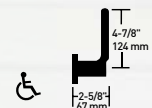
42 (D Plymouth)
Material: Heavy wrought,
 bronze, or stainless steel
Finishes: 605, 606, 612, 613,
 625, 626, 629, 630



St. Annes
Material: Solid
 forged brass
Finishes: 619, 626



Accent
Material: Solid
 forged brass
Finishes: 619, 626



Escutcheons and Roses

Choose from three types of escutcheon and four rose sizes to add tough, durable performance to your lockset.

Escutcheons



L Full Face

Material: Cold-forged brass, bronze or stainless steel

Finishes: 605, 606, 612, 613, 619, 625, 626, 629, 630

Size: 8" x 1 3/4" x 7/16"
(203 mm x 44 mm x 11mm)



L Concealed

Material: Cold-forged brass, bronze or stainless steel

Finishes: 605, 606, 612, 613, 619, 625, 626, 629, 630

Size: 8" x 1 3/4" x 7/16" (203 mm x 44 mm x 11 mm)



N Escutcheon

Material: Heavy wrought reinforced brass, bronze or stainless steel

Finishes: 605, 606, 612, 613, 619, 625, 626, 629, 630

Size: 8" x 2 9/16" x 7/16"
(203 mm x 65 mm x 11 mm)



Roses



A Wrought Rose

2 1/8" (54 mm) diameter
Available for use on L-Series knob and lever designs.
Order by letter designation corresponding to the design and diameter desired.



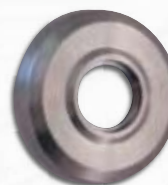
B Wrought Rose

2 9/16" (65 mm) diameter
Available for use on L-Series knob and lever designs.
Order by letter designation corresponding to the design and diameter desired.



Avanti (AVA)

2 5/8" (67 mm) diameter
Available for use on L-Series knob and lever designs.
Order by letter designation corresponding to the design and diameter desired.

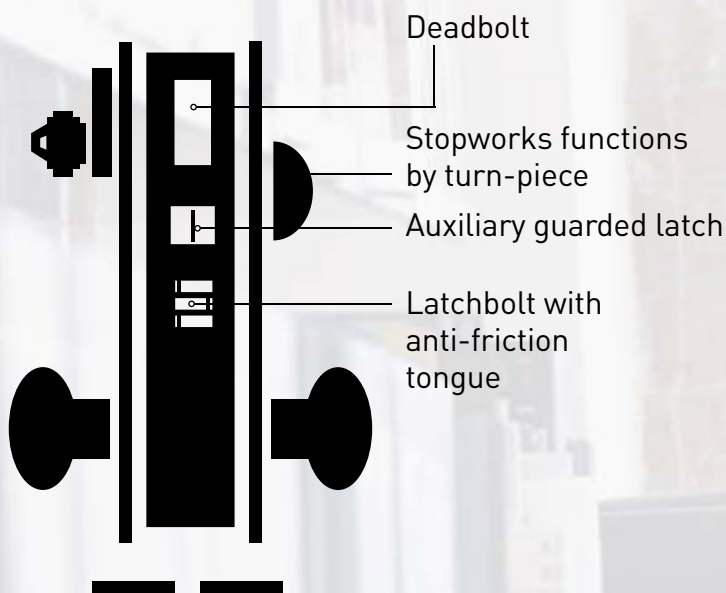


Merano (MER)

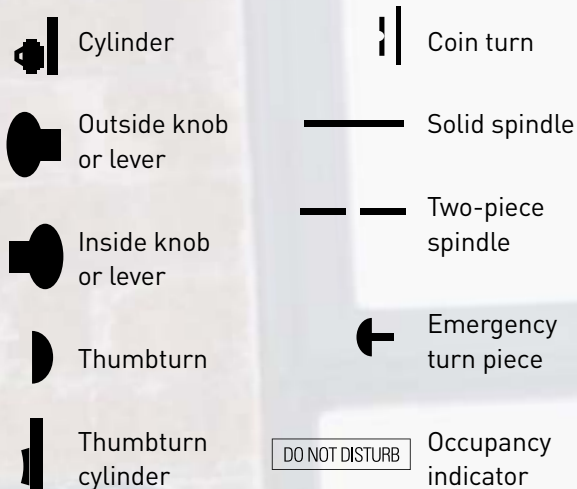
2 5/8" (67 mm) diameter
Available for use on L-Series knob and lever designs.
Order by letter designation corresponding to the design and diameter desired.

Lock Functions

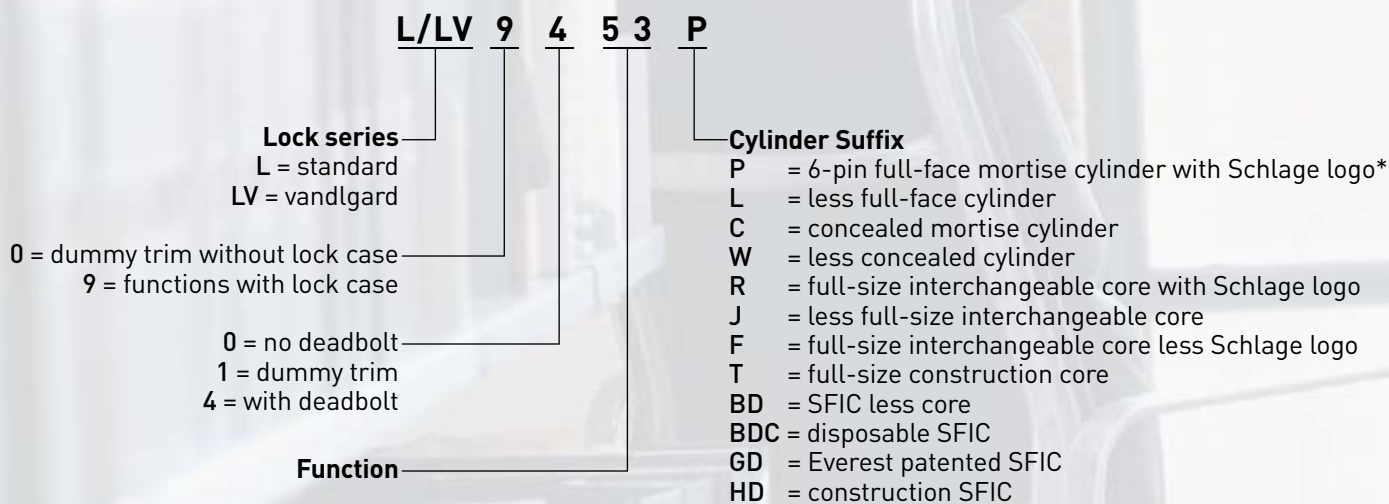
Lock Components



Symbol Key



Product Identification Guide









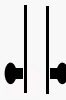


SFIC = Small Format (Best® style) Interchangeable Core

To order less Schlage logo, specify lock "with K510-612 faceplate."

LV = Vandlgard® function allows exterior lever to rotate freely down while remaining securely locked.

*In a double-door application where the dummy will be used as the strike order 10-091 Armored Front Strike separately.

Lock Functions | ANSI A156.13, Series 1000

	Schlage	ANSI		Schlage	ANSI
					
	L9010	F01		L9444	
	Passage Latch			LV9444	
	Latchbolt retracted by knob/lever from either side at all times. Inside lever is always free for immediate egress.			Privacy with Deadbolt and Coin Turn Outside	
				Latchbolt retracted by knob/lever from either side. Deadbolt thrown or retracted by inside thumbturn or outside coin turn. Throwing deadbolt locks outside knob/lever. Rotating inside knob/lever simultaneously retracts deadbolt and latchbolt, and unlocks outside knob/lever. Rotating outside coin turn retracts deadbolt and unlocks outside knob/lever. Specify per L283-056 for Torx screws. Available with rose trim only. Inside lever is always free for immediate egress. (Previously XL11-868)	
					
	L9040	F22			
	LV9040				
	Bath/Bedroom Privacy Lock				
	Lock Latchbolt retracted by knob/lever from either side unless outside is locked by inside thumbturn. Turning inside knob/lever or closing door unlocks outside knob/lever. To unlock from outside, remove emergency button, insert emergency thumbturn (furnished) in access hole and rotate. Inside lever is always free for immediate egress..				
					
	L9044			L0170	
	LV9044			Half Dummy Trim	
	Privacy With Coin Turn Outside			Knob/lever on one side fixed by mounting bar.	
	Latchbolt retracted by knob/lever from either side unless outside is locked by inside thumbturn or outside coin turn. Operating inside knob/lever, closing door, rotating inside thumbturn or rotating outside coin turn unlocks outside knob/lever. Specify per L283-056 for Torx® screws. Available with rose trim only. (Previously XL11-868)				
					
	L9440			L0172	
	LV9440	F19		Full Dummy Trim	
	Privacy With Deadbolt			Knob/lever on both sides fixed by mounting bar.	
	Latchbolt retracted by knob/lever from either side. Deadbolt thrown or retracted by inside thumbturn. Throwing deadbolt locks outside knob/lever. Rotating inside knob/lever simultaneously retracts deadbolt and latchbolt, and unlocks outside knob/lever. To unlock from outside, remove emergency button, insert emergency thumbturn in access hole and rotate. Inside lever is always free for immediate egress. (Previously XL11-761)				
					
				L9175	
				Half Dummy Trim with Lock Case	
				Fixed knob/lever on one side inoperable. Includes lock case and armored front. Options same as L9176 below.	
					
				L9176	
				Full Dummy Trim with Lock Case	
				Fixed knob/lever on both sides. Includes lock case and blank armor front. May be ordered with optional XL11-743 armored front with cutout to receive deadbolt.	

Lock Functions | Single Cylinder Non-Deadbolt Functions

Schlage	ANSI	Schlage	ANSI
	<p>L9050 LV9050 Office and Inner Entry Lock Latchbolt retracted by knob/lever from either side unless outside is made inoperative by key outside or by turning inside thumbturn. When outside is locked, latchbolt is retracted by key outside or by knob/lever inside. Outside knob/lever remains locked until thumbturn is returned to vertical or unlocked by key. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.</p>		<p>L9080EU LV9080EU Electrically Unlocked (Fail Secure) Outside knob/lever unlocked by 24VAC or DC. Latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Inside knob/lever always free for immediate exit. Inside lever is always free for immediate egress.</p>
	<p>L9056 LV9056 L9050 with Automatic Unlocking Latchbolt retracted by knob/lever from either side unless outside is made inoperative by key outside or by rotating inside thumbturn. Outside knob/lever unlocked by key outside or thumbturn. Rotating inside knob/lever simultaneously retracts latchbolt and unlocks outside knob/lever. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress. (Previously XL11-776)</p>		<p>L9080EL-RX L9080EU-RX Request to Exit (RX) Electrified Lock Same as L9080EL and L9080EU functions. In addition, a micro switch positioned inside the lock case monitors the retractor crank, and is actuated when rotation of the inside or outside knob/lever rotates the retractor hub. The switch signals the use of that opening to security systems, allowing a non-disruptive means of immediate egress. Specify per L283-059 for normally closed contacts (default). Specify L283-125 for normally open contacts. Inside lever is always free for immediate egress. (Previously XL11-807)</p>
	<p>L9070 LV9070 Classroom Lock Latchbolt retracted by knob/lever from either side unless outside is locked by key. Unlocked from outside by key. Inside knob/lever always free for immediate exit. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.</p>		
	<p>L9076 LV9076 Classroom Holdback Lock Latchbolt retracted by knob/lever from either side unless outside is locked by key. When locked, latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Depress inside knob/lever and turn key 360° for holdback feature. Inside lever is always free for immediate egress.</p>		
	<p>L9080 LV9080 Storeroom Lock Latchbolt retracted by key outside or by knob/lever inside. Outside knob/lever always inoperative. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.</p>		
	<p>L9080EL LV9080EL Electrically Locked (Fail Safe) Outside knob/lever continuously locked by 24VAC or DC. Latchbolt retracted by key outside or by knob/lever inside. Switch or power failure allows outside knob/lever to retract latchbolt. Auxiliary latch deadlocks latchbolt when door is closed. Inside knob/lever always free for immediate exit. Inside lever is always free for immediate egress.</p>		

Lock Functions | Single Cylinder Deadbolt Functions

Schlage ANSI



L9453 F20 LV9453 Entrance Lock

Latchbolt retracted by knob/lever from either side unless outside is locked by 20° rotation of thumbturn. Deadbolt thrown or retracted by 90° rotation of thumbturn. When locked, key outside or knob/lever inside retracts deadbolt and latchbolt simultaneously. Outside knob/lever remains locked until thumbturn is restored to vertical position. Throwing deadbolt automatically locks outside knob/lever. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.



L9456 F13 LV9456 Corridor Lock

Latchbolt retracted by knob/lever from either side. Deadbolt thrown or retracted by key outside or inside thumbturn. Throwing deadbolt locks outside knob/lever. Turning inside knob/lever simultaneously retracts deadbolt and latchbolt and unlocks outside knob/lever. Inside lever is always free for immediate egress.



L9465 Closet/Storeroom Lock

Latchbolt retracted by knob/lever from either side. Deadbolt thrown or retracted by key outside.



L9473 F21 Dormitory/Bedroom Lock

Latchbolt retracted by knob/lever from either side. Deadbolt thrown or retracted by key outside or thumbturn inside.



L9480 LV9480 Storeroom Lock With Deadbolt

Latchbolt retracted by key outside or by lever or knob inside. Outside knob/lever always fixed. Deadbolt thrown or retracted by key outside or thumbturn inside. Turning inside knob/lever simultaneously retracts both deadbolt and latchbolt. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress. (Previously XL11-591)



L9485 LV9485 Prison Function Lock

Latch retracted by key outside or knob inside. Outside knob always free spinning. Deadbolt only thrown or retracted by guard's key. Inside knob becomes fixed when deadbolt is thrown. Prisoner's key only retracts latchbolt. Furnished standard with tamper resistant Torx® screws. Specify per XL11-557.

Schlage ANSI



L9485 LV9485 Hotel or Restroom Lock

Latchbolt retracted by key outside or by knob/lever inside. Outside knob/lever always fixed. Deadbolt thrown or retracted by inside thumbturn. When deadbolt is thrown, all keys become inoperative except emergency or display keys. Turning inside knob/lever retracts both deadbolt and latchbolt simultaneously. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.



L9486 F15 LV9486

Hotel or Restroom Lock with "Do Not Disturb" Indicator

Latchbolt retracted by key outside or by knob/lever inside. Outside knob/lever always fixed. Deadbolt thrown or retracted by inside thumbturn. When deadbolt is thrown, "DO NOT DISTURB" plate is displayed. All keys become inoperative except emergency or display keys. Turning inside knob/lever retracts both deadbolt and latchbolt simultaneously. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.



L9486 x L583-375 LV9486 x L583-375

L9486 with "Occupied" Indicator

Latchbolt retracted by key outside or by knob/lever inside. Outside knob/lever always fixed. Deadbolt thrown or retracted by inside thumbturn. When deadbolt is thrown, "OCCUPIED" plate is displayed and all keys become inoperative except emergency keys. Turning inside knob/lever simultaneously retracts both deadbolt and latchbolt. Auxiliary latch deadlocks latchbolt when door is closed. (Previously XL11-580) Inside lever is always free for immediate egress.



L9496 Privacy with "Occupied" Indicator

Knob/lever retracts latchbolt from either side. Deadbolt thrown or retracted by key outside (retraction by key required in the event of an emergency) or inside thumbturn. Throwing deadbolt locks outside knob/lever and displays "OCCUPIED" plate. Rotating inside knob/lever simultaneously retracts both deadbolt and latchbolt and unlocks outside knob/lever. Inside lever is always free for immediate egress. (Previously XL11-885)

Lock Functions | Double Cylinder Non-Deadbolt Functions

Schlage ANSI



L9060
LV9060

Apartment Entrance Lock

Latchbolt retracted by knob/lever from either side unless outside is locked by key from inside. When locked, latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Inside lever is always free for immediate egress.



L9071
LV9071

Classroom Security Lock

Latchbolt retracted by knob/lever from either side unless outside is locked by key from either side. When locked, latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is locked. Inside lever is always free for immediate egress.



L9077
LV9077

Classroom Security Holdback Lock

Latchbolt retracted by knob/lever from either side unless outside is locked by key from either side. When locked, latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is locked. Depress inside knob/lever and turn key 360° for holdback feature. Inside lever is always free for immediate egress.



L9082 **F30**
LV9082

Institution Lock*

Latchbolt retracted by key from either side. Knob/lever on both sides always inoperative. Auxiliary latch deadlocks latchbolt when door is closed.



L9082EL
L9082EU
L9082 Electrically Locked or Electrically Unlocked Both Sides*

EEL: Outside and inside knob or lever continually locked electrically. Latchbolt retracted by key either side. Switch or power failure allows outside and inside knob/lever to retract latchbolt. Auxiliary latch deadlocks latchbolt when door is closed. EU: Outside and inside knob/lever unlocked electrically. Latchbolt retracted by key either side. Switch or power failure keeps inside and outside knob/lever locked. Auxiliary latch deadlocks latchbolt when door is closed. (Previously XL11-452)

Lock Functions | Double Cylinder Deadbolt Functions

Schlage ANSI



L9457
LV9457

Classroom Security Lock

LLatchbolt retracted by knob/lever from either side. Deadbolt thrown or retracted by key from either side. Throwing deadbolt locks outside knob/lever. Turning inside knob/lever simultaneously retracts deadbolt and latchbolt and unlocks outside knob/lever. Inside lever is always free for immediate egress.



L9466 **F14**
Store/Utility Room Lock*

Latchbolt retracted by knob/lever from either side. Deadbolt thrown or retracted by key from either side.



L9482
LV9482

Institution Lock with Deadbolt*

Latchbolt retracted by key from either side. Knob/lever on both sides always inoperative. Deadbolt thrown or retracted by key either side. Auxiliary latch deadlocks latchbolt when door is closed. Specify per XL11-543.

Lock Functions | Full Mortise Deadlocks

Schlage ANSI



L9460 **F17**
Cylinder x Thumbturn Lock

Deadbolt thrown or retracted by key outside or thumbturn inside.



L9462 **F16**
Double Cylinder Lock*

Deadbolt operated by key from either side.



L9463
Classroom Lock


Deadbolt thrown or retracted by key from outside. Inside thumbturn cylinder retracts deadbolt, but cannot project it.





L9464 **F18**
Cylinder Lock

Deadbolt thrown or retracted by key from one side. No trim on opposite side.







Lock Functions | Full Mortise Deadlocks Cont.

	Schlage	ANSI
	L9460 x XL11-635 L9460 with Pull	
	Knob/lever both sides fixed. Deadbolt thrown or retracted by key outside or thumbturn inside.	
	L9460 x XL11-886 Single Cylinder Deadlock with Pull	
	Deadbolt thrown or retracted by key outside or thumbturn inside. No latch, but inside knob or lever is spring-loaded. Rotating inside knob/lever also retracts deadbolt. Fixed outside knob/lever.	
	L9462 x XL11-886 Double Cylinder Deadlock with Pull	
	Deadbolt thrown or retracted by key from either side. No latch, but inside knob/lever is spring-loaded. Rotating inside knob/lever also retracts deadbolt. Fixed outside knob/lever.	
	L9464 x XL11-886 Deadlock with Pull	
	Deadbolt thrown or retracted by key from one side. No latch, but inside knob/lever is spring-loaded. Rotating inside knob/lever also retracts deadbolt. Fixed outside knob/lever.	

Special Functions

	L9040 LV9040 Privacy With Turns Both Sides
	Latchbolt retracted by knob/lever from either side unless outside is locked by inside or outside thumbturn. Operating inside knob/ lever, closing door or rotating either thumbturn unlocks outside knob/lever. Specify per XL11-446.
	L9110 x XL11-741 Full Dummy Trim with Lock Case*
	Spring-loaded knob/lever both sides. Includes lock case and blank armored front. May be ordered with optional XL11-743 armored front with cutout to receive deadbolt

Lock Functions | Small Mortise Deadlocks

	Schlage	ANSI
	L460 Cylinder x Thumbturn Lock	E06071
	Dedbolt thrown or retracted by key outside or thumbturn inside.	
	L462 Double Cylinder Lock*	E06061
	Deadbolt operated by key from either side.	
	L463 Classroom Lock	E06091
	Deadbolt thrown or retracted by key from outside. Inside thumbturn cylinder retracts deadbolt, but cannot project it.	
	L464 Cylinder Lock	E06081
	Deadbolt thrown or retracted by key from one side. No trim on opposite side.	
	L480 Door Bolt	
	Deadbolt thrown or retracted by thumbturn from one side. No trim on opposite side.	
	L496 Deadbolt with "Occupied" Indicator	
	Deadbolt thrown or retracted by key outside or thumbturn inside. When deadbolt is thrown "OCCUPIED" plate is displayed. (Previously XL11-911)	

*In a double-door application where the dummy will be used as the strike order 10-091 Armored Front Strike separately.

Caution: Double cylinder locks on residences and any door in any structure which is used for egress are a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.

Electrified Lock Function

Applications:

Security control centers, cashier rooms, fire safety exits, stairwell doors, telephone equipment rooms, computer rooms, hospital equipment and narcotics storage areas.

Regulating Devices:

Recognition Systems, Inc., HandReaders, wall switches, security consoles, access card readers, thermo-sensitive devices, smoke and fire alarms, telephone access controls, automatic time devices and computerized controls.



All installations should be in accordance with local electrical codes and National Electrical Code, NFPA 70.

Electrical Requirements for EL or EU

Voltage: 24V AC or 24V DC (maximum 29V, minimum 20V)
Peak Current: Amps 1.3 at 5 to 10 second intervals
Holding Current: Amps .135 between peak current intervals
Operating Temperature: Maximum +151° F, minimum -31° F

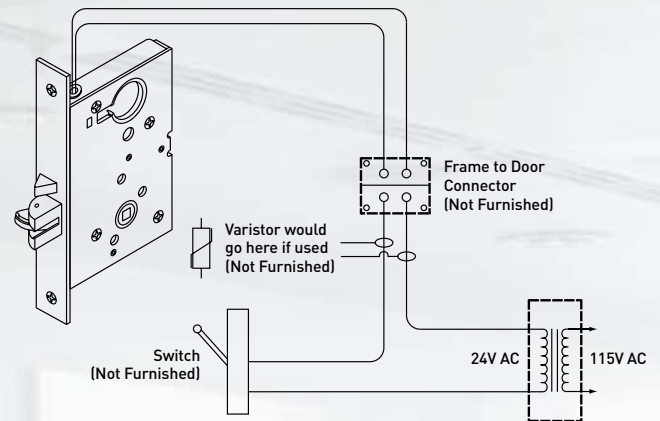
Micro Switch Electrical Requirements for Request to Exit (RX) Function

Amps: 1.0
Volts: 24 AC or DC
Peak Load: Amps, 5; volts, 250 AC or DC

Replacement Kit

L283-053 – Solenoid and driver, EL or EU

Typical Wiring Diagram for Electrified L-Series Locks



Typical Installation

- Electrified L-Series locks contain a transistorized circuit that provides full voltage to the solenoid upon initial application of electrical power and at 5 to 10 second intervals.
- Each lock should preferably have its own 24-volt transformer. Two or more locks may be operated in parallel from a single transformer, provided it has the necessary current rating.

NOTE: DO NOT connect locks in series from a higher voltage rated transformer.

- We DO NOT recommend that these locks be connected to a supply circuit that also contains electromagnetic devices. If an electromagnetic device is connected to the supply circuit, the resulting transient voltages could damage the lock. The transient voltage must be carefully suppressed at the equipment producing them before connecting the lock to the same circuit.
- A varistor rated at 35 volts (peak recurrent) may be used for transient voltage protection.



L9080EL LV9080EL

Electrically Locked (Fail Safe)

Outside knob/lever continuously locked by 24V AC or DC. Latchbolt retracted by key outside or by knob/lever inside. Switch or power failure allows outside knob/lever to retract latchbolt. Auxiliary latch deadlocks latchbolt when door is closed. Inside knob/lever always free for immediate exit.



L9080EU LV9080EU

Electrically Unlocked (Fail Secure)

Outside knob/lever unlocked by 24V AC or DC. Latchbolt retracted by key outside or knob/lever inside. Auxiliary latch deadlocks latchbolt when door is closed. Inside knob/lever always free for immediate exit.



L9080EL-RX L9080EU-RX

Request to Exit (RX) Electrified Lock

Same as L9080EL and L9080EU functions. In addition, a micro switch positioned inside the lock case monitors the retractor crank, and is actuated when rotation of the inside or outside knob/lever rotates the retractor hub. The switch signals the use of that opening to security systems, allowing a non-disruptive means of immediate egress. Specify per L283-059 for normally closed contacts (default). Specify L283-125 for normally open contacts. [Previously XL11-807]

Specifications

Handing:

L9000-Series lock bodies are field-reversible without disassembly.
L400-Series locks are non-handed, except L463.

Door Thickness:

1³/₄" (44 mm) standard. 1³/₈" (35 mm) to 2¹/₂" (64 mm) optional. Over 2¹/₂" (64 mm) door ranges vary by function and trim. Specify door thickness if other than 1³/₄".

Backset:

2-3/4" (70 mm) only.

Armored Front:

L9000-Series: 1¹/₄" x 8" x 7/32" (32 mm x 203 mm x 6 mm) standard.
1¹/₁₆" x 8" x 1⁷/₃₂" (27 mm x 203 mm x 6 mm) optional.

L400-Series: 4⁷/₁₆" x 3⁵/₈" x 1" (113 mm x 92 mm x 25 mm)

Case Size:

L9000-Series: 4⁷/₁₆" x 6¹/₁₆" x 1" (113 mm x 154 mm x 25 mm)

L400-Series: 4⁷/₁₆" x 3⁵/₈" x 1" (113 mm x 92 mm x 25 mm)

Spacing:

Knob or lever to cylinder, 3⁷/₈" (98mm); knob or lever to thumbturn hub, 2¹¹/₁₆" (68mm).

Bolts:

1" (25mm) throw stainless steel deadbolt and 3/4" (19mm) throw stainless steel latch with anti-friction tongue.

Exposed Trim:

Knobs: #41 and #42 heavy-duty wrought brass, bronze or stainless steel knobs match D-Series knobs.

Levers: Forged brass or bronze and cast stainless steel. Designs available to match ND-Series levers.

93 Lever Design: Extruded brass, bronze or stainless steel.

Mediterranean Designs: Forged-brass lever and rose.

Escutcheons: L escutcheons are cold-forged brass or bronze and stainless steel. N escutcheons are heavy wrought reinforced brass, bronze and stainless steel.

Trim Combinations: Available with knob both sides, lever both sides, or knob and lever with rose or escutcheon both sides.

Strike:

L9000-Series: ANSI curved lip strike 1¹/₄" x 4⁷/₈" (32 mm x 124 mm) x 1³/₁₆" (30 mm) lip to center with dust box standard. L400-Series: 1¹/₈" x 3⁵/₈" (29 mm x 92 mm) with dust box.

Cylinder & Keys:

6-pin Everest C123 keyway cylinder with two patented keys standard.

Keying Options:

Interchangeable core and Primus high security cylinders. Master keying, grand master keying and construction keying.

Certifications

ANSI:

L9000: ANSI A156.13 Series 1000, Grade 1 Operational and Security, UL Listed for 3-hour fire door (except L9076 and L9007). With interchangeable core cylinders: Grade 2 Security.

With Concealed Shell Cylinder: A156.13 Grade 1 Operational and Security. ANSI/ASTM F476-76 Grade 40, UL Listed. L400: ANSI A156.5 Grade 1

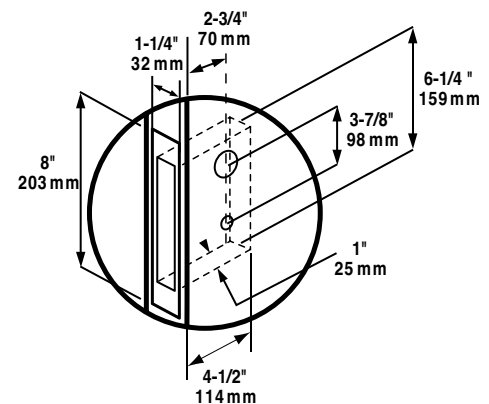
California State Reference Code:

(Formerly Title 19, California State Fire Marshal Standard) All levers with returns comply; levers return to within 1/2" of door face.

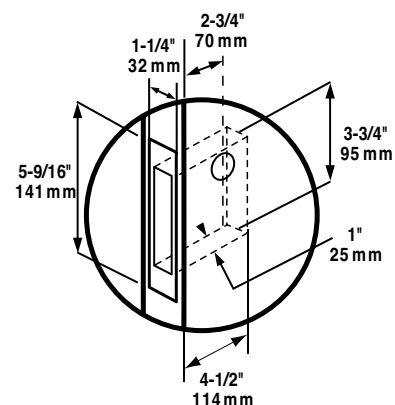
UL / cUL:

All locks listed for A label single doors, 4' by 10'. Letter F and UL symbol on latch front indicate listing. Electrified functions are UL19X Listed for single-point locking applications. UL437 Listed locking cylinder optional: specify Primus 20-500 Series cylinder.

Door Preparation for L9000 Series



Door Preparation for L400 Series



How to Order

To order Schlage products, descriptive data should be in the same sequence as shown.

Line Item	Qty	Product	Outside		Inside		Hand	Front	Strike	Door Thickness	Ext	Dim	Additional Details
			Des	Fin	Des	Fin							
1	2	3	4	5	6	7	8	9	10	11	12	13	14

1 Line item number

2 Quantity

3 Complete model number with function and cylinder type

To order cylinder options, change "P" at the end of the model number as follows:



L9453P Standard

L9453L Less standard cylinder. For Primus cylinder, specify this option and order Primus cylinder separately.

L9453C With temporary plastic construction cylinder. Double cylinder functions ordered less cylinder are furnished with these construction cylinders to maintain timing of key cams.



L9453J Prepared for full size interchangeable core, less core. For Primus core, specify this option and order Primus core separately.

L9453R With full-size conventional interchangeable core installed. Order control keys separately.

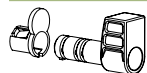
L9453T With full-size (temporary) construction core installed. Order all keys separately.



L9453BD Prepared for small format (Falcon, Best, etc.) interchangeable core (SFIC), less core.

L9453GD With Everest B Family restricted keyway small format core installed. Order control keys separately.

L9453HD With small format keyed brass construction core installed. Order all keys separately.



L9453BDC With small format disposable plastic construction core installed.

4/5 Outside design / finish. Specify tactile warning (knurling) here as "8" before lever design, e.g. 803. To specify complete design, combine the numeric knob or lever design with the alpha rose or escutcheon design. Example: 03L, 93A, 42B. When ordering Mediterranean design levers with L escutcheons, specify AST/00L, AVA/00L or MER/00L.

6/7 Inside design/finish. Leave blank if same as outside.

8 Hand. One hand per line item.

9 Front (use "Strike" field on Schlage form). Leave blank for standard armored front or enter number for narrow front.

10 Strike. Leave blank for standard or specify part number for optional strike. LLL = Less Strike.

11 Door thickness, if non-standard. Example: 200 = 2".

12 Extension, to specify whether thick door is extended inside (EI), outside (EO), differently (ED) or equally (EE).

13 Dimension for strike lip lengths. See strike page for availability of specific dimensions with specific strikes.
 100 = 1" 114 = 1 1/4" 112 = 1 1/2" 200 = 2"
 118 = 1 1/8" 138 = 1 3/8" 134 = 1 3/4"

14 Keying detail (e.g. key symbol, keyway, bitting) and other special requirements.

Example

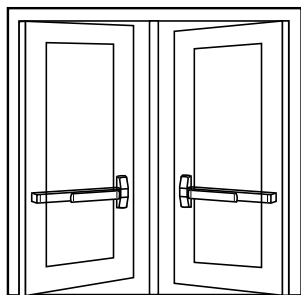
Line Item	Qty	Product	Outside		Inside		Hand	Front	Strike	Door Thickness	Ext	Dim	Additional Details
			Des	Fin	Des	Fin							
1	50	L9453P	03A	626			RH		10-091				
2	50	L9453P	03A	626			LH		10-091				
3	10	L9040	03A	626			RH			138			
4	10	L9040	03A	626		625	LH	09-668		138			
5	50	L9456P	07L	626		625	RH	09-668					
6	50	L9456P	07L	626			LH						

Note: Schlage order forms are available at no charge by contacting your IR Security & Safety Consultant or Customer Service.

VON DUPRIN®

Auxiliary Hardware and General Information

REMOVABLE MULLIONS



Mullions provide single door performance in double door openings with rim devices. Mullions are easily removed by loosening bottom set screw and removing top fitting cover.

The top mullion fitting is attached to the frame and is concealed by the fitting cover.

Mullions are shipped presized, with mounting screws and prepared for strikes.

Strikes are not included except where indicated.

To order, specify:

1. Model number.
2. Height of opening.
3. Finish.
4. Handing as required.
5. Center line deviation (refer to device template for standard centerline).
6. Strikes, when required, should be ordered with device.

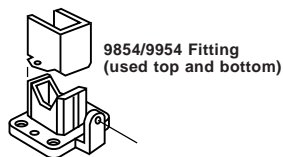
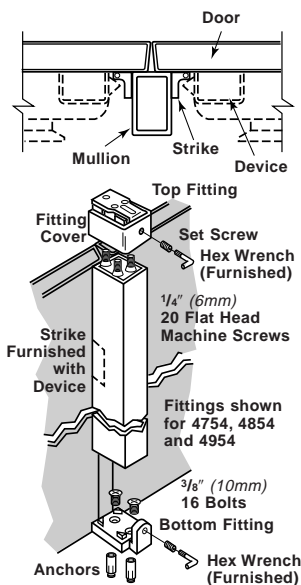
Stock Hollow Metal Applications

Devices mounted to cover ANSI 161 cutouts are higher than the standard mullion strike location. Consult the factory for special strike preparation or order a blank mullion.

Blank Mullions

Furnished without strike preparation and without fittings or stabilizers. Used to mount devices at a strike height different from the standard mullion preparation. Note: 9954 blank mullion is furnished less UL label.

SIX STEEL MULLIONS



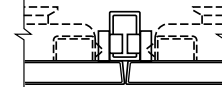
Electric and Monitor Strikes

Includes an electric cable for transferring power from frame to strikes. The cable has five wires to a twist-apart plug that is connected to a mating socket through a hole in the top fitting.

For use with all Von Duprin panic exit rim devices.

4754 — Prepared for two 4263 monitor strikes.

4854/9854 — Using one electric strike



4854 — Prepared for one 299 and one 6111 electric strike. Indicate handing for electric strike.

4854/9854 — Using one electric strike



Standard Doors

4954 — Prepared for two 264 or 299 strikes. For use with all Von Duprin panic rim devices. Note: specify strike choice with device.

9854 — Prepared for one 499-F and one 6111 electric strike. Indicate handing for electric strike UL fire label mullion for 90 minute openings up to 8' × 8' (2438mm × 2438mm). This mullion is not easily removed due to special fittings.

Fire Doors

9954 — UL fire label mullion for up to 3 hour openings up to 8' × 8' (2438mm × 2438mm) using Von Duprin fire exit rim devices. Must be used with two 268 (for 88-F) or two 499F (for 22-F, 98-F, 99-F) strikes. This mullion is not easily removed due to special fittings.

1654 — Prepared for two 1606 strikes.

Sizes — 4754, 4854, 4954, 1654 — 7'2" (2184mm), 8'2" (2489mm), 10'2" (3099mm). 9854/9954 — 7'3" (2209mm), 8' (2438mm), 10'3" (3124mm) (no UL label on 10' (3048mm).

Finishes

SP28 (sprayed aluminum), SP313 (sprayed dark bronze) or sprayed black.

VON DUPRIN® 98/99™ Rim Exit Device



299 Strike



98 and 99 rim exit devices for all types of single and double doors with mullion, UL listed for Panic Exit Hardware. Devices are ANSI A156.3 – 2001 Grade 1. The 98 device has a smooth mechanism case and the 99 device has a grooved case. The rim device is non-handed except when the following device options are used: SD (Special Dogging), -2 (Double Cylinder) or SS (Signal Switch). See Opposite page for available outside trim and device functions. Covers stock hollow metal doors with 86 or 161 cutouts on single doors (may cover cutouts on pairs – consult template).




The 98/99 devices are available in the following finishes: US3, US4, US10, US26, US26D, US28, 313AN, 315AN and US32D for the 98 device only. See page 52 for component finishes and the inside cover for finish chips.





Specifications

Device Functions	Device ships EO/DT/NL. Field selectable. For TP,K,or L remove NL drive screw from device		
Device Lengths	3'	2'4" to 3'	(711mm to 914 mm) Door Size
	4'	2'10" to 4'	(864 mm to 1219 mm) Door Size
Strikes	299 – Dull Black Optional Strikes – see page 39		
Dogging Feature	Hex key dogging standard		
Dogging Options	CD	Cylinder Dogging	see page 48
	SD	Special Center Case Dogging	see page 48
	LD	Less Dogging	see page 48
Electric Options	LX	Latchbolt Monitor Switch	see page 42
	RX	Pushpad Monitor Switch	see page 42
	RX2	Double Pushpad Monitor Switch	see page 42
	E	Electric Locking & Unlocking	see page 44
	EL	Electric Latch Retraction	see page 43
	SS	Signal Switch	see page 43
	CX	Chexit Delayed Exit	see page 45
	ALK	Alarm Exit Kit	see page 42
Miscellaneous Options	PN	Pneumatic Latch Retraction	see page 48
	-2	Double Cylinder	see page 48
	GBK	Glass Bead Kit	see page 49
Fasteners & Sex Bolts (SNB)	Includes 1 ¾" (19mm) – 2 ¼" (57mm) Wood & Metal Doors Optional SNB available for device, see next page for quantities		
Latch Bolt	Deadlocking, ¾" (19mm) throw		
Device Centerline from Finished Floor	39 13/16" (1011 mm) 39 11/16" (1008 mm) with Mullion		
Center Case Dimensions	8" x 2 ¾" x 2 3/8" (203mm x 70mm x 60mm)		
Mechanism Case Dimensions	2 ¼" x 2 ¼" (57mm x 57mm)		
Projection	Pushbar Neutral – 3 13/16" (97 mm) Pushbar Depressed – 3 1/16" (78 mm)		

See page 53 for How to Order specification

VON DUPRIN® 98/99™ Rim Exit Device Standard Trim

	Exit only	Dummy Trim Pull when Dogged	Night Latch Key Retracts Latchbolt	Night Latch Key Retracts Latchbolt Optional Pull Required
				
Product Description	98EO 99EO	98DT 99DT	98NL 99NL	98NL-OP 99NL-OP
Trim Description	---	990DT	990NL-R/V	110NL-MD 110NL-WD
Escutcheon Plate Size	---	3" x 14 ³ / ₁₆ " x ³ / ₃₂ " (76x360x2mm)	3" x 14 ³ / ₁₆ " x ³ / ₃₂ " (76x360x2mm)	---
Pull Center to Center	---	5 ¹ / ₂ " (140mm)	5 ¹ / ₂ " (140mm)	---
Projection	---	2" (51mm)	2" (51mm)	---
ANSI Function	01	02	03	03
Cylinder Type	---	---	Rim	Rim
Optional Trim (See pages 32 – 34)	x990EO x992EO x994EO x996EO	x991K-DT x992L-DT x994L-DT x996L-DT x696DT x697DT	x991K-NL x992L-NL x994L-NL x996L-NL x696NL x697NL	
Optional #425 Sex Bolt Quantity for Device	6	2	2	6

	Lever Key Locks & Unlocks	Lever – Night Latch Key Retracts Latchbolt	Lever – Blank Escutcheon Always operable (No Cylinder)	Lever Dummy Trim Pull when Dogged
				
Product Description	98L 99L	98L-NL 99L-NL	98L-BE 99L-BE	98L-DT 99L-DT
Trim Description	996L-R/V	996L-NL-R/V	996L-BE-R/V	996L-DT-RV
Escutcheon Plate Size	2 ³ / ₄ " x 10 ³ / ₄ " x ²⁷ / ₃₂ " (70x273x21mm)	2 ³ / ₄ " x 10 ³ / ₄ " x ²⁷ / ₃₂ " (70x273x21mm)	2 ³ / ₄ " x 10 ³ / ₄ " x ²⁷ / ₃₂ " (70x273x21mm)	2 ³ / ₄ " x 10 ³ / ₄ " x ²⁷ / ₃₂ " (70x273x21mm)
Pull Center to Center	---	---	---	---
Projection	2 ⁷ / ₈ " (73mm)	2 ⁷ / ₈ " (73mm)	2 ⁷ / ₈ " (73mm)	2 ⁷ / ₈ " (73mm)
ANSI Function	08	09	---	02
Cylinder Type	Rim	Rim	---	---
Optional Trim (See pages 32 – 34)	x992L x994L	x992L-NL x994L-NL	x992L-BE x994L-BE	x992L-DT x994L-DT
Optional #425 Sex Bolt Quantity for Device	2	2	2	2

For optional trims and functions see pages 32-34

VON DUPRIN® 33A/35A Rim Device



1439 Roller

33A and 35A rim devices for all types of single and double doors with mullion, UL listed for Panic Exit Hardware. Fits doors stiles as narrow as 1 $\frac{3}{4}$ " (44mm).

Features

- Nonhanded
- Field sizeable
- $\frac{3}{4}$ " (19mm) throw molydag® coated latch bolt
- Eight popular finishes
- Hex key dogging
- Latch bolt deadlocking
- One piece center case cover

Strikes and Fasteners

Device is furnished standard with 1439 roller strike in dull black finish. For strike dimensions and optional strike information, refer to page 19. Six bolts are furnished standard for mounting on 1 $\frac{3}{4}$ " (44mm) and 2 $\frac{1}{4}$ " (57mm) thick doors.

Device Options

Cylinder dogging, page 25.
 Electric latch retraction, page 22.
 Request to exit switch, page 21.
 Latch bolt monitoring switch, page 21.
 Signal switch, page 22.
 Dummy pushpad 25.
 Glass bead kit, page 25.

NOTE: For specific device applications, see device templates or consult factory.

Dimensions





Pushpad height to finished floor	39 $\frac{13}{16}$ " (1011mm) at center
Pushpad projection —	
neutral	3 $\frac{13}{16}$ " (97mm)
depressed	3 $\frac{1}{16}$ " (78mm)
Center case	8 $\frac{3}{16}$ " x 2 $\frac{13}{32}$ " x 1 $\frac{9}{16}$ " (208mm x 62mm x 40mm)
Device length — Short 3' (914mm)	2' 6" to 3' (762mm to 914mm) door size
Long 4' (1219mm)	3' 1" to 4' (940mm to 1219mm) door size





To Order, Specify:

1. Product description number from opposite page.
2. Size 4' (for door sizes 3' 1" to 4').
Size 3' (for door sizes 2' 6" to 3'), shipped standard.
3. Door thickness if other than standard 1 $\frac{3}{4}$ ".
4. Finish, see page 30.
5. Handing, LHR or RHR. Required on "SS", "L" or "386NL" functions, only. See page 26.

For How-To-Order Information on all devices, see page 28.

VON DUPRIN® 33A/35A Rim Device Trim

	Exit Only	Pull when dogged	Key retracts latch bolt	Key retracts latch bolt (Pull required)	Key locks lever (#06 lever standard)
					
Product Description	33A-EO 35A-EO	33A-DT 35A-DT	33A-NL 35A-NL	33A-NL-OP 35A-NL-OP	33A-L ^{1,2,3,4,5} 35A-L ^{1,2,3,4,5}
Trim Description	—	386DT	386NL	388	360L
Base Size	—	7 ¹⁵ / ₃₂ "h x 1 ⁵ / ₈ "w	7 ¹⁵ / ₃₂ "h x 1 ⁵ / ₈ "w	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w x ⁷ / ₈ "d
Grip Size	—	8 ¹ / ₂ "h x 4 ⁵ / ₁₆ "w	8 ¹ / ₂ "h x 4 ⁵ / ₁₆ "w	—	4 ¹ / ₂ "
Projection	—	2 ⁷ / ₁₆ "	2 ⁷ / ₁₆ "	1"	3"
ANSI Function	01	02	03	03	08-09
Cylinder Type	—	—	Rim	Rim	1 ¹ / ₄ " Mortise Straight Cam

	Key retracts latch bolt	Key retracts latch bolt	Key locks thumbturn (Pull required)	Key locks thumbturn
				
Product Description	33A-NL-OP x 550 DT 35A-NL-OP x 550 DT	33A-NL-OP x Ives 8190 Pull 35A-NL-OP x Ives 8190 Pull	33A-TL ^{1,2,4,5} 35A-TL ^{1,2,4,5}	33A-TL x Ives 8190 Pull ^{1,2,4,5} 35A-TL x Ives 8190 Pull ^{1,2,4,5}
Trim Description	388 x 550	388 x IVES 8190 Pull	360T	360T x Ives 8190 Pull
Base Size	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w x ⁷ / ₈ "d	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w x ⁷ / ₈ "d
Grip Size	10"	10" Suggested	—	10" Suggested
Projection	2 ⁵ / ₈ "	3 ¹ / ₄ "	1 ¹³ / ₁₆ "	3 ¹ / ₄ "
ANSI Function	03	03	11-12	11-12
Cylinder Type	Rim	Rim	1 ¹ / ₄ " Mortise Straight Cam	1 ¹ / ₄ " Mortise Straight Cam

Two #425 sex bolts are furnished standard for end case mounting. When exit only (EO) is used, two #325 are furnished for mounting center case.

¹If no cylinder is required specify "BE" blank escutcheon, trim always operable; example 33A-L-BE.

²NL function is available by changing orientation of mortise cylinder cam.

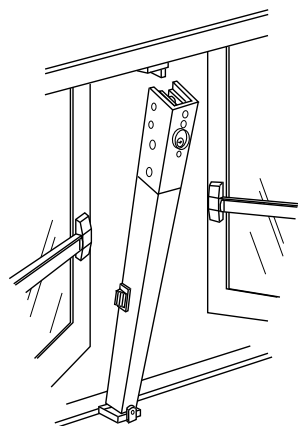
³Matching dummy trim is available, order 360L-DT trim.

⁴Wood door applications require the 33A-WDA door cover plate.

⁵Cylinder collar required for 1¹/₂" cylinders.

VON DUPRIN® Auxiliary Hardware and General Information

KEYED REMOVABLE MULLION



Keyed Removable Mullion makes removal faster and easier by a single operation of the mortise cylinder. Mullions provide single door performance and security on double door applications. Once the mullion is removed, large equipment or furniture can freely pass through the opening. The unit will self lock when re-installed,

without use of the cylinder key.

This new lock assembly is available on Von Duprin's standard and fire labeled steel mullions, and can be purchased separately for retrofit on existing steel mullion applications. Sizes include 7'2" (2184mm), 8'2" (2489mm) and 10'2" (3099mm).

To order, specify:

1. Model number KR165\4, KR4954, KR9854, K9954 or Retrofit Kit KR54, KR54-F.

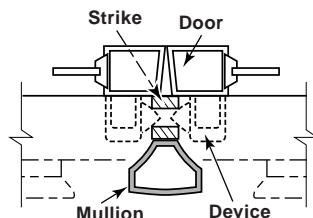
MT54 Storage Mount

MT54 is a set of floor and wall brackets that provide convenient storage of the keyed removable mullion when removed from the opening.

To order, specify:

1. MT54

TWO ALUMINUM MULLIONS



5654 — Prepared for two 264 or 299 strikes with weatherstripping.

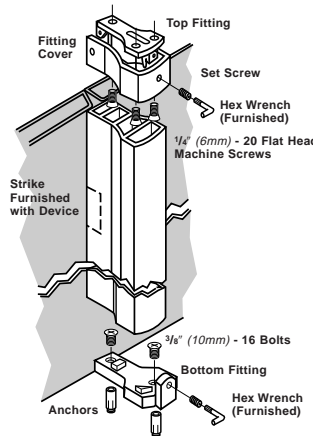
5754 — Prepared and furnished with one 1408 double door strike.

Note: Specify device "less strike".

Sizes — 7'2" (2184mm), 8'2" (2489mm), 10'2" (3099mm).

Finishes

US4 (brass anodized), US10 (bronze anodized), US28 (aluminum anodized) or 313AN (dark bronze anodized).

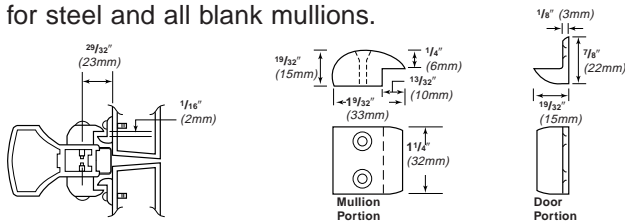


154 Stabilizer Set

A two-piece interlocking unit. One piece mounts on the mullion with the top mounting hole 5¹³/₁₆" (148mm) below the centerline of the strike; the other piece mounts on the door. Shims are provided to adjust for misalignment between the door and mullion.

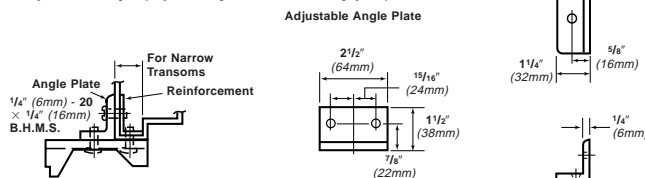
The set maintains integrity between the door and mullion to prevent vandalism and to ensure contact between the device and strike as the doors expand and contract with temperature changes.

Furnished standard on aluminum mullions; optional for steel and all blank mullions.

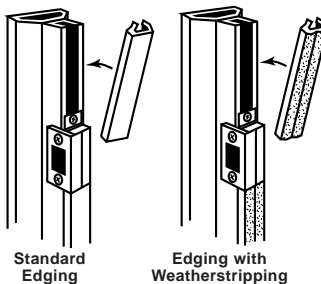


Angle Plate

Used with narrow transom frames. The plate attaches to the transom to extend the surface area needed to mount the mullion. Must be ordered separately (specify mullion type).









Weatherstripping



Weatherstripping retards cold air from blowing between doors and mullion. It also serves as a silencer when the door is closed against the mullion. The silicone treated weatherstrip pile is bonded to a polypropylene backing. A slide-in molding houses the weatherstripping, covers mounting screws of the strike and extends to both the top and bottom of the mullion.

VON DUPRIN® 98/99™ Optional Trim

Knob and Thumbpiece Trim

	 Knob Key Locks & Unlocks	 Knob - Night Latch Key Retracts Latchbolt	 Knob - Blank Escutcheon Always Operable (No Cylinder)	 Knob - Dummy Trim Pull when Dogged	 Thumbpiece Key Locks & Unlocks	 Thumbpiece Blank Escutcheon Always Operable (No Cylinder)
Trim Description	991K	991K-NL	991K-BE	991K-DT	990TP	990TP-BE
Escutcheon Plate Size	2¾" x 10¾" x 27/32" (70x273x21mm)	2¾" x 10¾" x 27/32" (70x273x21mm)	2¾" x 10¾" x 27/32" (70x273x21mm)	2¾" x 10¾" x 27/32" (70x273x21mm)	2¾" x 10¾" x 27/32" (70x273x21mm)	2¾" x 10¾" x 27/32" (70x273x21mm)
Pull Center to Center	--	--	--	--	5½" (140mm)	5½" (140mm)
Projection	3¼" (83mm)	3¼" (83mm)	3¼" (83mm)	3¼" (83mm)	2" (51mm)	2" (51mm)
ANSI Function	08	09	--	02	05	05
Cylinder Type						
Rim or Vertical Rod Device	Rim	Rim	--	--	Rim	--
Mortise Lock Device	1¼" Mortise	1¼" Mortise			1¼" Mortise	--
#425 SNB optional-HMD Req. WD w/o SLM Pkg.	2	2	2	2	2	2
#825 SNB Req. WD w/o SLM Pkg. F Rim device ONLY	2	2	2	2	2	2
#425 SNB Req. w/ 499F	2	2	2	2	2	2

Lever Design Options



#01



#02



#03



#05

#06
Standard

#07

#12
Handed

#16



#17



#18

VON DUPRIN® 98/99™ Options

Pneumatic Controlled Exit Devices–PN



The PN feature provides remote latch bolt retraction in hazardous areas where electrically operated devices would not be permitted. The pneumatic solenoid will retract the latch bolt for momentary or prolonged periods. PN exit devices are particularly suited for use with automatic door operators. The PN feature is available on both Panic and Fire Exit Hardware devices.

The PN feature includes a special actuating linkage that gives building owners the option of mechanically or pneumatically dogging the exit device. If manual hex-key dogging is required, specify HD-PN (Dogging the device, whether mechanically or pneumatically, makes the device function as a push/pull unit and reduces the wear on its moving parts.) If cylinder dogging is required, the standard cylinder dogging is not available, but special center case dogging is available, specify SD-PN. SD-PN is not available on the 9875 or 9975 devices.

When activated pneumatically, the latch bolt(s) of the exit device retract in ½ to 1 ½ seconds. This pneumatic operation uses air pressure ranging from 50 to 100 pounds per square inch.

This product will function only when it is part of a pneumatic system (air compressor, air lines, pneumatic system, etc.). Contact LCN for correct control boxes

To Order, Specify:

- Standard — Use prefix PN, example PN99NL
- Hex Key Dogging — Use prefix HD-PN, example HD-PN99NL
- Special Center Case Dogging — Use prefix SD-PN, example SD-PN99NL

Double Cylinder – 2



Double cylinder features an inside key cylinder which locks or unlocks the outside trim and an outside key cylinder which retracts the latch bolt only (Night Latch Function). Available on rim or mortise lock device.

Rim requires two rim type cylinders. Mortise device requires 1 rim cylinder and 1 mortise cylinder with a straight cam. (Schlage cam reference B502-191.)

Available functions are thumbpiece, knob or lever.

To Order, Specify:

1. Suffix-2 with device/trim number, example 99TP-2.
2. Handing required, LHR or RHR.

Less Dogging – LD

Less Dogging is available in all 98/99™ Panic Exit devices to remove the dogging option.

To Order, Specify:

- Use prefix LD, example LD99L

Special Center Case Dogging – SD



Special cylinder dogging in the center case is available for Chexit, EL, ALK panic devices to allow for mechanical push/pull operation. With this option, the latchbolt is held retracted and pushbar is still operable. Specify handing — RHR or LHR.

SD requires 1 ¼" (32mm) mortise cylinder with a straight cam. (Schlage cam reference B502-191.)

Note: Available on Rim and Vertical Rod Panic Exit Devices only.

To Order, Specify:

- Use prefix SD, example SD99L

Cylinder Dogging — CD



Cylinder dogging is available on all 98/99™ Panic Exit devices to replace the standard hex key dogging. Unit requires a standard 1 ¼" (32mm) mortise cylinder with a straight cam (Schlage Cam B502-191 reference).

To Order, Specify:

- Use prefix, CD, example CD99L

Cylinder Dogging Kit — CDK

For field conversion, a cylinder dogging conversion kit is available. Cannot be added to fire exit hardware.

Order: 33A/99CDK or 35A/98CDK, specify finish.

Hex Key Dogging Kit — HDK

For field conversion, a hex key dogging conversion kit is available. Cannot be added to fire exit hardware.

Order: 33A/99HDK or 35A/98HDK, specify finish.

Braille, Embossed and Knurled Touchpads



Braille touchpad is embossed with the message "CAUTION STAIRWELL" in braille and raised letters provides assistance to person with impaired vision. Letters are ½" (13mm) high and braille is #2, raised height is ⅜" (2mm). Other messages are available on special order, limited to 20 characters per line.

Embossed touchpad is embossed with the word "PUSH"
Knurled touchpad is to provide warning to person with impaired vision.

VON DUPRIN® 98/99™ Electrical Options

Electric Latch Retraction — EL



The EL feature allows for the remote unlatching of exit devices. A control station operator can flip a switch to retract the latch bolt and immediately change an exit door to push-pull operation. A powerful, continuous duty solenoid retracts the latch bolt, either for momentary unlatching, or for extended periods of time. The EL feature is an alternative to manual dogging. If manual hex-key dogging is required, specify HD-EL. If cylinder dogging is required, the standard cylinder dogging is not available, but special center case dogging is available, specify SD-EL. SD-EL is not available on the 9875 or 9975 devices.

EL devices are also useful with automatic door operators, and may be applied to fire-rated applications when under the control of an **automatic fire alarm system**.

UL approved for Class II circuit applications.

The EL option does not include the power transfer from door to frame, the power supply, or the control operator. Refer to EPT-2 power transfer and the PS873 power supply.

The PS873 with the 871-2 option card is minimum option card required. Other option cards available for other functions, see PS873 power supply for additional information.

Solenoid Specifications:

- Continuous Duty — 24 VDC
- Current Inrush — 16 Amps
- Current Holding — 0.3 Amps

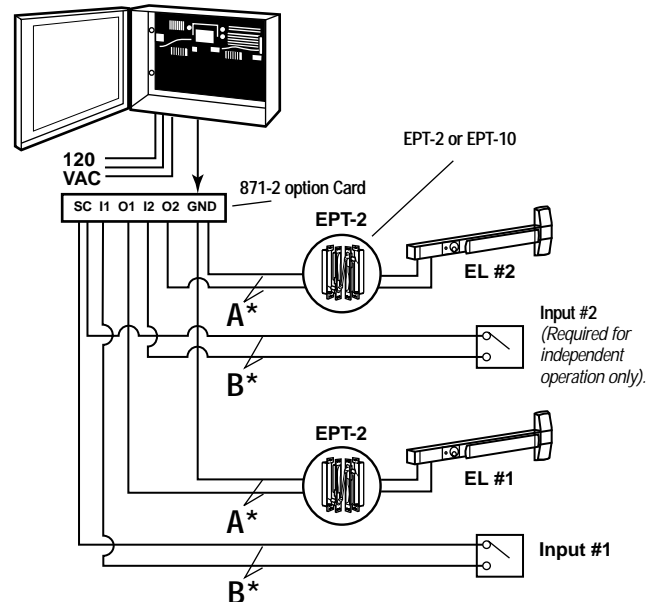
To order, specify:

- Standard — Use prefix EL, example EL99L.
- Hex Key dogging — Use prefix HD-EL, example HD-EL99L
- Special Center Case Dogging — Use prefix SD-EL, example SD-EL99L

Popular EL Application

Power Supply PS873-2

Electric Power Transfer EPT-2 or EPT-10



Signal Switch — SS



Monitors pushpad and latch bolt

The SS feature is used to signal the unauthorized use of an opening. This device is equipped with two internal SPDT switches. One switch monitors both the pushpad and the latch bolt assembly, making the latch bolt tamper resistant, for positive security. An additional SPDT switch is connected to the 1 1/4" (32mm) mortise with straight cam for alarm "bypass." (Schlage cam reference B502-191). The device can be connected to a security console, or may be used as a single door alarm when used with a horn and power supply. A continuous current electric transfer must be used for transferring power from the frame to the door.

Pushpad reads:

"EMERGENCY EXIT ONLY – PUSH TO OPEN AND SOUND ALARM." Pushpad is only available in US32D finish with red silk-screened lettering.

The SS mortise lock device is furnished with both the signal switch device and the SS7500 mortise lock. The SS7500 mortise lock has the versatility and advantages of the 7500 lock with the addition of signalling functions to monitor latch bolt operation and the trim locking function. The SS7500 mortise lock is supplied standard with the SS mortise lock device.

To Order, Specify:

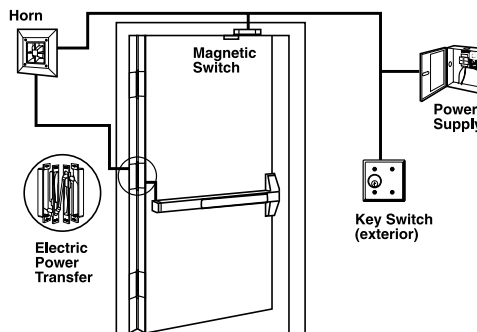
1. Prefix SS, example SS99L.
2. Handing Required, LHR or RHR.

Electrical Ratings:

Up to 2.0 AMPS @ 24VDC

Popular SS Application

Unauthorized use of this opening will activate the local horn. The key switch permits inhibiting this system for authorized entry.







EL Device Wire Selection Size





A*	Run Length	EL Device w/EPT or Door Loop
	0-100 ft.	14 gauge
	100-200 ft.	12 gauge

A*	Run Length	EL Device w/Electric Hinge/Pivot
	0-75 ft.	14 gauge
	75-150 ft.	12 gauge

B*	Wire Selection	Switch Wire Size
	1200 ft. Max.	18 gauge

VON DUPRIN® 33A/35A Rim Device Trim

	Exit Only	Pull when dogged	Key retracts latch bolt	Key retracts latch bolt (Pull required)	Key locks lever (#06 lever standard)
					
Product Description	33A-EO 35A-EO	33A-DT 35A-DT	33A-NL 35A-NL	33A-NL-OP 35A-NL-OP	33A-L ^{1,2,3,4,5} 35A-L ^{1,2,3,4,5}
Trim Description	—	386DT	386NL	388	360L
Base Size	—	7 ¹⁵ / ₃₂ "h x 1 ⁵ / ₈ "w	7 ¹⁵ / ₃₂ "h x 1 ⁵ / ₈ "w	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w x ⁷ / ₈ "d
Grip Size	—	8 ¹ / ₂ "h x 4 ⁵ / ₁₆ "w	8 ¹ / ₂ "h x 4 ⁵ / ₁₆ "w	—	4 ¹ / ₂ "
Projection	—	2 ⁷ / ₁₆ "	2 ⁷ / ₁₆ "	1"	3"
ANSI Function	01	02	03	03	08-09
Cylinder Type	—	—	Rim	Rim	1 ¹ / ₄ " Mortise Straight Cam

	Key retracts latch bolt	Key retracts latch bolt	Key locks thumbturn (Pull required)	Key locks thumbturn
				
Product Description	33A-NL-OP x 550 DT 35A-NL-OP x 550 DT	33A-NL-OP x Ives 8190 Pull 35A-NL-OP x Ives 8190 Pull	33A-TL ^{1,2,4,5} 35A-TL ^{1,2,4,5}	33A-TL x Ives 8190 Pull ^{1,2,4,5} 35A-TL x Ives 8190 Pull ^{1,2,4,5}
Trim Description	388 x 550	388 x IVES 8190 Pull	360T	360T x Ives 8190 Pull
Base Size	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w x ⁷ / ₈ "d	7 ¹ / ₂ "h x 1 ¹¹ / ₁₆ "w x ⁷ / ₈ "d
Grip Size	10"	10" Suggested	—	10" Suggested
Projection	2 ⁵ / ₈ "	3 ¹ / ₄ "	1 ¹³ / ₁₆ "	3 ¹ / ₄ "
ANSI Function	03	03	11-12	11-12
Cylinder Type	Rim	Rim	1 ¹ / ₄ " Mortise Straight Cam	1 ¹ / ₄ " Mortise Straight Cam

Two #425 sex bolts are furnished standard for end case mounting. When exit only (EO) is used, two #325 are furnished for mounting center case.

¹If no cylinder is required specify "BE" blank escutcheon, trim always operable; example 33A-L-BE.

²NL function is available by changing orientation of mortise cylinder cam.

³Matching dummy trim is available, order 360L-DT trim.

⁴Wood door applications require the 33A-WDA door cover plate.

⁵Cylinder collar required for 1¹/₂" cylinders.

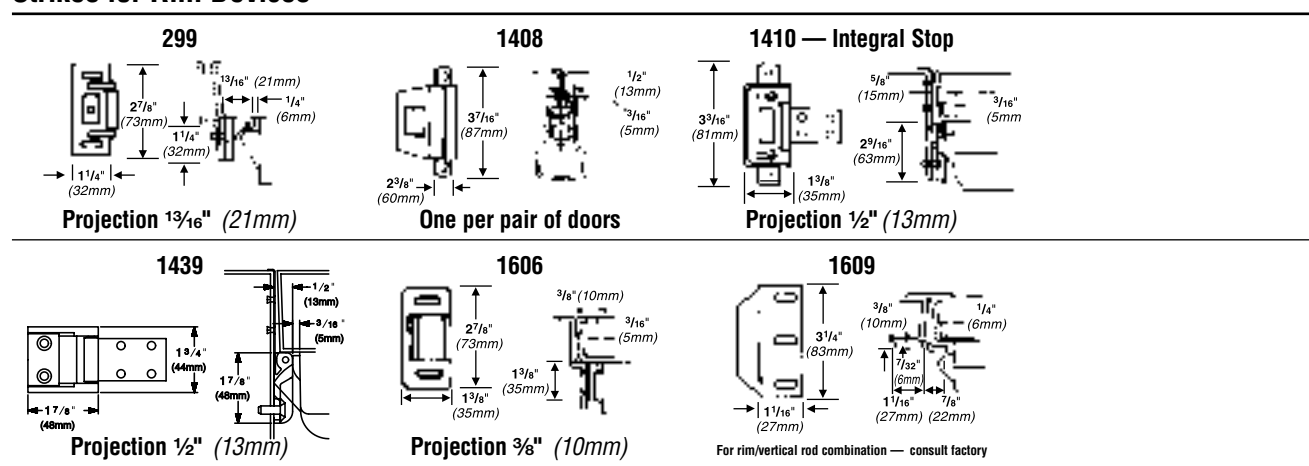
VON DUPRIN® 33A/35A Strike/Stile Information

Strike Application/Minimum Stile

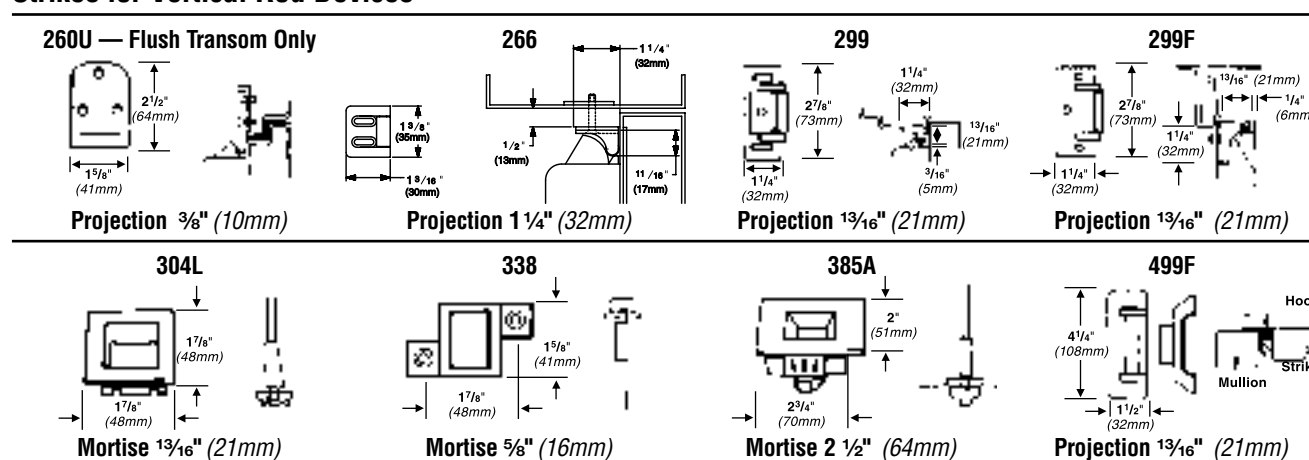
Device Type	Standard		Double door		Optional		Double door	
	Single door Strike	Stile	Strike w/Mullion*	Stile	Single door Strike	Stile	Strike w/Mullion*	Stile
33A					299	2 3/4" (70mm)	299 x 5654	2 5/8" (67mm)
35A	1439	1 3/4" (44mm)	1408 x 5754	1 3/4" (44mm)	1410	1 3/4" (44mm)	299 x 4954	3 5/16" (84mm)
					1606	2 1/2" (64mm)	1606 x 1654	2 3/4" (70mm)
3327A	266 (Top)		266 (Top)		299 (Top)		299 (Top)	
3527A	304L (Bottom)	1 3/4" (44mm)	304L (Bottom)	1 3/4" (44mm)	385A (Bottom)	3 1/8" (79mm)	385A (Bottom)	3 1/8" (79mm)
	248L-4 (Bottom)		248L-4 (Bottom)		260U (Top)		260U (Top)	
					385A (Bottom)	2 1/8" (54mm)	385A (Bottom)	2 1/8" (54mm)
3327A-F			299F (Top)					
3527A-F			304L (Bottom)	2 3/16" (56mm)				
3327A-LBR-F			499F (Top)	3 5/8" (92mm)				
			(Req. Auxiliary Fire Latch)					
3347A								
3547A	338 (Top)	2 1/2" (64mm)	338 (Top)	1 3/4" (44mm)	304L (Bottom)	2 1/2" (64mm)	304L (Bottom)	2 1/2" (64mm)
3348A	385A (Bottom)		385A (Bottom)					
3548A								
3347A-F								
3547A-F			338 (Top)	3 1/2" (89mm)			304L (Bottom)	3 1/2" (89mm)
3348A-F			385A (Bottom)					
3548A-F								
3347A-LBR								
3547A-LBR	338 (Top)	2 1/2" (64mm)	338 (Top)	2 1/2" (64mm)				
3348A-LBR								
3548A-LBR								
3347A-LBR-F								
3547A-LBR-F			338 (Top)	3 5/8" (92mm)				

*Mullion information — Refer to the General and Auxiliary Catalog.

Strikes for Rim Devices



Strikes for Vertical Rod Devices







VON DUPRIN® 98/99™ Optional Lever Trim



996L Trim

The new 996L Breakaway™ trim has become the standard lever trim offering on the 98L/99L series devices. The 996L trim blends two successful Von Duprin designs; the look of the traditional 992L lever trim and the security and durability of the Von Duprin Breakaway™ design. The Breakaway™ design is especially effective in areas where vandalism to door hardware is a problem. The design intent is to discourage costly repairs from becoming necessary. The Breakaway™ feature is not available on the NL (night-latch) or DT (dummy trim) versions.

Optional Lever Trims – 992





	Lever Key Locks and Unlocks 	Lever – Night Latch Key Retracts Latchbolt 	Lever – Blank Escutcheon Always Operable (No Cylinder) 	Lever – Dummy Trim Pull when Dogged (Not recommended for Fire Device) 
Trim Description	992L	992L-NL	992L-BE	992L-DT
Escutcheon Plate Size	2¾" x 10¾" x 27/32" (70x273x21mm)	2¾" x 10¾" x 27/32" (70x273x21mm)	2¾" x 10¾" x 27/32" (70x273x21mm)	2¾" x 10¾" x 27/32" (70x273x21mm)
Pull Center to Center	--	--	--	--
Projection	27/8" (73mm)	27/8" (73mm)	27/8" (73mm)	27/8" (73mm)
ANSI Function	08	09	--	02
Cylinder Type				
Rim or Vertical Rod Device	Rim	Rim	--	--
Mortise Lock Device	1¼" Mortise	1¼" Mortise	--	--



992L Trim





The 992L trim series provides the traditional Von Duprin escutcheon design. Special versions available for doors of over 2 ¼" (57mm) thicknesses. Additionally available in an RX and E-locking/unlocking version.

Optional Lever Trims – 994





	Lever Key Locks and Unlocks 	Lever – Night Latch Key Retracts Latchbolt 	Lever – Blank Escutcheon Always Operable (No Cylinder) 	Lever – Dummy Trim Pull when Dogged (Not recommended for Fire Device) 
Trim Description	994L	994L-NL	994L-BE	994L-DT
Escutcheon Plate Size	2¾" x 9¼" x 27/32" (70x235x21mm)	2¾" x 9¼" x 27/32" (70x235x21mm)	2¾" x 9¼" x 27/32" (70x235x21mm)	2¾" x 9¼" x 27/32" (70x235x21mm)
Pull Center to Center	--	--	--	--
Projection	27/8" (73mm)	27/8" (73mm)	27/8" (73mm)	27/8" (73mm)
ANSI Function	08	09	--	02
Cylinder Type				
Rim or Vertical Rod Device	Rim	Rim	--	--
Mortise Lock Device	1¼" Mortise	1¼" Mortise	--	--

VON DUPRIN® 98/99™ Exit Rim Device

Optional Lever Trims – 696/697

	Dummy Trim Pull when Dogged (Not recommended for Fire Device) 	Dummy Trim Pull when Dogged (Not recommended for Fire Device) 	Night Latch Key Retracts Latchbolt 	Night Latch Key Retracts Latchbolt 
Trim Description	696DT	697DT	696NL	697NL
Escutcheon Plate Size	1 $\frac{5}{8}$ " x 13 $\frac{1}{2}$ " x $\frac{3}{16}$ " (41x343x5mm)	1 $\frac{5}{8}$ " x 13 $\frac{1}{2}$ " x $\frac{3}{16}$ " (41x343x5mm)	1 $\frac{5}{8}$ " x 13 $\frac{1}{2}$ " x $\frac{3}{16}$ " (41x343x5mm)	1 $\frac{5}{8}$ " x 13 $\frac{1}{2}$ " x $\frac{3}{16}$ " (41x343x5mm)
Pull Center to Center	5 $\frac{1}{2}$ " (140mm)	5 $\frac{1}{2}$ " (140mm)	5 $\frac{1}{2}$ " (140mm)	5 $\frac{1}{2}$ " (140mm)
Projection	2 $\frac{1}{8}$ " (52mm)	3" (76mm)	2 $\frac{1}{8}$ " (52mm)	3" (76mm)
ANSI Function	02	02	03	03
Cylinder Type				
Rim or Vertical Rod Device	--	--	Rim	Rim
Mortise Lock Device	--	--	1 $\frac{1}{4}$ " Mortise	1 $\frac{1}{4}$ " Mortise
#425 SNB optional-HMD Req. WD w/o SLM Pkg.	2	2	2	2
#825 SNB Req. WD w/o SLM Pkg.	2	2	2	2
#425 SNB Req. w/ 499F	2	2	2	2

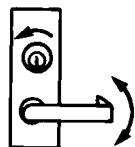
Optional Lever Trims – 696/697

	Thumbpiece Key Locks & Unlocks 	Thumbpiece Key Locks & Unlocks 	Thumbpiece - Blank Escutcheon Always Operable (No Cylinder) 	Thumbpiece - Blank Escutcheon Always Operable (No Cylinder) 
Trim Description	696TP	697TP	696TP-BE	697TP-BE
Escutcheon Plate Size	1 $\frac{5}{8}$ " x 13 $\frac{1}{2}$ " x $\frac{3}{16}$ " (41x343x5mm)	1 $\frac{5}{8}$ " x 13 $\frac{1}{2}$ " x $\frac{3}{16}$ " (41x343x5mm)	1 $\frac{5}{8}$ " x 13 $\frac{1}{2}$ " x $\frac{3}{16}$ " (41x343x5mm)	1 $\frac{5}{8}$ " x 13 $\frac{1}{2}$ " x $\frac{3}{16}$ " (41x343x5mm)
Pull Center to Center	5 $\frac{1}{2}$ " (140mm)	5 $\frac{1}{2}$ " (140mm)	5 $\frac{1}{2}$ " (140mm)	5 $\frac{1}{2}$ " (140mm)
Projection	2 $\frac{1}{8}$ " (52mm)	3" (76mm)	2 $\frac{1}{8}$ " (52mm)	3" (76mm)
ANSI Function	05	05	05	05
Cylinder Type				
Rim or Vertical Rod Device	Rim	Rim	--	--
Mortise Lock Device	1 $\frac{1}{4}$ " Mortise	1 $\frac{1}{4}$ " Mortise	--	--
#425 SNB optional-HMD Req. WD w/o SLM Pkg.	2	2	2	2
#825 SNB Req. WD w/o SLM Pkg.	2	2	2	2
#425 SNB Req. w/ 499F	2	2	2	2

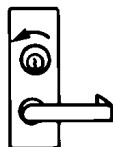
VON DUPRIN® 98/99™ Trim Operation Selection

Operation Options

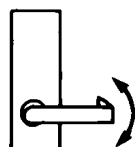
Lever and Knob Operations



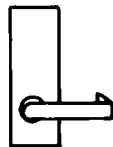
Standard operation, key locks and unlocks lever or knob. e.g., 996L (Classroom)



Night latch, key retracts latch bolt. Lever or knob is rigid. Use NL suffix, e.g. 996LNL. (Storeroom)



Blank escutcheon, lever or knob always active. Use BE suffix, e.g., 996L-BE. (Passage)



Dummy trim, lever or knob rigid for pull operation. Use DT suffix, e.g., 996L-DT.

374T/376T Series Thumbturn Control (Shown with 990DT Trim)



Standard operation, key locks and unlocks thumbturn. Optional operation, key unlocks thumbturn, re-locks when key is removed. This operation is created by changing the cylinder plate included with control. Use 1¼" mortise cylinder with a straight cam. Schlage cam reference B502-191.

HL6 Exit Device Trim Option



Von Duprin and Glynn-Johnson have collaborated on an exit device trim that answers the problem of accessibility and performance. Using the Von Duprin 98/9975 mortise lock exit device along with the Glynn-Johnson HL6 Push/Pull latch, Ingersoll-Rand has created an exit device with mortise lock durability that utilizes a fully ADA compliant Pull paddle trim. The 98/9975HL device is available in all standard architectural finished and can be found in the Von Duprin device price list for easy ordering.

Vandal Resistant Trim

VR910 & VR914 Series

Features:

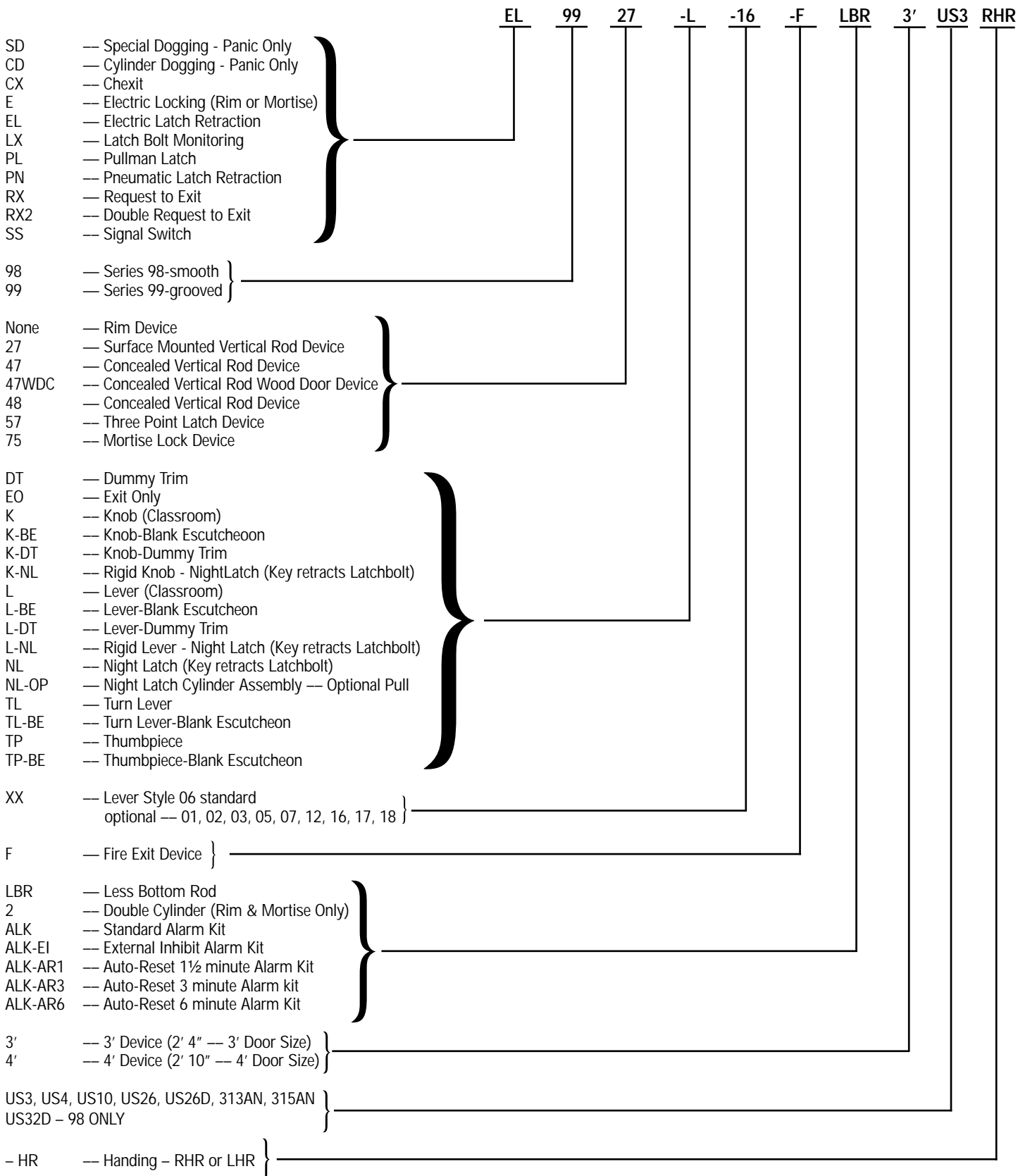
- Stainless Steel construction, 11 gage (0.120" thick)
- Thru-bolts and rugged mounting screws for maximum fastening strength.
- 10-24 screws supplied with VR910 & VR914 models.
- Built-in lock protector prevents vandalism to mortise latchbolt (available on certain models).
- Extra-tough stainless steel cylinder collar prevents pipe wrench or similar tool from damaging cylinder. Tapered design prevents side impacts from transferring directly to cylinder. Collar spins freely.
- Furnished with mounting screws for door thicknesses of 1¾" to 2¼"
- Finish: US32D
- VR910 grip coated in black plastisol for softer touch and resilience to temperature extremes. Grip designed for comfortable operation.
- VR914 grip in all stainless steel.
- Meets ANSI/BHMA 156.13, Trim Security Test and California State Accessibility Standards Title 24.
- 1½" (38mm) clearance from grip to door
- 1⅞" (48mm) total projection from door
- Consult IVES catalog for specification/ordering information.



Model	For Use With	Size
VR910DT & VR914DT	98/99 Rim or Vert. Rod Device	5¼" (133mm) w x 11" (279mm) h
VR910NL & VR914NL	98/99 Rim or Vert. Rod Device	5¼" (133mm) w x 11" (279mm) h
VR910M-DT & VR914M-DT	9875/9975 Mortise Device	7¼" (184mm) w x 11" (279mm) h
VR910M-NL & VR914M-NL	9875/9975 Mortise Device	7¼" (184mm) w x 11" (279mm) h

VON DUPRIN® 98/99™ Additional Information

Nomenclature – How To Order



VON DUPRIN® E996L Electrified Breakaway™ Lever Trim

E996L electrified Breakaway lever trim provides remote locking and unlocking capabilities while incorporating the patented Breakaway trim design.

The 24VDC solenoid can be energized from a distant controller, thus allowing access control of the opening. The control of stairwells in high-rise buildings is a common application for this trim.

When electrically unlocked the unit operates as a normal lever trim. When electrically locked, the lever feels locked, but when more than 35 pounds of torque pressure is applied, the Breakaway lever feature engages.

The E996L is provided standard in a fail safe (FS) condition, but can be field converted to a fail secure (FSE) where allowed. The trim can be ordered with a device, added to an existing 98/99 series device application, or a conversion kit can be added to an existing 996L Breakaway lever trim. On new construction applications, the E996L trim will require less door prep.

The E996L is available with a blank escutcheon (BE) function, or with a cylinder for night latch function.

The E996L electrified trim replaces the current “E” electric feature on 98/99 series rim devices. Consult factory for requirements.

To Order, Specify:

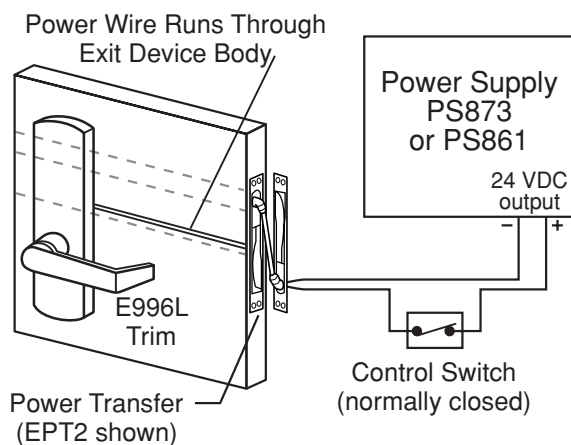
1. Use “E” prefix, example E996L.
When ordering with device specify trim series with “E” prefix, example 9927L-BE 3’ US26D E996.
2. Device type, R/V (rim/surface or concealed vertical rod) or M (mortise).
3. RHR is furnished standard if not specified.
Field reversible.
4. Lever style (06 lever is furnished standard).
5. Finish: US3, US4, US10, US10B, SP313, US26, US26D, SPBLK, US15



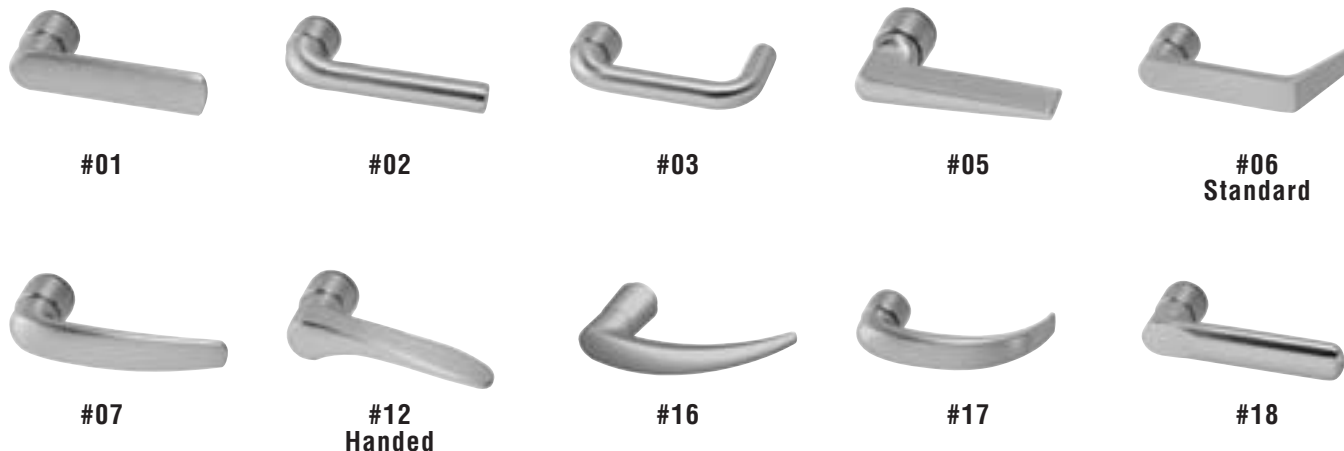
SPECIFICATIONS
Solenoid – Continuous Duty 24VDC
Solenoid Draw – 0.22 amp

E996L ELECTRICAL WIRING

- Power input for E996L is 24VDC
- Two wires on trim are non-polarized (18 AWG minimum)



LEVER DESIGN OPTIONS



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SECTION 08800 - GLAZING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Glass and glazing as indicated.
- C. Related Sections:
 - 1. Section 08110: Hollow Metal Doors, Windows, and Frames.
 - 2. Section 08400: Entrances and Storefronts.
 - 3. Section 08710: Door Hardware.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's descriptive literature and installation recommendations for glass, glazing, and accessories.
- B. Material Samples: Submit 6-inch square units of each type of glass specified.

1.03 QUALITY ASSURANCE

- A. Labeling: Label each piece of glass and glazing and mirrors with manufacturer's name, and the grade or quality of the material. Labels shall be intact before and after installation.
- B. Comply with the following as a minimum requirement:
 - 1. ASTM C 1036 - Standard Specification For Flat Glass.
 - 2. ASTM C 1048 - Standard Specification For Heat-Treated Flat Glass.
 - 3. ASTM E 774 - Standard Specification For Sealed Insulated Glass Units.
 - 4. CPSC 16 CFR 1201 - Safety Standards for Architectural Glazing Materials issued by the Consumer Products Safety Commission.
 - 5. GANA - Glazing Manual.
- C. Qualifications of Installer: Minimum 10 years experience installing glass in projects of similar scope and complexity.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver glass and glazing materials with manufacturer's labels intact.
- B. Do not remove labels until glass has been installed and inspected by Project Inspector.
- C. Protect glass from staining, marking, and damage.

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- D. Putty and glazing compound shall be delivered to the Project site in manufacturer's original unbroken containers labeled to identify contents.

1.05 PROJECT CONDITIONS

- A. Perform glazing when ambient temperature is above 40 degrees F.
- B. Perform glazing on clean, dry surfaces only.

1.06 WARRANTY

- A. Manufacturer shall provide a 10-year material warranty against distortion or harmonics. Manufacturer shall provide a 20-year material warranty for coatings and thermally or acoustically rated insulation units against deterioration in acoustic or thermal rating.
- B. Installer shall provide a 10-year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND FABRICATORS

- A. To maximum extent possible, provide domestically manufactured and fabricated glass, and provide glass from one manufacturer.
- B. Types of glass specified or indicated shall be manufactured or fabricated by one of the following:
 - 1. AFG Industries
 - 2. PPG Industries
 - 3. Viracon
 - 4. Guardian Industries

2.02 GLASS MATERIALS

- A. General: Conform to ASTM C 1036, ASTM C 1048 and to ANSI Z97.1. Label factory cut panes.
- B. Float Glass: Type I, (transparent glass flat), Class 1 (clear), Quality q3, (glazing select), minimum 1/4 inch thickness unless otherwise indicated or required.
- C. Tinted Float Glass: Type I, Class 2 (tinted heat absorbing and light reducing), quality q3, manufactured by PPG, Solargray, minimum 1/4 inch thickness unless otherwise indicated or required.
- D. Tempered Glass: Condition A, Type I or II, Class 1, Quality q3, Kind FT, match color of clear or tinted glass as applicable; fully thermal tempered, heat strengthening or chemical tempering is not permitted. Perform tempering by horizontal oscillating roller hearth or high speed roller hearth process. Do not permit fabrication processes leaving gripper or tong marks. Handle and size glass according to manufacturer's written instructions.
- E. Insulated Glass: Pre-assembled sealed lite units with dehydrated space between glass units, complying with ASTM E 774 for Class CBA units.

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- F. Low Emissivity Glass (Low E Glass): Provide units with thin metallic high-transmittance coating applied to the number 3 surface of the unit, unless otherwise indicated. The U-value for the IGU shall be no greater than 0.34, unless otherwise indicated.

2.03 GLASS SETTING MATERIALS

- A. Setting Blocks: ASTM C 864, channel shape; having 1/4 inch internal depth, Shore A hardness of 80 to 90 Durometer. Blocks shall be a minimum 2 inch long. Block width shall be approximately 1/16 inch less than the full width of the rabbet. Block thickness shall be at least 3/16 inch, sized for rabbet depth as required.
- B. Spacers: ASTM C 864, channel shape, with 1/4 inch internal depth, 3/32 inch flanges, web, 1/8 inch thick, one to 3 inches long. Spacers shall provide Shore A hardness of 40 to 50 Durometer.
- C. Vinyl Glazing Channels: Profile compatible with framing system and designed to accommodate glass of specified thickness, light gray in color. Provide for dry glazing aluminum frames where indicated or permitted.
- D. Glazing Tape: Poly-isobutylene based sealant tape, conforming to AAMA 804.1, with adhesive one side protected by temporary paper cover, Extru-Seal manufactured by Pecora Corp., No. 303 by Protective Treatments, Inc., or equal.
- E. Spring Steel Spacers: Galvanized steel wire or strip designed to position glazing in channel or rabbet sash with stops.
- F. Glazing Clips: Galvanized steel spring wire designed to hold glass in position in rabbet sash without stops.
- G. Glazing Points (Sprigs): Pure zinc stock, thin, flat, triangular or diamond-shaped pieces, 1/4 inch minimum size.
- H. Glazing Sealants for Metal Sash: GE Silicones Silglaze II 2800, GE Silicones Silpruf, GE Silicones 1200 Silicone, and Dow Corning 999A. Polybutylene, oleoresinous, asphalt, and oil base sealants are not permitted. Provide sealant of same color as structural silicone sealant unless otherwise required.
- I. Glazing Compound for Wood Sash: Acrylic latex caulk by Tremco. Provide for bedding and caulking glass in wood frames.
- J. Glazing Compounds and Sealants for Thermoplastic: Provide silicone, butyl, or polysulfide glazing compound.

PART 3 - EXECUTION

3.01 TOLERANCES

- A. Thickness indicated or specified are nominal within standard tolerances. Maximum size of vertical panes shall not exceed following:
 - 1. Glass Thickness Double Strength: 1/8 inch 3/16 inch 1/4 inch
 - 2. Maximum Areas in Square Feet: 12 16 20

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3.02 INSTALLATION, GENERAL

- A. Glazed cabinet doors, windows, transoms, and fixtures, not otherwise noted or indicated, shall be glazed with clear float glass. Room or entrance doors shall be glazed with clear wire glass.
- B. Glazing tapes or sealants shall be installed wherever glass contacts wood or metal surfaces. Width of strips shall be as required.
- C. Glazing compound shall be neatly and cleanly installed in straight lines, even with inside edge of sash members. Thumb puttying is not permitted.
- D. Glazing Aluminum Sash: Glazing material in aluminum sash shall be installed in compound and secured in place with aluminum glazing beads. In addition, horizontal beads shall be installed with 6 inch x one inch, type A, self-tapping, stainless steel, Phillips-head screws, installed into pre-drilled, counter-sunk holes and spaced 2 inches from each end and 9 inches on centers.

3.03 INSTALLATION OF GLASS

- A. Conform to requirements of GANA Glazing Manual.
- B. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.
- C. Provide compressible filler rods or equivalent back-up material to prevent sealant from extruding into glass channel weep systems, from adhering to back surface of joints and to control depth of sealant for optimum performance.
- D. Force sealants into glazing channels, in manner to eliminate voids and to ensure complete bond of sealant to glass and channel surfaces.
- E. Tool exposed surfaces of sealants to provide for drainage away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.
- F. Where dry glazing of aluminum frame is indicated or permitted, provide vinyl glazing channels installed in accordance with frame manufacturers written recommendations. Do not stretch channels. Miter corners.
- G. For tape glazing, furnish tape of thickness to provide approximately 30 percent compression. Cut tape to proper length and install to permanent stops, the entire length of the head and sill first, then to jambs. Butt tape together with no overlap and remove paper backing. Install glass on setting blocks at quarter points and maintain uniform glass edge clearance around entire perimeter of glass. Maintain manufacturer's recommended edge clearance and bite on glass. Install glass firmly into tape with a slight lateral movement to assure proper adhesion. Install tape to removable stop with evenly distributed firmness, smoothing out wrinkles in tape. Secure removable stop in proper position so tape makes contact with glass as stop is installed, forcing contact with glass and completely sealing joint. Remove excess tape from both sides at slight angle over sight line. Do not undercut.

3.04 PROTECTION AND CLEANING

- A. Protect exterior glass from breakage by furnishing crossed streamers attached to framing and away from glass surface. Do not directly install markers to glass surfaces. Remove non-permanent labels and clean surfaces.

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- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer. Glazing, which cannot be cleaned to a required condition, shall be deemed defective Work.
- D. Remove and replace glass, which is broken, chipped, cracked, abraded, or damaged during construction.
- E. Remove protective covering from thermoplastic not more than 4 days before Substantial Completion, and immediately before cleaning. Methods of final cleaning and finishing shall be as prescribed by thermoplastic glazing publications referenced above.
- F. Wash glass on both faces not more than 4 days before Substantial Completion. Wash glass by method recommended by glass manufacturer. Do not furnish harsh cleaning agents, caustics, abrasives, or acids for cleaning. Polish glass both sides and leave free of soil, streaks, and labels.

3.05 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

3.06 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 09100 - METAL SUPPORT ASSEMBLIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Metal support systems as indicated and/or described.
- C. Related Sections:
 - 1. Section 09220: Portland Cement Plaster and Metal Lath.
 - 2. Section 09250: Gypsum Board.
 - 3. Section 09500: Acoustical Ceiling Systems.

1.02 SYSTEM DESCRIPTION

- A. Regulatory Requirements: Comply with 2007 CBC requirements.
- B. Design Requirements:
 - 1. Metal Studs: Studs for interior partitions shall be roll-formed channel or C-shapes.
 - 2. Track: Stud track for floor and ceiling anchorage shall be channel configuration, sized to fit studs. Galvanized steel as manufactured for installation with specified metal studs.
 - 3. Design: Design is based on minimum 5 pounds per square foot load applied perpendicular to walls. Deflection shall not exceed 1/240 under design load.

1.03 SUBMITTALS

- A. Shop Drawings: Submit shop drawings showing framing, connection details, accessories and anchorage. Indicate location of assemblies and size and spacing of framing components.
- B. Product Data: Submit manufacturer's catalog data for each item proposed for installation.
- C. Certificates: Furnish manufacturer's certification that materials meet or exceed specification requirements.

1.04 QUALITY ASSURANCE

- A. Coordinate with related Work to provide blocking for items mounted on finished surfaces and to provide allowances for pipes and other items inside partitions and walls.
- B. Comply with following as a minimum requirement:
 - 1. American Welding Society (AWS): Structural Welding Code Steel (D1.1); and Structural Welding Code Sheet Steel (D1.3).
 - 2. ASTM Standards:

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- a. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
 - b. ASTM A 1008 – Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength Low-Alloy with Improved Formability.
 - c. ASTM A 641 – Standard Specification for Zinc Coated (Galvanized) Carbon Steel Wire.
 - d. ASTM C 645 – Standard Specification for Non-Structural Steel Framing Members.
 - e. ASTM C 955 – Standard Specification for Load Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging, for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
 - f. ASTM C 954 – Standard Specification for Steel Drill Screws for Application of Gypsum Panel Products or Metal Bases to Steel Studs From 0.033 Inch to 0.112 Inch in Thickness.
 - g. ASTM E 1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.
- C. Tolerances: Install walls and partitions on straight lines, plumb, free of twists or other defects, and contacting a 10 foot straightedge for its entire length at any location within a 1/8 inch tolerance. Install horizontal framing level within a tolerance of 1/8 inch in 12 feet in any direction.

1.05 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be delivered in their original unopened packages and stored protected from damage. Do not store material directly on grade. Provide adequate support to prevent bowing of material prior to installation.
- B. Store welding electrodes in accordance with AWS D12.1.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products manufactured by one of following:
 - 1. Dietrich Industries, Inc., www.dietrichindustries.com.
 - 2. Marino/WARE, www.marinoware.com
 - 3. Current members of Steel Stud Manufacturers Association (SSMA).

2.02 MATERIALS

- A. Light Gage Metal Framing:
 - 1. Metal framing shall be formed from corrosion resistant-steel conforming to requirements of ASTM A653, 33 ksi minimum.
 - 2. Metal framing shall be zinc coated in conformance to requirements of ASTM A926, G60.
 - 3. Metal framing shall be manufactured in conformance to ASTM C645.
 - 4. Install metal framing according to ASTM C1007, Standard Specification for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories.

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- B. Studs: SSMA, ICBO ER-4943P, minimum yield 33 ksi, hot-dipped galvanized or electro-galvanized sheet steel, G-60, C Stud type, punched web (except tracks and joists), C-shaped, sizes required to conform to details and scheduled wall thicknesses. Studs shall be rolled from new steel sheet and shall not be produced from re-rolled steel. Stud flanges shall not be less than 1-5/16 inch wide; track flanges, not less than 1-1/4 inch wide.
1. Wall Framing and Furring for Plaster and Mortar Beds: Studs and tracks shall be 18-gage minimum, unless otherwise indicated.
 2. Wall Framing and Furring for Gypsum Wallboard: Studs and tracks shall be 20-gage minimum, unless otherwise indicated.
 3. Stud gages indicated on Drawings or specified are the minimum. Where required stud height and/or loads exceed code requirements or manufacturer's recommendations, provide heavier gage studs and/or decrease stud spacing as necessary to conform to code requirements.
- C. Suspended and Furred Ceiling Systems and Wall Furring: Suspended ceiling framing system shall support finished ceiling, light fixtures, air diffusers, and accessories, as required. Suspension system shall provide a maximum deflection of L/240. Carrying channels shall be fabricated from minimum 0.0548-inch thick cold-rolled steel, 1-1/2 inch wide x 7/16 inch deep. Carrying channels for supports under ducts shall be 2 inches in size as specified. Carrying channels shall be fabricated from hot-dip galvanized coated sheet.
1. Plaster Ceilings: Cross furring members shall conform to ASTM C 645, and shall be fabricated from cold-rolled steel, 3/4 inch wide x 7/16 inch deep. Furring members shall be fabricated from hot-dip galvanized coated sheet.
 2. Gypsum Wallboard Ceilings: Furring members shall be fabricated from cold-rolled steel, 7/8 inch x 2-9/16 inches. Furring members shall be fabricated from hot-dip galvanized coated sheet.
- D. Framed Ceilings: Framed ceiling framing system shall support finished ceiling, light fixtures, air diffusers, and accessories, as required. Suspension system shall provide a maximum deflection of L/240.
1. Plaster and Gypsum Wallboard Ceilings: Ceiling joists shall conform to ASTM C 645, hot-dip galvanized coated steel, C-shaped, unpunched, 20-gage minimum thickness, unless noted otherwise.
- E. Shaft Wall Framing Members: CH studs and J runners, 20-gage minimum for 2, 4 or 6 inch studs, conforming to ASTM 645, fabricated of steel conforming to ASTM A 653, hot-dip galvanized.
- F. Framing Accessories: Provide all standard related accessories including floor and ceiling tracks, clips, web stiffeners, anchors, and similar items, of same manufacture as each type of stud specified, and as required for a complete installation.
- G. Splay Wires and Compression Struts: Approved manufacturers acceptable to manufacturer of ceiling grids, gages and types as required by building codes for ceiling types and weights specified.
- H. Wires: Soft-annealed galvanized steel wire, 8 gage for hanger wires and 16 gage for framing unless otherwise specified.
- I. Fasteners: Wafer-head screws, self-drilling type for 20 gage metal and heavier. ASTM C954 self-drilling, self-tapping screws, Type S-12 pan head, 1/2 inch long.

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- J. Fire Rated Acoustical Foam Tape: Compressible, closed cell polyvinyl chloride foam with pressure sensitive adhesive, in rolls with protective release liner on non-adhesive face, 6 pounds per cubic foot density, 1 inch wide x not less than 1/4 inch thick, self-extinguishing, UL 94 recognized, Norseal V740FR, manufactured by Norton Performance Plastics Corporation, or equal.
- K. Acoustical Sealant: Permanently resilient type, non-hardening, manufactured by USG, Gold Bond, or equal.
- L. Zinc-Rich Paint: Conform to Fed Spec DOD-P-21035A, Z.R.C. "Cold Galvanizing Compound", manufactured by ZRC Products Company. Provide for touch-up of galvanized surfaces.
- M. Steel Backing Plates: Provide a minimum 4 inch wide by 16 gage steel, or sections of studs and stud track welded or fastened to web of studs, except as otherwise indicated. Apply shop coat of metal primer.
- N. Anchorage Devices Powder Actuated: Minimum 0.177 inch diameter by 1-7/16 inch long fasteners in regular concrete and 0.145 inch diameter by 1-1/8 inch long fasteners in lightweight concrete. Allowable shear and tension values as permitted in ICBO Report No. 2388, 1639 or 1147, reduced to 80 percent.
- O. Anchorage Devices, Drilled Expansion Anchors: Minimum 3/8-inch diameter with 2-1/4 inch embedment. Allowable shear and tension values as permitted in ICBO Report No. 1372, 2895 or 4627, reduced to 80 percent.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that overhead or concealed Work is completed, tested, inspected, and finished as required before starting Work of this section.

3.02 INSTALLATION

A. Walls and Partitions:

- 1. Fasten floor runners for exterior walls and interior partitions to concrete slab with required power driven fasteners. Spacing of fasteners not to exceed 24 inches on center. Fasten ceiling runners to structure as indicated.
- 2. Sound insulated walls and partitions: Embed floor runner tracks in two beads of acoustical sealant or two runs of compressible tape seal. Install top track nested into slotted track system, in same manner for full height of walls. Where wall ends abutting concrete, masonry, or steel set end studs in two beads of acoustical sealant or two tape seals and secure at 4-foot centers vertically.
- 3. Space studs not over 16 inch on center unless indicated otherwise. Studs shall be located approximately 2 inches from doorframe jambs, abutting partitions and partition corners, except those providing support for door and window openings.
- 4. Furnish and install manufacturer's standard floor track. Fasten track to floor by means of 1/4 inch x 1-1/4 inch Star "Dryvin" hammer drive anchors or 3/16 inch x 1 inch round head, "Rawl-Drives" one-piece expansion bolts spaced not to exceed 3 feet, and installed in drilled holes in slab, or to wood joist with nails as indicated. Track may be fastened to concrete floor slabs with, power-driven fasteners.

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5. Studs shall be seated squarely in track with stud web and flanges abutting track web, plumbed and securely fastened with sheet metal screws, to flanges or web of both floor and top tracks. Provide 4 screws per stud.
6. Where there is no suspended ceiling, tops of stud walls shall be provided with track and shoes and be fastened as specified for floors. Welding of studs to ceiling track will not be permitted except where bearing studs are installed.
7. Over metal doorframes, install a cut-to-length section of runner track, with flanges slit and web-bent to allow flanges to overlap adjacent vertical studs, and securely fasten to studs. At doorjamb, extend studs continuous to structure above.
8. Bridging, or horizontal bracing of 1-1/2 inch, cold-rolled channels shall be fastened in a manner to prevent stud rotation. Bridging shall be furnished as follows: walls up to 10 feet high, one row at mid-height; walls exceeding 10 feet high, bridging or bracing rows spaced not to exceed 5 feet on center.
9. Wind bracing shall be fastened where indicated on Drawings. Minimum size of strap shall be as indicated on Drawings. Track where strap terminates shall be anchored as indicated on Drawings.

B. Plaster Ceiling Suspension System:

1. Provide horizontal furring in accordance with 2007 CBC Table 25A-A.
2. Hanger Wires:
 - a. Hanger wires for ceilings suspended from wood frame construction shall be installed in accordance with CBC Table 25A-A and shall be fastened with stem lag screws in bottom edge of joists or rafters. Wire shall be looped through hole in stem lag screw and then wrapped twice around it. Stem lag screws shall be "Stanlag Screws" by Stanline, Inc., or equal, of type and penetration as follows:

Type Size	Hanger Wire	Screw Penetration, Minimum
Stanlag #SLS-3	#12 & #10	1-1/4 inch
Stanlag #SLS-375	#9 & #8	1-1/2 inch

- b. Hanger wire shall be wrapped twice around runner channel, drawn up taut, and wrapped twice around it.
3. Runner channels shall be installed 6 inches maximum from walls, parallel to runners. Splices in runner channels shall be provided at hangers only, by lapping channels not less than 12 inches and tying channels together at 2 points with a double wrap of tie wire twisted up taut.
4. Ends of runner channels abutting concrete or masonry surfaces shall be 1-1/4 inch clear and shall be tied to wall or partition with 3/4 inch channel brackets providing a 4-inch right angle bend secured with two 1/4 inch by 1 inch power-driven fasteners. Brackets shall extend from face of surface not less than 8 inches and shall be tied to runner channels at 2 points with double wrap of tie wire twisted up taut.
5. Securely saddle-tie furring channels to runner channels at each crossing with 16 gage tie wire twisted up taut, and with wings left uncut and bent back.

C. Gypsum Wallboard Ceiling Suspension and Framing: Suspended ceiling system framing shall be installed in accordance with ASTM C 754, and as follows.

1. Hangers shall be spaced not more than 48 inches along runner channels and 36 inches in other direction or 42 inches in both directions unless otherwise indicated. Locations of hanger wires shall be coordinated with other Work. Hangers at ends of runner channels shall be located not more than 6 inches from walls. Hanger wire shall be fastened to

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structural elements with required fasteners. Sags or twists, which develop in suspended system, shall be adjusted. Damaged or faulty parts shall be replaced.

2. Main Runners: Hanger wires shall be double strand saddle-tied to runner channels and ends of hanger wire shall be twisted three times around itself. Main runners shall be located to within 6 inches of parallel wall to support ends of cross furring. Main runners shall not come in contact with abutting masonry or concrete walls. Where main runners are spliced, ends shall be overlapped 12 inches with flanges of channels interlocked, and shall be securely tied at each end of splice with wire looped twice around channels.
 3. Furring channels shall be fastened to runner channels and to structural supports at each crossing with tie wire, hairpin clips, or required fastenings. Furring channels shall be located within 2 inches of parallel walls and beams, and shall be cut 1/2 inch short of abutting walls.
 4. Ceiling Openings: Support members shall be provided as required at ceiling openings for access panels, recessed light fixtures, and air supply or exhaust. Support members shall be not less than 1-1/2 inch main runner channels and vertically installed suspension wires or straps shall be located to provide at least minimum support specified for furring and wallboard attachment. Intermediate structural members not a part of structural system, shall be provided for attachment or suspension of support members.
 5. Light fixtures and air diffusers shall be supported directly from suspended ceiling runners. Wires shall be provided at required locations to support weight of recessed or surface mounted light fixtures and air diffusers.
 6. Control Joints: Ceiling control joints for expansion and contraction shall be located where indicated on drawings. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.
 - a. Interior Ceilings With Perimeter Relief: Control joints shall be installed so linear dimensions between control joints shall not exceed 50 feet in either direction or more than 2500 square feet in area.
 - b. Interior Ceilings Without Perimeter Relief: Control joints shall be installed so linear dimensions between control joints shall not exceed 30 feet in either direction or more than 900 square feet in area.
- D. Splay Wires and Compression Struts: Install as detailed and as required to prevent upward and sideward motion under seismic conditions, as required by code.
- E. Suspension Under Ducts: For hangers spaced at 4 to 5-1/2 foot centers, provide 6 gage hanger wires with minimum 2 inch runner channels spaced at maximum 48 inch centers. For greater spans, design system for live load of 10 pounds per square foot of area plus dead load and provide a detail in Shop Drawings.
- F. Furring: Provide framing for horizontal furring as shown or required. Conform to above requirements as applicable.

3.03 CLEANING

- A. Remove and legally dispose of debris, rubbish, and waste material off Project site.

3.04 PROTECTION

- A. Protect Work of this section until Substantial Completion.

END OF SECTION

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SECTION 09220 - PORTLAND CEMENT PLASTER AND METAL LATH

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Lath and Portland cement plaster and stucco as indicated.
- C. Related Sections:
 - 1. Section 06100: Rough Carpentry.

1.02 DESIGN REQUIREMENTS

- A. Provide pre-formulated products that require only addition of clean water for mixing.

1.03 SUBMITTALS

- A. Shop Drawings: Submit elevations and details indicating locations and types of components, splices, connections and accessory items. Indicate locations and types of framing substrates.
- B. Material Samples: Submit 48 inch x 48 inch samples of each stucco and Portland cement plaster texture for review. Samples shall be representative of texture, color, and proposed workmanship. Maintain reviewed samples on Project site for reference.
- C. Product Data: Submit manufacturer's catalog data for each material and component proposed for installation.
- D. Certificates: Furnish manufacturer's certification that materials meet or exceed specification requirements.
- E. Mock-ups: Provide a mock-up at least 10 feet x 10 feet x 1 foot. Include at least one control joint and one corner condition. Locate where required by the Architect.

1.04 QUALITY ASSURANCE

- A. Coordinate with related Work to provide backing support for items mounted on finished surfaces and to provide allowances for pipes and other items in wall cavities.
- B. Comply with the following as a minimum requirement:
 - 1. ANSI A42.3 Lathing and Furring for Portland Cement Based Plaster, Exterior and Interior.
 - 2. Federal Specifications (FS):
 - a. UU-B-790a - Grade D Building Paper, Vegetable Fiber: (Kraft Waterproofed, Water Repellent and Fire Resistant).

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- b. QQ-L-101a - Federal Specification for Lath, Metal and other Metal Plaster Bases.
- 3. ASTM Standards:

- a. ASTM A 570 - Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
- b. ASTM A 611 - Steel, Cold-Rolled Sheet Carbon, Structural Quality.
- c. ASTM A 641 - Zinc-Coated (Galvanized) Carbon Steel Wire.
- d. ASTM A 653M-01a - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated by the Hot-Dip Process.
- e. ASTM C 150 - Portland Cement.
- f. ASTM C 206 - Finishing Hydrated Lime.
- g. ASTM C 897 - Aggregate for Job Mixed Portland Cement Based Plasters.
- h. ASTM C 926 - Application of Portland Cement Based Plaster.
- i. ASTM C 1047 - Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- j. ASTM C 1509 - Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- k. ASTM E 11 - Wire-Cloth Sieves for Testing Purposes.
- l. ASTM C1063-03 – Standard Specification for Installation of Lathing to Receive Interior and Exterior Portland Cement-Based Plaster.

- C. Exterior and Interior Lath: Where lath is fastened to horizontal wood supports, comply with 2007 CBC requirements.
- D. Plaster: Conforming to general requirements of Stucco Manufacturers Association - Specifications and Standards for Manufactured Stucco Finishes.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect metal lathing and plastering materials before, during and after installation. In event of damage, immediately provide required repairs and replacements.
- B. Deliver and store Portland cement materials on the Project site in a manner to provide protection from exposure and damage by moisture. Pile materials to permit easy access for proper inspection and identification of each shipment. Stockpile adequate supplies of sand on the Project site to permit sampling and testing before installation. Store to avoid inclusion of foreign material.
- C. Deliver stucco to the Project site in manufacturer's sealed and labeled packages.

PART 2 - PRODUCTS

2.01 LATH AND ACCESSORY MATERIALS

- A. Each bundle of lath shall be sealed with a metal tag bearing the lath designation, weight and manufacturer's name.
- B. Water Repellant Backing for Horizontal Surfaces: W.R. Grace & Co., "Bituthene 4000" sheet, 0.060 inch thick, consisting of polyethylene sheet and rubberized asphalt, self-adhering.
- C. Adhesives and sealers for water repellant backing: Types as recommended by manufacturer for installation with specified membrane sheet.
- D. Expanded Metal Lath: ASTM C 841, small diamond mesh expanded metal lath, expanded from steel sheets with hot-dip galvanized coating G60 in accordance with ASTM A 653. Lath shall be V-groove, self-furring type for installation over sheathing and spaced framing.

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1. Vertical wall surfaces use diamond mesh 2.5 lbs.
 2. Horizontal assemblies, soffits, use diamond mesh 3.4 lbs.
- E. Backing for Metal Lath: Reinforced, laminated water resistant paper backing conforming to Fed Spec UU-B-790A (1), manufactured by Fortifiber Corp. Super Jumbo Tex, USG, Inryco or Western Metal Lath. Paper backings shall provide flame spread rating of 25 or less when tested according to ASTM E 84 and shall bear UL label. Furnish for exterior plastering (except on soffits and ceilings), and for mortar-set ceramic wall tile.
1. Furnish paper Grade D, 60 minute rating, on wood studs without sheathing, and on plywood sheathing.
 2. Furnish Grade B, 16-hour rating, on gypsum sheathing.
- F. Corner and Strip Reinforcing Lath: Flat or shaped lath reinforcing units, galvanized metal or wire lath types, no less than 2.5 pounds per square yard, outstanding legs minimum of 2 inches for wire lath and 3 inches for metal lath when formed for angle reinforcing. Furnish galvanized type for installation with galvanized metal lath.
- G. Plastering Accessories: Minimum 26-gage galvanized steel with expanded wings. PVC and zinc alloy are not permitted. Furnish casing beads, expansion screeds, foundation screeds, ventilating screeds and other items as indicated or required.
1. Exterior Expansion Screeds: Sizes and profiles indicated or required, furnished with expanded wings unless otherwise indicated or required by installation.
 2. Drip Screed: Similar to Superior No. 10.
 3. Casing Beads: Milcor, Superior, USG, or equal, similar to Milcor Type 66 by 7/8 inch high for exterior plaster.
 4. Exterior Corner Reinforcement: Woven wire type with longitudinal wires, galvanized.
 5. Ventilating Screeds: Alabama Metal Industries, or equal, soffit vent screed, perforated web type, with integral plaster grounds.
 6. Foundation Weep Screeds: Alabama Metal Industries, or equal, integral plaster ground and weep screed.
- H. Screws: USG Type S and Type S12, "ClimaSeal" finish.
- I. Wire for fastening lath together and fastening corner beads, metal grounds and base screeds to lath and framing shall be 18-gage, galvanized conforming with ASTM A 641.
- J. Nails: 11-gage roofing nails, 7/16 inch diameter head, barbed, diamond point, zinc-coated, 1-1/2 inch long for horizontal application; 1 inch penetration for vertical application.

2.02 PLASTER MATERIALS

- A. Exterior Stucco: As manufactured by Omega Products, LaHabra Products, or Merlex Stucco, Inc. Furnish formulations requiring only addition of water for installation. Sand shall pass the No. 20 sieve. Mix and sand shall provide the specified finish. Furnish integral colored stucco in color as selected by Architect.
- B. Portland Cement: ASTM C 150, Type II, low alkali.
- C. Hydrated Lime: ASTM C 206, Type S.
- D. Finish Coat Plaster: Omega Products, Inc., Omega Flex Integral color acrylic stucco finish, or equal, factory formulated blend of portland cement, hydrated lime, aggregates and color, requiring addition of water only at the Project site.

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- E. Water: Clean, potable and from domestic source.
- F. Waterproofing Admix: Red Label Suconem by Super Concrete Emulsions Ltd., AntiHydro, or equal.
- G. Plaster Bonding Agent: Omega Acrylic, manufactured by Omega Products, Upco Bonding Adhesive No. 705, or Merlex Stucco "Acrylex", ASTM C932-03.
- H. Sand: Washed natural sand conforming to ASTM C 144, except gradation of sand shall be as follows:

- 1. Percentage retained, each sieve, by weight:

<u>Sieve Size</u>	<u>Maximum</u>	<u>Minimum</u>
No. 4	0	0
No. 8	10	0
No. 16	40	10
No. 30	65	30
No. 50	90	70
No. 100	100	95

- I. Base Coat Reinforcement: Alkali resistant fiberglass shorts, 1/2 inch chopped strands, Type AR, manufactured by OCF, PPG Industries, or equal.
- J. Plaster Patching Materials:
 - 1. Bonding Agent: Omega Acrylic Bonder, or equal.
 - 2. Patching Plaster: Manufactured by Omega Products, or equal. Furnish fast setting, compatible with existing plaster materials, "Exterior 2 in 1," Portland cement base coat material, requiring only addition of water. Material shall provide initial set within 20 minutes, and final set within one hour.
- K. Miscellaneous Materials
 - 1. Underlayment: Single ply self-adhesive waterproofing membrane as manufactured by W.R. Grace Company, Jiffy-Seal, or equal. Furnish for installation behind stress relief joints and backing on horizontal and vertical surfaces exposed to weather; under metal copings and flashings; and window jambs and sills.
 - 2. Provide additional components and materials required for a complete installation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that overhead or concealed Work is finished, completed, tested and inspected as required before starting Work of this section.

3.02 LATH INSTALLATION

- A. General: Where exterior and interior lath is fastened to horizontal wood supports, comply with the current edition of the CBC.. Refer to Section 01400: Testing and Inspection.
- B. Exterior Lathing, General:

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1. Application of Metal Lath: Metal lath or wire fabric lath shall be installed in accordance with the provisions of 2007 CBC, Table 2507.2. Lath shall be furred out from vertical supports or backing not less than 1/4 inch.
2. Self-furring lath meets furring requirements.
3. Where external corner reinforcement is not installed, lath shall be furred out and carried around corners, extending and fastened to at least one support.
4. A weep screed shall be provided at or below foundation plate line on exterior stud walls. Screed shall be installed a minimum of 4 inches above grade and shall be of a type permitting water to drain to exterior of building. Weather-resistant barrier and exterior lath shall cover and terminate on attachment flange of screed.

3.03 INSTALLATION-WEATHER BARRIER MEMBRANE

- A. Install one layer of underlayment over areas to receive lath with weather barrier membrane. Install horizontally with each course weatherlapped 2 in. over layer below. Over wood based sheathing, install a second layer with laps offset from the first layer.
- B. Install lath over underlayment in accordance with manufacturer's instructions.
- C. Install single ply self-adhesive waterproofing membrane per manufacturer's recommendations in areas indicated on the Drawings.

3.04 PLASTER APPLICATION - GENERAL

- A. Install plaster in conformance with ASTM C 926 and 2007 CBC.
- B. Apply each plaster coat to an entire wall or ceiling panel without interruption to avoid cold joints and abrupt changes in uniform appearance of succeeding coats. Wet plaster shall abut existing plaster at naturally occurring interruptions in plane of plaster (such as corner angles, openings and control joints) wherever possible. Cut joining, where necessary, square and straight and at least 6 inches away from a joining in preceding coat.
- C. Control Joint Spacing: When stucco is applied to any construction using metal lath, joint spacing recommendations should be implemented. The joint spacing should meet the following criteria:
 1. No length should be greater than 18 ft. in either direction.
 2. No panel should exceed 144 sq. ft. for vertical applications.
 3. No panel should exceed 100 sq. ft. for horizontal, curved, or angular sections.
- C. Provide sufficient moisture in plaster mix or by curing methods to permit continuous and complete hydration of cementitious materials, considering climatic and Project site conditions.
- D. Provide sufficient time between coats to permit each coat to cure or develop enough rigidity to resist cracking or other damage when next coat is installed.

3.05 EXTERIOR PLASTERING

- A. Concrete surfaces, except where noted as "Exposed Concrete" or "Painted Concrete," shall be finished with stucco dash finish coats, as specified.
- B. Preparation of Surfaces:

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1. Exterior concrete and masonry surfaces to be plastered shall be free of oily or waxy substances, and loose or foreign material. Uniformly spray with nozzle-type water spray at least 12 hours before installation of plaster.
 2. Concrete and masonry surfaces to receive 5/8 inch thick Portland cement plaster shall be treated with bonding agent. This surface preparation shall not be installed instead of a brown coat of plaster.
 3. Concrete surfaces to receive stucco dash finish shall be lightly sandblasted to provide a roughened surface.
 4. Verify that lath has been installed securely and that grounds, screeds, casing beads and other accessories are straight, in correct position, and securely fastened in place.
- C. Number of Coats and Thickness: Exterior plaster shall be portland cement as follows with minimum thickness from face of supports or surfaces to finish face of plaster as follows:
1. Lathed Surfaces: 3 coats, scratch, brown and finish, 7/8 inch thick, one inch thick where required by CBC.
 2. Stucco Dash Finish Coats: 2 coats, 1/8 inch thick.
 3. Concrete and Masonry Base: 2 coats, brown and finish, 5/8 inch thick.
- D. Proportions:
1. Proportion ingredients for Portland cement. Calibrated boxes are required to determine the accuracy of proportioning. Proportions shall adhere to current edition of CBC.
 2. Dash Bond Coat: Mixed in the proportion of 1 cubic foot of standard portland cement to 1-1/2 cubic feet of sand.
 3. Stucco Finish: Stucco shall be factory prepared, exterior type, colored stucco containing a portland cement base, required aggregates and mineral pigments. Colors shall be as selected by the Architect. Selected colors are not limited to standard stock colors and certain Work, such as ceilings, soffits and walls, may be finished in non-standard colors as selected.
- E. Mixing: Provide stucco mix, plaster and aggregate in proportions specified, furnishing only sufficient water to obtain proper consistency before installation. Do not mix any more material at any time than can be installed within 1/2 hour after mixing. Do not allow material to remain in mixer or mixing boxes overnight. Maximum allowable slump shall be 2-1/2 inch, based on a 2 inch x 4 inch x 6 inch slump cone.
- F. Application:
1. Dash Bond Coat: Dash on surface, leave undisturbed, and maintain damp for at least 24 hours following installation.
 2. Scratch Coat: Install with sufficient material to completely cover laths and scratch across supports.
 3. Brown Coat: Rod to a straight, true, even surface and float to receive finish coat.
 4. Stucco Finish Coat: Install in 2 coats to a total thickness of 1/8 inch, each coat covering surface uniformly. First coat shall be installed to form texture pattern and second coat shall provide uniform color and texture.
 - a. First coat shall be installed by providing several passes with nozzle to completely cover surface.

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- b. The second coat shall be installed by doubling back same day, when first coat is sufficiently dry.
 - c. Over concrete surfaces, second coat shall be installed 24 hours after installation of first coat. In warm weather, first coat shall be cured by light water spray after material has set.
 - d. Protection: Protect those surfaces, which are not to receive dash finish coats. Such surfaces shall be shielded and shall have any sand left from dashing operation removed.
- G. Curing Exterior Plaster: Adhere to current edition of CBC for curing requirements.
- H. Option for Machine Application, Scratch and Brown Coats: Instead of hand installed plaster, the furnishing of plastering machines for interior or exterior scratch and brown coats is permitted. Machine installation shall be in accordance with the following:
- 1. Qualifications: Provide proper equipment and apparatus.
 - 2. Apparatus: Pump shall be equipped with an air pressure gage and required safety devices. Hoses and connections shall be tight and pressure shall be maintained constant.
 - 3. Tests: Tests for determining proper consistency of plaster mix shall be taken at nozzle using slump cone method. Tests shall be observed by the Project Inspector at least twice each day and as often as deemed necessary. Perform required tests and maintain an accurate log of such tests to ascertain compliance with material slump requirements. Material slump shall not exceed 2-1/2 inches at nozzle. Furnish an adequate number of standard 2 inch x 4 inch x 6 inch slump cones for testing. Cones shall be on the Project site before Work is started and at all times during performance of the Work of this section.
 - 4. Proportion and Application: Proportioning, mixing, number of coats and thickness shall be same as specified for hand application. Cement aggregate and water shall be mixed to plaster machine. Plaster mix shall be projected into and conveyed through a hose to the nozzle at end of hose and deposited by pressure in its final position ready for manual straightening and finishing.
 - 5. Follow-Up: Perform scoring operation of plaster, based on settings and drying conditions at time of installation. Curing shall be as previously specified.
 - 6. Protection: Before installing any plaster, thoroughly protect other adjacent Work.

3.06 QUALITY CONTROL

- A. Finish interior and exterior plaster to a uniform texture, free of imperfections and flat within 1/8 inch in 5 feet. Form a suitable foundation for paint and other finishing materials. Avoid joining marks in finish coats.

3.07 TESTING

- A. Samples of sand shall be obtained at the Project site. Tests may be performed as deemed necessary by the Project Inspector.
- B. Provide a supply of 6 inch x 4 inch x 2 inch cones for slump testing of Portland cement plaster. Samples of plaster taken at nozzle shall have a maximum slump of 2-1/2 inches. Plaster material not complying with this requirement shall be deemed as defective Work.

3.08 REPAIR REQUIREMENTS FOR DAMAGED PLASTER

- A. Plaster Detached from Framing:
 - 1. Remove loose and broken plaster.

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2. Repair or replace damaged water-resistant backing and lath in compliance with specified standards.
3. Remove stucco finish from surrounding area in the same plane by sandblasting.
4. Install a scratch coat and a brown coat mixed with liquid bonding agent instead of water to the areas devoid of plaster.
5. Install a coat of liquid bonding agent to entire wall plane.
6. Install a 1/8 inch thick stucco finish coat to entire wall plane and match existing texture and color.

B. Cracked Plaster - Unpainted:

1. Remove loose material from crack with a wire brush.
2. Remove stucco finish from entire wall plane by sandblasting.
3. Fill crack with slurry of stucco and liquid bonding agent.
4. Install a coat of liquid bonding agent to entire wall plane.
5. Install 1/8 inch thick stucco finish to entire wall plane and match existing texture and color.

C. Cracks Larger Than 1/2 inch - Painted:

1. Remove loose material from crack with a wire brush.
2. Fill crack with slurry of one part plastic portland cement to 3 parts masonry/stucco sand and liquid bonding agent to match existing texture of adjacent surface.
3. Paint entire wall plane, color to match existing.

D. Where patching of plaster over existing lath is feasible, fasten loose lath and install new lath with nails at 6-inch centers. Where metal is furnished, lap new lath over existing 6 inches and tie at 6-inch centers. Install paper backings as required, shingled into existing. Spray existing gypsum lath with water over a period of several hours to moisten it thoroughly. Install a bonding coat to the cut edges of existing plaster and plaster as specified above. Work deemed to be defective, shall be removed and replaced as required.

E. Patching of Holes, Cracks, and Gouges: Holes, cracks, gouges, missing sections, and other defects in existing improvements shall be patched. For holes over 1 inch in size, cut small sections of lath and place in opening attached to existing material. Install 3 coats of plaster. For holes one inch and smaller, install bonding agent to existing surfaces and neatly fill hole with plaster, installing necessary coats to match adjacent surfaces, eliminate cracks and match existing surface texture. Cracks, gouges, and other defects shall be filled with plaster or spackle as required and neatly finished to match adjacent existing improvements.

3.09 CLEANING

- A. Remove and legally dispose of rubbish, debris, and waste material off the Project site.

3.10 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 09250 - GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

- A. Incorporated Documents: Contract drawings, Provisions of the Bid Documents, General and Special Conditions, General Requirements, and Division 1 apply to the Work of this Section.
- B. Section Includes: Furnishing materials, labor, and equipment necessary for the completion of gypsum board as indicated on the drawings and specified herein.
 - 1. Gypsum board systems and accessory components as indicated.
- C. Related Sections: Section containing requirements related to this section include, but may not be limited to:
 - 1. Section 06100: Rough Carpentry.
 - 2. Section 09100: Metal Support Assemblies.
 - 3. Section 09500: Acoustical Ceiling Systems.

1.02 SYSTEM DESCRIPTION

- A. Design Requirements: Provide systems capable of deflection as required by 2007 CBC and authorities having jurisdiction.
- B. Regulatory Requirements: Comply with 2007 CBC requirements for design and installation.

1.03 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating complete suspension system including connections, anchorage and trim features.
- B. Material Samples: Submit 18-inch x 18-inch samples of the texture coat of gypsum board panels with edges taped.
- C. Product Data: Submit manufacturer's catalog data for each product proposed for use.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. ASTM C 36 - Gypsum Wallboard.
 - 2. ASTM C 645 - Nonstructural Steel Framing Members.
 - 3. ASTM C 840 - Application and Finishing of Gypsum Board.
 - 4. ASTM C 841 - Installation of Interior Lath and Furring.
 - 5. ASTM C 1002 - Steel Drill Screws for the Application of Gypsum Panel Products or Metal plaster Bases.
 - 6. ASTM C 1047 - Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - 7. NFPA or ULI requirements for fire-rated assemblies per ASTM E119.
 - 8. Underwriters Laboratories (ULI) requirements and listings for fire-rated materials and products classification.
 - 9. Gypsum Association GA 214 - Recommended Levels of Gypsum Board Finish.
- B. Qualifications:

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1. Installer: Minimum 5 years experience in installing and finishing gypsum board.

C. Finishes: Gypsum wallboard finish shall conform to requirements of GA 214, and as specified herein. Levels used on the project are described as follows:

LEVELS OF GYPSUM BOARD FINISH					
Level	Joints	Interior Angles	Accessories	Fasteners	Surface
1	Tape set in compound	Tape set in joint compound			Tool marks and ridges acceptable
2	Tape set in joint compound and one separate coat of joint compound	Tape embedded in joint compound and wiped to leave a thin coat of compound over tape, and one separate coat	Covered by one separate coat of joint compound	Covered by one separate coat of joint compound	Free from excess joint compound. Tool marks and ridges acceptable.
3	After taping, cover with two separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *
4	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *
5	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Skim coat of joint compound applied to entire surface. Surface free from tool marks and ridges. **

*At completion of specified taping and finishing, apply one coat of high solids primer as specified hereafter.

**Or use Sheetrock Brand Primer Surfacer "Tuff-Hide" in lieu of skim coat and primer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original, factory sealed packages, containers or bundles bearing brand name and name of manufacturer.
- B. Materials shall be kept dry. Gypsum wall board shall be neatly stacked flat; avoid sagging and damage to edges, ends and surfaces.
- C. Fire-rated materials shall have fire classifications numbers attached and legible.

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- D. Use all means necessary to protect gypsum board systems before, during and after installation.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Products of following manufacturers form basis for design and quality intended.
1. United States Gypsum Corporation
 2. Georgia Pacific
 3. Gold Bond Building Products

2.02 MATERIALS

- A. Gypsum Board:
1. Fire-resistant, 48-inch wide, up to 16 feet long conforming to ASTM C 36 with long edges tapered;
5/8" FIRECODE C by U.S. Gypsum Co. Fasten to wood with 1 3/8" drywall nails or 1" 8-18x.323 drywall screws. To steel use 1" 8-18x.323 type S-12 drywall screws. Tape all joints with SHEETROCK heavy paper tape and SHEETROCK Lightweight All-Purpose or Ready Mix – Plus 3 compound. Or approved equal.
 2. Water resistant, 48 inch wide, up to 16 feet long conforming to ASTM C 630 with long edges tapered;
5/8" WR by U.S. Gypsum Co. Fasten to wood with 1 3/8" galvanized drywall nails or 1" 8-18x.323 corrosion resistant drywall screws. To steel use 1" 8-18x.323 type S-12 corrosion resistant drywall screws. Tape all joints with SHEETROCK heavy paper tape and SHEETROCK Lightweight All-Purpose or Ready Mix – Plus 3 compound. Or approved equal.
- B. Metal Framing: Refer to Section 09100: Metal Support Assemblies.
- C. Fastenings:
1. ASTM C 1002 self-drilling, self-tapping bugle-head drywall screws; No. 6 Type S, 1 inch long for metal framing, Type W 1-1/4 inch long for wood framing (for single-layer panels). Screws shall be given a corrosion-resistant treatment.
- D. Wire: Galvanized and annealed carbon steel wire:
1. Tie Wire: No. 16 SWG.
 2. Hanger Wire: No. 8 SWG, annealed and galvanized.
- E. Metal Trim: ASTM C 1047, Paper-Face metal trim and cornerbead fabricated from minimum 26 gage galvanized steel, Trim units shall be of size and type to fit gypsum board construction and shall include corner beads, casings, edge trim and other shapes indicated and required. USG, Beadex, or National Gypsum company. Outside corner, paper-faced corner bead B1 XW ELJ-Trim-Paper faced metal "J" trim, B9
- F. Finishing Materials:
1. High solids primer to be SHEETROCK Brand First Coat manufactured by USG or High-build primer by Sherwin Williams.
 2. Texture coat finish material shall be manufactured by the U.S. Gypsum, Hamilton, or Highland Stucco and Lime Products, Inc.
- G. Sheathing and Backing Board:

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1. Cementitious Backing: Water-resistant, non-combustible cementitious panels reinforced with a fiberglass scrim, complying with ANSI A118.9; 5/8" Durock Cement Board by U.S. Gypsum Co. Fasten to wood with 1 1/2" galvanized roofing nails or 1 5/8" Durock No. 8 wood screws. To steel use 1 5/8" Durock No. 8 screws. Tape all joints with DUROCK glassfiber tape and ANSI A136.1 Type I organic adhesive. Or approved equal.
2. Screws for board attachment: ASTM C 1002.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Metal Framing: Refer to Section 09100: Metal Support Assemblies.
- B. Metal Trim:
 1. Provide corner beads at outside corners and angles, metal casing where gypsum board terminates at uncased openings, metal edge trim where board edges abut horizontal and vertical surfaces of other construction.
 2. Install trim in accordance with manufacturer's directions and secure to framing with joint compound. Apply trim in longest practical pieces.
- C. Gypsum Board:
 1. Install gypsum board in conformance with ASTM C 840.
 2. Gypsum board shall be cut by scoring and breaking or by sawing, working from face side. Where board meets projecting surfaces it shall be scribed and neatly cut. Unless conditions require otherwise, board shall be applied first to ceilings, then to walls. End joints shall occur over a support. Use panels of maximum practical length so that a minimum number of end joints occur.
 3. End joints shall be staggered and joints on opposite sides of a partition shall be arranged to occur on different studs. Joint layout at openings shall be made so that no end joints will align with edges of openings.
 4. Except where specified otherwise, fasteners shall be spaced not less than 3/8 inch from edges and ends of gypsum board. Do not stagger fasteners at adjoining edges and ends.
 5. Install gypsum board vertically or horizontal as permitted by specific UL Design at walls. Attach board with drywall screws spaced not to exceed 8 inch on centers around perimeter of boards and 12 inch on centers on intermediate studs. Space screws at 8 inches on centers along top and bottom runners. Screws shall be driven to provide screwhead penetration just below gypsum board surface without breaking surface paper. Where electrical outlet and switch boxes are indicated, provide adjustable attachment brackets between studs. Nails will not be acceptable.
 6. Install gypsum board to ceiling framing with long dimension at right angles to furring channels, or wood framing members, and attach with specified drywall screws or nails spaced 6 inch to 7 inch on centers across board. Screws or nails shall be not less than 1/2 inch from side joints and 3/8 inch from butt end joints. Abutting end joints shall occur over furring channels and end joints of boards shall be staggered. Support cutouts or openings in ceilings with furring channels.
 7. Install access doors, furnished under another section, in correct location, plumb or level, flush with adjacent construction, and securely attached to framing.

3.02 TOLERANCES

- A. Install gypsum board flat within 1/8 inch in 10 feet.

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3.03 JOINT TREATMENT AND FINISHING

- A. Conform to GA 214-M and the following.
- B. All Levels: Apply tape bedding compound, tape, and finishing cement on joints in wallboard as required for specified levels of finish.
- C. Levels 2 through 5:
 - 1. Apply joint cement and finishing cement over screw heads. Treat all inside corners with joint cement, tape, and finishing cement. Treat outside corners with corner beads and finishing cement.
 - 2. Provide metal casing beads at all edges of gypsum wallboard which abut ceiling, wall, or column finish, and elsewhere as required, such as openings, offsets, etc. Make all exposed joints, trims and attachments non-apparent following application of paint or other finishes. If the joints and fasteners are apparent, correct defects as directed.
 - 3. Seal the raw edges of plumbing openings and boards that have been cut to fit with sealing compound brushed on.
 - 4. When entire installation is completed and prior to installation of finish materials by other trades, correct and repair broken, dented, scratched or damaged wallboard.
- D. Levels 3 and 4: Apply one coat of high solids primer over entire surface.
- E. Level 5: Apply one coat of skim coat over entire surface, followed by one coat of high solids primer over entire surface. Or, use Sheetrock Brand Primer Surfacer, Tuff-Hide in lieu of skim coat and high solids primer.

3.04 REQUIRED LEVELS OF FINISH

- A. Unless otherwise indicated or specified, levels of finish required shall be as follows:
- B. Level 1: Plenum areas above ceilings, insides of shafts, and other concealed areas.
- C. Level 2: Substrate for tile.
- D. Level 3: Backing for adhered acoustic tile and where textured finish is indicated.
- E. Level 4: Exposed, painted wallboard in classrooms, utility rooms, and areas receiving vinyl wall covering.
- F. Level 5: Exposed, painted wallboard in restrooms and corridors where semi gloss enamel is used.
- G. Primer-Surfacer.

3.05 TEXTURE COAT

- A. Spray apply texture coat to interior gypsum board surfaces which are scheduled to receive a painted finish, except in food preparation areas.
- B. Texture coat shall create a uniform splatter pattern finish with an 80 percent minimum coverage of surface.
- C. Interior surfaces of electrical boxes and wiring therein shall be protected from spray.

3.06 CLEAN-UP

- A. Upon completion, repair damage caused by work and remove debris, surplus materials and tools of work from site. Leave installation clean and ready for finishing.

3.07 REPAIR OF DAMAGED GYPSUM BOARD

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- A. Reset protruding or loose fasteners.
- B. For each nail in a fractured area or a protruding nail, replace with specified screws placed in an undamaged area near the loose nail.
- C. Remove loose gypsum, paper, and joint compound.
- D. Refinish to match existing texture.
- E. Paint entire wall plane, color to match existing.

END OF SECTION

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SECTION 09300 - TILE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Ceramic tile.
 - 2. Waterproof membrane for tile.
 - 3. Stone thresholds related to tile.
 - 4. Mortar setting beds for floor tile.
 - 5. Thin set beds for floor and wall tile.
- C. Related Sections:
 - 1. Section 03300: Cast-In-Place Concrete.
 - 2. Section 09220: Portland Cement Plaster and Metal Lath.
 - 3. Section 06100: Rough Carpentry
 - 4. Section 09250: Gypsum Board
 - 5. Section 07920: Joint Sealants

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data, standard specifications, Material Safety Data Sheets, and other technical information for each product specified.
- B. Material Samples: Manufacturer's standard palette, indicating full range of tile colors, textures, and grout colors.
- C. Mock-Ups: For each type, color, and texture, minimum 1' x 1' or three full tile courses, on Plexiglas to demonstrate proper bond mortar and coverage; grout color, hardness and depth.
- D. Installation Instructions: Manufacturer's preparation and installation instructions.
- E. Product Certificates: Signed by manufacturer certifying that the products furnished comply with requirements of this Specification.
- F. Reference Methods: Copies of TCA and ANSI Methods.

1.03 QUALITY ASSURANCE

- A. Comply with applicable parts of the following codes or standards as a minimum requirement:
 - 1. ANSI A108, American National Standard Specifications for the Installation of Ceramic Tile.
 - 2. ANSI A118, American National Standard Specifications for Ceramic Tile Installation Materials.
 - 3. ANSI A137.1, Standard Specifications for Ceramic Tile.
 - 4. ASTM A 185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

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5. ASTM C 144 - Aggregate for Masonry Mortar.
 6. ASTM C 150 - Portland Cement.
 7. ASTM C-144 – Sand.
 8. ASTM C 206 - Finishing Hydrated Lime.
 9. ASTM C-206 or C 207 - Hydrated Lime for Masonry Purposes.
 10. ASTM C 645 - Nonstructural Steel Framing Members.
 11. ASTM C 1028 - Determining the Static Coefficient of Friction of Ceramic Tile and other like surfaces by the Horizontal Dynamometer Pull-Meter Method.
 12. ASTM D 4551 - Poly Vinyl Chloride (PVC) Plastic Flexible Concealed Water-Containment Membrane.
 13. Tile Council of America (TCA) – Handbook for Ceramic Tile installation.
- B. Grade Certificate and Labeling: With each delivery of tile, furnish manufacturer’s “Master Grade Certificate” to the Architect.
- C. Laboratory Testing: Tile shall be tested for compliance with ASTM C 1028.
- D. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.
- E. Comply with all requirements of 2007 California Building Code and ADA.
- F. Qualifications of Tile Manufacturer: Company specializing in ceramic tile, mosaics, pavers, trim units, and thresholds with five years minimum experience. Obtain tile from a single source with resources to provide products of consistent quality in appearance and physical properties.
- G. Qualification of Installation System Manufacturer: Company specializing in installation systems/ mortars, grouts/ adhesives with ten years minimum experience. Obtain products from single source manufacturer to insure consistent quality and compatibility.
- H. Qualifications of Installer: Company specializing in installation of ceramic tile, mosaics, pavers, trim units and thresholds with five years experience with installations of similar scope, materials, and design.
- I. Pre-Construction Meetings:
1. Prior to start of the Work of this section and after approval of submittals, schedule an on-site meeting with the Contractor, Owner, Architect, and representatives of the material manufacturer and tile installer to review construction conditions and Drawings for conformance with the requirements of this specification for each substrate.
 2. Prior to laying tile and after surfaces to receive tile are installed (mortar beds, backing boards, joint separators) and after testing of waterproof membrane, schedule an on-site meeting with the Contractor, Owner, Architect, and representatives of the material manufacturer and tile installer to review tile, tile installation materials, and finishing equipment for conformance with the requirements of this specification.
- 1.04 DELIVERY, STORAGE AND HANDLING
- A. Deliver tile in sealed containers, with manufacturer's labels intact.
 - B. Deliver other products in manufacturer's unopened containers.
 - C. Keep all materials clean and dry.

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1.05 MAINTENANCE

- A. Extra Materials: Provide a minimum of 5 percent of each type and color of tile and accessory shapes, from the same run or lot as the installed tile, in manufacturers' cartons and labeled.

1.06 WARRANTY

- A. Manufacturer shall provide a 5-year material warranty.
- B. Installer shall provide a 5-year labor warranty.
- C. For waterproofing, manufacturer shall provide a 10-year material warranty for waterproofing installation, tile setting, and grouting materials.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Tile: To establish quality, the Specification is based on ANSI A.137.1 Standard Grade by Dal-Tile Corporation. Equivalent tile products from the following manufacturers may be provided:
 - 1. Dal-Tile Corporation
 - 2. American Olean Company.
 - 3. Monarch Tile Manufacturing, Inc.
- B. Installation Materials: To establish quality, the specification is based on setting and waterproofing materials and methods by Laticrete International, Inc. Equivalent products and methods of the following manufacturers may be provided:
 - 1. Laticrete International, Inc.
 - 2. Custom Building Products
 - 3. Mapei
- C. Colors, Textures, and Patterns: Tile from manufacturer's standard product line as selected by Architect. Tile trim and accessories shall match adjoining tile. Grout color shall match tile unless otherwise indicated.
- D. Tile sizes: Tile sizes specified are modular dimensions unless otherwise indicated.

2.02 TILE

- A. Unglazed Ceramic Mosaic Floor Tile:
 - 1. Size: 2 inch x 2 inch or as indicated.
 - 2. Colors and patterns as selected by Architect.
 - 3. Slip Resistance: Resistant to slipping appropriate to the installed conditions of use, as required by the 2007 California Building Code and ADA.

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- a. As a minimum, ceramic tile flooring shall have a coefficient of friction of at least 0.6 per ASTM C 1028.
- b. For tile in shower and locker areas, incorporate grit into tile to increase slip resistance.

B. Glazed Wall Tile:

1. Size: 4-1/4 inch x 4-1/4 inch face dimensions x 5/16 inches thick (ceramic mosaic tile may also be used on walls).
2. Colors and patterns as selected by Architect.

C. Trim:

1. Integral bullnose at external corners.
2. Provide bullnose where tile projects from jamb.

2.03 INSTALLATION MATERIALS

- A. Mortar Sand: ASTM C 144.
- B. Portland Cement: ASTM C 150, Type I or II.
- C. Hydrated Lime: ASTM C 207, Type S; or ASTM C 206.
- D. Portland Cement Mortar: ANSI 108.1B
- E. Latex Portland Cement Mortar: Sand-cement mortar mix gauged with Laticrete 38 Acrylic Admix or Custom Building Products Acrylic Mortar Admix.
- F. Latex Portland Cement Mortar for Shower Areas: Laticrete 226 Thick Bed Mortar Mix Gauged with Laticrete 3701 Mortar and Grout Admix.
- G. Latex Portland Cement Bond Mortar: Laticrete 317 Floor & Wall Thinset gauged with Laticrete 3701 Admix, or Custom Building Products Master Blend mixed with Acrylic Mortar Admix.
- H. Latex Portland Cement Bond Mortar over Waterproof Membrane: Laticrete 317 Floor & Wall Thinset gauged with Laticrete 3701 Admix.
- I. Waterproof Membrane: Thin, cold-applied, single component liquid with embedded reinforcing fabric equal in performance characteristics to Laticrete 9235 Waterproof Membrane.
- J. Latex Portland Cement Grout: Laticrete Sanded Grout (1500 Series) or Unsanded Grout (1600 Series, for joints smaller than 1/8").
- K. Epoxy Grout for Floors: Laticrete SP-100 Stainless Epoxy Grout for Floors and Walls (Series 700).
- L. Cleavage Membrane and Wall Backing Paper: ASTM D 226, Type I (No. 15) 15-pound asphalt-saturated felt.
- M. Separation Material (for all caulked joints including perimeters and quarry-tile fields of floor mortar beds): Quality Foam, QF 200 white, 3/8" wide x 5" high.

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- N. Backer Rod for sealants (for ceramic mosaic fields): Polyethylene foam, closed-cell, flexible and compressible, 3/16" diameter.
- O. Cleaner and Sealer:
1. Cleaner and sealer shall be from one manufacturer, acceptable to tile and grout manufacturers. To establish quality, the Specification is based on Aqua Mix Inc. Equivalent products from Miracle Sealants Co. or Watco Tile and Brick may be provided.
 2. Cleaner: Aqua Mix Concentrated Tile Cleaner, neutral phosphate-free cleaner, or Custom Building Products Tile Lab Concentrated Tile/ Stone Cleaner.
 3. Sealer: Aqua Mix Penetrating Sealer, fungus- and bacteria-resistant, stain-resistant, and slip-resistant as specified for tile, or Custom Building Products Tile Lab Surface Gard.
- P. Sealant:
1. Sealant and primer shall be from one manufacturer, acceptable to tile and grout manufacturers. To establish quality, the Specification is based on the following products. Equivalent products from other approved manufacturers may be provided (see Section 07920, Joint Sealants).
 2. Sealant for Ceramic Mosaic Tile: Pecora 898 Silicone Sanitary Sealant or Laticrete Latasil NS.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Examine substrates, areas, and conditions where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile. Verify that all vents, drains, piping, and other projections through substrate have been installed. Proceed with Work only after all conditions are in compliance.
- B. Verify that substrates for setting tile are firm; dry, clean and within flatness tolerances required by relevant ANSI A108 tile installation standards. Prepare surfaces as follows:
1. Concrete Floors: Allow concrete floors to cure for 28 days minimum before beginning tile and grout installation. Remove laitance, sand, dust, and loose particles with air blast. If coatings remain, including curing compounds and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials, remove them by using a terrazzo or concrete grinder, a drum sander, a polishing machine equipped with a heavy-duty wire brush, or a shot-blast system.
 2. Plywood Subfloors: Before installing mortar setting bed over plywood sub-floors, install cleavage membrane over the sub-floor. Anchor firmly in place and lap joints 6 inches minimum. Turn up 6 inches at walls, beneath building felt on walls.
 - a. Cleavage Membrane:
 - 1) No. 15 (16.9 kg) asphalt saturated felt, ASTM D226, Type 1.
 - 2) Polyethylene film, ASTM D4397, 4.0 mil thickness.
- C. Substrates to receive wall tile and base shall be:
1. Scratch coat of cement plaster, as specified in Section 09220: Portland Cement Plaster and Metal Lath (required in student restrooms, showers and locker rooms, and quarry tile bases).

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2. Cementitious backing panels, as specified in Section 09250: Gypsum Board.

- D. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical items of Work, and similar items located in or behind tile have been completed before installing tile.
- E. Verify that joints and cracks in tile substrates are coordinated with tile caulked- joint locations; if not coordinated, adjust as required by the Architect.
- F. Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.
- G. Protect adjacent surfaces during progress of the Work of this section.

3.02 TILE INSTALLATION, GENERAL

- A. Install tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out Work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- B. For tile mounted in sheets, install joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished Work.
- C. Extend Work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Locate expansion, control, contraction or isolation joints and other sealant-filled joints, directly above joints in concrete substrates, at horizontal and vertical changes in plane, or where indicated during installation of mortar beds. In quarry tile floors, provide at 12 feet on center maximum. Use foam to provide 3/8-inch width. Do not saw-cut joints after installing tiles.
- F. Prepare and clean joints to be caulked, and apply sealants to comply with requirements of Section 07920, Joint Sealants.
- G. Conform to manufacturers printed instructions, and applicable requirements of ANSI and TCA Standards.

3.03 TILE INSTALLATION, FLOOR

- A. Install reinforcing and latex Portland-cement mortar setting bed over cured concrete slab or cleavage membrane on plywood floor. Lap reinforcing at least one full mesh, and support or lift so that it is approximately in the middle of mortar bed. Do not abut against vertical surfaces. Install foam separation material at perimeters and expansion joint locations for caulked joints.
- B. Mix setting mortar in accordance with ANSI A.108.1a.2.2.

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- C. Once begun, mortar installation must continue until room is completely filled. Discard any batch not floated and finished within ½ hour of mixing. Firmly compact before screeding. Screed to true plane and pitch as indicated. Slope mortar bed sufficiently that water flows to drain and no puddling will occur. Slope mortar down to floor drains for proper installation of waterproof membrane. After screeding, firmly rub down with steel or wood float.
- D. Cure mortar bed with a light fog spray of water and cover with 6-mil Visqueen for 72 hours.
- E. Waterproof Membrane:
 - 1. Install waterproof membrane where indicated and in all kitchen, toilet, shower, and locker areas per TCA Standard F122-02. Extend membrane up wall mortar or backing board as follows:
 - a. 6 inches minimum, or 3 inches above top of curb wall.
 - b. In shower rooms, to ceilings.
 - 2. Insure that all layers of membrane are fully inserted into clamping ring of floor drain. After membrane installation and before tile setting, install pea gravel around sub drain to prevent blockage of weep holes and place mortar to proper level for setting tile.
 - 3. Before setting tile and after seven (7) days curing, water test the membrane by damming drains and doors, filling floor with water to 4-inch minimum depth, and leaving for 24 hours. Correct any leaks and re-test before proceeding. After testing, protect membrane from traffic until tile Work begins.
- F. Install tile over properly cured setting bed or waterproof membrane utilizing "thin-set" method with latex Portland cement bond mortar, in accordance with manufacturer's printed instructions and ANSI A108.5. Confirm substrate is completely clean and free of dust. Cut foam at floor perimeters flush with top of mortar bed. Insure that bond coats do not intrude into joints to be caulked.
- G. Minimum coverage of bond mortar shall be 80% except 95% in shower areas, for quarry tile, and exterior installations. Place tile into fresh mortar and move and press or beat in tile to insure full contact. Before setting proceeds, set and remove three tiles or sheets of tiles to confirm specified coverage of bond mortar. If coverage is insufficient, utilize a larger toothed trowel or back butter tiles until proper coverage is provided.
- H. Install tile on floors with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 to 1/8 inch.

3.04 TILE INSTALLATION, WALLS

- A. Install wall mortar beds before floor mortar beds.
- B. On plaster walls, clean scratch coat surface of loose or foreign materials, fog spray with water, and install brown coat mortar bed over scratch coat to a thickness not less than 3/8" and not greater than 3/4 inch. Once started, wall mortar installation must continue until wall is completely floated. Discard any batch not floated and finished within ½ hour of mixing. As soon as wall mortar is dried to sufficient hardness but still in a plastic condition, firmly rub down with wood float and scribe all plane interfaces the full depth.
- C. Cover cure with 40 wt. Kraft paper for 72 hours minimum.
- D. Install tile over properly cured setting bed, waterproof membrane, or cementitious backing panels utilizing "thin-set" method with latex Portland cement bond mortar, in accordance with

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manufacturer's printed instructions and ANSI A108.5. Confirm substrate is completely clean and free of dust. Insure that bond coats do not intrude into joints to be caulked.

- E. Minimum coverage of bond mortar shall be 80% except 95% in shower areas or exterior installations. Set and test as specified for floors.
- F. Lay out the Work so tiles will be centered on each wall or section of wall in order to minimize tile cuts. Lay out tile wainscots to next full tile beyond dimensions indicated. Spot setting bed with mortared tile, set plumb and true, to accurately indicate plane of finished tile surfaces.
- G. Install tile on walls with following joint widths:
 - 1. Glazed Wall Tile: 1/16 inch.
- H. Horizontal joints shall be level, vertical joints plumb with surfaces true and plumb, edges of tiles flushed.
- I. Rub exposed cuts smooth with a fine stone; no cut edge shall be set against a fixture or adjoining surface without a 1/16 inch joint to be caulked.
- J. Install access doors where required, furnished under another section, in correct location, plumb or level, flush with adjacent construction, and securely fastened to framing.

3.05 GROUTING

- A. Prior to starting, ensure that all wall and floor tile surfaces are clean and any excessive bond mortar is scraped and vacuumed from joints (approximately 2/3 depth of tile should be open for grouting). Follow manufacturer's instructions for mixing grout. Once grout Work commences, proceed until complete wall or floor area is finished utilizing one batch of grout.
- B. Latex Portland cement grouting: Dampen tile surface and joints with water using sponge, but leaving no puddles in joints. Force grout into joints using sufficient pressure on rubber float so as to fill joints completely, and scrape excess grout off tile surface with rubber float. Smooth or tool grout to uniform joint finish. Do not over water.
- C. Curing latex Portland cement grout: Remove final grout haze with clean soft cloth, and cover with 40-weight Kraft paper to cure. Leave paper in place for protection. Cover wall surfaces with 40-weight Kraft paper for 72 hours.

3.06 CLEANING AND SEALING

- A. If grout scum is not visible on tile surface after curing, clean tile surface with clear water. Remove and replace cracked, broken or defective Work with proper material.
- B. If, when curing membrane is removed, grout scum is visible on tile surface, follow this cleaning method:
 - 1. Immediately recover floor with paper or felt and allow to continue curing for a minimum of 14 days. Uncover floor and maintain entire tile surface saturated with clean cool water for not less than 2 hours.
 - 2. Utilize a neutral cleaner acceptable to manufacturers of tile and grout, and follow manufacturer's instruction. Do not provide generic acid cleaners.
 - 3. Wet tile floors and apply cleaning solution to floor surface, then scrub with a brush. Rinse area several times with clean water to flush solution off floor surface.

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- C. Apply penetrating sealer in accordance with manufacturer's instructions utilizing a dense sponge applicator, paint pad, sprayer or brush. Avoid overlapping, puddling, and rundown. Completely wipe surface dry within 3 to 5 minutes using cotton or paper towels. Do not allow sealer to dry on tile. After 2 hours, test surface by applying water droplets to surface. If water is absorbed, apply a second coat. Avoid surface traffic for 24 hours.

3.07 CAULKING

- A. Insure joints to be caulked are free and clear of all setting and grouting materials and construction debris. Do not permit any foot traffic on installed caulking for a minimum of 48 hours or protect with hardboard strips.
- B. Install in accordance with Section 07920: Joint Sealants.

3.08 PROTECTION

- A. Admit no traffic where tile is installed until mortar and grout has set for a minimum of 72 hours.
- B. Protect the Work of this section until Substantial Completion.

3.09 CLEAN UP

- A. Remove and legally dispose of rubbish, debris, and waste material off the Project site.

END OF SECTION

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SECTION 09500 - ACOUSTICAL CEILING SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Lay-in acoustical ceiling systems.

B. Related Work:

1. Section 09100: Metal Support Assemblies.
2. Sections 09250: Gypsum Board.
3. Division 15: Mechanical.
4. Division 16: Electrical.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installer: Minimum 5 years experience in installing acoustical ceiling systems of the types specified.

B. Design Criteria:

1. Deflection of finished surface to 1/360 of span or less.
2. 1/8 inch maximum permissible variation from true plane measured from 10-foot straightedge placed on surface of finished acoustical fiber units.

C. Requirements of Regulatory Agencies:

1. Conform to 2007 CBC requirements and UL - Tunnel Test for Fire Hazard Classification of Building Materials.
2. CISCA Code of Practices.
3. Acoustical Materials:
 - a. Acoustical and Insulating Materials Association Bulletin - Performance Data for Architectural Acoustic Materials.
 - b. FS SS-S-118A, Sound Control Blocks & Board (Acoustical Tiles & Panels, Prefabricated).

1.03 SUBMITTALS

A. Samples:

1. Lay-in panels, 6 inch x 6-inch minimum size.
2. Lay-in Systems: Sample of assembly system to indicate all typical members, connections, splices, wall angle, and colors.

B. Shop Drawings:

1. Indicate complete plan layouts and installation details.

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2. Indicate related Work of other sections that is installed in, attached to, or penetrates ceiling areas, such as air distribution and electrical devices.

C. Product Data:

1. Suspension System for Lay-in Ceiling: Printed data for all suspension system components, including load tests.

D. Maintenance Materials: Provide extra panels equal to 1 percent of the area of each typical module size of acoustical panel, but not less than 8 of each size, style and color.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the Project site in original sealed packages.

B. Storage: Store materials in building area where they will be installed, in original package. Keep clean and free from damage due to water or deteriorating elements.

C. Handle in a manner to prevent damage during storage and installation.

1.05 PROJECT CONDITIONS

A. Environmental Requirements: Maintain temperature in space at 55 degrees F or above for 24 hours before, during and after installation of materials.

B. Scheduling:

1. Before concealing Work of other sections, verify required tests and inspections have been completed.

2. Coordinate with related Work of other sections. Coordinate location and symmetrical placement of air distribution devices, electrical devices, and all penetrations with related Work section.

1.06 WARRANTY

A. Provide a 10-year material warranty.

B. Provide a 2-year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Armstrong World Industries.

B. USG Corporation.

C. BPB Celotex.

2.02 MATERIALS

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- A. Ceiling systems shall consist of lay-in acoustical ceiling panels and suspension systems manufactured by the same company.
- B. 24" x 48" Module Ceiling System:
 - 1. Acoustical Ceiling Panels:
 - a. Panel Name: Armstrong Item #1728, Humigard Plus Fine Fissured mineral fiber ceiling board.
 - b. Panel Size: 24" x 24"
 - c. Panel Thickness: 5/8 in.
 - d. Edge Detail: Square.
 - e. Light Reflectance: 0.85 minimum, complying with ASTM E 1477.
 - f. CAC: Minimum 35, UL Classified, complying with ASTM E 1414.
 - g. Class: UL Class A, in accordance with ASTM E 1264.
 - h. NRC: Minimum 0.50, UL Classified, complying with ASTM C 423.
 - i. Color: White.
 - j. Recycled Content: Minimum 36 percent.
 - k. Mold and Mildew Resistance: All panels and faces shall be treated with a biocide paint additive to inhibit mold and mildew or an anti-microbial solution.
- C. Suspension System:
 - 1. Suspension System Name: Prelude 15/16" by Armstrong.
 - 2. Fire Class: Class A.
 - 3. Duty: Heavy Duty.
 - 4. Color: White.
- D. Brace Attachment Clip: Manufacturers' standards to fit system furnished for acoustical panels, as indicated.
- E. Vertical Strut: USG Donn Compression Post, or equal, or as indicated; types and designs complying with requirements of authorities having jurisdiction and seismic requirements.
- F. Hanger Wire: No. 12 gage (9 gage for pendant fixtures), galvanized carbon steel per ASTM A 641, soft tempered, prestretched.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Furnish layouts for inserts, clips or other supports and struts required to be installed by the Work of other trades that depend upon support by the suspended ceiling system.
- B. Coordinate related Work to ensure completion prior to installation of clips or fasteners.
- C. Lay-In Ceiling Systems: Compare layouts with construction conditions. Tile shall be spaced symmetrically about the centerlines of the room or space, and shall start with a tile or joint line as required to avoid narrow tiles at the finish edges unless indicated otherwise. Joints shall be tight with joint lines straight and aligned with the walls. Ceiling moldings shall be provided where tile abuts wall with matching caulking to eliminate any space.

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3.02 INSTALLATION OF SUSPENSION SYSTEMS

A. General:

1. System shall be complete; with all joints neatly and tightly joined and securely fastened; suspension members shall be installed in a true, flat, level plane.
2. Hanger Wires: 12-gage minimum; larger sizes as indicated or required.
 - a. Fasten wires to panel points and structure above per most stringent requirements of fabricator and 2007 CBC and as indicated on Drawings.
 - b. Wires exceeding 1:6 out-of-plumb shall be braced with counter-sloping wires.
 - c. Maintain wires 6 inches minimum clear of non -braced ducts, pipes, and other items.
 - d. Install wire within 6 inches of ends of all main runners and cross-tees at ceiling perimeters.
 - e. Where obstructions prevent direct suspension, provide trapezes or equivalent devices; 1-1/2 inches minimum cold-rolled channels back to back may be installed for spans to 6 feet max.
 - f. Wire to be straight, without extraneous kinks or bends and tolerate a 200 - pound pull without stretching or shifting the suspension clip.
3. Bracing Wires to Resist Seismic Forces: 12-gage minimum, larger sizes as indicated or required.
 - a. System for Bracing Ceilings: Lay-In Ceiling Systems: Install one four-wire set of sway-bracing wires and a vertical strut for each 144 square feet maximum of ceiling area. Locate wire-sets and struts at 12 feet maximum on center. At ceiling perimeters, wire-sets shall be within 6 feet of walls.
 - b. Install four-wire sets and struts within 2 inches of cross-runner intersection with main runner; space wires 90 degrees from each other.
 - c. Do not install sway bracing wires at an angle greater than 45 degrees with the ceiling plane.
 - d. Wires shall be tight, without causing ceiling to lift.
 - e. Fasten struts in accordance with 2007 CBC requirements.
4. Provide all additional wires, 12-gage minimum, necessary to properly support suspension at electrical devices, air distribution devices, vertical soffits, and other concentrated loads.
5. Suspension:
 - a. Suspension members shall be fastened to 2 adjacent walls; but shall be 1/2 inch minimum clear of other walls.
 - b. Any suspension members not fastened to walls shall be interconnected to prevent spreading, near their free end, with a horizontal metal strut or 7445 stabilizer bar or 16-gage taut tie wire.
 - c. Provide additional tees or sub-tees to frame openings for lights, air distribution devices, electrical devices, and other items penetrating through ceiling, which do not have an integral flange to support and conceal cut edges of acoustic panels. Provide cross-bracing necessary to securely support any surface mounted fixtures or other items.
6. Attachment of Wires:
 - a. To Metal Deck or Steel Framing Members: Install as required by current code.
 - b. To Suspension Members: Insert through holes in members or supporting clips.
 - c. All wires to be fastened with tight turns; three tight turns minimum for hanger wires; four tight turns minimum for bracing wires. All turns to be made in a 1-1/2 inches maximum distance.

B. Suspension System for 24" x 48", Lay-in Acoustical Ceilings:

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1. Main Runners: Install main runners 48 inches apart; 12-gage hanger wires space 48 inches on center maximum along runners, and within 6 inches of ends.
2. Install wall moldings.
3. Cross-Tees: Install between main runners in a repetitive pattern of 2-foot spacings.
4. Sub-Tees: Install at edges of penetrations.

3.03 INSTALLATION OF ACOUSTICAL PANELS

- A. Install panels into suspension system. Partial panels are to be neatly cut and fitted to suspension and around penetrations and/or obstructions. Duplicate edges at partial panels; cuts to be straight. Repaint cut tiles to match color or as directed by manufacturer for Mylar facing at visually exposed conditions or as required by the Architect.

3.04 AIR DISTRIBUTION DEVICES

- A. Refer to and coordinate with Division 15, Mechanical.
- B. Install air distribution grilles and other devices into suspension system. Install 4 taut wires, each 12-gage minimum, to each device within 3 inches of device corners, to support their weight independent of the suspension system.

3.05 LIGHT FIXTURES

- A. Refer to and coordinate with Division 16: Electrical.
- B. Fixtures weighing less than 56 Pounds: Install fixtures into suspension systems and fasten earthquake clips to suspension members. Install minimum 2 slack safety wires, each 12-gage minimum, to each fixture at diagonally opposite corners, to support their weight independent of the system.
- C. Fixtures weighing more than 56 Pounds: Install fixtures into suspension system and fasten earthquake clips to suspension system members. Install not less than 4 taut 2 gage wires capable of supporting four times the fixture load.

3.06 CLEANING

- A. General: After installation of acoustical material has been completed, clean all surfaces of the material, removing any dirt or discolorations.
- B. Acoustical Panels: Minor abraded spots and cut edges shall be touched up with the same paint as was used for factory applied finish of the lay-in panels.

3.07 CLEAN UP

- A. Remove and legally dispose rubbish, debris and waste materials off of the Project site.

3.08 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 09540 - SANITARY WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Fiberglass reinforced plastic panels and accessories as indicated on the Drawings.
- C. Related Section:
 - 1. Section 09250: Gypsum Board.

1.02 SYSTEM DESCRIPTION

- A. Fiberglass reinforced plastic panels and accessories for kitchen and food preparation areas as indicated on the Drawings.

1.03 SUBMITTALS

- A. Provide in accordance with Division 1.
- B. Shop Drawings: Indicate location and dimension of joints and fastener attachments
- C. Samples: Submit 8" x 10" sample of each type, color, and accessories to be installed.
- D. Certificate of Compliance: Submit certificate from manufacturer that installed wall surfacing meets specification requirements.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. Class A Interior Finish Material as defined by the National Fire Protection Association Life Safety Code 101.
 - 2. Underwriters Laboratories, Inc. listed, in accordance with ASTM E84, Surface Burning Characteristics of Building Materials.
 - 3. USDA/FSIS Requirements.
 - 4. FMRC (Factory Material Research Center) approved.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's cartons properly labeled and identified.
- B. Store all materials flat in a clean, dry storage area where temperature shall be maintained above 50 degrees F. Do not store rolls on end.

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1.06 PROJECT CONDITIONS

- A. Installation environment shall be stable and controlled.
- B. Room temperature shall be controlled to 75 degrees F plus or minus 5 degrees, during and after installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wall panels: Kemlite Fire-X Glasbord with Surfaseal, fiberglass reinforced plastic Kemlite Company, or equal.
 - 1. Wall Panels: Class 1 (A) Interior Finish. Thickness to be .09 inch, Smooth surface.
 - 2. Class A Flame Spread: Less than 25, with Smoke Developed less than 450.
 - 3. Barcol Hardness scratch resistance: 55 as per ASTM D-2583.
 - 4. 25-cycle Taber Abrasion Test: No more than a 0.038% weight loss.
 - 5. Gardner Impact Strength: 22 inch lbs. minimum Per ASTM D-3029.
 - 6. Class 1 (A) Interior Finish Label: Provide identification on front side for installation and means of confirming finish standard after installation, when installation labels are removed.
- B. Color: White.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine backup surfaces to determine corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
- B. Do not begin installation until backup surfaces are in satisfactory condition.

3.02 APPLICATION

- A. Perform cutting with carbide tipped saw blades or drill bits, or cut with snips.
- B. Install panels with manufacturer's recommended gap for panel field and corner joints.
- C. Fastener holes in the panels shall be predrilled 1/8" oversize.
- D. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.
- E. Utilizing products acceptable to manufacturer, install the system in accordance with panel manufacturer's printed instructions.

3.03 CLEANING

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

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3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 09610 – CLEAR CONCRETE SEALER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contract drawings, Conditions of the Contract, and Division1, General Requirements, apply to the Work of this Section.
- B. Contribute to LEED (EQ) Low-Emitting: Adhesives & Sealers: 4.1
- C. Section Includes: Penetrating clear gloss sealer to protect and add an attractive gloss to existing concrete and decorative concrete surfaces. Sealers are low in odor, low in VOC content and acrylic based.
- D. Related Sections: Section containing requirements related to this section include, but may not be limited to:
 - 1. Section 03300: Cast-In-Place Concrete.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Trained installers certified by the manufacturer and ability to perform entire installation.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Maintain materials at temperature between 65 and 85 degrees F (18 and 29 degrees C) during transport and storage.
- B. Store products in manufacturer's unopened packaging until ready for installation.

1.06 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.07 WARRANTY

- A. Provide manufacturer's warranty that sealer will maintain a dust free surface for a minimum of 5 years and remain resistant to common cleaning chemicals.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Dayton Superior "Ultra Seal 30 EF", Arizona Polymer Flooring "Aqua Prime", Eco Safety Products "Acri-Soy"
- B. Requests for substitutions will be considered in accordance with provisions of Section 01631.

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2.02 MATERIALS

- A. Concrete Floor Sealer: Ultra Seal 30 EF, two coats, single-component, low odor acrylic, 30% percent solids.
- B. Use: Seal, protect and add an attractive gloss to existing concrete and decorative concrete surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Prepare concrete surfaces in accordance with sealer manufacturer's instructions and recommendations.
- B. Clean surfaces thoroughly prior to installation.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- D. Remove existing floor coverings down to bare concrete.
- E. Fill holes and depressions before the application of sealer.
- F. Scarify concrete surface removing surface contaminants and lightly roughening the surface. Do not over-roughen. Do not acid etch concrete surface.

3.03 INSTALLATION

- A. Do not install if:
 - 1. New concrete is less than 35 days old.
 - 2. Concrete surface is damp or wet.
 - 3. Concrete temperature is below 60 degrees F (15 degrees C) or below the dew point.
 - 4. Air temperature is below 65 degrees F (18 degrees C) or above 85 degrees F (29 degrees C).
- B. Install in accordance with manufacturer's instructions.
- C. Install each coat at rate recommended by manufacturer and check wet film thickness.

3.04 FIELD QUALITY CONTROL

- A. Final floor sealer appearance shall be glossy, resistant to water absorption and maintain a dust free concrete surface.

END OF SECTION

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SECTION 09652 - VINYL COMPOSITION TILE

1.01 DESCRIPTION OF WORK

- A. Incorporated Documents: Contract drawings, Provisions of the Bid Documents, General and Special Conditions, General Requirements, and Division 1 apply to the Work of this Section.
- B. Section Includes: Furnishing materials, labor, and equipment necessary for the completion of vinyl composition tile as indicated on the drawings and specified herein.
 - 1. Vinyl composition tile flooring as indicated.
- C. Related Sections: Section containing requirements related to this section include, but may not be limited to:
 - 1. Section 03300: Cast-in-Place Concrete.

1.02 QUALITY ASSURANCE

- A. Manufacturer: Provide Vinyl Composition Tile flooring and accessories as produced by Azrock Commercial Flooring (800) 523-6265, ext. 406, including recommended primers, adhesives, sealants, and leveling compounds.
- B. Fire Test Performance: Provide Vinyl Composition Tile flooring which complies with the following fire test performance criteria as determined by an independent testing laboratory acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux (CRF): Not less than the following rating per ASTM E 648.
 - a. 0.45 watts per sq. cm or more, Class 1.
 - 2. Flame Spread: Not more than 25.
 - 3. Smoke Development: Not more than 50.
 - 4. Smoke Density: Not more than 450 per ASTM E 662.
- C. Static Load Limit:
 - 1. ASTM F 90.
 - 2. 125 lb. per sq. in.
 - 3. Floors should be protected from sharp-point loads and heavy static loads.
- D. Slip Resistance: Resilient flooring demonstrating a coefficient of friction of at least 0.6 per ASTM D2047 will be accepted as meeting the intent of slip resistance. CBC 1124B.1 / ADA Standards 4.5.1.

1.03 SUBMITTALS

- A. Submit shop drawings, layout plan, and manufacturer's installation instructions for commercial Vinyl Composition Tile flooring and accessories.
- B. Product Data: Submit manufacturer's technical data for each type of Vinyl Composition Tile flooring and accessory.

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- C. Samples for Initial Selection Purposes: Submit manufacturer's standard color charts in form of actual sections of Vinyl Composition Tile flooring, including accessories, showing full range of colors and patterns available, for each type of resilient flooring required.
- D. Submit a copy of manufacturer's recommended maintenance procedures for commercial Vinyl Composition Tile and accessories.
- E. Submit the manufacturer's certification that the Vinyl Composition Tile flooring has been tested by an independent laboratory and complies with the required fire tests.

1.04 PROJECT CONDITIONS

- A. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.
- B. Store materials in a clean, dry, enclosed space off the ground, and protected from the weather and from extremes of heat and cold. Protect adhesives from freezing.
- C. Maintain minimum temperature of 65°F (18°C) and a maximum temperature of 100°F (38°C) in spaces to receive Vinyl Composition Tile flooring for at least forty-eight (48) hours prior to installation, during installation, and for not less than forty-eight (48) hours after installation. Store Vinyl Composition Tile flooring materials in spaces where they will be installed for at least forty-eight (48) hours before beginning installation. Subsequently, maintain minimum temperature of 55°F (13°C) in areas where work is completed. Protect all materials from the direct flow of heat from hot air registers, radiators, or other heating fixtures and appliances.
- D. Install Vinyl Composition Tile flooring and accessories after other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install Vinyl Composition Tile flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by Vinyl Composition Tile flooring manufacturer's recommended bond and moisture test.

1.05 WARRANTY

- A. Floors and wall base to be free from manufacturing defects for five (5) years from the date of installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Vinyl Composition Tile flooring is Azrock by Tarkett Commercial, telephone 800-558-2240.
- B. For flooring substitutions, provide products of one of the following manufacturers of Vinyl Composition Tile:
 - 1. Mannington, Inc.
 - 2. Armstrong World Industries, Inc.
 - 3. Owner approved equal.

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2.02 VINYL COMPOSITION TILE FLOORING

- A. Product Description: Azrock Vinyl Composition Tile (VCT)
 - 1. Material: A composition of polyvinyl chloride resin binder, fillers, and pigments.
 - 2. Patterns and Colors: As selected by Architect.
 - 3. Size: 12 in. x 12 in. (305 cm x 305 cm).
 - 4. Gauge (nominal thickness): 1/8 inch (8.2 mm).
 - 5. Gloss (typical value): 60 degrees specular: 20-40.

- B. Reference Specifications:
 - 1. FED SPEC SS-T-312B(1), Type IV, Comp. 1.
 - 2. ASTM F 1066, Comp. I, Class 2; through pattern.
 - 3. Minimum slip resistance rating for floors of >0.60 per ASTM D2047.
 - 4. Provide materials with static load limit of 125 psi or higher.
 - 5. Flammability: Provide materials with 1.0 CRF or higher when tested in accordance with ASTM E648, Flooring Radiant Panel Test.
 - 6. Smoke Density: Provide materials with smoke density of less than 450 when tested in accordance with ASTM E 662.

2.03 ADHESIVES AND PRIMERS

- A. Use water and alkali resistant, zero regulated VOC type adhesives as recommended by flooring manufacturer for specific application.

2.04 ACCESSORIES

- A. Wall Base: Provide Wall Base complying with FS SS-W-40; Type II vinyl, with matching end stops and pre-formed or molded corner units. Use full roll base only. Individual four (4) foot strips are not acceptable.
 - 1. Height: 4".
 - 2. Thickness: 1/8" gage.
 - 3. Style: Standard top-set covered toe.
 - 4. Finish: Matte.
 - 5. Color from manufacturers standard colors as selected by Architect.

- B. Provide transition/reducing strips tapered to meet abutting materials.

- C. Provide threshold of thickness and width as shown on the drawings.

- D. Provide Vinyl Composition Tile edge strips of widths shown on the drawings, of equal gauge to the flooring and homogenous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

- E. Provide metal edge strips of width shown on drawings and of required thickness to protect exposed edges of the Vinyl Composition Tile flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

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- F. Subfloor Filler: Hydraulic/Portland cement based material designed for providing thin solid surface for leveling and for minor ramping of subsurface to adjacent floor finishes. Use material capable of being applied and feathered out to adjacent floor without spalling.
- G. Floor Finish: Finish as recommended by flooring manufacturer for material type and location.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Installer to inspect and examine subfloor surfaces to determine that they are satisfactory, free from cracks, holes, ridges and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material. A satisfactory subfloor surface is defined as one that is smooth and free from cracks, holes, ridges, coatings preventing adhesive bond, and other defects impairing performance or appearance.
 - 1. Contractor to patch and repair all existing defects including but not limited to cracks, holes, ridges that might impair adhesive bond.
 - 2. Flooring Manufacturer's Representative to confirm the suitability of the subfloor prior to installation of new Vinyl Composition Tile.
- B. Perform bond and moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry as well as to ascertain presence of curing compounds.
 - 1. Determine that surfaces are free from curing, sealing, and hardening compounds, and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold or mildew.
- C. Do not allow Vinyl Composition Tile flooring work to proceed until subfloor surfaces are satisfactory.
- D. Report conditions contrary to Contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare sub-floor surfaces as follows:
 - 1. Use leveling and patching compounds as recommended by resilient flooring manufacturer for filling small cracks, holes and depressions in sub-floors.
 - 2. Remove coatings from sub-floor surfaces that would prevent adhesive bond, including curing compounds incompatible with resilient flooring adhesives, paint, oils, waxes and sealers.
 - 3. Wood underlayment to have a smooth fully sanded face, free of irregularities, and to be free of substances, that could interfere with adhesion of resilient tile.
- B. Broom clean or vacuum surfaces to be covered, and inspect sub-floor.
 - 1. Surfaces shall be free from paint, varnish, excessive adhesive residue, solvents, wax, oil and other foreign matter.
- C. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

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- E. A successful Bond and Moisture Test must be completed before starting installation.
 - 1. The Calcium Chloride Test for moisture shall also be conducted.
 - a. The results of the Calcium Chloride Test should not exceed 5 lb. Per 1,000 sq. ft. per twenty-four (24) hours.
 - 2. Surface alkali of 9 or less as measured by pH test paper, and free of carbonization and dust.
- F. Temperature shall be maintained at a minimum of 68°F (18°C) and a maximum of 100°F (36°C) for forty-eight (48) hours prior to and during installation, and for forty-eight (48) hours after completion.
 - 1. A minimum temperature of 55°F (13°C) shall be maintained thereafter.
- F. Condition all flooring materials and adhesives to room temperature prior to starting installation.
 - 1. Protect all materials from the direct flow of heat from hot air registers, radiators, or other heating fixtures and appliances.

3.03 WARNING

- A. Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, vinyl tile flooring, backing, lining felt, or asphaltic "cutback" adhesives.
- B. These products may contain either asbestos fibers or crystalline silica. Avoid creating dust, inhalation of such dust is a cancer and respiratory tract hazard.
- C. Contact the Owner for information and instructions addressing the task of base floor preparation or encapsulation of existing flooring.

3.04 INSTALLATION, GENERAL

- A. Where movable partitions are shown, install Vinyl Composition Tile flooring before partitions are erected.
- B. Install Vinyl Composition Tile flooring using method indicated in strict compliance with manufacturer's printed instructions. Extend Vinyl Composition Tile flooring into toe spaces, door reveals, and into closets and similar openings.
- C. Scribe, cut, and fit Vinyl Composition Tile flooring to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions.
- D. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on sub-floor. Use chalk or other non-permanent marking device.

3.05 CLEANING AND PROTECTION

- A. Perform the following operations immediately upon completion of resilient flooring:
 - 1. Sweep or vacuum floor thoroughly.

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2. Do not wash floor until time period recommended by resilient flooring manufacturer has elapsed to allow resilient flooring to become well-sealed in adhesive.
 3. Damp-mop floor being careful to remove black marks and excessive soil.
 4. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by resilient flooring manufacturers.
- B. Protect flooring against damage during construction period to comply with Vinyl Composition Tile flooring manufacturer's directions.
1. Protect Vinyl Composition Tile flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishings across floors.
- C. Clean Vinyl Composition Tile flooring not more than four (4) days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Clean Vinyl Composition Tile flooring by method recommended by Vinyl Composition Tile flooring manufacturer.

3.06 MAINTENANCE

- A. Initial Protection: The application of several coats of polish immediately after installation will help protect the new flooring from dirt, soils, traffic and stains by other trades throughout the duration of construction. Apply floor finish in accordance with manufacturer's recommendations.

3.07 EXTRA STOCK

- A. Deliver stock of maintenance materials to the Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.
1. Vinyl Composition Tile Flooring: Furnish not less than 5 unopened boxes for each type, color and pattern installed.

END OF SECTION

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SECTION 09658 - RUBBER BASE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Topset coved rubber base for installation with flooring.
- C. Related Sections:
 - 1. Section 09652: Vinyl Composition Tile.
 - 2. Section 09680: Carpet

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's published technical data describing materials, construction and recommended installation directions. Submit technical data and installation instructions for each adhesive material.
- B. Maintenance Instructions: Submit manufacturer's recommendations for maintenance, care and cleaning of base.
- C. Samples: Submit samples of cove and straight top set base in each available color. Following color selections, submit samples, not less than 12 inches long of each selected color and type. Submit pint cans of each type adhesive.
- D. Maintenance Materials: Before Substantial Completion, deliver at least 50 lineal feet with 5 end stop units and 5 outside corner units of each color of rubber base installed. Deliver the materials in unopened factory containers or in sealed cartons with labels identifying the contents, matching installed materials. Include unopened cans of adhesives adequate to install the maintenance materials.

1.03 QUALITY ASSURANCE

- A. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar flooring materials.
- B. Comply with the following as a minimum requirement:
 - 1. ASTM E 84: Surface Burning Characteristics of Building Materials.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to the Project site in original unopened manufacturer's packaging clearly labeled with manufacturer's name. Materials shall be stored at not less than 70 degrees F for not less than 48 hours before installation.

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1.05 PROJECT CONDITIONS

- A. Ventilation and Temperature: Verify areas that are to receive rubber base are ventilated to remove fumes from installation materials, and areas are within temperature range recommended by the various material manufactures for site installation conditions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Burke/Mercer Flooring Products, 2250 S. Tenth Street, San Jose, CA 95112.
- B. Roppe, 800-537-9527, www.roppe.com
- C. Johnsonite, www.johnsonite.com.
- E. Owner approved equal.

2.02 MATERIALS

- A. Rubber base: Conform to ASTM F 1861; Group 1, solid (homogeneous); Type TS, thermoset vulcanized rubber; Style A, straight; and Style B; 4 inch high unless otherwise indicated, integral colors as selected, non-shrinking, 1/8 inch thick, with matching molded inside corners and end stops.
- B. Base Adhesive: Water based, low odor type formulated specially for use with rubber base, and manufactured or recommended by manufacturer of rubber base.

PART 3 - EXECUTION

3.01 COORDINATION

- A. Coordinate the Work of this section with other sections to provide a level, smooth and clean finish surface to receive rubber base.

3.02 EXAMINATION

- A. Field verify dimensions and other conditions affecting the Work of this section before commencing the Work of this section.
- B. Before Work is started, examine surfaces that are to receive rubber base. Deficiencies shall be corrected before starting the Work of this section.

3.03 PREPARATION

- A. Do not start preparation until adjacent concrete floor slabs are at least 90 days old and finish flooring is installed.
- B. Install rubber base when ambient temperature is 70 degrees F or higher.

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3.04 INSTALLATION

- A. Securely fasten cement base to backing in long lengths in accordance with manufacturer's recommendations. Lay out lengths so that not less than 18 inches long filler pieces are provided. Assure that top and toe continuously contact the wall and floor, and that all joints are tight. Install factory formed internal and external corners, and end stops where cove base ends at jambs and offsets.
- B. Base and outside corners shall be rolled with a seam roller before adhesive sets.

3.05 CLEANING

- A. Maintain surfaces of base clean as installation progresses. Clean rubber base when sufficiently seated and remove foreign substances.
- B. Clean adjacent surfaces of adhesive or other defacement. Replace damaged and/or defective Work to the specified condition.

3.06 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

3.07 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 09680 - CARPET

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Carpet as indicated.
- C. Related Sections:
 - 1. Section 03300: Cast-In-Place Concrete.
 - 2. Section 06100: Rough Carpentry
 - 3. Section 09658: Rubber Base

1.02 SUBMITTALS

- A. Shop Drawings: Submit dimensioned layout of carpet seaming and details for binder bars.
- B. Samples:
 - 1. Submit 3 labeled, minimum 27-inch square with proper backing, samples from each dye lot of carpet required for the Work.
 - 2. Trim and accessories: Submit 12-inch long samples of each type trim proposed for the Work.
- C. Product Data: Submit the following:
 - 1. Carpet manufacturer's published technical data fully describing carpet materials, construction, and recommended installation directions.
 - 2. Technical data and installation instructions for each adhesive and sealer material.
 - 3. Carpet manufacturer's published instructions for maintenance, care, cleaning and repair of carpet.
- D. Certificate: Submit a certificate from carpet manufacturer that materials supplied comply with fire hazard resistance standards specified.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. All materials shall comply with the recommendations of the ADA Accessibility Guide and 2007 CBC.

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- a. Provide glue-down or firm cushion installation that complies with CBC Section 1124B.3
 - b. Carpet shall have a level loop, textured loop, level-cut, or level-cut/uncut pile texture and maximum pile height of ½" per CBC Section 1124.3.
 - c. Carpet edges shall comply with CBC Section 1124B.3.
- B. Requirements of Regulatory Agencies: Carpeting shall meet requirements of federal, state and local regulatory agencies for flammability, static control, or other properties as specified.
- C. Carpet Installation: Comply with CRI 104 - Standard for Installation of Textile Floor Covering Materials.
- D. Each color of carpet shall be of the same dye lot.
- 1.04 DELIVERY, STORAGE AND HANDLING
- A. Full or cut rolls of carpeting shall be cut, packaged and identified by the factory. Distributor, dealer, or vendor cutting, re-packaging, and re-labeling is not permitted.
 - B. Store material at least 24 hours at room temperature prior to installation.
 - C. Deliver fire-rated materials with testing agency labels and required fire classification numbers attached and legible.
- 1.05 JOB CONDITIONS
- A. Ventilation and Temperature: Verify areas to be carpeted are ventilated to remove fumes from installation materials, and areas are within temperature range recommended by the various material manufacturers for Project site installation conditions.
 - B. Protection: Prohibit traffic on carpet for at least 12 hours after installation. Cover carpet with heavy non-staining Kraft paper in areas where the Work of other trades is to be performed and/or traffic and passage areas. Protect carpet from damage or soiling. Maintain protection in place until Substantial Completion.
- 1.06 WARRANTY
- A. Installer shall provide a 2-year labor warranty.
 - B. Manufacturer shall provide a 20-year material warranty.
 - C. Manufacturer shall provide a 10-year material warranty for colorfastness and texture retention.
- 1.07 MAINTENANCE
- A. Extra Materials: Provide minimum 36 inches in any one dimension of extra materials for each color, pattern, and dye lot of carpet.

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PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND PRODUCTS

- A. Mohawk Carpet Company, Martin J. Spillman, tel. 951-898-4900, cell 951-314-0103, fax 951-898-5900.
 - 1. Entry SD-26 Woven interlock / Heavy Commercial Traffic 30-year warranty, Mohawk Carpet Co., or equal.
- B. Collins & Aikman Floorcoverings.
- C. Lees Faculty IV.
- D. Owner approved equal.

2.02 MATERIALS

- A. Carpet shall meet the following minimum standards:
 - 1. Pile: ½ inch maximum height with level loop or cut pile.
 - 2. Dye Method: 100 percent Solution Dyed Method.
 - 3. Construction: Type A: Tufted level loop with UPS backing (no cut or cut loop accepted)
Type B: Woven Interlock (no cut or cut loop is permitted.)
 - 4. Pile / Yarn weight: Minimum 26 oz per square yard.
 - 5. Anti-Microbial Protection: Required both and top bottom.
 - 6. Moisture impermeable: Carpet shall be unaffected by water and moisture.
 - 7. Static Protection: The manufacturer warrants that the carpet will not static discharge in excess of 3.5 KV or under when tested under the AATCC Test Method 134 for the life of the carpet.
 - 8. Calcium Chloride: Carpets shall be able to be installed with 5 lbs. hydrostatic pressure or better (pounds) per 1000 square feet per 24 hours with a written documentation from manufacturer, per CRI-104.
 - 9. Stain and Soil Protection: BASF Zeftron 2000, 10 year stain removal guarantee.
 - 10. Fluorochemical Treatment: Minimum of 500 parts per million: per CRI-102; after two hot extractions (AATCC171), minimum 400 Parts Per Million per CRI TM-102.
 - 11. Zippering Warranty: Carpet will not zipper or develop continuous pile yarn runners in the body of the carpet for a minimum of 20 years from the date of Substantial Completion.
 - 12. Edge Ravel: Carpet will not have continuous pile yarn coming out at seams for a minimum of 20 years from the date of Substantial Completion.
 - 13. Texture Retention Warranty: The manufacturer warrants that the carpet will substantially maintain its physical surface texture against crushing, matting and walking out for 10 years from the date of Substantial Completion.
 - 14. Color fastness to light: Carpet will not fade for 10 years due to exposure to sunlight.
 - 15. Color fastness to atmospheric contaminants: Carpet will not fade for 5 years due to atmospheric contaminants.
 - 16. Traffic Classification: Class III – Extra Heavy Commercial Traffic (more than 1000-foot traffic per day).
 - 17. GSA Certification: All carpet shall meet or exceed the General Services Administration requirements.

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18. Flammability:

Flooring Radiant Panel:	Class I- per ASTM E 648
NBS Smoke Density:	Less than 450 per test ASTM E 662; NFPA-258
Flame Resistant:	Shall pass Methenamine pill test ASTM E 662.

19. Run Resistant Strength: Not less than 25 lbs., in accordance with the Loop Pile Run Resistance test (TP 155-86), wet or dry for a minimum of 20 years.
20. Indoor Air Quality: Carpet shall meet or exceed CRI & EPA guidelines (green label certified and labeled).
21. Recycling Program: Carpet shall be eligible to qualify for a close-loop recycling program (close-loop is a carpet that upon recycling is turned back into carpet and no part of the reclaimed carpet enters a landfill) either through the carpet manufacturer or fiber manufacturer.

- B. Carpets shall be from one dye lot, unless otherwise reviewed by the Architect.
- C. Full and cut rolls of carpet shall be cut, packaged, and identified by the factory. Distributors, dealers and vendor cutting, re-packaging, and re-labeling is not permitted.
- D. Carpet Edge Strips: A-600-SH Silver Clamp Down manufactured by Universal Metals, or equal.
- E. Stair Nosing: Universal Moldings # A-544-BA 1 commercial (butt to nosing) type or equal, installed with recommended sized screws.
- F. Adhesive: Water-resistant latex-based adhesive recommended by carpet manufacturer for direct glue-down carpet installation. Where primers or sealers are furnished, verify their compatibility with adhesive.
- G. Patching Compounds: Cementitious type, Ardex SD-F, Durabond's Webcrete #95, or equal, as recommended by carpet manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Before installation is started, examine surfaces to receive carpet. Deficiencies shall be corrected before starting Work of this section.
- B. Field verify dimensions and other conditions affecting this Work before commencing carpet installation.

3.02 PREPARATION

- A. Testing of Subfloors: Verify concrete is dry with electronic tester or sealed rubber-mat test, number of tests as needed to ensure that slabs are dry but at least one test per floor and for every 2500 square feet of floor area. Allow floor slabs with excessive moisture to dry; test until dried to tolerance permitted by floor adhesive manufacturer. Test floors for alkalinity. Acceptable range is pH 5 to pH 9. Excessive alkalinity shall be neutralized prior to installation of carpet.

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- B. **Cleaning and Drying:** Clean concrete floor slabs of all oil, grease, waxes, curing compounds, dust, dirt, debris, paint, and other deleterious substances. Provide a commercial vacuum cleaner to remove dust and dirt. Damp mop to remove dust that may remain after first vacuuming, allow surface to dry, and again vacuum; repeat procedure if necessary to eliminate all dust. Do not furnish oiled or chemical treated sawdust or any similar product for dust removal.
- C. **Leveling:** Verify floor slabs true to level and plane within a tolerance of 1/8 inch in 10-feet. Test floor areas both ways with a 10-foot straightedge and repair all high and low areas exceeding allowable tolerance. Pop ups shall be hammered out and floor filled with a cementitious leveling compound. Remove high areas by power sanding, stone rubbing or grinding, chipping off and filling with cementitious leveling compound, or equivalent method. Fill all low areas with cementitious leveling compound. Repair and level the surfaces having abrupt changes in plane, such as trowel marks or ridges, whether or not within the allowable tolerance. Again clean areas where repairs are performed. Do not sand, stone rub grind or power chip floor adhesives that contain asbestos.
- D. **Wood subfloors:** Clean wood subfloors of all oil, grease, waxes, dust, dirt, debris, paint, and other deleterious substances. Do not furnish oiled or chemical treated sawdust or any similar product for dust removal. Sand off projecting ridges. If recommended by carpet manufacturer, seal floors with a recommended wood sealer, compatible with adhesives to be installed.
- E. **Conditioning of Materials:** Carpet and adhesives shall be conditioned at the Project site at not less than 65 degrees F and relative humidity between 10 percent and 65 percent for 48 hours prior to installation.

3.03 CARPET INSTALLATION

- A. **General:** Install carpet in accordance with requirements of CRI 104, except where more stringent requirements are specified herein or recommended by carpet materials manufacturers.
- B. **Install carpet rolls** in each dye lot in the number sequence as furnished by manufacturer. Roll out carpet in one direction and do not reverse direction at any locations. Align carpet with centerline of room or space, and adjust at edges for wall variations.
- C. **Color Control:** Install dye lot in the number sequence at locations indicated to prevent shading variations. Install only one dye lot for each area of building unless otherwise reviewed. If more than one dye lot is required, obtain prior review of color match between dye lots.
- D. **Carpet Runs:** Install carpet in one-piece lengths between permanent walls unless otherwise required. Seams are permitted only where shown on the layout Shop Drawings. Install corridor carpet in one-piece sizes for full length and width, cross seaming only where corridors change direction.
- E. **Laying and Seaming:** Cut carpet for seams between tuft rows and prevent damage to tufts or loops, prevent edge ravel, and preserve uniform tuft row alignment and spacing on both sides and across seams. Install carpet with tuft or loop rows in straight lines both ways, free of offsets, waviness, distortion, or misalignment. Cut seam edges straight and square with backing. Trim carpet at walls, columns, and penetrations for a compressed fit.
- F. **Doorways:** Extend carpet into doorways without piecing in and seam to the carpet on other side of door under door centerline except where metal thresholds occur; no small filler pieces of carpet will be permitted at doorways.

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- G. Adhesive Installation: Do not power stretch carpet during installation. Provide notched trowel as required by adhesive manufacturer. Evenly spread adhesive free of excess or thin areas. Place and roll carpet within open time of adhesive. Roll carpet in both directions with a 75 lbs. to 100 lbs. towards open seams or edges to expel trapped air and assure that 100 percent of the adhesive transfers to the carpet backing while maintaining full coverage on the floor.
- H. Binder Bars: Provide bars at all edges of carpet not abutting walls or other construction, securely fastened in place. Precisely align splices and tightly miter angles.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEANING

- A. As each carpeted area is completed, clean up all dirt and debris, remove spots and soiling with proper cleaner, trim off loose threads with sharp scissors, and vacuum entire area clean.

3.06 CLEAN-UP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

3.07 INSTRUCTION

- A. Before Substantial Completion of the Work, provide a 4-hour Owner instruction period for proper maintenance of carpeting. Instructions shall be provided by technical representative of manufacturer.

END OF SECTION

SECTION 09900 - PAINTS AND COATINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Interior and exterior painting.
- C. Following items shall not be painted:
 - 1. Brass valves, chromium or nickel-plated piping and fittings.
 - 2. Boiler control panels and control systems.
 - 3. Fabric connections to fans.
 - 4. Flexible conduit connections to equipment, miscellaneous nameplates, stamping, and instruction labels and manufacturer's data.
 - 5. Mechanical and electrical utility lines, piping and heating and ventilation ductwork in tunnels, under-floor excavated areas or crawl spaces, attic spaces and enclosed utility spaces.
 - 6. Flag, floodlight, parking light poles and loudspeaker poles, metal stairs, handrails and chain-link fence with a galvanized finish, unless otherwise noted.
 - 7. Structural and miscellaneous steel, open web steel joists and metal floor decking, which will not be exposed in final construction, shall have no finish other than one coat of shop primer.
 - 8. Hardboard covering on tops and backs of counters and benches.
 - 9. Brass, bronze, aluminum, lead, stainless steel and chrome or nickel-plated surfaces.
 - 10. Non-metallic walking surfaces unless specifically shown or specified to be painted.

1.02 SYSTEM DESCRIPTION

- A. Regulatory Requirements:
 - 1. Paint materials shall comply with the Food and Drug Administration's (F.D.A.) Lead Law and the current rules and regulations of local, state and federal agencies governing the use of paint materials.
 - 2. All products shall meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD).

1.03 SUBMITTALS

- A. List of Materials: Before submittal of samples, submit a complete list of proposed paint materials, identifying each material by distributor's name, manufacturer's name, product name and number, including primers, thinners, and coloring agents, together with manufacturers' catalog data fully describing each material as to contents, recommended installation, and preparation methods. Identify surfaces to receive various paint materials.
- B. Material Samples: Submit manufacturer's standard colors samples for each type of paint specified. Once colors have been selected, submit samples of each color selected for each type of paint accordingly:

1. Samples of Paint and Enamel must be submitted on standard 8 ½" x 11" Leneta Opacity-Display Charts. Each display chart shall have the color in full coverage. The sample shall be prepared from the material to be installed on the Work. Identify the project on which the paint is to be installed, the batch number, the color number, the type of material, and the name of the manufacturer.
 2. Elastomeric shall be submitted in duplicate samples of the texture coating. Samples will be not less than 2 ½" by 3 ½" in size and installed upon backing. Finished Work will match the reviewed sample in texture.
 3. All materials and color samples shall be reviewed before starting any painting.
- D. For transparent and stained finishes, prepare samples on same species and quality of wood to be installed in the Work, with written description of system used.

1.04 QUALITY ASSURANCE

- A. Certification of Materials: With every delivery of paint materials, the manufacturer shall provide written certification the materials comply with the requirements of this section.
- B. Coats: The number of coats specified is the minimum number. If full coverage is not obtained with the specified number of coats, install additional coats as required providing the required finish.
- C. Install coats and undercoats for all types of finishes in strict accordance with the recommendations of the paint manufacturer as reviewed by the Architect.
- D. Paint materials shall comply with the following as a minimum requirement:
1. Materials shall be delivered to Project site in original unbroken containers bearing manufacturer's name, brand number and batch number.
 2. Open and mix ingredients on premises in presence of the Project Inspector.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Storage and Mixing of Materials: Store materials and mix only in spaces suitable for such purposes. Maintain spaces clean and provide necessary precautions to prevent fire. Store paint containers so the manufacturer's labels are clearly displayed.

1.06 SITE CONDITIONS

- A. Temperature: Do not install exterior paint in damp, rainy weather or until surface has thoroughly dried from effects of such weather. Do not install paint, interior, or exterior, when temperature is below 50 degrees F, or above 90 degrees F, or dust conditions are unfavorable for installation.

1.07 WARRANTY

- A. Manufacturer shall provide a 3-year material warranty.
- B. Installer shall provide a 3-year labor warranty.

1.08 MAINTENANCE

- A. Provide at least one gallon of each type, color and sheen of paint coating installed. Label containers with color designation indicated on Drawings.

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

- A. Furnish the products of only one paint manufacturer unless otherwise specified or required. Primers, intermediate and finish coats of each painting system must all be the products of the same manufacturer, including thinners and coloring agents, except for materials furnished with shop prime coat by other trades.
- B. Factory mix paint materials to correct color, gloss, and consistency for installation to the maximum extent feasible.
- C. All paint materials to be minimum "Architectural Grade".
- D. Gloss degree standards shall be as follows:

HIGH GLOSS	70 and above	EGGSHELL	30 to 47
SEMI-GLOSS	48 to 69	SATIN	15 to 29

2.02 MANUFACTURERS

- A. Acceptable manufacturers, unless otherwise noted:
 - 1. Vista Paints
 - 2. Dunn-Edwards Corporation Paints
 - 3. ICI
 - 4. Owner approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine surfaces to receive paint finish. Surfaces that are not properly prepared and cleaned or that are not in condition to receive the finish specified shall be corrected before prime coat is installed.
- B. New woodwork shall be thoroughly cleaned; hand sandpapered, and dusted off. Nail holes, cracks or defects in Work shall be filled. On stained woodwork, fill shall be colored to match stain. Filling shall be performed after the first coat of paint, shellac or varnish has been installed.
- C. Plaster surfaces except veneer plaster shall be allowed to dry at least 3 weeks before painting. Veneer plaster shall be allowed to dry sufficiently to receive paint as determined by moisture meter tests.

- D. Metal surfaces to be painted shall be thoroughly cleaned of rust, corrosion, oil, foreign materials, blisters, and loose paint.
- E. Do not install painting materials to wet, damp, dusty, dirty, finger marked, rough, unfinished or defective surfaces.
- F. Concrete surfaces shall be dry, cleaned of dirt and foreign materials and in proper condition to receive paint. Neutralize spots demonstrating effects of alkali.
- G. Mask off areas where necessary.

3.02 APPLICATION

- A. Backpainting: Immediately upon delivery to the Project site, finish lumber and millwork shall be backpainted on surfaces that will be concealed after installation. Items to be painted shall be backpainted with priming coat specified under "Priming".
- B. Priming: New wood and metal surfaces specified to receive paint finish shall be primed. Surfaces of miscellaneous metal and steel not embedded in concrete, and surfaces of unprimed plain sheet metal Work shall be primed immediately upon delivery to the Project site. Galvanized metal Work and interior and exterior woodwork shall be primed immediately after installation. Priming of surfaces and priming coat shall be as follows:
 - 1. Knots, Pitch and Sap Pockets: Shellac before priming.
 - 2. Exterior Woodwork and Wood Doors: Prime with one coat of exterior waterborne emulsion wood primer.
 - 3. Interior Woodwork: Where indicated to be painted, prime with one coat of waterborne wood primer.
 - 4. Stain: Woodwork indicated to receive a stain and varnish finish shall be stained to an even color with water borne stain. On open-grained hardwood, mix stain with paste filler and completely fill pores in wood.
 - 5. Galvanized Metal Work: Clean oil, grease and other foreign materials from surfaces. Install vinyl wash pretreatment coating. Follow manufacturer's instructions for drying time, and then prime with one coat of metal primer.
 - 6. Unprimed Iron, Steel, and Other Uncoated Metals: Where specified to be painted, prime with one coat of metal primer.
 - 7. Shop Primed Metal Items: Touch up bare and abraded areas with metal primer before installation of second and third coats.
 - 8. Coats shall be installed evenly and with full coverage. Finished surfaces shall be free of sags, runs and other imperfections.
- C. Allow at least 24 hours between coats of paint.
- D. Rollers shall not be used on wood surfaces.
- E. Each coat of painted woodwork and metal, except last coat, shall be sandpapered smooth when dry. Texture-coated gypsum board shall be sanded lightly to remove surface imperfections after first coat of paint has been installed.
- F. Each coat of paint or enamel shall be a slightly different tint as required. Each coat of paint, enamel, stain, shellac, and varnish will be inspected by the Project Inspector before next coat is applied. Notify the Architect that such Work is ready for inspection.
 - 1. Tinting Guideline: The first coat, primer/undercoat(s) to be untinted or tinted up to 50% lighter or darker (at the discretion of the installer) than the finish coat. The second coat (or

third coat if a seal coat and undercoat have been specified) is to be factory tinted in the range of 10% to 15% lighter or darker (at the discretion of the installer) than the finish coat. The final coat is to be factory tinted to the required color selected. These tinting guidelines shall be provided on all surfaces receiving paint..

- G. Do not "paint-out" UL labels, fusible links and identification stamps.

3.03 CLEANING

- A. Remove rubbish, waste, and surplus material and clean woodwork, hardware, floors, and other adjacent Work.
- B. Remove paint, varnish and brush marks from glazing material and, upon completion of painting Work, wash and polish glazing material both sides. Glazing material, which is damaged, shall be removed and replaced with new material.
- C. Clean hardware and other unpainted metal surfaces with recommended cleaner. Do not furnish abrasives or edged tools.

3.04 SCHEDULE

- A. Interior: All paint is 100% acrylic:
 - 1. Woodwork, Painted: 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: 100% Acrylic interior enamel, semi-gloss or gloss as indicated.
 - 2. Woodwork, Stained and Varnished: 4 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second, Third and Fourth Coats: Varnish, semi-gloss.
 - 3. Wood Corridor doors: 4 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second, Third, and Fourth Coats: Varnish, gloss.
 - 4. Other Wood Doors: 4 coats.
 - a. Varnished or painted as indicated.
 - b. If varnished, same finish system as painted woodwork, with semi-gloss or gloss finish to match adjacent wall.
 - 5. Miscellaneous Woodwork: 4 coats. Wood items including, but not limited to: stair treads and risers, handrails, rolling ladders, wood base and shoe, chair rails, counter tops and locker room benches.
 - a. First Coat: As specified in this section under Priming.
 - b. Second, Third and Fourth: Exterior varnish, gloss.
 - 6. Casework: Interior surfaces of casework (except plastic laminate-faced casework) including top, edges and underside of shelving, poles, surfaces of drawers (except fronts), interior surfaces of mailbox pigeonholes, and particle board.
 - a. First Coat: Waterborne stain.
 - b. Second and Third Coats: Satin varnish.
 - 7. Plaster: 4 coats.

- a. First Coats: Pigmented wall sealer.
- b. Second coat: Enamel under coater.
- b. Third and Fourth Coats – Interior enamel, semi-gloss or gloss as indicated.
- 8. Gypsum Board: 4 coats.
 - a. First Coat: Drywall sealer.
 - b. Second Coat: Enamel under coater.
 - c. Third and Fourth Coats: Interior enamel, semi-gloss or gloss as indicated.
- 9. Concrete: 3 coats.
 - a. First: Concrete sealer.
 - b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.
- 10. Concrete Block: 3 coats.
 - a. First: Concrete block filler.
 - b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.
- 11. Metal: Shall be cleaned, pre-treated and painted with 3 coats. Items to be painted include, but are not limited to: exposed structural and miscellaneous steel, metal doors and frames, ladders, table and bench legs.
 - a. First Coat: Metal primer.
 - b. Second and Third Coats: Interior gloss enamel, except metal doors and frames, which shall be semi-gloss or gloss to match adjacent wall.
 - c. Damaged galvanized surfaces shall be coated with a zinc-rich coating meeting ASTM A780:
 - 1) ZRC Cold Galvanizing Compound.
 - 2) Sherwin Williams Zinc Clad.
 - 3) Approved equal.

B. Exterior: 100% acrylic.

- 1. Woodwork: 3 coats..
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior house and trim enamel.
- 2. Wood Doors: 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior gloss enamel.
- 3. Plaster and Stucco: 2 coats. Flat 100% acrylic.
 - a. Exterior 100 percent acrylic.
- 4. Concrete: 3 coats. Flat 100% acrylic.
 - a. First Coat: Concrete sealer.
 - b. Second and Third Coats: Exterior 100 percent acrylic.
- 5. Concrete Block: 3 coats. Flat 100% acrylic.
 - a. First Coat: Concrete block filler.
 - b. Second and Third Coats: Exterior 100 percent acrylic.
- 6. Metal: 3 coats. Shall be cleaned and pre-treated. Items to be painted include, but are not limited to: steel columns and miscellaneous steel items, gravel stops, metal doors and frames, hoods and flashings.

- a. First Coat: As specified in this section under Priming.
- b. Second and Third Coats: Exterior gloss enamel.

C. Mechanical and Electrical Work:

- 1. Except where interior mechanical and electrical Work to be painted is specified to receive another paint finish, Work occurring in finished rooms and spaces shall be cleaned, pre-treated, and painted with 3 coats. Items to be painted include, but are not limited to: steel and copper piping, pipes, vents, fittings, ducts, plenums, miscellaneous supports and hangers, electrical conduit, fittings, pull boxes, outlet boxes, unfinished surfaces of plumbing fixtures, miscellaneous metal cabinets, panels, and access doors and panels.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Interior enamel, semi-gloss or gloss to match adjacent wall or ceiling finish.
- 2. Insulation and Taping on Pipes and Ducts: 3 coats.
 - a. Finished Rooms:
 - First Coat: Interior waterborne primer.
 - Second and Third Coats: Interior semi-gloss or gloss enamel to match adjoining wall or ceiling finish.
 - b. Building Exterior:
 - First Coat: Exterior waterborne primer.
 - Second and Third Coats: Exterior gloss enamel.
- 3. Inside surfaces of ducts, vents, dampers and louvers as far back as visible from room in which they open shall be painted with 2 coats of flat black paint.

D. Miscellaneous:

- 1. Outside Storage Units (wood or metal): 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior gloss enamel.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 09961 – ANTI-GRAFFITI COATINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes surface preparation and field application of anti-graffiti coating systems to items and surfaces scheduled.
- B. Related Sections include the following:
 - 1. Section 05500: Metal Fabrication.
 - 2. Section 09900: Paints and Coatings

1.03 SUBMITTALS

- A. Product Data for each coating system indicated. Include block fillers and primers:
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.
 - 3. Certification by manufacturer that products supplied comply with requirements indicated that limit the amount of VOCs in coating products.
 - 4. Architect will furnish color chips for surfaces to be color coated.
- B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Warranty.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed anti-graffiti coating system applications similar in material and extent to those indicated for Project, is certified by the manufacturer, and whose work has a record of successful in-service performance.
- B. Source Limitations: Obtain base coatings, top coatings, and removal agent from the same manufacturer.

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1.05 PERFORMANCE REQUIREMENTS

- A. Provide anti-graffiti coating system complying with the following:
1. Permanent coating system.
 2. Show no signs of deterioration, or change of appearance after graffiti removal during the warranty period.
 3. Capability of removing 100% of all types of paint and graffiti materials from treated surfaces without damaging the coating or the substrate.
 4. Upon graffiti removal, no evidence of graffiti shall remain.
 5. Capable of withstanding a minimum of 120 cleaning cycles without measurable coating deterioration.
 6. Shall not increase dirt pick-up of substrate.
- B. Meet the following test results for the following chemicals:
- | | |
|------------------------|------------------------|
| 1. MEK | No effect after 5 days |
| 2. Carboxylic Acid | No effect after 5 days |
| 3. 75% Phosphoric Acid | No effect after 5 days |
| 4. 37% HCL | 3 hours blister |
| 5. 50% Sulfuric Acid | No effect after 5 days |
| 6. 20% NIT | 68 hours blister |

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:
1. Name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. Handling instructions and precautions.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
- C. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

1.07 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 45 and 95 deg F.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

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- C. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.

1.08 EXTRA MATERIALS

- A. Furnish extra graffiti removal materials in quantities described below. Package coating materials in unopened, factory-sealed containers for storage and identify with labels describing contents.

- 1. Quantity: One full case (12, 16 ounce bottles)

1.09 WARRANTY

- A. System Warranty: Provide written warranty signed by manufacturer, agreeing to repair or replace work which exhibits defects in materials or workmanship. Defects are defined to include failure to withstand complete graffiti removal, ghosting, shadowing, chemical staining, yellowing, and normal environmental effects.

- B. Warranty Period: 10 years from date of completion.

PART 2 - PRODUCTS

2.01 ANTI-GRAFFITI SYSTEM/MANUFACTURER

- A. Graffiti Solution System; American Polymer Corp. or approved equal.

2.02 ANTI-GRAFFITI COATING MATERIALS

- A. VOC Classification: Provide materials that comply with South Coast Air Quality Management District's VOC classification.

- B. Coatings shall meet requirements of the following:

- 1. ASTM B 117 and ASTM D 714 (salt spray minimum acceptable of 8000 hours).
 - 2. ASTM D 530 (hardness)
 - 3. ASTM D 412 (tensile strength and elongation)
 - 4. ASTM D 522 (pass 3/8 inch mandral)
 - 5. ASTM D 968 (abrasion test)
 - 6. ASTM E 96 (vapor transmission)
 - 7. Water clear, non-yellowing, free of waxes and urethanes.
 - 8. Non-toxic, non-flammable, biodegradable, with a PH 7 – 8.5.
 - 9. Shall allow moisture vapor transmission.

- C. Undercoating: GSS Barrier; water-based undercoating used as a sealer over porous surfaces.

- 1. Provide high-solids version for use over porous or uneven surfaces.

- D. Topcoating: GSS-10; permanent anti-graffiti top coating.

- 1. Finish: Matte.
 - 2. Color: Clear or tinted, as indicated

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- E. Graffiti Remover: GSS Erasol; non-caustic, biodegradable and recyclable, allowing graffiti removal without the use of blasting equipment, hot water, or high-pressure wash equipment.

2.03 **COLORS**

- A. Colors: Clear matt finish.

PART 3 - EXECUTION

3.01 **EXAMINATION**

- A. With Applicator present, examine substrates and conditions under which anti-graffiti coatings will be applied, for compliance with coating application requirements.
 - 1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
 - 2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.
- B. Coordination of Work: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.
- C. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:
 - 1. Confirmation of primer's suitability for expected service conditions.
 - 2. Confirmation of primer's ability to be top coated with materials specified.
- D. Notify Architect about anticipated problems before using the coatings specified over substrates primed by others.

3.02 **PREPARATION**

- A. General: Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 - 1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- B. Cleaning: Before applying coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for each substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove primers and reprime substrate.
 - 2. Cementitious Substrates: Prepare concrete, brick, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and

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release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.

3. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
4. Metal Substrates: Clean ferrous-metal surfaces that have been shop coated; remove oil, grease, dirt, and other foreign substances.

D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application.

3.03 APPLICATION

A. General: Apply coatings according to manufacturer's written instructions.

1. Use applicators and techniques best suited for the material being applied.
2. Do not apply coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.

B. Application Over Cementitious Surfaces:

1. Base: 2 coats of GSS Barrier undercoating; 3 to 4 mils minimum dry film thickness.
2. Finish: 2 coats of GSS-10 top coating; 3 to 4 mils minimum dry film thickness.

C. Application Over Primed Metal Surfaces:

1. Finish: 2 coats of GSS-10 top coating; 3 to 4 mils minimum dry film thickness.

D. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.04 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:

1. Owner will engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:
 - a. Quantitative materials analysis.
 - b. Absorption.
 - c. Accelerated weathering.
 - d. Accelerated yellowness.

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- e. Alkali and mildew resistance.
 - f. Abrasion resistance.
 - g. Washability.
- B. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. If necessary, Contractor may be required to remove rejected materials from previously coated surfaces if, on recoating with specified materials, the two coatings are not compatible.
- C. Demonstration: Apply alkyd-based graffiti to a 2 ft. sq. treated area selected by the Owner's representative. 5 days minimum after application, demonstrate complete removal of the graffiti in the presence of the Owner's representative.

3.05 CLEANING

- A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- 1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.06 PROTECTION

- 1. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- 2. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
- 3. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION

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SECTION 10170 – TOILET PARTIONS

PART 1 – GENERAL

1.01 SUMMARY

- A. Incorporated Documents: Contract drawings, Provisions of the Bid Documents, General and Special Conditions, General Requirements, and Division 1 apply to the Work of this Section.
- B. Section Includes: Furnishing materials, labor, and equipment necessary for the completion of toilet partitions as indicated on the drawings and specified herein.
 - 1. Solid plastic toilet compartments, urinal screens and vision screens as indicated.
- C. Related Sections: Section containing requirements related to this section include, but may not be limited to:
 - 1. Section 10800: Toilet Room Accessories.

1.02 REFERENCES

- A. American Society for Testing Materials:
 - 1. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 2. ASTM B221 - Aluminum Alloy Extruded Bars, Rods Wire, Shapes and Tubes.
 - 3. ASTM E-84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. California Code of Regulations - Title 24:
 - 1. 2007 CBC
 - 2. CAS/CAR - California Accessibility Statutes/California Accessibility Regulations, Books 1 and 2, May 1994.
- C. Americans with Disabilities Act - ADA - Title II.

1.03 PERFORMANCE REQUIREMENTS

- A. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
 - 1. Smoke Developed Index: Not to exceed 450.
 - 2. Flame Spread Index: Not to exceed 75.
 - 3. Material Fire Ratings:
 - a. National Fire Protection Association (NFPA): Class B.
 - b. International Code Council (ICC): Class B.

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1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.
- B. Installer's Qualifications: A Company or Individual, regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.
- C. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to ensure proper fitting of work. However, allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay work.
- D. Coordination: Furnish inserts and anchorages that must be built into other work for installation of toilet partitions and related work; coordinate delivery with other work to avoid delay.
- E. Comply with CAS/CAR and ADA for accessibility for the physically disabled.
 - 1. Toilet stalls for disabled persons shall have slide bolt door latch, U-shape or wire pulls both sides of the door and self-closing hinges. Door hardware shall be mounted at 30" to 44" above finished floor. CBC Section 1115B.3.1.4.5.
 - 2. Doors at front entry stalls shall have 32" minimum clear width when the door is open 90°. CBC Section 1115.3.1.4.4.
 - 3. Doors at side entry stalls shall have 34" minimum clear width when the door is open 90°. CBC Section 1115B.3.1.4.4.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings and accessories.
- B. Shop Drawings: Submit shop drawings for fabrication and erection of toilet partition assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.
- C. Samples: Submit samples of the toilet compartment material including partitions, hardware, fastenings and accessories.
- D. Furnish color samples for Architect's approval.

1.05 PROJECT CONDITIONS

- A. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.
- B. Store materials in a clean, dry, enclosed space off the ground, and protected from the weather and from extremes of heat and cold.
- C. Verify that field measurements are as indicated on shop drawings.

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- D. Coordinate the work with placement of support framing and anchors in wall.
- E. Install toilet partitions and accessories after other finishing operations, including painting, have been completed.

1.06 WARRANTY

- A. Manufacturer shall guarantee its plastic against breakage, corrosion, and delaminating under normal conditions for 15 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. (Labor not included in warranty.)

PART 2 – PRODUCTS

2.01 MANUFACTURER

- A. Scranton Products (Santana/Comtec/Capitol), Scranton, PA..
 - 1. Local Representative for Scranton Products: Service Oriented Sales, 1339 Lawrence Drive, Newbury Park, CA 91320, 805-375-6599.
- B. Owner approved equal.

2.02 MATERIALS

- A. Doors, panels and pilasters shall be 1" thick constructed from High Density Polyethylene (HDPE) resins. Partitions shall be fabricated from polymer resins compounded under high pressure, forming a single component that is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. All plastic components shall be covered with a protective plastic masking.

2.03 CONSTRUCTION

- A. Doors, panels, and pilasters shall be 1" thick with all edges rounded to a ¼" radius.
- B. Doors and dividing panels shall be 55" high and mounted at 14" above the finished floor. An aluminum heat sink may be fastened to the bottom edges (optional).
- C. Pilasters shall be 82" high (standard) and fastened into a 3" high pilaster shoe with a stainless steel tamper resistant torx head sex bolt.

2.04 HARDWARE

- A. Door hardware:
 - 1. Hinges shall be 8" and fabricated from heavy-duty extruded aluminum (6463-T5 alloy) with bright dip anodized finish with wrap-around flanges, through bolted to doors and pilasters with stainless steel, torx head sex bolts
 - 2. Door strike/keeper shall be 6" long and made of heavy-duty extruded aluminum (6436-T5 alloy) with a bright dip anodized finish and secured to the pilasters with stainless steel tamper resistant torx head sex bolts. Bumper shall be made of extruded black vinyl.

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3. Latch and housing shall be made of heavy-duty extruded aluminum (6463-T5 alloy). The latch housing shall have a bright dip anodized finish, and the slide bolt and button shall have a black anodized finish.
 4. Each door shall be supplied with one coat hook/bumper and door pull made of chrome plated zamak. Accessible doors shall be supplied with a second door pull and out swing doors with one door stop made of chrome plated zamak.
- B. Pilaster shoes shall be 3" high (type 304, 20 gauge) stainless steel. Pilaster shoes shall be secured to the pilaster with a stainless steel tamper resistant torx head sex bolt.
- C. Full length continuous 18-gauge stainless steel wall brackets shall be used for all panels to pilaster, pilasters to wall and panel to wall connections. Wall brackets shall be thru-bolted to panels and pilasters with one-way sex bolts. Attachment of brackets to adjacent wall construction shall be accomplished by No. 14 x 1 1/2" stainless steel Phillips head screws anchored directly behind the vertical edge of panels and pilasters at twelve-inch (12") intervals along the full length of bracket and at each twelve-inch (12") interval alternately spaced between anchor connections.
- D. Headrail shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design and integrated curtain track. The headrail shall have a clear anodized finish and shall be fastened to the headrail bracket by a stainless steel tamper resistant torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant torx head screws.
- E. Headrail brackets shall be 18-gauge stainless steel with a satin finish and secured to the wall with a stainless steel tamper resistant torx head screws.

2.04 FINISHES

- A. Solid Plastic Color:
1. Color: As selected by the Architect.
- B. Aluminum Extrusions (6364-T5 Alloy):
1. Clear anodized finish to be used in all installations unless notified otherwise by the Architect.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that may affect installation of partitions. Report any discrepancies to the architect.
- B. Take complete and accurate measurements of complete toilet compartment locations.
- C. Start of work constitutes acceptance of job.

3.02 INSTALLATION

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- A. Erection of partitions, etc., shall be in accordance with the manufacturer's standard recommendations and the following:
1. Install partitions rigid, straight, plumb, and level manor, with plastic laid out as shown on shop drawings and manufacturer's installation instructions.
 2. All doors and panels to be mounted at 14" above finished floor.
 3. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8".
 4. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.
 5. Finished surfaces shall be cleaned after installation and be left free of all imperfections.
 6. Urinal screens shall be floor-mounted.

END OF SECTION

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SECTION 10350 - FLAGPOLES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Flagpoles as indicated.
- C. Related Sections:
 - 1. Section 03300: Cast-In-Place Concrete.
 - 2. Section 05500: Metal Fabrications.

1.02 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating dimensions of flagpoles, number of sections, and anchoring details.
- B. Product Data: Submit manufacturer's product literature.
- C. Installation Instructions: Submit manufacturer's installation instructions.

1.03 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Flagpole shall be the product of a manufacturer who has been regularly engaged in manufacture of flagpoles for at least 5 years.

PART 2 - PRODUCTS

2.01 FABRICATION

- A. Pole shall be fabricated of steel pipe sections, fitted, and secured together. Length, grade, and wall thickness of pipe sections shall be as indicated.
- B. Furnish pole with a ball-bearing halyard top furnished with a 3/4 inch steel pipe standard and a seamless spun copper ball. Prime the ball with 2 coats of automotive primer, sand smooth and then coat with 22 carat gold leaf. Furnish gold leaf size applicable for installation of gold leaf.
- C. Pole shall be furnished with a malleable iron cleat 5 feet above finish grade.
- D. Pole shall be furnished with a cleat cover and hasp for a padlock. Padlock will be provided by the Owner.
- E. Provide 2 sets of 3/4 inch swivel snaps. Entire flagpole, except ball, cleat and swivel snaps, shall be hot-dipped galvanized after fabrication, but before assembly.

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- F. Provide 12 solid braided nylon sash cords for raising and lowering flag.

PART 3 - EXECUTION

3.01 ERECTION

- A. Install in accordance with reviewed shop drawings and manufacturer's written recommendations.
- B. Pull assembly shall be installed with a minimum of 3 set screws.
- C. Bolt baseplate to foundation, bearing on high-strength grout, unless otherwise detailed.

3.02 TOLERANCES

- A. Flagpole shall be true and plumb after installation with cleat located in prevailing wind direction. Maximum variation from true vertical shall be within one inch of true vertical, measured at top of pole, in 3 directions.

3.03 CLEANUP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 10440 - IDENTIFYING DEVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. Incorporated Documents: Contract drawings, Provisions of the Bid Documents, General and Special Conditions, General Requirements, and Division 1 apply to the Work of this Section.
- B. Section Includes: Furnishing materials, labor, and equipment necessary for the completion of identifying devices as indicated on the Drawings and specified herein.
- C. Interior room signs, interior directional signs, geometric restrooms signs, evacuation plans, exterior regulation signage, exterior directional signage, menu boards and exterior building signs.

1.02 DEFINITIONS

- A. Accessible Route: A continuous unobstructed path that complies with ADA, 2007 CBC and ANSI A 117.1.
- B. Characters: Letters, numbers, punctuation marks, and typographic symbols.
- C. Circulation Path: An exterior or interior way of passage from one place to another for pedestrians, including, but not limited to, walks, hallways, courtyards, stairways, and stair landings.
- D. Common Use: Interior and exterior rooms, spaces, or elements made available for the occupancy by students, staff, or others visiting or utilizing facilities.
- E. Facility: Portions of buildings, structures, site improvements, complexes, equipment, roads, walks, passageways, parking lots, or other real or property located on a Project site.
- F. ISA: International Symbol of Accessibility
- G. Pictogram: A pictorial symbol, which is recognized as representing activities, facilities, or concepts.
- H. Sign: An Architectural element composed of displayed text, symbolic, tactile or pictorial information.
- I. Space: A definable area, such as a room, toilet room, hall, assembly area, entrance, storage room, alcove, courtyard or lobby.
- J. Tactile: An object that can be perceived through the sense of touch.

1.03 SYSTEM DESCRIPTION

- A. Comply with the most stringent requirements of Americans with Disabilities Act Accessibility Guidelines (ADAAG) and CBC. Standards are based on ICC/ANSI A117.1.

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1. Character type: Characters on signs shall be raised 1/32 inch (0.794 mm) minimum and shall be sans serif uppercase characters accompanied by Grade 2 Braille (See Note 5 below).
2. Character size: Raised characters shall be a minimum of 5/8 inch (15.9 mm) and a maximum of 2 inches (52 mm) high.
3. Finish and contrast: Contrast between character, symbols and their background must be 70% minimum and have a non-glare finish. CBC 1117B.5.2.
4. Proportions: Characters on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio of between 1:5 and 1:10. CBC 1117B.5.3.
5. Braille: California Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Dots shall be 1/10 inch (2.54 mm) on centers in each cell with 1/10 inch (5.08 mm) space between cells, measured from the second column of dots in the first cell to the first column of dots in the second cell. Dots shall be raised a minimum of ¼ inch (1.635 mm) above the background. CBC 1117B.5.6.
 - a. Recommend rounded or domed California Braille dots, each distinct and separate. Dots with straight sides and flat tops are not readable for many Braille users.

B. Parking Lot Entrance Signs and Accessible Parking Space Identification Signs:

1. Parking lot entrance signs shall comply with CBC, warning that cars parked in parking spaces reserved for people with disabilities will be towed.
2. Parking spaces reserved for people with disabilities shall be identified with a reflective sign featuring the ISA, which shall comply with CBC. Van accessible spaces shall be identified with the term "Van Accessible." (CBC 1129B.3)
3. Reserved parking spaces shall also be identified by the ISA at the foot of the space in compliance with CBC. (CBC 1129B.5.4). Access aisles shall be striped as required. (ANSI 117.1).

C. Circulation Path Signs:

1. Circulation path signs leading from public right of ways, public transportation, and/or parking lots that are not accessible or do not lead to accessible entrances to the building, shall be located at decision points directing people with disabilities to the accessible routes and/or entrances. Signs shall include the ISA. (ANSI 117.1. 703.7) Such signs shall be installed so those steps will not have to be retraced. (CBC 1117B.5.8.1.2).

D. Building Entrance Signs:

1. Accessible building entrances shall be identified with the ISA. (CBC 1117B.5.8.1). Inaccessible entrances shall have a sign, which includes the ISA, directing to the nearest accessible entrance this sign shall be placed at the last decision point before reaching the inaccessible entrance. (CBC 1117B.5.7). Building entrances shall have a sign stating "No Smoking", in accordance with California statute prohibiting smoking in public buildings.
2. When classrooms or other functional spaces have individual entrances from the exterior of the building, or from a courtyard, and such entrances are accessible, one sign can be placed on each exterior elevation stating "All rooms have accessible entrances." The ISA shall be included on such signs, which shall also include the phrase, "No smoking in the building."

E. Room Identification Signs:

1. Each permanent room and space identified by a sign shall have a sign installed adjacent to the door it identifies, with raised characters and Braille, in conformance with ANSI 117.1 (703.2 or 703.3). This includes entrances to rooms and spaces, which are entered by an exterior entrance or by a door off an interior corridor or courtyard. (CBC 1117B.5.1).

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2. Restroom identification signs shall include a gender pictogram in a 6-inch high field. Pictogram field shall be located above the raised character and Braille text on the tactile sign, which is to be located adjacent to the door in conformance with ANSI 117.1 (703.2 or 703.3, CBC 1117B.5.1) Restrooms shall be identified as follows:
 - a. WOMEN.
 - b. MEN.
 - c. RESTROOM (for unisex, single person restrooms).
3. A geometric sign placed on the door shall also identify each restroom. The sign for women and girls' restrooms is a circle. The sign for men and boys' restrooms is a triangle. Unisex restrooms are identified by a triangle on and within the boundary of a circle. (CBC 1115B.5) Accessible restrooms shall include the ISA, (CBC 1117B.5.8.1.3), a minimum of 4 inches high, centered on the geometric sign on the door.
4. If there is not adequate space for a sign immediately adjacent to the door, and the door opens inward, the gender pictogram, the ISA, and the raised characters and Braille can be included on the geometric sign installed on the door. In the case of restrooms with no doors, but only shielded entrances, the geometric sign can also include the required elements and be installed adjacent to the entrance.

F. Exit, Stair, and Stairwell Identification Signs:

1. Exit and Exit Stairs, which are required to be identified as such by the Fire Marshal, shall also be identified by a sign with raised characters and Braille which conforms to ANSI 117.1 (703.2 or 703.3). A sign shall identify enclosed stairways with raised characters and Braille. The following designations shall be provided:
 - a. EXIT (For an unlocked exit door without an alarm, leading to the exterior of the building.)
 - b. STAIR (For an enclosed stairway door on the ground floor, or for an enclosed stairway door on any other floor which does not lead to an exit.
 - c. EXIT STAIR UP/EXIT STAIR DOWN (For an enclosed stairway door above or below the ground floor that leads to an exit.)
 - d. EXIT WITH ALARM (For an exit or exit stair door with an alarm.)
 - e. EXIT ONLY or EXIT STAIR UP ONLY/EXIT STAIR DOWN ONLY (For an exit door or exit stair door that locks from the outside and does not allow a return.)
2. Enclosed stairwells shall be identified by a raised and Braille numeral or letter or combination identifying the level of the floor. This sign shall be located adjacent to the door leading from the stairwell into the corridor. The ground floor shall, in addition to its numeral or letter identification, be identified by a raised, five pointed star. The sign shall conform to ANSI 117.1 (703.2 or 703.3).

G Directional Signs for Accessible Elements:

1. Directional signs for inaccessible restrooms shall be installed at decision points directing disabled people to accessible restrooms. Signs shall include the ISA along with appropriate text and /or arrows, in conformance to ANSI 117.1 (703.4 and 703.7).
2. In building of 2 or more stories, where the elevator is not visible from the main circulation route, directional signs with the word "Elevator", an appropriate arrow, and the ISA shall be mounted at each decision point, in conformance to ANSI 117.1 (703.4 and 703.7).
3. In building with inaccessible exits, directional signs with the word "Exit", an appropriate arrow, and the ISA shall be mounted at each decision point. (ANSI 117.1 703.4 and 703.7, CBC 1133B.1.1.1.1 Exception 2).
4. Signs indicating the provision of special equipment for the hearing impaired (i.e. TTY phone, volume control phones and Assistive Listening Systems) shall include the appropriate Symbols of Accessibility in conformance to ANSI 117.1 (703.7), shall include brief text and/or arrows to direct people to this equipment in conformance to ANSI 117.1

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(703.4). Signs shall be mounted at appropriate decision points and above the equipment itself so they are visible when the equipment is in use by others. (CBC 1117B.5.8.2, 1117B.5.8.3, , 1117B.5.8.4, 1117B.5.10, 1104B.2)

1.04 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.
- C. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, reinforcement, accessories, layout, and installation details.
 - 1. Provide message list for each sign required, including large-scale details of wording and layout of lettering.
 - 2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
 - 3. Furnish full-size spacing templates for individually mounted dimensional letters and numbers.
- D. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.
 - 1. Samples for verification of color, pattern, and texture selected, and compliance with requirements indicated:

1.05 QUALITY ASSURANCE

- A. Single-Source Responsibility: For each separate type of sign required, obtain signs from one source from a single manufacturer.
- B. Design Criteria: The drawings indicate size, profiles, and dimensional requirements of signs and are based on the specific type and model indicated. Signs by other manufacturers may be considered, provided that deviations in dimensions and profiles are minor and do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Provide signs from one source from a single manufacturer:
 - 1. H. Toji & Company, 3286 E. Artesia Blvd., Long Beach, CA 90805, phone 562-423-6600, fax 562-423-6002, email: tojico@covad.net, or accesscomm@earthlink.net.
 - 2. ASI-Modulex, 5849 Uplander Way, Culver City, CA 90230, phone 310-645-1400, fax 310-645-9877.
 - 3. Approved equal.

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2.02 BRAILLE AND RAISED-CHARACTER (TACTILE) SIGNS

- A. Provide standard Die-raised letter aluminum signs with baked enamel finish per ASTM B209 0.1" thick. Color to be typically the darker color with white incised letters and/or numbers. New signs at an existing site shall match the existing sign colors (verify with Owner).
1. Exits and stairs
 2. Named rooms with no number
 3. Numbered rooms with no name
 4. Numbered rooms with a name
 5. Restrooms
- B. Sign Plate and Lettering Sizes:
1. Room or Space Identification Signs:

MEN	7" x 1-1/2" high with 3/4" high letters (stock)
WOMEN	7" x 1-1/2" high with 3/4" high letters (stock)
NUMBERS	6" x 3" high with 2" high numbers
Others	10" x 2" high with 3/4" high letters
(Increase or decrease length as required)	
- C. Installation:
1. Room Identification Signs: Mount at a height 5'-0" above finished floor. Plates installed on the interior face of door shall be secured with four 1/8-inch diameter Cadmium plated Phillips head screws, 2 per side at each corner. Plates installed on the exterior face or both sides of doors shall be secured through the door with two nickel plate brass binding posts or sex bolts with the screw portion on the interior side.
- D. Raised Characters:
1. Edges of characters beveled or rounded. (ANSI 117.1 703.2 and 703.3).
 2. Minimum of 1/8 inch between the top surfaces of adjacent characters measuring between the 2 closest points. (ANSI 117.1 703.2 and 703.3)
 3. Helvetica Regular typestyles with proportions that comply with ANSI 117.1 703.2 and 703.3 and CBC 1117B.5.3, whichever is more stringent:
- E. Braille:
1. Rounded or domed dots in accordance with ANSI 117.1 (703.5).
 2. Specifications in accordance with CBC (1117B.5.2) and ANSI 117.1. (703.5), whichever is more stringent.
 3. No indication of capital letters except for proper names, individual letters or acronyms, or beginnings of sentence in accordance with ANSI 117.1 (703.5).

2.03 PARKING LOT SIGNS

- A. Tow-Away Signs:
1. 18 inches x 24 inches x 0.080 inch aluminum, rounded corners. White reflective graphics on dark blue reflective background. Character styles and proportions shall comply with ANSI 117.1 (703.4) and shall be a minimum of one inch high.
 2. Sign shall be installed on a wall or pole at each entrance to the parking lot or lots on the Project site. Pole shall be 2" x 2" galvanized steel tube weighing a minimum of 4.31 lbs.

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per foot conforming to ASTM A500, Grade B, 3/16" wall thickness. Provide metal cap at top of tube. Weld all edges, grind smooth. Repair all scratches, holes and imperfections to galvanized coating.

B. Accessible Parking Identification Signs:

1. 12 inches x 18 inches, 0.080 inch aluminum, rounded corners. White reflective graphics on dark blue reflective background. ISA shall be minimum 8 inches high. Van accessible spaces shall include the words "Van Accessible" below the pictogram on the same sign, or a separate sign with the words shall be installed below the ISA sign.
2. Sign shall be installed on a wall or a pole at the head of each accessible parking space. Signs in the public way shall be installed with the bottom edge of the sign a minimum of 80 inches above the pavement or ground. Signs in a planting area, parking strip or on a wall shall be installed with the bottom edge of the sign a minimum of 60 inches above the pavement or ground; comply with ANSI A117.1.

2.04 EXTERIOR DIRECTIONAL AND INFORMATIONAL SIGNS

A. Accessible Path of Travel Signs:

1. 0.080 inch aluminum rounded corners; white on dark blue background; non-glare, high contrast signs. ISA minimum 4-1/2 inches high, conforming to ANSI 117.1-1198 (703.7). Text to conform to ANSI 117.1 (703.4).
2. Sign to be mounted on post or wall with the lower edge of the sign between 48 inches and 60 inches above the ground or surface.

B. Other Informational and Directional Signs: Signs to be non-glare and high contrast. Text to conform to ANSI 117.1 (703.4).

2.05 GEOMETRIC TOILET ROOM DOOR SIGNS.

A. Signs shall comply with CBC (1115B.5). Geometric signs shall be 1/4 inch thick, fabricated of a non-glare material which shall contrast with the restroom door (light to dark, or dark to light). Circle shall be 12 inches in diameter; stand-alone triangle shall have equal sides 12 inches in length. Triangle placed on circle shall not protrude outside of circle. When restroom or other sanitary facility is accessible, ISA shall be placed in the center of the geometric sign. Non-tactile text, such as "Staff Only", may be added to the sign.

B. Signs shall be installed on the door leading into the restroom or other sanitary facility, centered on the door, and with the center of the sign 60 inches from the finished floor.

2.06 ROOM CAPACITY SIGNS

A. Room or spaces having an occupant load of more than 50 where fixed seats are not installed, and which are used for classroom, assembly, or similar purposes, shall have the capacity of the room posted in a conspicuous place near the main exit or exits from the room or space. In multipurpose rooms or spaces, the maximum number of occupants permitted for each use shall be indicated.

B. The sign shall read:

MAXIMUM ROOM CAPACITY	XXX	OR	ROOM CAPACITY DINING	XXX
			ASSEMBLY	XXX

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- C. Type: Color, material and letter style to match other aluminum identification signs; plate size approximately 10" x 3-1/2" to 5" high with 1 inch high letters.
- D. Coordination: Architect shall coordinate all room capacity sign locations and types and shall indicate same on the Drawings.

PART 3 - EXECUTION

3.01 GENERAL

- A. Non-glare (non-reflective) materials shall be furnished for signs, which identify, direct to, or give information about facilities and their use. Parking, traffic signs, and exterior safety signs may be furnished with reflective materials. Identification sign for accessible parking spaces shall be furnished with reflective materials.
- B. Characters shall have a minimum of 70 percent contrast with their backgrounds on signs which identify, direct to, or give information about facilities and their use.
- C. Character styles, proportions and sizes on signs shall comply with ANSI 117.1 (703.4.2.) and CBC 1117B.5.3, whichever is most stringent. Characters required to be tactile shall comply with ANSI 117.1 (703.2.4 and/or 703.3.3) and CBC 1117B.5.3, whichever is most stringent.
- D. Braille translations of room and space identifications shall be Grade 2 and Braille cells and dots shall comply with ANSI 117.1 (703.5) and CBC, (1117B.5.2) whichever is most stringent.
- E. Pictograms and Symbols of Accessibility shall comply with the standards in ANSI A117.1. (703.6 and/or 703.7).
- F. Restrooms shall be identified with a geometric symbol on the door, which complies with CBC (1115B.5).
- G. Signs required by the State Fire Marshal shall comply with CBC.

3.02 METHODS OF INSTALLATION

- A. Interior Identification Signs and Interior Directional Signs:
 - 1. Fasten to wall with 4 tamper-proof round-head screws, one at each corner of sign. Furnish plastic anchors.
 - 2. When concealed installation is specified, install backplate to wall as above. Fasten sign to backplate with very high-bond double-faced tape.
 - 3. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.
- B. Geometric Signs: Geometric toilet room signs shall be fastened to doors with 3 tamper-proof oval-head counter-sunk screws.
- C. Exterior Post Mounted Directional Signs: Install by post mount. Size of required footing shall be as indicated.
- D. Exterior Wall Mounted Identification Signs and Directional Signs:

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1. Aluminum signs: Fasten to wall with 4 tamper-proof round-head screws, one at each corner of sign. Furnish lead anchors.
2. Acrylic signs: Install backplate to wall as above. Fasten sign to backplate with very high-bond double-faced tape and silicone.
3. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.

E. Exterior Building Sign:

1. Each letter shall be furnished with a minimum of 3 cast mounting lugs on backside, drilled and tapped to receive installation bolts.
2. Letters shall be installed according to manufacturer's method PMC-1. Letters shall be installed 3/4 inch away from wall surface, by an aluminum sleeve spacer.

3.03 CLEANUP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 10441 - CAST LETTERS SIGN

PART I – GENERAL

1.01 SCOPE

- A. Furnish all materials, labor and equipment necessary to complete installation of cast letter sign shown on drawings and herein specified. Installation shall include all appropriate hardware and adhesive.

1.02 SUBMITTALS

- A. Manufacturer's illustrated product literature and specifications.
- B. Installation instructions.
- C. Complete shop drawings.

1.03 QUALITY ASSURANCE

- A. Manufacturer to have a minimum of 5 years experience in manufacturing signage.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER OR MANUFACTURER'S REPRESENTATIVE

- A. Metallic Arts, 914 North Lake Road, Spokane Valley, WA 99212, Phone: (800)541-3200, Fax: (509)483-1759, info@metallicarts.com, www.metallicarts.com.
- B. Owner approved equal.

2.02 MATERIAL

- A. Material: Aluminum alloy 356.
- B. Finish: Clear anodized.

2.03 MOUNTING

- A. Standard projected mounting with sleeve covering stud and spacing letter from face of surface. Provide mounting template.

2.04 FABRICATION

- A. Letters shall be made of cast aluminum.
- B. Letter shall be Helvetica Medium Condensed letterstyle and shall be 12" inches high, as indicated on the drawings.
- C. Finish shall be Satin.
- D. Mounting Method shall be PROJECTED- ½".

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PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install cast letters in accordance with manufacturer's written installation instructions and shop drawings.

3.02 CLEANING & PROTECTION

- A. Wash all surfaces clean following installation.

3.03 WARRANTY

- A. Metallic Arts carries a Lifetime Guarantee on all products.

END OF SECTION

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SECTION 10520 - FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Fire Extinguishers and Cabinets.
- C. Related Sections:
 - 1. Section 06100: Rough Carpentry.
 - 2. Section 09250: Gypsum Board.

1.02 SUBMITTALS

- A. Shop Drawings: Indicate materials, sizes, anchorage, and installation details.
- B. Product Data: Submit manufacturer's product literature, indicating product characteristics.
- C. Material Samples: Submit manufacturer's standard cabinet color samples for selection by Architect.

1.03 QUALITY ASSURANCE

- A. Installer shall be manufacturer-trained and certified to install the Work of this section.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's wrapping to protect items.
- B. Store items in a dry, enclosed area.

PART 2 - PRODUCTS

2.01 FIRE EXTINGUISHERS AND CABINETS

- A. Location: Fire extinguisher cabinets and fire extinguishers shall be installed where indicated on Drawings or as required by authorities having jurisdiction.
- B. Manufacturer: Fire extinguishers and cabinets shall be manufactured by one of the following:
 - 1. Potter-Roemer
 - 2. J. L. Industries
 - 3. Larsen's Manufacturing
 - 4. Modern Metal Products, by Muckle

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5. Waltrous

- C. Fire Extinguisher Type: Provide a legally appropriate rechargeable fire extinguisher for every fire extinguisher cabinet and as otherwise indicated.
 1. Corridors, Administration and Special Use Rooms [Cabinet mounted]: Type ABC multi-purpose dry chemical with UL rating 2A:10B:C, 5 lb. size, also with red glossy polyester coated steel cylinder, pressure gauge, hose and horn. Maximum Height: 15 ¼". Maximum Cylinder Diameter: 4 ½".

- D. Fire Extinguisher Requirements:
 1. Design Specification:
 - a. Finish: Corrosion and impact resistant red epoxy.
 - b. Valve Stem Assembly: Metal, reusable, connects to cylinder by threaded pipefitting, aluminum or steel siphon tube, and shatter resistant plastic face gauge.
 - c. Gauge to Indicate: "Recharge," "fully charged (195 PSI)," and "over charge."
 - d. Pull Pin: Metal, reusable and securely fastened to unit with metal, aluminum chain or very heavy plastic line approximately 4 ½" long.
 - e. Mechanical Operation: Pistol grip, heavy duty metal handle (plastic not permitted), and shall be operated by a grip and squeeze lever.
 2. Manufacturer Identification/Information: Manufacturer's name, date manufactured, model number, U.L. approval seal and/or number, contents operating instructions, etc. shall be identified on the Fire Extinguisher.
 3. Warning and First Aid Label: Fire extinguisher must indicate all standard warnings concerning breathing, eyes, skin and ingestion. Provide emergency and first aid procedures.
 4. Property Identification: Label affixed at front of unit, size 2" x 4", shall read "PROPERTY OF HEMET SERVICE CENTER".
 5. Repair Parts: The manufacturer and/or their representative shall maintain within the Riverside County area an adequate stock of replacement parts, available for immediate delivery.
 6. Warranty:
 - a. Manufacturer shall provide a 5-year material warranty.
 - b. Installer shall provide a 5-year labor warranty.
 7. Material Safety Data Sheet: Provide an MSDS sheet with every shipment as set forth in the California Labor Code, Section 6390.

- E. Fire Extinguisher Cabinet: Provide semi-recessed/square trim edge cabinet with 1 ¼" to 2" projection:
 1. Potter-Roemer Fire Extinguisher Cabinet 7120:

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- a. Door Style: either DV (Duo Vertical Panel) with lock or E (Center Break Glass) with lock, glass to be clear tempered safety glass.
- b. Cabinet Door and Frame: Cold rolled steel with electrostatically applied, thermally fused polyester coating with recoatable white finish.
- c. Identification Lettering: Cabinet door to be furnished with die cut lettering indicating "FIRE EXINTGUISHER" in contrasting color to cabinet finish, and either vertical or horizontal lettering depending upon door style.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with manufacturer's recommendations.
- B. Cabinets shall be installed plumb and level, where indicated on Drawings, at heights required by authorities having jurisdiction.

3.02 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

- A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

END OF SECTION

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SECTION 10652 - ACCORDION FOLDING PARTITIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Accordion folding partitions as indicated.
- C. Related Sections:
 - 1. Section 06100: Rough Carpentry.

1.02 SUBMITTALS

- A. Shop Drawings: Submit complete shop drawings indicating construction and installation details.
- B. Product Data: Submit manufacturer's catalog data indicating products proposed for installation.
- C. Material Samples: Submit samples of vinyl fabric indicating entire range of colors and textures.
- D. Test Reports: Submit certified copies of test reports indicating results of STC performance.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. ASTM E 90 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
 - 3. ASTM E 119 - Fire Tests of Building Construction and Materials.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to the Project site in original cartons or containers, with manufacturer's labels intact and legible.
- B. Provide all means necessary to protect partitions and accessories before, during and after installation.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Folding partitions shall provide a minimum sound transmission class of 38 when tested in accordance with ASTM E 90.

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2.02 MANUFACTURERS

- A. Partitions shall be one of following:

<u>Manufacturer</u>	<u>Product Designation</u>	<u>STC</u>
Holcomb and Hoke Mfg Co., Inc.	Foldoor-SuperSoundguard X16	39
Modernfold	Soundmaster SM 8	39
Hough Mfg. Corp., Hufcor	Series 3800	38

2.03 GENERAL

- A. Partition shall be of dimensions indicated, top supported in track without floor guides, and shall be furnished complete with accessories.

2.04 MATERIALS

- A. Frames: Corrosion-resistant steel, of interlacing, collapsible and extendable hinged plates, connected and supported to provide smooth volute operation. Volute shall extend or retract equally and simultaneously.
- B. Track and Accessories: Partitions shall be furnished with track, steel ballbearing wheel trolleys with nylon treads, hardware, and accessories necessary for complete installation. Both sides of partitions shall be furnished with sound seals at top and bottom. Anchor post shall be sealed tight to wall; lead post shall provide positive seal into jamb mold. Track and moldings shall be steel finished with baked-on enamel, or heavy extruded aluminum with anodized finish as selected by Architect.
- C. Partition Covering: Flame-resistant, vinyl-coated or laminated fabric, meeting requirements of F S CC-W-408. Fabric shall not peel, craze or crack and shall provide a flame spread of 25 or less when tested in accordance with ASTM E 84.
1. Fabric shall weigh at least 36 oz. per lineal yard for single-ply covers, and at least 21 oz. when laminated to multi-ply fiberboard inner core. Fabric weight is for 54-inch wide material.
- D. Hardware and Trim: Partitions shall be furnished with latching device to provide positive closure and shall be furnished with pulls on both sides. Hardware and trim shall be dull chrome plated or anodized aluminum.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Before starting installation, related Work shall be in proper condition and location. Installation Work shall not proceed until such conditions have been corrected. Verify that variation in floor surface level is not greater than allowable tolerances by folding panel partition manufacturer.

3.02 INSTALLATION

- A. Installation shall be in accordance with manufacturer's written recommendations.
- B. Fasten track to structural support with steel hangers or brackets as indicated.

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- C. Adjust partition for smooth and easy operation.

3.03 FIELD QUALITY CONTROL

- A. Verification of Performance: Owner reserves the right to verify performance of in-place systems.
- B. Manufacturer's Field Services: Manufacturer's authorized representative shall visit the Project site to observe installation at least once a day during installation.

3.04 ADJUSTING

- A. Adjust for smooth and balanced movement of panels on track. Adjust each panel seal for optimum contact and acoustical performance.

3.05 CLEANUP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

3.06 DEMONSTRATION

- A. Before Substantial Completion, provide a 2-hour demonstration and training period to Owner personnel:
 1. Demonstrate operation of panels, from stacked open position to fully sealed position.
 2. Instruct in movement and placement of panels and activation of seals.
 3. Instruct in removal, repair and reinstallation of typical panel, including readjustment of seals.

3.07 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 10670 - METAL STORAGE SHELVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Incorporated Documents: Contract drawings, Provisions of the Bid Documents, General and Special Conditions, General Requirements, and Division 1 apply to the Work of this Section.

1.02 SYSTEM DESCRIPTION

- A. Steel Shelving: Shelving racks, single- or double-faced units, at least 85 inches high, unless otherwise indicated, of lengths and depths indicated.
1. Backs, intermediate uprights, and ends of units shall be closed or open as indicated; except that double faced units shall have closed ends.
 2. Module sizes: 24 inches, 30 inches, 36 inches, 42 inches and 48 inches wide; 12 inches, 18 inches, 24 inches, 30 inches and 36 inches deep, as indicated.
- B. Metal Finish:
1. Metal components, except aluminum and plated parts, shall be furnished with a phosphatized baked enamel factory finish installed in 2 coats with 0.001-inch minimum dry film thickness. Finish coat shall be smooth, free of streaks, drops, sags, pinholes, checks, cracks, peeling, blisters, and foreign material.
 2. Bolts, nuts and clips shall be zinc-plated.
- C. Counters and cabinets shall be fabricated of manufacturer's standard steel shelving units with counter tops and doors as indicated.

1.03 SUBMITTALS

- A. Shop Drawings: Submit plans, elevations and details indicating details of assembly, shelving locations and methods of attachment.
- B. Product Data: Manufacturer's data for special construction and non-standard shelving required.
- C. Material Samples: Submit Samples of finished metal.

1.04 QUALITY ASSURANCE

- A. Qualifications of Installer: Shelving shall be installed by a firm having at least 5 years experience in installations of comparable scope and complexity.

PART 2 - PRODUCTS

2.01 COMPONENTS

- A. As a standard, these Specifications are written for Open Clipper Units as manufactured by Penco. Provide shelf units in 12" 18" and 24" as shown on the Drawings.
- B. Shelves:
1. Shelves shall be 18 gage commercial quality, cold rolled steel and formed on 4 sides into a channel shape, reinforced full length, front and rear, with a one inch x one inch x 1/8 inch angle or a one inch x 12 gage bar or shelf shall be 22 gage with 1-3/16 inches x 13/16 inch minimum box flanges, front and back, and with lapped and welded corners. Edges shall be ground smooth, free from barbs and sharp edges.
 2. Shelves shall be reversible and interchangeable. Top and bottom shelves shall be bolted to each post.

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3. Each intermediate shelf shall be fastened with 4 one-piece clips, of a type that can be repositioned without the use of tools or special adapter and without disturbing shelving in adjoining sections.
 4. Exposed faces of shelves shall be furnished with continuous label holders, 7/8 inch minimum in height and fabricated from 24 gage steel. Fasten to shelf with 3 bolts.
- C. Posts:
1. Posts shall be formed of roll-formed angle shape, 1-3/4 inches, at least 13 gage, with holes punched as required, maximum 2 inches on center.
 2. Brace each intermediate upright and alternate backs with at least one pair of one inch x 12 gage cross bracing. Omit at sections with closed ends, backs or intermediate uprights.
 3. Double entry racks shall be furnished with 8 corner gussets of 14 gage steel instead of cross-bracing at front or back. Each gusset shall be bolted to post with 2 bolts measuring 1/4 inch in diameter and to shelf with one 1/4 inch diameter bolt.
- D. Bases: Provide a 3-inch x 20 gage steel closed base strip to top surface of bottom shelf.
- E. End and Back Panels: Panels for closed ends and backs shall be 24 gage steel, 22 gage where exposed.

PART 3 - EXECUTION

3.01 ERECTION

- A. Steel shelving shall be installed plumb and level. Install over zinc-plated floor plate, 13-gage minimum, installed under upright posts.
- B. Anchoring: Steel shelving shall be fastened to floor and walls.
1. Floor: Freestanding racks shall be fastened to floor at each exposed end and at intermediate uprights at 9 feet on center maximum. Furnish 1-1/2 inches x 11/16-inch hold-down angles, 14-gage minimum perforated for 2 fasteners as near upright as possible.
 2. Walls: Fasten shelving to walls through rear shelf flange at each end and alternate section, at top shelf and at second shelf from bottom. Omit floor anchoring.
 3. Fasteners:
 - a. Concrete: 5/16-inch diameter, 1-1/2 inches minimum penetration, and self-drilling concrete anchors.
 - b. Wood: 1/4-inch minimum diameter plated lag screw with 1-1/2 inches minimum penetration into wood.
- C. Installation of Plastic Laminate Countertop: Fasten plywood to shelf top with flat head wood screws at 18 inches on center, 5/8 inch minimum penetration, from underside of countertop, around perimeter.

3.02 ADJUSTING

- A. Install and securely tighten fasteners.

3.03 CLEANUP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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SECTION 10800 - TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide and install toilet room accessories as listed below:
 - 1. Toilet room accessories in restrooms.
 - 2. Towel and soap dispensers in restrooms and workrooms.
 - 3. Electric hand dryer in restrooms.

1.02 QUALITY ASSURANCE

- A. Acceptable manufacturers: The product model numbers indicated below and on the Drawings are Bobrick Washroom Equipment, Inc., unless noted otherwise.
 - 1. Bobrick Washroom Equipment, Inc.
 - 1. Bradley Washroom Equipment, Inc.
 - 2. American Specialties, Inc.
- B. Locked (tumbler lock) accessories shall be keyed alike except for lock on coin receiving boxes in vending equipment.

1.03 SUBMITTALS

- A. Comply with requirements of Section 01300, Submittals, regarding submittals.
- B. Product Data: Manufacturer's catalog and data sheets, parts list, and installation requirements for each accessory item specified.
- C. Matrix: Provide a matrix indicating the name of each room to receive accessories and the type and quantity of each accessory to be provided in each room.
- D. Operation and Maintenance Data: Maintenance data, operating instructions and keys required for each type of equipment and lock.

PART 2 - PRODUCTS

2.01 PUBLIC TOILETS

- A. Unless noted otherwise below, provide toilet room accessories equal to the Bobrick model numbers listed below, or approved equal.
 - 1. B-290 series with 1/4" select float plate glass mirror with 15-year silver spoilage warranty. Frame shall be 3/4" welded seamless stainless steel beveled to the glass. Size as indicated on the Drawings.
 - 2. B4288 Contura Series Multi-Roll Toilet Tissue Dispenser, surface-mounted at each non-accessible stall in toilet rooms.

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3. B-4388 Dual Roll, Semi-recessed Toilet Tissue Dispenser, stainless steel, at each accessible stall in toilet rooms.
4. B-4112 Soap Dispenser, stainless steel, Contura Series, surface-mounted at each sink in non-toilet room locations and as indicated on Drawings in toilet rooms.
5. B-26212 Singlefold Paper Towel Dispenser, stainless steel, surface-mounted at each sink in non-toilet room locations only.
6. B-5806 series 1-1/2" diameter stainless steel Grab Bar with concealed mounting.
7. B-4369, Paper Towel Dispenser and Waste Receptacle, Contura Series, stainless steel, semi-recessed.
8. B-4221, Seat Cover Dispenser, surface-mounted in toilet rooms where indicated.
9. B-4353 Sanitary Napkin Disposal, Contura Series, recessed at each accessible stall in toilet rooms.
10. B-270 Sanitary Napkin Disposal, Contura Series, surface-mounted at each non-accessible stall in toilet rooms.
11. Hand Dryer: Surface-mounted Model One, as manufactured by Comac Corporation, 4" maximum projection from finish wall surface, cast zinc and steel cover, stainless steel finish. Coordinate with electrical.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Check wall opening for correct dimensions, plumbness of blocking or frames, and other preparation that would affect installation of accessories.
- B. Check areas to receive surface mounted units for conditions that would affect quality and execution of work.
- C. Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories.
- D. Do not begin installation of washroom accessories until openings and surfaces are acceptable to contractor or architect.

3.02 INSTALLATION

- A. Install accessories at locations and height indicated level and plumb. Installation methods shall be in accordance with manufacturer's recommendations. All exposed fasteners to be tamper-proof. Finish of exposed fasteners to match items secured.
- B. Toilet accessories required to be accessible shall be mounted at heights according to 2007 CBC Section 1118B, 1115B.8. Toilet paper and feminine napkin dispensers located on the grab side of an accessible toilet room or stall shall not project more than 3" from the finished wall surface nor be located closer than 1½" clear of the tangent point of the grab bar.
- C. Install manufacturer's recommended anchor system for all grab bars.
- D. Conceal evidence of drilling, cutting and fitting on adjacent finishes.
- E. Fit flanges of accessories snug to wall surfaces. Caulk gaps between flanges and finish wall surfaces after accessories are installed.
- F. Where plywood backing is used, finish and paint the edges grey or silver.

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3.03 ADJUST AND CLEAN

- A. Adjust accessories for proper operation.
- B. Clean exposed surfaces prior to final inspection.
- C. Deliver accessories schedule, keys and parts manual as part of project closeout documents. For owner's permanent records, provide two sets of the following items of manufacturer's literature:
 - 1. Technical data sheets of each item used for the project.
 - 2. Service and parts manuals.
 - 3. Name and local representative to be contacted in the event of need of field service or consultation.

END OF SECTION

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SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 15.
- B. This Division is an integrated whole comprising interrelated and interdependent Sections and shall be considered in its entirety in determining requirements of the Work.
- C. Refer to other sections of this Division for additional requirements or information regarding the subjects of this Section.

1.02 SECTION INCLUDES

- A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:
 - 1. Submittals.
 - 2. Coordination drawings.
 - 3. Record documents.
 - 4. Maintenance manuals.
 - 5. Rough-ins.
 - 6. Mechanical installations.
 - 7. Cutting and patching.

1.03 SUBMITTALS

- A. General: Follow the procedures specified in Division 1.
- B. Mechanical Submittals: Increase the number of mechanical related shop drawings, product data, and samples submitted to allow for required distribution by one additional copy, which will be retained by the Mechanical Consulting Engineer.
- C. Product Data: Assemble "product data" into tabbed brochures according to main areas of work i.e. Fire Protection; Plumbing; H.V.A.C.; Temperature Control; Testing, Adjusting, and Balancing.
 - 1. Assemble each brochure with tabbed separators for each Specification Section where products are noted to be submitted, with separate tabs for each product listed.
 - 2. Temperature "control shop drawings" may be submitted separately after preparations for review.
 - 3. For items such as valves, hangers and accessories, indicate specific items and where they are to be used.
 - 4. Contractor need only to submit for review those items specified to be submitted, unless requested by the Architect for special review.
- D. Submit for review, only the specific items required in this Section or other Sections of Division 15.

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- E. Additional submittals shall include but not limited:
 - 1. Air balance reports and equipment data record drawings.
 - 2. Certification of completion of testing.
 - 3. Certification of completion of operation instructions.
 - 4. Operating instruction brochure.
 - 5. Maintenance instruction brochures.
 - 6. Equipment guarantees.
 - 7. 1/4" = 1'-0" or larger scale layouts of "Equivalent" equipment or "Or Approved Equal" equipment.
 - 8. Coordination Drawings, where requested or required.
- F. Submittal materials will be reviewed for substantial conformity with the intent of the contract plans and specifications only. Such review does not indicate approval of dimensions, quantities, coordination with other trades, or work methods of the contractor, which are indicated thereon.
- G. Additional copies may be required by individual sections of these specifications.

1.04 COORDINATION

- A. The Contractor shall be totally responsible for coordinating the layout of all building elements to avoid conflict of the work of the structural, mechanical, electrical systems, and architectural features of the building.
- B. The cost of any extra work of any kind caused by a conflict due to this lack of coordination shall be borne by the Contractor.

1.05 COORDINATION OF DRAWINGS

- A. Prepare coordination drawings in accordance with Division 1 to a scale of 1/4" = 1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of the installations are of importance to the efficient flow of the Work, including but not necessarily limited to the following:
 - 1. Indicate the proposed locations of piping, ductwork, equipment, and materials. Include the following:
 - a. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
 - b. Equipment for connections and support details.
 - 2. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.
- B. Submittal of "Or Approved Equal" substitutions of equipment will not be reviewed unless accompanied by coordination drawings.

1.06 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 1. In addition to the requirements specified in Division 1, indicate the following installed conditions:

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1. Record as specified in Division 1 the locations and invert elevations of underground installations.
- 1.07 MAINTENANCE MANUALS
- A. Prepare maintenance manuals in accordance with Division 1 and Division 15 Section "Supplementary Mechanical Requirements".
- 1.08 DELIVERY, STORAGE, AND HANDLING
- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- 1.09 EQUIVALENT EQUIPMENT
- A. These specifications and/or drawings names and specifies certain equipment in detail. It also names equivalent equipment by manufacturer, which is not considered to be a "substitution".
 - B. Submit equivalent equipment to the Architect for review per the requirements of Division 1, and Section "Basic Mechanical Requirements."
 - C. Equipment of Manufacturers named in Division 15 will be considered equivalent to that specified in detail and/or named on the drawings if:
 1. The proposed equipment is of equivalent quality, capacity.
 2. Equipment is as fully equipped, fits the space allotted, and has physical configuration and weight similar to the equipment specified in detail.
 - D. A complete lay out of an equipment room or area must be submitted for equivalent equipment. Notice space limitations. Layouts to include plans and section views at a scale of not less than 1/4" = 1 ft.
 - E. The Architect shall determine the acceptability of "Equivalent Equipment."

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.02 MECHANICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
 1. Coordinate mechanical systems, equipment, and materials installation with other building components.
 2. Verify all dimensions by field measurements.

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3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of mechanical system with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components in full compliance with the equipment manufacturer's recommendations. If the drawings or the manufacturer does not provide a specific space requirement for servicing equipment, provide as a minimum, horizontal distance of 36" from face of equipment to opposite vertical surface.
11. Install access panels or doors where units are concealed behind finished surfaces.
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
13. Any equipment located above a ceiling that has any component, which is serviceable shall be installed within 12" of the top of the ceiling.

3.03 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 1. In addition to the requirements specified in Division 1, the following requirements apply:
 1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 1. Uncover Work to provide for installation of ill-timed Work.
 2. Remove and replace defective work.
 3. Remove and replace Work not conforming to requirements of the Contract Documents.
 4. Remove samples of installed Work as specified for testing.
 5. Install equipment and materials in existing structures.
 6. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
- C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the new Work.
- D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

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- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 - 1. Patch existing finished surfaces and building components using experienced installers and new materials matching existing materials. For installer's qualifications refer to the materials and methods required for the surface and building components being patched.

END OF SECTION

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SECTION 15011 - SUPPLEMENTARY MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies supplementary requirements for mechanical installations and includes requirements common to more than one section of Division 15. It expands and supplements the requirements specified in Section 15010 "Basic Mechanical Requirements."

1.02 DESCRIPTION

- A. Provide a complete and operable installation, including all labor, supervision, materials, equipment, tools, apparatus, transportation, warehousing, rigging, scaffolding and other equipment and services necessary to accomplish the work in accordance with the intent and meaning of these drawings and specifications.

1.03 COORDINATION

- A. Coordination of the work is the responsibility of the Contractor.
- B. Contractor shall designate an individual competent and versed in the mechanical trades to coordinate the mechanical work with the work of other trades.

1.04 DEFINITIONS (AS USED ON DIVISION 15 DRAWINGS AND HEREIN)

- A. "Provide" means furnish, install and connect unless otherwise described in specific instances.
- B. "Piping" means pipes, fittings, valves and all like pipe accessories connected thereto.
- C. "Ductwork" means ducts, plenums, compartments, or casings including the building structure, which are used to convey or contain air.
- D. "Extend", "Submit", "Repair" and similar words mean that the Contractor (or his designated subcontractor) shall accomplish the action described.
- E. "Codes" or "Code" means all codes, laws, statutes, rules, regulations, ordinances, orders, decrees, and other requirements of all legally constituted authorities and public utility franchise holders having jurisdiction.
- F. "Products", "Materials" and "Equipment" are used interchangeably and mean materials, fixtures, equipment, accessories, etc.
- G. "Utility Areas" are defined as mechanical, electrical, janitorial, and similar rooms or spaces which are normally used or occupied only by custodial or maintenance personnel. "Public Areas" are defined as the rooms or spaces, which are not included in the utility areas definition.
- H. "Building Boundary" includes concrete walkways immediately adjacent to the building structure.
- I. "Below Grade" means buried in the ground.
- J. "Substantial Mechanical Completion" means all components of all systems are functioning but lacking in final adjustment.

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- K. Pressure rating specified (such as for valves and the like) means design working pressure for and with references to the fluid, which the device will serve.

1.05 RELATED WORK

- A. Coordination: Refer to Architectural, Civil, Structural, and Electrical Drawings for the construction details and coordinate the work of this Division with that of other Divisions. Order the work of this Division so that progress will harmonize with that of other Divisions and all work will proceed expeditiously. The work of this Division shall include direct responsibility for the correct placing and connection of mechanical work in relation to the work of other Divisions.
- B. Examine other Divisions for work related to the Work of this Division, especially Division 16 - Electrical.

1.06 EXISTING CONDITIONS

- A. Visit the site prior to bidding and investigate the existing conditions, which affect or will be affected by the work of this Division. Become thoroughly familiar with the working conditions and take into account any special or unusual features peculiar to this job. By the act of submitting a Bid, the Contractor will be deemed to have complied with the foregoing, to have accepted such conditions, and to have made allowance therefore in preparing his Bid.
- B. The location of existing concealed utility lines are shown in accordance with reference data received by the Architect. The Architect does not guarantee the accuracy of such data. The points of connection are therefore approximate and the Bidder shall include adequate funds in his Bid to cover costs of connection regardless of their exact location.
- C. Exercise extreme caution during trenching operations. Repair the damage caused by such operations to existing utility lines at no cost to the Owner, whether the lines are shown on drawings or not.

1.07 DRAWINGS AND SPECIFICATIONS

- A. These drawings and specification do not include necessary components for construction safety.
- B. All provisions shall be deemed mandatory except as expressly indicated as optional by the word "may" or "option".
- C. Except where dimensioned, the drawings relating to this division are a diagrammatic presentation of the design concept, which indicates the general area where piping and ductwork is to be run. The drawings do not necessarily indicate any and all offsets and configurations required for coordination with other trades. The contractor is responsible for the correct placing of his work, and the proper location and connection of his work in relation to the work or other trades.

1.08 WATER (DOMESTIC AND FIRE), SANITARY SEWERS AND NATURAL GAS SERVICES

- A. Within 5 days after award of Contract, notify the serving utilities that the project is under construction and apply for permanent service in the name of the Owner. Furnish pertinent load and location information to them including the required dates for permanent service. Verify service locations and conform to utility company requirements.
- B. Contractor shall pay charges for permanent service connections levied by the utilities for which he will be reimbursed by the Owner. The reimbursement shall be limited to the actual amount of the utility service charges and a copy of the billing from the utility company shall accompany

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the Contractor's invoice.

1.09 PERMITS AND INSPECTIONS

- A. Obtain, schedule and pay for permits, licenses, approvals, tests, and inspections required by legally constituted authorities and public utility franchise holders having jurisdiction over the work.
- B. Afford the Architect's representative every facility for evaluating the skill and competence of the mechanics and to examine the materials. Concealed work shall be reopened when so directed during his periodic visits.

1.10 CODES AND REGULATIONS

- A. By submitting a Bid, Contractor is deemed to represent himself as competent to accomplish the work of this Division in conformance with applicable Codes. In case of conflict between the Contract Documents and Code requirements, the Codes shall take precedence. Should such conflicts appear, cease work on the parts of the contract affected and immediately notify the Architect in writing. It shall be the Contractor's responsibility to correct, at no cost to the Owner, any work he executes in violation of Code requirements. Specific references to codes elsewhere in this Division are either to aid the Contractor in locating applicable information or to deny him permission to use options, which are permitted by Codes.
- B. Applicable Codes: (Current editions unless otherwise noted)
 - 1. All local codes; city and/or county as applicable.
 - 2. OSHA requirements
 - 3. Uniform Building Code
 - 4. California Code of Regulations (CCR) Titles (as applicable)
 - 5. Fire Marshal Regulations
 - 6. State, County, City Health Department Ordinances and Regulations
 - 7. Regulations of all other authorities having jurisdiction.
 - 8. California Mechanical Code.
 - 9. California Plumbing Code.
- C. Where conflict or variation exists amongst Codes, the most stringent shall govern.

1.11 RECORD AND DOCUMENTATION

- A. Accumulate the following and deliver to the Owner's representative prior to final acceptance of the work.
 - 1. Record (As-Built) Drawings:
 - a. Maintain in good order in the field office a complete set of prints for all work being done under Division 15. Update the drawings daily with neat and legible annotations in red ink showing the work as actually installed.
 - b. The actual size, location and elevation of all buried lines, valve boxes, manholes, monuments, and stubouts shall be accurately located and dimensioned from building walls or other permanent landmarks.
 - c. Furnish the originals.

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2. Operation and Maintenance Manual: Furnish an operation and maintenance manual covering the stipulated mechanical systems and equipment. Seven copies of the manual, bound in hardback binders or an approved equivalent, shall be provided to the Architect.
3. Furnish one complete manual prior to the time that system or equipment tests are performed.
4. Furnish the remaining manuals before the contract is completed.
5. The following identification shall be inscribed on the cover:

OPERATION AND MAINTENANCE MANUAL
PROJECT TITLE
CONTRACTOR

1.12 TABLE OF CONTENTS

- A. Provide a table of contents. Insert tab sheets to identify discrete subjects. Instruction sheets shall be legible and easily understood, with large sheets of drawings folded in. The manual shall be complete in all respects for all materials, piping, valves, devices and equipment, controls, accessories and appurtenances stipulated. Include as a minimum the following:
 1. Updated approved materials lists, shop drawings and catalog information of all items of mechanical system equipment.
 - a. System layout showing piping, valves and controls.
 - b. Wiring and control diagrams with data to explain detailed operation and control of each component.
 - c. A control sequence describing start-up, operation and shutdown.
 - d. Detailed description of the function of each principal component of the system.
 - e. Procedure for starting.
 - f. Procedure for operating.
 - g. Shut-down instructions.
 - h. Installation instructions.
 - i. Adjustments, maintenance and overhaul instructions.
 - j. Lubrication schedule including type, grade, temperature range and frequency.
 - k. Safety precautions, diagrams and illustrations.
 - l. Test procedures.
 - m. Performance data.
 - n. Parts lists, with manufacturer's names and catalog numbers.
 - o. Preventive maintenance schedule.
 - p. Service organization with name, address and telephone number.
 - q. Valve identification chart and schedule.
 - r. ASME certificates.
 - s. Air balance report.
- B. Standards Compliance: Where equipment or materials are specified to conform with requirements of standards of recognized technical or industrial organizations such as American National Standards Institute (ANSI) American Society for Mechanical Engineers (ASME) American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), American Society for Testing Materials (ASTM), Underwriters Laboratories (UL), American Gas Association (AGA), American Refrigeration Institute (ARI), or National Electrical Manufacturer's Association (NEMA), that use a label or published listing as a method of indicating compliance, proof of such conformance shall be submitted and approved. The label or listing of the specified organization will be acceptable evidence.

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- C. Certificates of Conformance or Compliance: Submit original and not pre-printed certifications. Do not make statements in the certifications that could be interpreted to imply that the product does not meet all requirements.
- D. Certified Test Reports: Certified Test Reports are reports of tests conducted on previously manufactured materials or equipment identical to that proposed for use. Before delivery of materials and equipment, submit certified copies of test reports specified in the individual sections.
- E. Factory Tests: Factory tests are tests, which are required to be performed on the actual materials or equipment, proposed for use. Submit results of the tests in accordance with the requirements for laboratory test results of this Contract.
- F. Permits and Certificates of Inspection: Furnish the originals.
- G. Testing procedures and test results required in this and other sections. Furnish 2 copies.
- H. Other data required by other sections of this Division. Furnish 2 copies.

1.13 CONSTRUCTION COST BREAKDOWN

- A. Prepare and submit for review a construction cost breakdown for the major subdivisions of the mechanical work in accordance with General and Supplemental Conditions and Division 1.
- B. Subdivide each item on the breakdown into two headings: labor and materials. Include overhead and profit in each entry.
- C. Submit one copy of the breakdown directly to the Engineer and the remaining copies sent through regular channels.

1.14 TOOLS

- A. Provide all special tools needed for proper operation and routine adjustment and maintenance of systems and equipment. Deliver tools to Owner's representative and request a receipt for same.

1.15 WARRANTIES

- A. Refer to Division 1 Section for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.
- B. Where periods more than one year are specified in the specifications, such longer periods shall govern. However, when any component fails at any time during this period, the warranty period for such component and all other components, which are inactive because of, said failure shall be suspended. The warranty period for such components shall resume to run for the remaining portion of the warranty period when failed component is completely repaired and in operation; however, in no case shall the resumed portion of the warranty period be less than 3 months in duration.
- C. Neither payment for work, nor total or partial occupancy of work by the Owner, within or prior to the warranty period specified, shall be construed as acceptance of faulty work or shall condone any negligence or omission of Contractor in doing the work.
- D. Compile and assemble the warranties specified in Division 15, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.
- E. Provide complete warranty information for each item to include product or equipment to include

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date of beginning of warranty or bond; duration of warranty or bond; and names and addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

1.16 SEISMIC RESTRAINT

- A. Provide seismic restraint for mechanical equipment, piping, and ductwork.
- B. Contractor shall submit certification of suitability of seismic restraint methods signed by Structural Engineer registered in State of California.
- C. Contractor may refer to details applicable in the SMACNA, "GUIDELINES FOR SEISMIC RESTRAINT OF MECHANICAL SYSTEMS", using the 'g' forces for "other buildings" classification CCR Title 24. Deliver a copy of these Guidelines to the Owner's Resident Inspector.

1.17 SYSTEM OPERATIONAL TESTS

- A. The Contractor shall inform the Owner one week prior to starting this testing in order that the Owner's representative may be present.
- B. After balancing and prior to final inspection, the contractor shall operate all systems continuously trouble free and stable for a minimum period of fourteen (14) consecutive days including Saturday and Sunday. Each day shall be a minimum of an 8-hour day. Should a problem arise, the fourteen (14) day period shall be restarted and repeated until successfully operated for full 14 days. A written report certified by the Owner's representative shall indicate the successful completion of a stable and trouble free 14-day period.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Standard Products: Materials and equipment shall be essentially the standard cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be their latest standard designs that comply with the specification requirements.
- B. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use at least two years prior to bid opening, unless more stringent requirements are specified. Where two or more units of the same type of equipment are required, these units shall be products of a single manufacturer. The components thereof, however, are not required to be exclusively of the same manufacturer.
- C. Each major component of equipment shall have manufacturer's name, address, model, and serial number on a nameplate securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.
- D. Whenever on the plans, or in these specifications, products are identified by the name of one manufacturer, it is intended that equivalent products of other manufacturers are acceptable, unless otherwise indicated, if accepted as a substitution by the Architect.

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- E. Where three or more manufacturers are listed as "acceptable manufacturers" however, then the products furnished shall be the product of one of the manufacturers listed. Manufacturers listed as "acceptable manufacturers" shall be considered "Equivalents" and shall meet quality and performance of a particular one specified by both name and catalog number.

2.02 PRODUCT LISTING

- A. When two or more items of same material or equipment are required (plumbing fixtures, pumps, valves, air conditioning units, etc.) they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in Work, except as otherwise indicated.

2.03 NAMEPLATE DATA

- A. Provide permanent operational data nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, model name, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

2.04 SUBSTITUTIONS

- A. General: Submittals of "Substitutions" shall be in accordance with requirements of Division 1.
- B. By proposing a substitution, it is deemed that the Contractor shall bear the cost of any changes (whether architectural, structural, electrical or mechanical) necessary to accommodate the substitution, if said substitution is accepted.
- C. Specific: Refer to other sections of this Division for additional requirements.

2.05 SUBMITTALS

- A. General: Make submittals in accordance with requirements of Division 1.
- B. Specific: Refer to other sections of this Division for additional requirements.

PART 3 - EXECUTION

3.01 WORKMANSHIP AND INSTALLATION METHODS

- A. Workmanship shall be in the best standard practice of the trade.
- B. Install equipment in accordance with the manufacturer's instructions and recommendations unless otherwise noted or specified.

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3.02 TESTS

A. General:

1. Demonstrate that all components of the work of this Division have been provided and that they operate in accordance with the Contract Documents.
2. Provide instruments and personnel for tests and demonstrations. Submit signed test results.

B. Specific: Refer to the other sections of this Division for test requirements.

3.03 DELIVERY, HANDLING, STORAGE OF MATERIALS AND PROTECTION OF WORK

A. Protect materials against dirt, water, chemical and mechanical damage both while in storage and during construction.

B. Cover materials in such a manner that no finished surfaces will be damaged, marred or splattered with plaster or paint, and all moving parts will be kept clean and dry.

C. Replace or refinish any damaged materials including fronts of control panels, ductwork fittings, and shop-fabricated ductwork.

D. Keep cabinets and other openings closed to prevent entry of foreign matter.

E. Specific: Refer to other sections of this Division for additional requirements.

3.04 PROJECT CONDITIONS

A. Check and coordinate for clearance, accessibility and placement of equipment either by going through openings provided or by placing equipment during construction. Ordering of equipment to be shipped disassembled, or disassembly of equipment at Project Site and reassembly of equipment to accomplish this requirement shall be executed without additional cost. Where provided openings are inadequate to accommodate equipment, provide new openings and restoration of same, all at no additional cost. Obtain written approval for new openings before proceeding.

B. Verify location of all plumbing fixtures and equipment within finished spaces with the Architectural Drawings. In the event that Mechanical Drawings do not indicate exact locations, or are in conflict with the Architectural Drawings, obtain information regarding proper locations. Installation of work without proper instruction under such circumstances will result in relocation of work, when directed, without additional cost.

3.05 INSTRUCTION TO OWNER PERSONNEL

A. When specified in other sections, the Contractor shall furnish, without additional expense to the Owner, the services of competent instructors who will give full instruction to the designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the equipment or system specified. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance of work. Instruction shall be given at the Owner's convenience. The number of man-days (eight-hours) of instruction furnished shall be as specified in other sections. When more than four man-days of instruction are specified, approximately half of the time shall be used for classroom instruction. All other time shall be used for instruction with the equipment or system. When significant changes or modifications are made under the terms of the contract, provide additional instructions to acquaint the operating personnel with the changes or modifications.

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- B. Contractor shall videotape, both visual and audio, instruction to Owner's personnel on the maintenance and operation of the mechanical systems.
- C. Submit certification, signed by Owner's agent that instructions have been completed and the videotape has been reviewed and delivered to the Owner.
- D. Printed operating instructions and a copy of wiring diagrams are to be mounted in all equipment areas, framed and behind glass or encased in plastic. Printed operating instructions shall include steps for starting up and securing equipment. As a precedent to final acceptance four (4) copies of instructions are to be submitted to the Architect for review. Contractor shall turn over to Owner in a neat brochure form, equipment guarantee and maintenance instructions.

3.06 CLEANING

- A. Cleaning shall be done as the work proceeds. Periodically remove waste and debris to keep the site as clean as is practical.
- B. Refer the Division 1 Section: for general requirements for final cleaning.
- C. Leave exposed parts of the mechanical work in a neat, clean and usable condition, with painted surfaces unblemished and plated metal surfaces polished.
- D. Thoroughly clean all materials, equipment and appliances. Clean and prepare all surfaces to be painted. Clean the entire premises of unused materials, debris, spots and marks to the satisfaction of the Architect.
- E. Remove, thoroughly clean and replace all strainers and automatic valves after the system has been put in operation until system is clear of all foreign matter and repeat this operation after ten (10) days and again after the system has been in operation thirty (30) days. Submit certification that this operation has been completed.

3.07 SAFETY REQUIREMENTS

- A. Enclose and guard belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts in accordance with OSHA requirements. Insulate, guard, and cover any high-temperature equipment and piping so located as to endanger personnel or create a fire hazard.

END OF SECTION

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SECTION 15012 - MECHANICAL PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements for handling requests made after award of the Contract for substitutions of products specified in Division 15.

1.02 RELATED SECTIONS

- A. Procedure for Contractor's construction Schedule and the Schedule of Submittals are included under Division 1.
- B. Standards: Refer to Division 1 for applicability of industry standards to products specified.
- C. Procedural requirements governing the Contractor's selection of products and product options are included under Division 1.
- D. Division 1 for Products and Substitutions.

1.03 DEFINITIONS

- A. "Products" is defined to include purchased items for incorporation into the work, regardless of whether specifically purchased for project or taken from Contractor's stock of previously purchased products. "Materials" is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, installed or applied to form units of work.
- B. "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, etc.). Definitions in this paragraph are not intended to negate the meaning of other terms used in contract documents, including "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction", and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

1.04 SUBSTITUTIONS

- A. The requirements for substitutions do not apply to specified Contractor options on products and construction methods. Revisions to contract documents, where requested by Owner, Architect or Engineer, are "changes" not "substitutions". Substitutions requested during bidding period, which have been accepted prior to Contract Date, are included in contract document and are not subject to requirements for substitutions as specified herein. Contractor's determination of and compliance with governing regulations and orders issued by governing authorities do not constitute "substitutions"; and do not constitute a basis for change orders, except as provided for in contract documents. Otherwise, contractor's requests of changes in products, materials and methods of construction required by contract documents are considered requests for "substitutions", and are subject to requirements hereof.
- B. Conditions: The Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.

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1. Extensive revisions to Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of Contract Documents.
3. The request is directly related to an "or approved equal" clause or similar language in the Contract Documents.
4. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
5. Contractor will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.
6. Contractor certifies that the substitution is not heavier than the specified item and does not necessitate any structural redesign; will fit within the room or area designed for the specified item; and will not exceed any maximum dimensions specified or shown on the original contract Documents. All roof mounted equipment must be less than or equal to the maximum height dimension from the finished roof as shown on the drawings.
7. Contractor represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.
8. Contractor represents that he will provide the same warranty for the substitution that he would for that specified.

1.05 SUBMITTALS

- A. Requests for Substitutions: Any request for substitution shall follow the guidelines of Substitution Requirements in Division 1.
- B. Substitution Warranty: All submittals of Request for Substitutions under the General and Supplementary Conditions of this Section shall be accompanied by a completely executed (filled out) and signed Substitution Warranty in the form entitled "Substitution Warranty", bound herein. Substitutions will not be accepted without the Substitution Warranty. In addition to other requirements, Contractor shall warrant in writing on his own letterhead that substituted materials shall perform as specified, and assume complete responsibility for same, including responsibility and costs required for modifications to building or other materials or equipment, and any additional coordination with work of other trades. Testing, if required, shall be paid by Contractor.
- C. Responsibility of Contractor: The contractor shall be solely and directly responsible for fitting accepted substitute material and equipment into the available space in a manner acceptable to the Architect, and for the proper operation of the substituted equipment with all other equipment with which it may be associated. The Contractor shall bear all costs of meeting the above requirements for presenting a proposed substitution, and if the substitution is accepted, he must bear all costs involved.
- D. Submit the following as part of the Request for Substitutions:
 1. Data showing proposed equipment is "equal" to that specified and is fully equipped, fits the space allotted and has physical configuration and weight similar to the equipment specified in detail.
 2. A complete layout, where applicable, of equipment room or area must be submitted for equipment proposed in "Request for Substitution". Submittal shall conform to requirements of Division 1 and Section 15010 "Basic Mechanical Requirements" as it applies to "Coordination Drawings."
 3. Seismic Restraint: Where seismic restraint is required for products or equipment as specified, methods of seismic restraint signed by structural engineer registered in the State of California, shall be submitted for review to the Authority Having Jurisdiction.

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1.06 ARCHITECT'S ACTION

- A. The Architect may request additional information or documentation necessary for evaluation of the request. Requests, by the Architect, for additional information or documentation will be in accordance with Division 1 requirements. The Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

- A. Substitutions shall conform to the product requirements for the specified products or equipment.

PART 3 - EXECUTION

(Not Applicable.)

END OF SECTION

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SAMPLE

S U B S T I T U T I O N S W A R R A N T Y

In addition to other requirements, Contractor shall warrant in writing that substituted materials shall perform as specified, and assume complete responsibility for same, including responsibility and costs required for modifications to building or other materials or equipment, and any additional coordination with work of other trades. Testing, if required, shall be paid by contractor. The following is an example of the type Substitution Warranty which shall be executed by the Contractor, on his own letterhead:

SUBSTITUTION WARRANTY

We propose to provide

 (Describe items being proposed for substitution)

for _____ in lieu
of _____

(List project name)

as indicated on the drawings and described in Section _____ of the Specifications.

We agree to assume the cost of any modifications to other portions of the work as necessary to accommodate or material(s) and system(s).

We hereby warrant that _____

is the equivalent of _____
 (Specified Product)

in every respect and will perform satisfactorily under the conditions and use indicated on the Drawings and described in the Specifications.

Signed: _____
 (Manufacturer/Supplier/Other)

Date: _____

Signed: _____
 (Subcontractor)

Date: _____

Signed: _____
 (Contractor)

Date: _____

NOTE:
 Affix Corporate Seal over Signatures.

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SECTION 15030 - ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies the basic requirements for electrical components, which are an integral part of packaged mechanical equipment. These components include, but are not limited to factory-installed motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment.
- B. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are scheduled on Drawings.
- C. All motors, power driven equipment and automatic control equipment, except motor starters as hereinafter set forth required and connected with the work of this section of the specifications are to be furnished and installed under Division 15.
- D. Control low (24V) and control line (120V) voltage wiring, conduit and related switches and relays required for the automatic control and/or interlock of motors and equipment includes final connection, are to be furnished and installed under Division 15. Materials and installation to conform to Class 1 or 2, CAC Title 24, Article E725, and as restricted under Division 16 of these specifications.
- E. Power wiring, conduit, outlets, disconnect switches, motor starters and motor-rated contactors, and making of final connections, except as hereinafter specified, are to be furnished and installed under the Division 16 of these Specification.
- F. All power supply wiring for providing a power source to control dampers, control valves, VAV boxes, control transformers, etc., shall be furnished and installed under Division 16.
- G. Identify circuits and equipment as outlined in the Electrical Sections of these Specifications.
- H. Coordinate requirements for underground conduit only between buildings for control interlocks shown on the drawings. This conduit to be furnished and installed under Division 16 of these Specifications.
- I. Space provisions have been made on electrical panels for control power source.

1.02 RELATED SECTIONS

- A. Separate electrical components and materials required for field installation and electrical connections are specified in Division 16.
- B. This section applies to all Division 15 sections specifying packaged mechanical equipment.

1.03 REFERENCES

- A. NEMA Standards MG 1: Motors and Generators
- B. NEMA Standards ICS 2: Industrial Control Devices, Controllers, and Assemblies
- C. NEMA Standard 250: Enclosures for Electrical Equipment

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- D. NEMA Standard KS 1: Enclosed Switches
- E. Comply with National Electrical Code (NFPA 70).
- F. California Code of Regulations (CCR), Title 24

1.04 SUBMITTALS

- A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification sections.

1.05 QUALITY ASSURANCE

- A. Electrical components and materials shall be UL labeled.

PART 2 - PRODUCTS

2.01 MOTORS

- A. Provide all motors necessary for equipment under the Mechanical Work. See Electrical Drawings for voltage and phase of electrical services.
- B. The following are basis requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.
 - 1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
 - 2. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
 - 3. 2-speed motors shall have 2 separate windings on poly-phase motors.
 - 4. Temperature Rating: As a minimum motors shall be rated for 40 degree C environment with maximum 50 degree C temperature rise for continuous duty at full load (Class A Insulation).
 - 5. Starting capability: Frequency of starts as indicated by automatic control system, and not less than 5 evenly time spaced starts per hour for manually controlled motors.
 - 6. Service Factor: 1.15 for poly-phase motors and 1.35 for single-phase motors.
 - 7. Motor construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.
 - a. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.
 - b. Bearings:
 - 1) Ball or roller bearings with inner and outer shaft seals.
 - 2) Re-greasable bearings, except permanently sealed where motor is normally inaccessible for regular maintenance.
 - 3) Bearings designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.
 - 4) Bearings for fractional horsepower, light duty motors, sleeve type bearings are permitted.
 - c. Enclosure Type:
 - 1) Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation.
 - 2) Guarded drip-proof motors where exposed to contact by employees or building occupants.

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- 3) Weather protected Type I for outdoor use, Type II where not housed (Epoxy encapsulated or TEFC).
- d. Overload protection: Polyphase built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter. Single phase, provide thermal overload protection.
- e. Noise rating: "Quiet".
- f. Efficiencies shall be guaranteed minimum values in accordance with the following tabulation. Efficiencies shall be established in accordance with NEMA Test Standards MG1-12.53A using IEEE Test Procedure 112, Method B:

<u>HP</u>	<u>EFFICIENCY</u>
1 - 2	81.5
3 - 5	86.5
7-1/2 - 10	90.6
15	92.0

- g. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.
- h. Provide all motors with junction boxes or terminals boxes and provide adjustable slide rails for all motors with belt drives.
- i. Motors rated 1 HP and larger shall have shaft, bearings and etc. capable of operating with multiple grooved sheaves and two or more belts.
- j. V Type Belt Drives: Drives requiring not more than 2 belts; variable pitch type; size for mid-point of operating range. Drives requiring 3 or more belts; nonadjustable constant speed type. Provide belts in matched sets.

2.02 MOTOR STARTERS

- A. Unless provided as part of packaged mechanical equipment or otherwise indicated, starters for motors will be provided under Division 16. Provide to Division 16 the data necessary for motor starter heater sizing for all motors.
- B. Starters for factory packaged mechanical equipment specified under Division 15 shall be provided as part of the package.
- C. Motor Starter Characteristics:
 - 1. Enclosures: NEMA 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA 3R with conduit hubs, or units in hazardous locations, which shall have NEC proper class and division.
 - 2. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and start-up condition.
- D. Manual switches shall have:
 - 1. Pilot lights and extra positions for multi-speed motors.
 - 2. Overload protection: melting alloy type thermal overload relays.
- E. Magnetic Starters:
 - 1. Maintained contact push buttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated.
 - 2. Trip-free thermal overload relays, each phase.
 - 3. Interlocks, pneumatic switches and similar devices as required for coordination with control requirements of Division-15 Controls sections.
 - 4. Built-in control circuit transformer, fused from line side, where service exceeds 240 volts.

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5. Externally operated manual reset.
6. Under-voltage release or protection.

F. Motor Connections:

1. Flexible conduit, except where plug-in electrical cords are specifically indicated.

2.03 DISCONNECT SWITCHES

- A. When applied as part of factory furnished and mounted equipment, disconnects shall meet the requirements for disconnect switches set forth in Division 16.

PART 3 - EXECUTION

3.01 SEISMIC RESTRAINT

- A. All electrical devices to be seismically restrained per Division 16.

END OF SECTION

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SECTION 15052 - SELECTIVE DEMOLITION – MECHANICAL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes limited scope of selective mechanical demolition work as follows:
 - 1. Nondestructive removal of materials and equipment for reuse or salvage as indicated.
 - 2. Dismantling mechanical materials and equipment made obsolete by these installations.

1.02 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 and 15 Specification Sections.
- B. Schedules indicating proposed methods and sequence of operations for selective demolition prior to commencement of Work. Include coordination for shut-off of utility services and details for dust and noise control.
 - 1. Coordinate sequencing and Owner occupancy specified in Division 1.
 - 2. Coordinate other selective demolition work as outlined in Division 1.

1.03 PROJECT CONDITIONS

- A. Conditions Affecting Selective Demolition: The following project conditions apply:
 - 1. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
 - 2. Locate, identify, and protect mechanical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas. Provide minimum of 72-hour notice to Owner prior to utility interruption.

1.04 SEQUENCE AND SCHEDULING

- A. Coordinate the shut-off and disconnection of utility services with the Owner and the utility company.
- B. Notify the Architect at least 5 days prior to commencing demolition operations.
- C. Perform demolition in phases as indicated.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.01 EXAMINATION

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- A. Examine areas where selective demolition is to occur. Determine extent of work and affect on existing conditions to remain. Advise Architect of any conditions that might create extensive alterations beyond indicated scope.

3.02 SELECTIVE DEMOLITION

- A. General: Demolish, remove, demount, and disconnect abandoned mechanical materials and equipment indicated to be removed and not indicated to be salvaged or saved.
- B. Materials and Equipment To Be Salvaged: Remove, demount, and disconnect existing mechanical materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated for storage.
- C. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.
- D. Mechanical Materials and Equipment: Demolish, remove, demount, and disconnect the following items:
 - 1. Inactive and obsolete piping, fittings and specialties, equipment, ductwork, controls, fixtures, and insulation.
 - a. Piping and ducts embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Remove materials above accessible ceilings. Drain and cap piping and ducts allowed to remain.
 - 2. Perform cutting and patching required for demolition.

END OF SECTION

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SECTION 15055 - BASIC PIPING MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies piping materials and installation methods common to more than one section of Division 15 and includes joining materials, fire stop sealants, and basic piping installation instructions.

1.02 RELATED SECTIONS

- A. The following sections contain requirements that relate to this section:
 - 1. Division 15 Section "Basic Mechanical Requirements" applies to the work of this Section.
 - 2. Piping materials and installation methods peculiar to individual systems are specified within their respective system specification sections of Division 2 and 15.
 - 3. Valves are specified in a separate section and in individual piping system sections of Division 15.
 - 4. Expansion Compensation is specified within the respective system specification section of Division 15.
 - 5. Division 15 "Supports and Anchors".
 - 6. Division 15 "Mechanical Identification".

1.03 SUBMITTALS

- A. Refer to Division 1 and "Basic Mechanical Requirements" for administrative and procedural requirements for submittals.
- B. Product Data: Submit product data on fire stop sealants.

1.04 QUALITY ASSURANCE

- A. Welding procedures and testing shall comply with ANSI Standard B31.1.0 - Standard Code for Pressure Piping, Power Piping, and The American Welding Society, Welding Handbook.
- B. Soldering and Brazing procedures shall conform to ANSI B9.1 Standard Safety Code for Mechanical Refrigeration.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Provide factory-applied plastic end-caps on each length of pipe and tube, except for concrete, corrugated metal, hub-and-spigot, and clay pipe. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.
- C. Protect flanges, fittings, and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

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PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

- A. Refer to the individual piping system specification sections in Division 15 for specifications on piping and fittings relative to that particular system.
- B. Weld-O-Lets: Welding Weld-O-Lets may be used in lieu of tees where branch connection pipe size is two or more pipe sizes smaller than main header size.

2.02 JOINING MATERIALS

- A. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.
- B. Brazing Materials: Comply with SFA-5.8, Section II, ASME Boiler and Pressure Vessel Code for brazing filler metal materials appropriate for the materials being joined.
- C. Soldering Materials: Refer to individual piping system specifications for solder appropriate for each respective system.
 - 1. Soldering materials shall not contain lead.
- D. Gaskets for Flanged Joints: Gasket material shall be full-faced for cast-iron flanges and raised-face for steel flanges. Select materials to suit the service of the piping system in which installed and which conform to their respective ANSI Standard (A21.11, B16.20, or B16.21). Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.

2.03 SLEEVES AND SEALS

- A. Sleeves:
 - 1. Sheet-Metal Sleeves: 5" and Smaller, 20 gage galvanized sheet metal; 6" and Larger, 10 gage, galvanized sheet metal, round tube closed with welded longitudinal joint.
 - 2. Steel Sleeves: Schedule 40 galvanized, welded steel pipe, ASTM A53, Grade A.
 - 3. Galvanized steel telescoping type: Galvanized sheet metal per manufacturers standards.
 - 4. Polyethylene Sleeves: Manufacturer's standard product.
- B. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.04 FIRESTOP SEALANT

- A. Fire stopping material shall be asbestos-free and capable of maintaining an effective barrier against flame and gases in compliance with the following requirements:
 - 1. Flame Spread: 25 or less, ASTM E 84.
 - 2. Smoke Development: 50 or less, ASTM E 84.
 - 3. Combustibility: Noncombustible, ASTM E 136.

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- B. Material when installed shall have the same fire rating as the assembly in which it is being installed.

2.05 PIPING ISOLATION

- A. Manufacturer's standard product for providing sound and electrolysis isolation.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ream ends of pipes and tubes, and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.

3.02 INSTALLATIONS

- A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated. Refer to individual system specifications for requirements for coordination drawing submittals.
- B. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated otherwise.
- C. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.
- D. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated on the Drawings.
- E. Install piping tight to slabs, beams, joists, columns, walls and other permanent elements of the building. Provide space to permit insulation applications, with 1" clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.
- F. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.
- G. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4" ball valve, and short 3/4" threaded nipple and cap.
- H. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals.
- I. Coordinate to provide curb, minimum 4" above finish floor, for all pipe shafts or floor openings for multiple pipes.
- J. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, or floors, the fire rated integrity shall be maintained.

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3.03 PIPE SUPPORTS AND HANGERS

- A. Horizontal Pipes: Hangers and supports shall be hung from solid rods, and lengths of which shall be adjustable. Strap hangers will not be permitted. In lieu of individual hangers, trapeze hangers may be used for parallel pipes, details of which shall be submitted to the Architect for approval. Hanger rods for both single and trapeze hangers shall be hung from suitable clips, beam clamps or inserts, as necessary. For concrete construction, inserts shall be set in forms before concrete is poured. Explosive type fasteners or studs will not be permitted. "Phillips" type shield may be used when authorized by the Architect. No piping shall be supported by any wire, rope, wood or other makeshift device.
- B. Provide hangers size and spacing per SMACNA "Guidelines for Seismic Restraint of Mechanical Systems".
- C. Where building construction does not permit the above-specified spacing of hangers, the Contractor shall provide adequate additional steel supports. Location and details shall be submitted to the Architect for approval. In all cases, pipe supports shall be spaced to provide adequate support for the pipes, the medium in the pipes, insulation, valves and fittings.
- D. All vertical pipelines shall be supported, not hung, at each floor. Malleable iron or steel pipe clamps of ample size, bolted around the pipes, shall be used for these pipe supports. All vertical water piping shall have vibration isolators between support clamp and structure.
- E. Pipe hangers shall be of the positive restraint type or be provided with approved restraint clips to prevent lateral movement of attachment.
- F. Contractor may refer to details applicable in the SMACNA "Guidelines for Seismic Restraint of Mechanical Systems".

3.04 FITTINGS AND SPECIALTIES

- A. Use fittings for all changes in direction and all branch connections.
- B. Remake leaking joints using new materials.
- C. Install Y-type strainers with blow-down valves on the supply side of each control valve, pressure reducing or regulating valve, solenoid valve, and elsewhere as indicated.
- D. Install unions adjacent to each valve, and at the final connection to each piece of equipment and plumbing fixture having 2" and smaller connections, and elsewhere as indicated.
- E. Install Flanges in piping 2-1/2" and larger, where indicated, adjacent to each valve, and at the final connection to each piece of equipment.
- F. Install dielectric unions to connect piping materials of dissimilar metals in dry piping systems (gas).
- G. Install dielectric fittings to connect piping materials of dissimilar metals in wet piping systems (water).

3.05 JOINTS

- A. Steel Pipe Joints:
 - 1. Pipe 2" and Smaller: Thread pipe with tapered pipe threads in accordance with ANSI B2.1. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint lubricant or sealant suitable for the

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service for which the pipe is intended on the male threads at each joint and tighten to leave not more than 3 threads exposed.

2. Pipe Larger than 2":
 - a. Weld pipe joints (except for exterior water service pipe) in accordance with ASME Code for Pressure Piping, B31.
 - b. Weld pipe joints of exterior water service pipe in accordance with AWWA C206.
 - c. Install flanges on all valves, apparatus, and equipment. Weld pipe flanges to pipe ends in accordance with ASME B31.1.0 Code for Pressure Piping. Clean flange faces and install gaskets. Tighten bolts to torque specified by manufacturer of flange and flange bolts, to provide uniform compression of gaskets.
- B. Non-ferrous Pipe Joints:
 1. Brazed and Soldered Joints: For copper tube and fitting joints, braze joints in accordance with ANSi B31.1.0 -Standard Code for Pressure Piping, Power Piping and ANSI B9.1 - Standard Safety Code for Mechanical Refrigeration.
 2. Thoroughly clean tube surface and inside surface of the cup of the fittings, using very fine emery cloth, prior to making soldered or brazed joints. Wipe tube and fittings clean and apply flux. Flux shall not be used as the sole means for cleaning tube and fitting surfaces.
 3. Mechanical Joints: Flared compression fittings may be used for refrigerant lines 3/4" and smaller.
- C. Joints for other piping materials are specified within the respective piping systems sections.

3.06 INSTALLATION OF SLEEVES

- A. Provide pipe sleeves for pipes to pass through walls, floor and roofs. Diameter of sleeve to be 1-inch larger than the outside diameter of pipe or pipe and covering of insulated pipe. Galvanized steel telescoping type sleeves or polyethylene may be used. Where seepage may occur, use steel pipe sleeves.
- B. All pipe sleeves through floors other than floors on grade shall extend 2-inches above finished floor and shall be caulked with mineral wool. Provide collar where polyethylene sleeve is used.
- C. Where required in existing construction, or where sleeves have been omitted, openings for pipe may be core drilled in floors and/or walls or partitions, providing prior acceptance of such core drilling is obtained from the Architect. Holes core drilled through floors above grade shall be provided with sleeves extending 2-inches above finish floor as hereinbefore specified.
- D. Seal with resilient sealant: Dow Corning "Fire Stop" or approved equal.

3.07 INSTALLATION OF FIRE STOP SEALANT

- A. Firestopping shall be provided at, but not limited to, duct, and piping penetrations through floor slabs and through time rated partitions or fire walls.
- B. Install firestopping materials in accordance with the manufacturer's instructions and the following requirements.
 1. Filling: Firestopping materials shall completely fill the void spaces.
- C. Coordination: Coordinate the work with other trades. Firestopping materials at penetrations of insulated pipes and ducts shall be applied prior to insulation, unless the insulation meets the requirements specified for firestopping.

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- D. Surface Preparation: Surfaces to be in contact with firestopping materials shall be free of dirt, grease, oil, loose material, rust, or other substances that may affect proper fitting or the required fire resistance.

3.08 INSTALLATION OF PIPE ISOLATION

- A. Provide sound and electrolysis isolation on all uninsulated, pipes, Semco "Trisolators" or Potter-Roemer "Prisolators".

3.09 INSTALLATION OF PIPE FLASHING

- A. Pipe flashing assemblies, "Semco" Fig. 1100-4, as required, seal the joint between flashing and pipe with waterproofing compound. Install counterflashing sleeve to cover a minimum of 3/4-inch to top of lead flashing, making the top joint permanently watertight.

3.10 TESTING OF PIPING

- A. Provide notification of test at least three working days prior to tests on all or part of any piping system. Do not allow or cause any piping system to be insulated, covered, concealed or enclosed until such systems have been tested and reviewed.
- B. Provide all necessary materials (including temporary isolation valves or caps), pumps, testing media and labor for testing. Temporarily remove any device in piping system, which will not withstand test pressure specified, and reinstall same after successful testing. Test time begins to accrue after full test pressure is achieved.
- C. Testing and inspection of all piping systems and associated equipment for leaks shall be accomplished after installation and cleaning and prior to placing into service. Flanges, threaded joints and all welds shall be left unpainted and uninsulated until the piping systems have been approved.
- D. A rigid visual inspection of each specific piping system shall be made prior to conducting tightness tests, to ascertain that all appurtenances and equipment are provided, properly connected and supported, and in all respects ready for testing.
- E. Equipment such as pumps, chillers, tanks, heat exchangers, flexible hose, safety valves and similar equipment shall not be subjected to the piping system test pressure. Equipment shall either be disconnected from the piping or be isolated by valves or blanks during testing and reinstalled after acceptance by the Owner.
- F. Indicating pressure gauges mounted locally may be tested with the lines provided the test pressure does not exceed the scale range.
- G. Orifice plates, rotometers, displacement meters and other line inserts shall either not be installed until completion of all testing, or shall be removed prior to any tests and reinstalled after test has been accepted by the Owner.
- H. The application of pressure to a system shall be under control at all times, so that in no case shall the test pressure be exceeded by more than 6 percent.
- I. Gauges used for testing shall be tested for accuracy as directed or approved by the Owner, and then installed as close as possible to the low point of the piping system.
- J. Do not apply test pressure until the piping system and its contents approach the same temperature.

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- K. While piping is under test, exercise care that excessive pressure does not occur due to increase in ambient temperature.
- L. Control Valves:
 - 1. Control valves which are installed with block and by-pass valve shall have the block valve closed, the by-pass valve opened, and a temporary pipe piece inserted in place of the control valve (or a test blank may be installed on each side of the control valve) until all flushing and testing of all lines of that system is completed and accepted by the Owner, after which they shall be reinstalled.
 - 2. Control valves installed without block or by-pass valves shall be replaced by a pipe piece during flushing and testing of the system. After acceptance of the flushing they shall be reinstalled.
- M. Minimum piping test pressures shall be as noted in following table; or they shall be 150 percent of design pressure for the specific system being tested, whichever is higher.

SYSTEM	TEST MEDIUM	TESTING PRESSURE (PSIG)	DURATION (HOURS)	ACCEPTABLE TOLERANCE
Soil, Water, Vent, & Storm Water	Water	10' Column of water.	4	No joint sweat
Water	Water	150	4	None. Except temperature change.
Fuel Gas	Air	60	4	None. Except temperature change.

- N. Conduct hydrostatic tests with water at a temperature below 100 degrees F.
 - 1. Fill the system slowly with water and vent at highest points to expel the air before pressurizing.
 - 2. Carefully examine all joints for leaks or defects.
 - 3. Provide connections as required to accomplish the above.
- O. Keep accurate test records of each line or system tested and provide copies of same to Owner after acceptance. Each test shall include:
 - 1. Identification of piping system and test number.
 - 2. Testing medium.
 - 3. Test pressure.
 - 4. Date of test acceptance.

3.11 ADJUSTMENTS

- A. At the completion of the Work, completely adjust all valves and equipment for their proper use and rating.

END OF SECTION

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SECTION 15100 - VALVES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes general duty valves common to most mechanical piping systems.
 - 1. Special purpose valves are specified in individual piping system specifications.

1.02 RELATED SECTIONS

- A. Division 15 Section "Mechanical Identification" for valve tags and charts.

1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract, Division 1 Specification Sections, and Section 15010 "Basic Mechanical Requirements."
 - 1. Product data, including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.
 - 2. Provide valve schedule showing manufacturer's figure numbers and sizes.

1.04 QUALITY ASSURANCE

- A. Single Source Responsibility: Comply with the requirements specified in Division 1 Section "Materials and Equipment," under "Source Limitations."
- B. American Society of Mechanical Engineers (ASME) Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- C. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) Compliance): Comply with the various MSS Standard Practices referenced.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves for shipping as follows:
 - 1. Ensure valves are dry and internally protected against rust and corrosion.
 - 2. Protect valve ends against damage to threads, flange faces, and weld-end preps.
 - 3. Set valves in best position for handling. Set globe and gate valves closed to prevent ratting; set ball and plug valves open to minimize exposure of functional surfaces; and block swing check valves in either closed or open position.
- B. Storage: Use the following precautions during storage:
 - 1. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect valves from weather. Store the valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.

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PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products from one of the manufacturers listed in valve schedule.

2.02 VALVE FEATURES, GENERAL

- A. Valve Design: Rising stem or rising outside screw and yoke stems.
 - 1. Non-rising stem valves may be used where headroom prevents full extension of rising stems.
- B. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.
- C. Sizes: Same size as upstream pipe, unless otherwise indicated.
- D. Operators: Provide the following special operator features:
 - 1. Hand wheels, fastened to valve stem, for valves other than quarter turn.
 - 2. Lever handles, on quarter-turn valves 6-inches and smaller, except for plug valves. Provide plug valves with square heads; provide one wrench for every 10 plug valves.
 - 3. Chain-wheel operators, for valves 2-1/2 inch and larger, install 72 inches or higher above finished floor elevation. Extend chains to an elevation of 5'-0" above finished floor elevation.
 - a. Provide gear drive operators, on quarter-turn valves 8-inch and larger.
- E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
- F. End Connections: As indicated in the valve specifications.
 - 1. Threads: Comply with ANSI B1.20.1.
 - 2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
 - 3. Solder-Joint: Comply with ANSI B16.18.
 - a. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg. F for gate, globe, and check valves; below 421 deg. F for ball valves.

2.03 GATE VALVES

- A. Gate Valves, 2-Inch and Smaller: MSS SP-80; Class 150, body and union bonnet of ASTM B62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron hand wheel. Do not use solder end valves for hot water heating or steam piping applications.

MANUFACTURE	THREADED NRS	THREADED RS	SOLDER NRS	SOLDER RS
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R				
Crane	X	431UB	X	X
Grinnell	3050	3060	X	X
Milwaukee	1141	1151	X	1169
Nibco	T-136	T-135	S-136	X
KITZ	x	42	x	43

1. "x" means not available.

- B. Gate Valves, 2-1/2 Inch and Larger: MSS SP-70; Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A126 class B; with flanged ends, "Teflon" impregnated packing, and two-piece backing gland assembly.

MANUFACTURER	OS & Y RS	NRS
Crane	465-1/2	461
Grinnell	6020A	6060A
Nibco	617-O	F-619
Milwaukee	F-2885	F-2882
KITZ	72	75

2.04 BALL VALVES

- A. Ball Valves, 2 Inches and Smaller: Rated for 150 psi saturated stem pressure, 400 psi WOG pressure; two- or three-piece construction; with bronze body conforming to ASTM B 62, full port only, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl covered steel handle. Provide solder ends for condenser water, chilled water, and domestic hot and cold water service; threaded ends for heating hot water and low-pressure steam.

Ball Valves - 1 Inch and Smaller:

MANUFACTURER	THREADED ENDS	SOLDER ENDS
Conbraco (Apollo)	70-100	70-200
Crane	9302	9322
Nibco	T-580-70	S-580-70
Stockham	S-216 BR-R-T	S-216-BR-R-S
Watts	B-6000	B-6001
Milwaukee	BA-100	BA-150
KITZ	58	59

1. "x" means not available.

Ball Valves - 1-1/4 Inch to 2 Inch:

MANUFACTURER	THREADED ENDS	SOLDER ENDS
Conbraco (Apollo)	82-100	82-200
Nibco	T-590-Y	S-590-Y
Stockham	S-216 BR-R-T	S-216-BR-R-S
Watts	B-6800	B-6801
KITZ	62	63

2. "x" means not available.

3. For grooved end connections, use Victaulic Style 721.

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2.05 PLUG VALVES

- A. Plug Valves, 2-Inch and Smaller: Rated at 150 psi WOG; bronze body, with straightaway pattern, square head, and threaded ends.
 - 1. Lunkenheimer: 454 or equal.
 - 2. Homestead: 611 (Semi Steel Body) or equal.
- B. Plug Valves, 2-1/2 Inch and Larger: MSS SP-78; rated at 175 psi WOG; lubricated plug type, with semi steel body, single gland, wrench operated and flanged ends.
 - 1. Powell: 2201 or equal.
 - 2. Homestead: 605 or equal.

2.06 GLOBE VALVES

- A. Globe Valves, 2-Inch and Smaller: MSS SP-80; Class 125; body and screwed bonnet of ASTM B 62 cast bronze; with threaded or solder ends, brass or replaceable composition disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron hand wheel. Provide Class 150 valves meeting the above where system pressure requires.

CLASS 125 MANUFACTURER	CLASS 125 THREADED	CLASS 150 SOLDER	THREADED
Crane	1	1310	17TF
Milwaukee	502	1502	590
Nibco	T-211-B T-211-Y	S-211-B S-211-Y	T-235-Y
KITZ	11	12	10

- B. Globe Valves, 2-1/2-Inch and Larger: MSS SP-85; Class 125 iron body and bolted bonnet conforming to ASTM A 126, Class B; with outside screw and yoke, bronze mounted, flanged ends, and "Teflon" impregnated packing, and two-piece backing gland assembly.

MANUFACTURER	STRAIGHT BODY	ANGLE BODY
Crane	351	353
Milwaukee	F2981	F2986
Nibco	F-718-B	F-818-B
KITZ	76	X

- 1. "x" means not available.

2.07 BUTTERFLY VALVES

- A. General - Where butterfly valves are used as shutoff for termination, or equipment removal or repair, select ductile iron lug type valves, bi-directional, dead-end service rated to the full working pressure of the valve. Select wafer type valves for other applications. Provide gear operators on butterfly valves 8" and larger. Valve bodies to have extended necks to provide for 2-1/4" insulation as needed. Butterfly valves 12 inch and smaller rated to 200 psi, 14 inch and larger 150 psi.

Butterfly Valves 2-1/2 Inches and Larger:

The following are model numbers for wafer-type, with nickel-plated ductile-iron disc:

MANUFACTURER	LEVER	GEAR

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Crane	12	12
Nibco	WD-20103	WD-20105
Milwaukee	MW-222E	MW-322E
KITZ	DJ Series	DJ Series

Grooved Ends: Victaulic Series 300 and 704.

The following are model numbers for lug-type, with nickel-plated ductile-iron disc:

MANUFACTURER	LEVER	GEAR
Crane	14	14
Nibco	LD-20103	LD-20105
Milwaukee	ML-222E	ML-322E
KITZ	DJ Series	DJ Series

Grooved Ends: Victaulic Series 300 and 704.

The following are model numbers for wafer-type, with aluminum-bronze disc:

MANUFACTURER	LEVER	GEAR
Crane	42	42
Nibco	WD-20003	WD-20005
Milwaukee	CW-223E	CW-323E
KITZ	DJ Series	DJ Series

Grooved Ends: Victaulic Series 300A, 700A, and 703A.

The following are model numbers for lug-type, with aluminum-bronze disc:

MANUFACTURER	LEVER	GEAR
Center Line	Series LT	Series LT
Crane	44	44
Nibco	LD-20003	LD-20005
Milwaukee	CL-223E	CL-323E
KITZ	DJ Series	DJ Series

Grooved Ends: Victaulic Series 300A, 700A, and 703A.

2.08 CHECK VALVES

- A. Swing Check Valves, 2-Inch and Smaller: MSS SP-80; Class 125, cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, Y-pattern, and bronze disc; and having threaded or solder ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

MANUFACTURER	CLASS 125 THREADED ENDS	CLASS 125 SOLDER ENDS	CLASS 125 THREADED ENDS
Crane	37	1342	137
Milwaukee	509	1509	510
Nibco	T-413	S-413	T-433
KITZ	22	23	29

1. For grooved connections, use Victaulic Series 712.

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- B. Swing Check Valves, 2-1/2 Inch and Larger: MSS SP-71; Class 125 (Class 175 FM approved for fire protection piping systems), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal wing, and bronze disc or cast-iron disc with bronze disc ring; and flanged ends. Provide valves capable of being refitted while the valve remains in the line.

MANUFACTURER	CLASS 125	CLASS 175
Crane	373	x
Milwaukee	F2974	x
Nibco	F-918	x
KITZ	78	x

1. For grooved connections, use Victaulic Series 712.
2. "x" means not available.

- C. Lift Check Valves, 2-Inch and Smaller: Class 125; cast-bronze body and cap conforming to ASTM B 62; horizontal or angle pattern, lift-type valve, with stainless steel spring, bronze disc holder with renewable "Teflon" disc, and threaded ends. Provide valves capable of being refitted and ground while the valve remains in the line.

MANUFACTURER	HORIZONTAL	ANGLE
Jenkins	655-A	x
Lunkenheimer	233	x

1. "x" means not available.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.
- B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.
- C. Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.
- E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.
- F. Replace defective valves with new valves.

3.02 VALVE ENDS SELECTION

- A. Select valves with the following ends or types of pipe/tube connections:

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1. Copper Tube Size, 2-Inch and Smaller: Solder ends, except provide threaded ends for heating hot water and low-pressure steam service.
2. Steel Pipe Sizes, 2-Inch and Smaller: threaded or grooved end.
3. Steel Pipe Sizes 2-1/2 Inch and Larger: grooved end or flanged.

3.03 VALVE INSTALLATIONS

- A. General Application: Refer to piping system specification sections for specific valve applications and arrangements. Use gate, ball, and butterfly valves for shut-off duty. Use globe, plug, and ball valves for throttling duty.
- B. Locate valves for easy access and provide separate support where necessary. Where concealed, install behind access panel with valve located for complete accessibility for servicing.
- C. Install valves and unions for each fixture and item of equipment. Arrange valves to allow equipment removal without system shutdown. Unions are not required on flanged devices.
- D. Install three-valve bypass around each pressure reducing valve using throttling-type valves.
- E. Install valves in horizontal piping with stem at or above the center of the pipe.
- F. Install valves in a position to allow full stem movement.
- G. Installation of Check Valves: Install for proper direction of flow as follows:
 1. Swing Check Valves: Horizontal position with hinge pin level.
 2. Lift Check Valve: With stem upright and plumb.
- H. Where shut-off valves are installed in a confined space such as in a wall or furring, install ball valves with operating handle parallel with face of wall.
- I. Where valves are located in walls, do not install more than 6'-0" from finished floor. Where valves are located above the ceiling, install them centered on access point and not greater than 24" above access point.

3.04 SOLDER CONNECTIONS

- A. Cut tube square and to exact lengths.
- B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket in same manner.
- C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.
- D. Open gate and globe valves to full open position.
- E. Remove the cap and disc holder of swing check valves having composition discs.
- F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.
- G. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

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- H. Use 95-5 tin/antimony solder for all solder joints unless indicated otherwise.

3.05 THREADED CONNECTIONS

- A. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.
- B. Align threads at point of assembly.
- C. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
- D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.06 FLANGED CONNECTIONS

- A. Align flange surfaces parallel.
- B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

3.07 FIELD QUALITY CONTROL

- A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

3.08 ADJUSTING AND CLEANING

- A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

3.09 VALVE PRESSURE/TEMPERATURE CLASSIFICATION SCHEDULES

- A. Below schedules are for standard installation conditions. Variations or special valves and/or conditions set forth in other Division 15 Sections shall take precedence.

VALVES, 2-INCH AND SMALLER

SERVICE	GATE	GLOBE	BALL	CHECK
Condenser Water	125	125	150	125
Chilled Water	125	125	150	125
Domestic Hot and Cold Water	125	125	150	125
Heating Hot Water	150	150	150	150
Low-Pressure Steam	150	150	150	150

VALVES, 2-1/2 INCH AND LARGER

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SERVICE	GATE	GLOBE	BUTTERFLY	CHECK
Condenser	125	125	200	125
Chilled Water	125	125	200	125
Domestic Hot and Cold Water	125	125	200	125
Heating Hot Water	125	125	200	125
Low-Pressure Steam	125	125	200	125

END OF SECTION

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SECTION 15130 - ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes limited scope of general construction materials and methods for access doors and panels in walls and ceilings for access to mechanical materials.
- B. Requirements of access doors are outlined in Division 1.
- C. Access doors and panels are required for all mechanical equipments requiring maintenance, inspection, adjustment, monitoring, etc... which are installed in inaccessible areas such as behind walls, above ceiling, under floor, etc...

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including installation instructions for each type of access door or panel.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer Qualifications: Engage an experienced Installer for the installation of access panels and doors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:
 - 1. Milcor Div. Inryco, Inc.
 - 2. Jay R. Smith Mfg. Co.
 - 3. Zurn Industries, Inc.
 - 4. Acorn.

2.02 ACCESS DOORS

- A. Steel Access Doors and Frames: Factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush with adjacent surfaces.
- B. Frames: 16-gage steel, with a 1-inch-wide exposed perimeter flange for units installed in unit masonry, pre-cast, or cast-in-place concrete, ceramic tile, or wood paneling.
 - 1. For installation in masonry, concrete, ceramic tile, or wood paneling: 1 inch-wide-exposed perimeter flange and adjustable metal masonry anchors.
 - 2. For gypsum wallboard or plaster: perforated flanges with wallboard bead.
 - 3. For full-bed plaster applications: galvanized expanded metal lath and exposed casing bead, welded to perimeter frame.

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- C. Flush Panel Doors: 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees; factory-applied prime paint.
 - 1. Fire-Rated Units: Insulated flush panel doors, with continuous piano hinge and self-closing mechanism.
- D. Locking Devices: Flush, screwdriver-operated cam locks.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which access door and panel products are to be installed. Do not proceed with work until unsatisfactory conditions have been in manner acceptable to Installer.

3.02 APPLICATION

- A. Nonrated Walls and Ceilings: Prime coat finish door and frame, Allen key latch face of wall type; Zurn Z-1376, Smith 4760, Acorn 8211-3.
- B. Fire Rated Walls and Ceilings: "B" Labeled U.L. 1-1/2 hours, prime coat finish door and frame, flush keyed cylinder lock; Milcor.
- C. Tile Walls: Cover and frame chrome plated or 18-8 stainless steel, face-of-wall type, vandal resistant screws; Smith 4730, Zurn Z-1375-2.

3.03 INSTALLATION OF ACCESS DOORS

- A. Set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces.
- B. Adjust hardware and panels after installation for proper operation.

3.04 COORDINATION

- A. General: Coordinate locations of ceilings access doors with lights, air outlets, speakers, etc. Submit drawings showing relative locations of doors to other ceiling items for acceptance by the Architect prior to installation. Transparencies of floor plans and/or reflected ceiling plans will be available from the Architect for this purpose.
- B. Location: Doors may be located to serve more than one item where feasible, providing they are approved as specified. Sizes suitable for purpose intended, with 12" x 12" minimum.
- C. Access doors and panels not required in accessible ceiling systems where direct access to mechanical items is possible.

END OF SECTION

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SECTION 15140 - SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Extent of supports and anchors required by this section is indicated on drawings or in other Division-15 sections and include the following:
1. Horizontal-Piping Hangers and Supports;
 2. Vertical-Piping Clamps;
 3. Hanger-Rod Attachments;
 4. Building Attachments;
 5. Saddles and Shields;
 6. Miscellaneous Materials;
 7. Anchors;
 8. Equipment Supports.

1.02 RELATED SECTIONS

- A. This section is part of each Division-15 section making reference to or requiring supports and anchors specified herein.
- B. Supports and anchors furnished as part of factory-fabricated equipment, are specified as part of equipment assembly in other Division-15 sections.
- C. Section 03300: Cast-in-Place Concrete.

1.03 QUALITY ASSURANCE

- A. Codes and Standards:
1. Code Compliance: Comply with applicable plumbing codes pertaining to product materials and installation of supports and anchors.
 2. UL and FM Compliance: Provide products which are UL-listed and FM approved.
 3. MSS Standard Compliance:
 - a. Provide pipe hangers and supports of which materials, design, and manufacturer comply with MSS SP-58.
 - b. Select and apply pipe hangers and supports, complying with MSS SP-69.
 - c. Fabricate and install pipe hangers and supports, complying with MSS SP-89.
 - d. Terminology used in this section is defined in MSS SP-90.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including installation instructions for each type of support and anchor.

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PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

- A. Hangers and support components shall be factory fabricated of materials, design, and manufacturer complying with MSS SP-58.
 - 1. Components shall have galvanized coatings where installed for piping and equipment that will not have field-applied finish.
 - 2. Pipe attachments shall have nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Thermal Hanger Shield Inserts: 100-psi average compressive strength, waterproofed calcium silicate, encased with a sheet metal shield. Insert and shield shall cover entire circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

2.02 HORIZONTAL-PIPING HANGERS AND SUPPORTS

- A. General: Except as otherwise indicated, provide factory fabricated horizontal-piping hangers and supports complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.
 - 1. Adjustable Steel Clevis Hangers: MSS Type 1.
 - 2. Adjustable Swivel Pipe Rings: MSS Type 6.

2.03 VERTICAL-PIPING CLAMPS

- A. General: Except as otherwise indicated, provide factory fabricated vertical-piping clamps complying with MSS SP-58, of one of the following types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
- B. Two-Bolt Riser Clamps: MSS Type 8.

2.04 HANGER-ROD AND BUILDING ATTACHMENTS

- A. General Hanger Rod Attachment: Refer to structural drawings for requirements of hanger rod and building attachments. If a specific attachment that is required is not detailed on the structural drawings, one of the following attachments may be submitted for review by the structural engineer prior to installation. Except as otherwise indicated, provide factory fabricated hanger-rod attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachment to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
- B. General Building Attachment: Except as otherwise indicated, provide factory fabricated building attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and

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manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

Concrete Inserts:	MSS Type 18.
Center Beam Clamps:	MSS Type 21.
Steel Beam Clamps W/Eye Nut:	MS Type 28.
Linked Steel Clamps W/Eye Nut:	MSS Type 29.
Malleable Beam Clamps:	MSS Type 30.
Steel Brackets:	
One of the following for indicated loading:	
Light Duty:	MSS Type 31.

2.05 SADDLES AND SHIELDS

- A. General: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.
- B. Protection Shields: MSS Type 40; provide high density insert of same thickness of insulation.

2.06 MANUFACTURERS OF HANGERS AND SUPPORTS

- A. Manufacturers: Subject to compliance with requirements, provide hangers and supports of one of the following:
 - 1. B-Line Systems, Inc.
 - 2. Tolco inc.
 - 3. Elcen Metal Products Co.
 - 4. Fee & Mason Mfg. Co.; Div. Figgie International
 - 5. ITT Grinnel Corp.

2.07 MISCELLANEOUS MATERIALS

- A. Steel Plates, Shapes and Bars: ASTM A36.
- B. Cement Grout: Portland cement (ASTM C150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.
- C. Pipe Alignment Guides: Factory fabricated, of cast semisteel or heavy fabricated steel, consisting of bolted two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.
- D. Pipe Roll Stand: Factory fabricated cast iron stand, size as required, with insulation installed on piping.

2.08 ISOLATORS

- A. Isolators: Provide factory-fabricated isolators of size required.
- B. Spring Isolators: Refer to Section 15241 VIBRATION CONTROL.
- C. Manufacturers: Semco "Trisolator" or Potter-Roemer PR-ISO.

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PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine substrates and conditions under which supports and anchors are to be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachment.
- B. Prior to installation of hangers, supports, anchors and associated work, installer shall meet at project site with Contractor, installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section and Architect/Engineer for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.03 INSTALLATION OF BUILDING ATTACHMENTS

- A. Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

3.04 INSTALLATION OF HANGERS AND SUPPORTS

- A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and type as installed for adjacent similar piping.
- C. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.
- D. Provisions of Movement: Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors.
- E. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- F. Pipe Slopes: Install hangers and supports to provide required pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 Pressure Piping Codes are not exceeded.

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- G. Bare Piping: Install isolators for all bare domestic water and bare hydronic piping.
- H. Insulated Piping: Comply with the following installation requirements.
 - 1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
 - 2. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on cold or chilled water piping, install coated protective shields. Provide rigid insulation reinforcement at shields.
- I. Hangers and supports to be capable to resist the minimum seismic forces indicated in drawings.

3.05 EQUIPMENT SUPPORTS

- A. Concrete housekeeping bases will be provided as work of Division 3.
- B. Furnish to Contractor, scaled layouts of all required bases, with dimensions of bases, and location to column center lines. Furnish templates, anchor bolts, and accessories, necessary for base construction.

3.06 ADJUSTING AND CLEANING

- A. Hanger Adjustment: Adjust hangers so as to distribute loads equally on attachments.
- B. Support Adjustment: Provide grout under supports so as to bring piping and equipment to proper level and elevations.
- C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
- D. Touch-Up Painting: Immediately after erection of anchors and supports, clean field welds and abraded areas of shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-PA-1 requirements for touch-up of field-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- E. For 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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SECTION 15190 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Extent of mechanical identification work required by this section is indicated on drawings or specified in other Division-15 sections, and includes the following:
 - 1. Painted Identification Materials
 - 2. Plastic Pipe Markers
 - 3. Plastic Tape
 - 4. Underground-Type Plastic Line Marker
 - 5. Plastic Duct Markers
 - 6. Valve Tags
 - 7. Diagram and Schedule Frames
 - 8. Engraved Plastic-Laminate Signs
 - 9. Plastic Equipment Markers
 - 10. Plasticized Tags
 - 11. Equipment Marker

1.02 RELATED SECTIONS

- A. This section makes reference to identification devices specified herein.
- B. Mechanical identification furnished as part of factory-fabricated equipment, is specified as part of equipment assembly in other Division-15 sections.
- C. Refer to Division-16 Sections for identification requirements of electrical work; not work of this section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for each identification material and device required.
- B. Samples: Submit samples of each color, lettering style and other graphic representation required for each identification material or system.
- C. Schedules and Diagrams:
 - 1. Submit valve schedule for each piping system, typewritten and reproduced on 8-1/2" x 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shut-off and similar special uses, by special "flags", in margin of schedule.
 - 2. Submit temperature control diagrams and Sequence of Operation on bond paper suitable for framing.
- D. Maintenance Data: Include product data and schedules in maintenance manuals; in accordance with requirements of Division 1 and Division 15, Section 15011 "Supplementary Mechanical Requirements".

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1.04 QUALITY ASSURANCE

A. Codes and Standards:

1. ANSI Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
2. No adhesive type identification markers will be accepted. All markers and tags shall be permanently attached to pipe, etc.
3. All identification markers installed exterior of buildings shall be ultra-violet resistant.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide mechanical identification materials of one of the following:

1. Allen Systems, Inc.
2. Brady (W.H.) Co.; Signmark Div.
3. Industrial Safety Supply Co., Inc.
4. Seton Name Plate Corp.

2.02 MECHANICAL IDENTIFICATION MATERIALS

A. General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-15 sections. Where more than a single type is specified for application, selection is Installer's option, but provide a single selection for each product category.

2.03 PLASTIC PIPE MARKERS

A. Snap-On Type: Provide manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, complying with ANSI A13.1.

B. Insulation: Furnish 1" thick molded fiberglass insulation with jacket for each plastic pipe marker to be installed on uninsulated pipes subject to fluid temperatures of 125oF (52oC) or greater. Cut length to extend 2" beyond each end of plastic pipe marker.

C. Small Pipes: For external diameters less than 6" (including insulation if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:

1. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
2. Laminated or bonded application of pipe marker to pipe (or insulation).
3. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 3/4" wide; full circle at both ends of pipe marker, tape lapped 1-1/2".

D. Large Pipes: For external diameters of 6" and larger (including insulation if any), provide either full-band or strip-type pipe markers, but not narrower than 3 times letter height (and of required length), fastened by one of the following methods:

1. Laminated or bonded application of pipe marker to pipe (or insulation).
2. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 1-1/2" wide; full circle at both ends of pipe marker, taped lapped 3".

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3. Strapped-to-pipe (or insulation) application of semi-rigid type, with manufacturer's standard stainless steel bands.
- E. Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with names as shown or specified.
1. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as a separate unit of plastic.
- 2.04 PLASTIC TAPE
- A. General: Provide manufacturer's standard color-coded pressure-sensitive (self-adhesive) vinyl tape, not less than 3 mils thick.
- B. Width: Provide 1-1/2" wide tape markers on pipes with outside diameters (including insulation, if any) of less than 6", 2-1/2" wide tape for larger pipes.
- C. Color: Comply with ANSI A13.1, except where another color selection is indicated.
- 2.05 UNDERGROUND-TYPE PLASTIC LINE MARKER
- A. General: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide tape with printing which most accurately indicates the type of service of buried pipe.
1. Provide multi-ply tape consisting of solid aluminum foil core between 2-layers of plastic tape.
- 2.06 VALVE TAGS
- A. Brass Valve Tags: Provide 19-gage polished brass valve tags with stamped-engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high and with 5/32" hole for fastener.
1. Provide 1-1/2" diameter tags, except as otherwise indicated.
 2. Fill tag engraving with black enamel.
- B. Valve Tag Fasteners: Provide manufacturer's standard solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.
- C. Access panel markers: Provide manufacturer's standard solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.
- D. Access Panel Markers: Provide manufacturer's standard 1/16" thick engraved plastic laminate access panel markers, with abbreviations and numbers corresponding to concealed valve. Include 1/8" center hole to allow attachment.
- 2.07 DIAGRAM AND SCHEDULE FRAMES
- A. General: For each page of schedule and/or diagrams, provide glazed display frame, with screws for removable mounting on masonry walls. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.

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2.08 ENGRAVED PLASTIC-LAMINATE SIGNS

- A. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, white with black core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
- B. Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8" for larger units.
- C. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

2.09 LETTERING AND GRAPHICS

- A. General: Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of mechanical systems and equipment.
 - 1. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples; Boiler No. 3, Air Supply No. 1H, Standpipe F12).

2.10 EQUIPMENT MARKERS

- A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.
 - 1. Data:
 - a. Manufacturer, product name, model number, and serial number.
 - b. Capacity, operating and power characteristics, and essential data.
 - c. Labels of tested compliances.
 - 2. Location: Accessible and visible.
 - 3. Fasteners: As required to mount on equipment.
- B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
 - 1. Terminology: Match schedules as closely as possible.
 - 2. Data.
 - 3. Name and plan number.
 - a. Equipment service.
 - b. Design capacity.
 - c. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 - 4. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
- C. Equipment Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

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1. Data: Instructions for operation of equipment and for safety procedures.
 2. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
 3. Retain and edit subparagraph above or first subparagraph below.
 4. Thickness: 1/16 inch for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
 5. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
- D. Access Panel and Door Markers: 1/16-inch thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment.
1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
- 2.11 PLASTIC DUCT MARKERS
- A. Engraved, color-coded laminated plastic. Include direction and quantity of airflow and duct service (such as supply, return, and exhaust). Include contact-type, permanent adhesive.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finishes, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.02 PIPING SYSTEM IDENTIFICATION

- A. General: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:
1. Plastic pipe markers, with application system as indicated under "Materials" in this section. Install on pipe insulation segment where required for hot-non-insulated pipes.
- B. Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.
1. Near each valve and control device.
 2. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.
 3. Near locations where pipes pass through walls, floors ceilings, or enter non-accessible enclosures.
 4. At access doors, manholes similar access points which permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
 7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.03 UNDERGROUND PIPING IDENTIFICATION

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- A. General: During back-filling/top-soiling of each exterior underground piping systems, except sanitary sewer and storm drainage install continuous underground-type plastic line marker, located directly over buried line at 6" to 8" below finished grade. Where multiple small lines are buried in common trench and do not exceed overall width of 16", install single line marker.

3.04 VALVE IDENTIFICATION

- A. General: Provide valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. List each tagged valve on valve schedule for each piping system.
- B. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by Architect/Engineer.

3.05 MECHANICAL EQUIPMENT IDENTIFICATION

- A. General: Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:
 - 1. Fuel-burning units including boilers, furnaces, heaters.
 - 2. Pumps, compressors, chillers, condensers and similar motor-driven units.
 - 3. Fans and blowers.
 - 4. Packaged HVAC central-station or zone-type units.
 - 5. Split air conditioner indoor and outdoor units
 - 6. Single Duct terminal units and all equipment in ceiling space.
 - 7. (In addition to the equipment tag, install an identification tag for VAV units in locations approved by architect to indicate where each unit is installed above the ceiling. Coordinate the Installation location, type, size and color of this tag with the architect.)
- B. Lettering Size: Minimum 1/4" high lettering for name of unit where viewing distance is less than 2'-0", 1/2" high for distances up to 6'-0", and proportionately larger lettering for greater distances. Provide secondary lettering of 2/3 to 3/4 of size of the principal lettering.
- C. Test of Signs: In addition to name of identified unit, provide lettering to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

3.06 ADJUSTING AND CLEANING

- A. Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.
- B. Cleaning: Clean face of identification devices, and glass frames of valve charts.

END OF SECTION

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SECTION 15241 - VIBRATION CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Extent of vibration control work required by this section is indicated on drawings and schedules, and/or specified in other Division-15 sections.
- B. Types of vibration control products specified in this section include the following: See Isolation Schedule (Paragraph 3.08) and equipment installation details on HVAC drawings for type of vibration isolation applicable in this project.
 - 1. Fiberglass Pads and Shapes;
 - 2. Neoprene Pads;
 - 3. Vibration Isolation Springs;
 - 4. Pad-Type Isolators;
 - 5. Plate-Type Isolators;
 - 6. Double-Plate-Type Isolators;
 - 7. Threaded Double-Plate-Type Isolators;
 - 8. All-Directional Anchors;
 - 9. Neoprene Mountings;
 - 10. Spring Isolators, Free-Standing;
 - 11. Spring Isolators, Housed;
 - 12. Spring Isolators, Vertically-Restrained;
 - 13. Spring Isolators, Earthquake-Restrained;
 - 14. Seismic Snubbers;
 - 15. Thrust Restraints;
 - 16. Equipment Rails;
 - 17. Fabricated Equipment Bases;
 - 18. Inertia Base Frames;
 - 19. Roof-Curb Isolators;
 - 20. Isolation Hangers;
 - 21. Riser Isolators;
 - 22. Flexible Pipe Connectors.

1.02 RELATED SECTIONS

- A. This section is part of each Division-15 section making reference to vibration control products specified herein.
- B. Vibration control products furnished as integral part of factory-fabricated equipment are specified as part of equipment assembly in other Division-15 sections.
- C. Refer to other Division-15 sections for equipment foundations, hangers, sealants, gaskets, and other work related to vibration control work.
- D. Refer to other Division-15 sections for requirements of electrical connections to equipment isolated on vibration control products.
- E. Refer to other Division-15 sections for requirements of duct connections to air handling equipment isolated on vibration control products.

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1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of vibration control product. Submit schedule showing size, type, deflection, and location for each product furnished.
 - 1. Catalogue cuts and data sheets on specific vibration isolators to be utilized, showing compliance with the specification.
 - 2. An itemized list showing the items of equipment, piping, etc., to be isolated, the isolator type and model number selected, isolator loading and deflection, and reference to specific drawing showing frame construction where applicable.

- B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weights, required clearances, and method of assembly of components. Detail bases and show location of equipment anchoring points, coordinated with equipment manufacturer's shop drawings.
 - 1. Drawings showing equipment frame construction for each item of equipment, including dimensions, structural member sizes, support point locations, etc.
 - 2. Written approval of the frame design to be used, obtained from the manufacturer.
 - 3. Drawings showing methods for suspension, support, guides, etc., for piping and ductwork, etc.
 - 4. Drawings showing methods for isolation of pipes, etc., piercing walls, slabs, beams, etc.

- C. Maintenance Data: Submit maintenance data for each type of vibration control product. Include this data, product data, and shop drawings in maintenance manual in accordance with requirements of Division 1.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of vibration control products, of type, size, and capacity required, whose products have been in satisfactory use in similar service for not less than 5 years.
 - 1. Except as otherwise indicated, obtain vibration control products from single manufacturer.
 - 2. Engage manufacturer to provide technical supervision of installation of vibration control products.

- B. Vibration isolation manufacturer shall have the following responsibilities:
 - 1. Determine vibration isolation sizes and locations.
 - 2. Provide piping and equipment isolation system as scheduled or specified.
 - 3. Guarantee specified isolation system deflection.
 - 4. Provide installation instruction and drawings.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide vibration control products of one of the following:
 - 1. Cannon Fabrication, Inc. Basis of design.
 - 2. Mason Industries, Inc.
 - 3. Consolidated Kinetics, Inc.

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4. or approved equal

- B. Except as otherwise indicated mechanical equipment shown on drawings shall be isolated from the structure by means of resilient vibration and noise isolators supplied by a single manufacturer to the Contractor.

2.02 VIBRATION ISOLATION AND SEISMIC RESTRAINTS

A. Type and Description:

1. Type PN is a molded pad. The area of pad shall be chosen to match the load in order to achieve the required static deflection.
2. Type MN is a molded neoprene in shear element equipped with leveling bolts and baseplate with bolt holes to permit attachment to the building structure where required.
3. Type HN is a suspension hanger with a steel box frame and a molded neoprene in shear element. A neoprene grommet shall be provided at the location where the hanger rod passes through the hanger box so that no metal-to-metal contact occurs.
4. Type MS is a bare, stable, steel spring equipped with leveling bolts and with a minimum 1/4" thick ribbed neoprene pad under the baseplate. Bolt holes shall be provided in the baseplate to permit attachment to the building structure where required.
5. Type MSL is a bare, stable, steel spring with a ribbed neoprene pad under the baseplate. Bolt holes shall be provided in the baseplate to permit attachment to the building structure. Limit stops shall be provided to prohibit spring extension if the load is removed. These stops may also serve as rigid blocking during erection so that the installed and operating heights shall be the same. Clearance shall be maintained around restraining bolts and between the limit stops and the housing so as not to interfere with the spring action.
6. Type HS is a suspension hanger with a steel box frame and a steel spring resting on a neoprene cup. The cup shall contain a steel washer designed to evenly distribute the load to the neoprene and prevent its overload or extrusion. The spring diameter and hanger box lower hole size shall be large enough to permit the hanger rod to swing through a 30-degree arc before contacting the hole and short circuiting the spring. Hangers shall be provided with an eye bolt on the spring end.
7. Type CMS is prefabricated spring isolation curb for rooftop equipments. The lower member shall consist of a rectangular steel tube containing adjustable and removable steel springs that support the upper floating section. The upper frame must provide continuous support for the equipment and must resiliently resist wind and seismic forces. All-directional neoprene snubber bushings shall be a minimum of 1/4" thick. Steel springs shall rest on 1/4" thick neoprene acoustical pads and have a static deflection as indicated on the project drawings. Hardware must be cadmium plated or galvanized and the springs plated or provided with an approved rust-resistant finish. Weatherproofing shall be provided by a continuous flexible aluminum seal joined at the corners by flexible frictionless neoprene bellows. The aluminum seal must be nailed over and provided counter flashing to the curb's waterproofing. Access ports with waterproof covers shall be provided at each spring location and 2" thermal insulation shall be included on the lower sides of the curb.
8. Type SF is a flexible neoprene pipe connector. They shall be manufactured of multiple plies of nylon tire cord fabric and neoprene both molded and cured in hydraulic rubber presses. No steel wire or rings shall be used as pressure reinforcement. Straight connectors shall have two spheres. Neoprene elbows shall be manufactured with a single sphere forming the corner of the joint itself. Connectors up to and including 2" diameter may have threaded ends. Connectors 2-1/3" and larger shall be manufactured with floating steel flanges recessed to lock the connector's raised face neoprene flanges. All connectors shall be rated with either flanged or screwed twin spheres properly pre-extended as recommended by the manufacturer to prevent additional elongation under pressure. Connectors shall be provided with control units, in accordance with the manufacturer's recommendations to limit expansion.

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9. Specifications are based on the following Mason Industries models:

<u>Type Description</u>	<u>Mason Model</u>
PN Neoprene Pad	W
MN Neoprene Mount	ND
HN Neoprene Hanger	HD
MS Spring Mount	SLF
MSL Spring Mount with Limit Stop	SLR
HS Spring Hanger	W30
CMS Spring ISO Curb	RSC
SF Flexible Pipe Connector	SFDEJ

2.03 EQUIPMENT FRAMES

- A. General: Mounting frames and/or brackets shall be provided to carry the load of the equipment without causing mechanical distortion or stress to the equipment.
- B. Frame Types:
1. Type A frame is wide flange structure steel frame with height saving brackets as shown on the drawings. Mason WFSL
 2. Type B frame is a channel steel structural frame with brackets as shown on the drawings. Mason MSL
 3. Type C no frame required, isolators directly attached to equipment.

2.04 SEISMIC RESTRAINTS

- A. Type I, Rigidly Mounted Equipment: Attach to the structure with attachments to resist a lateral force per code requirements.
- B. Type II, Vibration Isolated Equipment:
1. Mount all vibration isolated equipment on rigid steel frames as described in the vibration control specifications unless the equipment manufacturer certified direct attachment capability.
 2. Each vibration isolated frame shall have a minimum of four all-directional seismic snubbers that are double acting and located as close to the vibration isolators as possible to facilitate attachment to the base and the structure.
 3. The snubber shall consist of interlocking steel members restrained by shock absorbent rubber material compounded to bridge bearing specifications.
 4. Elastomeric materials, replaceable and a minimum of 1/4 inch thick. Snubbers, manufactured with an air gap between hard and resilient material of not less than 1/8 inch or more than 1/4 inch. Install snubbers with factory set clearances.
 5. Snubbers shall be pre-approved by the State of California.

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- C. Type III, Seismic Restraint of Vibration Isolated Suspended Piping:
 - 1. Brace all piping and ductwork per the Mason Seismic Restraint Guidelines. The cable size and attachment to the pipe and structure shall be designed and signed by a licensed engineer in the State of California.
- D. Type IV, Suspended Vibration Isolated Equipment:
 - 1. Utilize a slack cable restraint system.
 - 2. The cable size and attachment shall be designed and signed by an engineer licensed in the State of California.

2.05 DUCTWORK

- A. Flexible connections shall be incorporated in the ductwork adjacent to all fan and coil units.

PART 3 - EXECUTION

3.01 GENERAL

- A. The vibration isolation manufacturer, or his representative, shall be responsible for providing such supervision as may be necessary to assure correct installation and adjustment of the isolators. Upon completion of the installation and after the system is put into operation, the manufacturer, or his representative, shall make a final inspection and submit his report to the Architect in writing, certifying the correctness of installation and compliance with approved submittal data.
- B. No equipment or pipe shall be installed which makes rigid contact with the "building" unless it is approved in this specification or by the architect. "Building" includes slabs, beams, studs, walls, latch, etc.
- C. Install flexible connectors at all connections to pumps and chillers. Connectors shall be Mason Safeflex constructed of peroxide cured EPDM material and Kevlar reinforcing.

3.02 MOUNTING

- A. Isolation Configuration for Floor Mounted or Suspended Equipment: Provide a maximum of four vibration isolators located at the corners of the equipment unless approval is obtained for additional isolators. Where feasible, provide three isolators.

3.03 EQUIPMENT ISOLATOR

- A. The equipment to be isolated shall be supported by a structural steel frame or attached directly to the machine where no frame is required.
- B. Brackets shall be provided to accommodate the isolator. The vertical position and size of the bracket shall be specified by the isolator manufacturer.
- C. The minimum operating clearance between the frame and the pad or floor shall be 1".
- D. The frame shall be placed in position and the brackets supported temporarily by 1" shims prior to the installation of the machine or isolators.
- E. After the entire system installation is completed and under full operation load, the isolator shall be adjusted so that the load is transferred from the shims to the isolator. When all isolators are

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properly adjusted, the shims shall be used as a gauge to check that the clearance is maintained so that the system will remain free of stress.

3.04 PIPING ISOLATOR, VERTICAL RISER OR HORIZONTALLY SUPPORTED

- A. The objective and installation procedure is similar to the Equipment Isolator Installation procedures.

3.05 PIPING ISOLATOR, HORIZONTALLY SUSPENDED PIPING

- A. The isolators shall be installed with the isolator hanger box as close as possible to the structure.
- B. The isolators shall be suspended from beams, never from slab diaphragms between beams unless specifically approved.
- C. Hanger rods shall be aligned to clear the hanger box.

3.06 DUCTWORK

- A. Flexible connections shall be incorporated in the ductwork adjacent to all air moving units supported with isolators. Connections shall be as herein specified.

3.07 INSTALLATION OF SEISMIC RESTRAINT

- A. All seismic restraints must be installed and adjusted so that the equipment and piping vibration isolation is not degraded by utilization of the restraints.
- B. Equipment:
 - 1. Position all seismic restraints with equipment in operation for proper operating clearances.
 - 2. Weld or bolt seismic restraints to the structure.
- C. Piping:
 - 1. Install seismic bracing without compromising vibration isolation

3.08 ISOLATION SCHEDULE

Vibration Isolation Schedule

Equipment	Isolator Spec. Type	Deflection	Restraint Type	Notes
Packaged Rooftop Air Conditioning Units	ISC	2.0"	CMS	Rooftop Curb Spring Isolation

END OF SECTION

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SECTION 15250 - MECHANICAL INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Extent of mechanical insulation required by this section is indicated on drawings and schedules, and by requirements of this section, and includes the following:
 - 1. Piping Systems Insulation:
 - a. Fiberglass.
 - b. Calcium Silicate.
 - c. Flexible Unicellular.
 - 2. Ductwork System Insulation:
 - a. Fiberglass
 - b. Flexible Unicellular.
 - 3. Equipment Insulation:
 - a. Fiberglass
 - b. Calcium Silicate
 - c. Flexible Unicellular.
 - 4. Acoustical Insulation
 - a. Fiberglass

1.02 RELATED SECTIONS

- A. Refer to Division-15 section "Supports and Anchors" for protection saddles, protection shields, and thermal hanger shields; not work of this section.
- B. Refer to Division-15 section "Mechanical Identification" for installation of identification devices for piping, ductwork, and equipment; not work of this section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, K-value, thickness, and furnished accessories for each mechanical system requiring insulation.
- B. Maintenance Data: Submit maintenance data and replacement material lists for each type of mechanical insulation. Include this data and product data in maintenance manual.

1.04 QUALITY ASSURANCE

- A. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.
- B. As a minimum, insulation shall meet installed conductance as set forth in Title 24 California Code of Regulations (CCR) Table 10-D or as indicated in contract documents, whichever is greater.

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1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.
- B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Babcock and Wilcox; Insulating Products Div.
 - 3. Certaineed Corp.
 - 4. Knauf Fiber Glass GmbH.
 - 5. Manville Products Corp.
 - 6. Owens-Corning Fiberglas Corp.
 - 7. Pittsburgh Corning Corp.
 - 8. Rubatex Corp.

2.02 PIPING INSULATION MATERIALS

- A. Fiberglass (Mineral Fiber) Piping Insulation: ASTM C547, Class 1 unless otherwise indicated. Manville Products Corp. Micro-Lok, Owens-Corning Fiberglass Corp., ASJ/SL-II or equivalent.
- B. Calcium Silicate Piping Insulation: ASTM C533, Type I. Owens-Corning Fiberglass Corp. "Kaylo Asbestos Free" or equivalent.
- C. Flexible Unicellular Piping Insulation: ASTM C534, Type I. Armstrong World Industries, Inc. or Rubatex Corp. meeting ASTM E-84 25/50 index.
- D. Jackets for Piping Insulation: ASTM C921, Type I (Vapor Barrier) for piping with temperatures below ambient. (Type II (Water Vapor Permeable) for piping with temperatures above ambient. Type I may be used for all piping at Installer's option.
 - 1. Encase pipe fittings insulation with one-piece premolded PVC fitting covers, fastened as per manufacturer's recommendations. Zeston PVC Insulated fitting covers or equivalent.
 - 2. Encase exterior piping insulation with aluminum jacket with weather-proof construction.
- E. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.
- F. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated.
- G. All Insulation shall be U.L. listed showing flame spread not greater than 25, nor smoke greater than 50, per NFPA 90A.

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2.03 DUCTWORK INSULATION MATERIALS

- A. Flexible Fiberglass Ductwork Insulation: ASTM C553, Type I, Class B-2, Owens-Corning Fiberglas Inc. unfaced duct wrap insulation, Type 100 or equivalent.
 - 1. Nominal thickness or equivalent to provide installed R-value as follows:
 - a. 1.5" thick - Installed R = 4.2
 - b. 2.0" thick - Installed R = 5.6
- B. Flexible Fiberglass Ductwork Insulation: ASTM C612, with ASTM C921 Type I vapor barrier jacket. Owens/Corning Fiberglas All Service Wrap Insulation, Type 100 or equivalent:
 - 1. Nominal thickness or equivalent to provide an installed R-value as follows:
 - a. 1.5" thick - Installed R = 4.2
 - b. 2.0" thick - Installed R = 5.6
- C. Ductwork Insulation Accessories: Provide staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.
- D. Ductwork Insulation Compounds: Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.
- E. All Insulation shall be U.L. listed showing flame spread not greater than 25, nor smoke greater than 50, per NFPA 90A.

2.04 ACOUSTICAL INSULATION

- A. Rigid Fiberglass Insulation: ASTM C612, Class 1, Owens/Corning Fiberglass, Inc., 10 lbs/ft³.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 PLUMBING PIPING SYSTEM INSULATION:

- A. Insulation Omitted: Omit insulation on chrome-plated exposed piping (except for handicapped fixtures), air chambers, unions, strainers, check valves, balance cocks, flow regulators, drain lines from water coolers, drainage piping located in crawl spaces or tunnels, buried piping, fire protection piping, and pre-insulated equipment.
- B. Cold Piping:
 - 1. Application requirements: Insulate the following cold plumbing piping systems:
 - a. Plumbing drains carrying cold condensate.

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2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
 - a. Fiberglass: 1" thickness.
 - b. Flexible Unicellular: 1/2" thickness.

C. Hot Piping:

1. Application Requirements: Insulate the following hot plumbing piping systems.
 - a. Potable hot water piping.
 - b. Potable hot water recirculating piping.
 - c. Hot drain piping (where indicated).
2. Insulate each piping system specified above with one of the following types and thicknesses of insulation.
 - a. Fiberglass: 1" thick for pipe sizes up to and including 6", 1-1/2" thick for pipe sizes over 6".

3.03 DUCTWORK SYSTEM INSULATION:

A. Insulation Omitted:

1. Do not insulate outside air and exhaust air ductwork unless otherwise indicated.
2. All ductwork specified to be insulated that is located in mechanical rooms, located on roofs, or where exposed in conditioned spaces or to weather shall be internally lined under Section 15891 "Metal Ductwork"; unless noted otherwise in these specifications or on the drawings.

B. Insulate the following with flexible fiberglass insulation, unfaced, 1.5" thickness unless otherwise noted. Firmly wrap insulation around duct work with all joints lapped a minimum of 2 inches. Secure insulation to ducts by means of 16 gauge soft-annealed galvanized wire spaced 12 inches on centers at loose ends.

1. Warm air heating ductwork in concealed spaces, unless in ceiling plenum provide all service wrap insulation.
2. Return air ductwork in non-conditioned concealed spaces unless in ceiling supply plenum use all service wrap insulation.
3. Return air ductwork located in return air ceiling plenums.

C. Insulate the following with Flexible Fiberglass insulation with all service vapor barrier facing, 1.5" thickness unless noted otherwise.

1. HVAC hot/cold mixed air ductwork between fan discharge or HVAC unit discharge, and room terminal unit.
2. Outdoor air intake ductwork between air entrance and indoor fan inlet or indoor HVAC unit inlet.
3. Installation:
 - a. Neatly wrap insulation around ducts with all joints tightly butted together.
 - b. Seal transverse joints with vapor barrier facing tab overlapping all joints 2-inches and secure with vapor barrier adhesive or outward-clinch staples on 4-inches centers.
 - c. Seal longitudinal joints with 4-inch wide vapor barrier adhesive tape.
 - d. Secure insulation to underside of ducts, 100 percent coverage, with ductwork insulation adhesive.

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- e. In addition to adhesive, on underside of ducts 24-inches or greater in width, use mechanical fasteners on maximum 12-inch centers.
 - f. Seal all penetrations of vapor barrier facing with vapor barrier mastic.
- D. Insulate the following with Rigid Fiberglass Insulation, 2.0" thickness unless noted otherwise.
- 1. HVAC and unit housings not preinsulated at the factory or where lining has been specifically omitted.
 - 2. Installation: Fasten to ductwork with adhesive and pins per manufacturer's recommendations. Butt all joints and provide 16 gage corner angles at corners. Seal all joints with approved duct tape.
- E. Contractor's Option: Contractor may provide duct liner as set forth in Section 15891, using equivalent installed "R" values; in lieu of external duct wrap or rigid insulation as specified above unless ductwork is specifically indicated as being unlined.
- F. Hot Ductwork:
- 1. Application Requirements: Insulate range and hood exhaust ductwork with PABCO "Super Fire Temp" asbestos free, non-combustible fireproofing board.
 - a. Provide 1 to 4 hour fire rating as indicated.
 - b. Install per manufacturer's instructions.

3.04 INSTALLATION OF PIPING INSULATION

- A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
- B. Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing, and acceptance of tests.
- C. Install insulation materials with smooth and even surfaces. Insulated each continuous run of piping with full-length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
- D. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.
- E. Maintain integrity of vapor barrier jackets on pipe insulation, and protect to prevent puncture or other damage.
- F. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.
- G. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.
- H. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3" wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3" wide vapor barrier tape or band.

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3.05 INSTALLATION OF DUCTWORK INSULATION

- A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
- B. Install insulation materials with smooth and even surfaces.
- C. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
- D. Maintain integrity of vapor barrier on ductwork insulation, and protect it to prevent puncture and other damage.
- E. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except where otherwise indicated.
- F. Lined Ductwork: Except as otherwise indicated, omit insulation on ductwork where internal insulation or sound absorbing linings have been installed.
- G. Ductwork Exposed to Weather: Where external insulation has been specifically indicated, protect outdoor insulation from weather by installing outdoor protective finish or jacketing as recommended by manufacturer.
- H. Corner Angles: Except for oven and hood exhaust duct insulation, install corner angles on external corners of insulation on ductwork in exposed finished spaces before covering with jacketing.

3.06 ACOUSTICAL INSTALLATION

- A. Install within confines of roof curbs for roof mounted air handlers and air conditioning units, and elsewhere as indicated on drawings.
- B. Cut to fit snugly within curb and around duct at duct penetrations, 4" minimum thickness.

3.07 PROTECTION AND REPLACEMENT

- A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION

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SECTION 15305 - AUTOMATIC FIRE SPRINKLERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies automatic sprinkler system for buildings and structures. Materials and equipment specified in this Section include:
 - 1. Pipe, fittings, valves, and specialties.
 - 2. Sprinklers.
- B. Products furnished but not installed include sprinkler head cabinet with spare sprinkler heads. Furnish to the Owner's maintenance personnel.

1.02 RELATED SECTIONS

- A. The following Sections contain requirements that relate to this Section:
 - 1. Division-15 Section "Private Fire Service Mains" for fire protection piping from fire service mains to and including water meter and backflow preventer.
 - 2. Division-15 Section "Mechanical Identification" for labeling and identification of fire protection piping systems and components.

1.03 DEFINITIONS

- A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).
- B. Other definitions for fire protection systems are listed in NFPA Standard 13.
- C. Working Plans as used in this Section means those documents (including drawings and calculations) prepared pursuant to the requirements contained in NFPA 13 for obtaining approval of the authority having jurisdiction.

1.04 SYSTEM DESCRIPTION

- A. FIRE PROTECTION SYSTEM is a "Wet-Pipe" system employing automatic sprinklers attached to a piping system containing water and connected to a water supply so that water discharges immediately from sprinklers opened by fire.

1.05 SUBMITTALS

- A. Product Data for each type sprinkler head, valve, piping specialty and fire protection specialty.
- B. Shop Drawings prepared in accordance with NFPA 13 identified as "Working Plans," including hydraulic calculations where applicable, and which have been approved by the authority having jurisdiction.
- C. Maintenance Data for each type sprinkler head, valve, piping specialty and fire protection specialty specified, for inclusion in operating and maintenance manual specified in Division 1 and Division 15 Section "Basic Mechanical Requirements."
- D. Welder's qualification certificates.
- E. Test Reports and Certificates including "Contractor's Material and Test Certificate for

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Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping" as described in NFPA 13.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Installation and alterations of fire protection piping, equipment, specialties, and accessories, and repair and servicing of equipment shall be performed only by a qualified installer. The term qualified means experienced in such work (experienced shall mean having a minimum of 5 previous projects similar in size and scope to this project), familiar with all precautions required, and has complied with all the requirements of the authority having jurisdiction. Upon request, submit evidence of such qualifications to the Architect. Refer to Division-1 Section: "Definitions and Standards" for definitions for "Installers." Installer shall have valid State of California Contractor's License.
- B. Qualifications for Welding Processes and Operators: Comply with the requirements of AWS D10.9, Specifications for Qualifications of Welding Procedures and Welders for Piping and Tubing, Level AR-3."
- C. Regulatory Requirements: Comply with the requirements of the following codes:
 - 1. NFPA 13 - Standard for the Installation of Sprinkler Systems.
 - 2. UL and FM Compliance: Fire Protection system materials and components shall be Underwriter's Laboratories listed and labeled, and Factory Mutual approved for the application anticipated.

1.07 SEQUENCING AND SCHEDULING

- A. Schedule rough-in installations with installations of other building components.

1.08 EXTRA MATERIALS

- A. Valve Wrenches: Furnish to Owner, 2 valve wrenches for each type of sprinkler head installed.
- B. Sprinkler Heads and Cabinets: Furnish six extra sprinkler heads of each style included in the project. Furnish each style with its own sprinkler head cabinet and special wrenches as specified in this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Manufacturer: Subject to compliance with requirements, provide fire protection system products from one of the following:
 - 1. Gate Valves:
 - a. Jenkins
 - b. Kennedy Valve, Div. of ITT Grinnell Valve Co., Inc.
 - c. Stockham
 - 2. Swing Check Valves:
 - a. Jenkins
 - b. Kennedy Valve, Div. of ITT Grinnell Valve Co., Inc.
 - c. Stockham

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3. Grooved Mechanical Couplings:
 - a. Stockham
 - b. Victaulic Company of America
 - c. Groove-Lok
4. Water Flow Indicators:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Star Sprinkler Corp.
 - c. Victaulic Company of America
 - d. Viking Corp.
5. Sprinkler Heads:
 - a. Automatic Sprinkler Corp. of America
 - b. ITT Grinnell
 - c. Reliable Automatic Sprinkler Co., Inc.
 - d. Star Sprinkler Corp.
 - e. Viking Corp.
6. Post Indicator Valves:
 - a. Mueller

2.02 PIPE AND TUBING MATERIALS

- A. General: Refer to Part 3 Article "Pipe Applications" for identification of systems where the below specified pipe and fitting materials are used.
- B. Steel Pipe: ASTM A53, Schedule 40, seamless, black steel pipe, plain ends.
- C. Steel Pipe: ASTM A53, Schedule 10, seamless, black steel pipe, plain ends.

2.03 FITTINGS

- A. Cast-Iron Threaded Fittings: ANSI B16.4, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.
- B. Malleable-Threaded Fittings: ANSI B16.3, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.
- C. Steel Fittings: ASTM A234, seamless or welded, for welded joints.
- D. Grooved Mechanical Fittings: ASTM A536, Grade 65-45-12 ductile iron; ASTM A47 Grade 32510 malleable iron; or ASTM A53, Type F or Types E or S, Grade B fabricated steel fittings with grooves or shoulders designed to accept grooved end couplings.
- E. Grooved Mechanical Couplings: Consist of ductile or malleable iron housing, a synthetic rubber gasket of a central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure roll-grooved pipe and fittings. Grooved mechanical couplings including gaskets used on dry-pipe systems shall be listed for dry-pipe service.
- F. Cast-Iron Threaded Flanges: ANSI B16.1, Class 250; raised ground face, bolt holes spot faced.

2.04 JOINING MATERIALS

- A. Welding Materials: Comply, with Section II, Part C, ASME Boiler and Pressure Vessel Code

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for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.

- B. Gasket Materials: Thickness, material, and type suitable for fluid or gas to be handled, and design temperature and pressures.

2.05 GENERAL DUTY VALVES

- A. Gate Valves - 2 Inch and Smaller: Body and bonnet of cast bronze, 175 pound cold water working pressure - non-shock, threaded ends, solid wedge, outside screw and yoke, rising stem, screw-in bonnet, and malleable iron handwheel. Valves shall be capable of being repacked under pressure, with valve wide open.
- B. Gate Valves - 2-1/2 Inch and Larger: Iron body; bronze mounted, 175 pound cold water working pressure - non-shock. Valves shall be solid taper wedge; outside screw and yoke, rising stem; flanged bonnet, with body and bonnet conforming to ASTM A126 Class B; replaceable bronze wedge facing rings; flanged ends; and a packing assembly consisting of a cast iron gland flange, brass gland, packing, bonnet, and bronze bonnet bushing. Valves shall be capable of being repacked under pressure, with valve wide open.
- C. Swing Check Valves: MSS SP-71; Class 175, cast iron body and bolted cap conforming to ASTM A126, Class B; horizontal swing, with a bronze disc or cast iron disc with bronze disc ring, and flanged ends. Valve shall be capable of being refitting while the valve remains in the line.

2.06 SPECIALTY VALVES

- A. Hose Gate Valves: 300 psig working pressure, cast brass valve with non-rising stem, red handwheel, female N.P.T. and male hose outlet. Brass solid wedge disk and tapered seat. Hose thread per requirements of authorities having jurisdiction.
- B. Alarm Check Valve: 175 psig working pressure, designed for horizontal or vertical installations, and have cast iron, flanged inlet and outlet, bronze grooved seat with "O" ring seals, single hinge pin and latch design. Provide trim sets for bypass, drain, electric sprinkler alarm switch, pressure gages, drip cup assembly piped with check valve to main drain line, and fill line attachment with strainer.

2.07 AUTOMATIC SPRINKLERS

- A. Sprinkler Heads: Fusible link type, and style as indicated or required by the application. Unless otherwise indicated, provide heads with nominal 1/2 inch discharge orifice, for "ordinary" temperature range.
- B. Sprinkler Head Finishes: Provide heads with the following finishes:
 - 1. Upright, Pendant, and Sidewall Styles: Chrome plated in finished spaces, exposed to view; rough bronze finish for heads in unfinished spaces and not exposed to view. Heads shall be wax-coated where installed exposed to acids, chemicals, or other corrosive fumes. On all exposed heads, install approved wire mesh head guard.
 - 2. In all areas of building with finished ceilings, install concealed type fire sprinkler heads.
 - a. Concealed Style: Rough brass, with painted white cover plate.
 - b. Flush Style: Bright chrome, with painted white escutcheon plate.
- C. Sprinkler Head Cabinet and Wrench: Finish steel cabinet, suitable for wall mounting, with hinged cover and space for 6 spare sprinkler heads plus sprinkler head wrench. Provide a

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separate cabinet for each style sprinkler head on the project.

2.08 ALARM DEVICES

- A. General: Types and sizes shall mate and match piping and equipment connections.
- B. Water Flow Indicators: Vane type waterflow detector, rated to 250 psig, designed for horizontal or vertical installation; have 2-SPDT circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere 125 volts AC and 0.25 ampere 24 Volts DC; complete with factory-set, field-adjustable retard element to prevent false signals, and tamper-proof cover which sends a signal when cover is removed.
- C. Supervisory Switches: SPST, normally closed contacts, designed to signal valve in other than full open position.

PART 3 - EXECUTION

3.01 PIPE APPLICATIONS

- A. Install Schedule 40 steel pipe with threaded joints and fittings for 2 inch and smaller, and with welded joints 2-1/2 inch and larger.
- B. and/or at Contractor's option
- C. Install Schedule 10 steel pipe with roll-grooved ends and grooved mechanical couplings.

3.02 PIPING INSTALLATIONS

- A. Install sprinkler piping to provide for system drainage in accordance with NFPA 13.
- B. Use approved fittings to make all changes in direction, bronze takeoffs from mains, and reductions in pipe sizes.
- C. Install unions in pipes 2 inch and smaller, adjacent to each valve. Unions are not required on flanged devices or in piping installations using grooved mechanical couplings.
- D. Install flanges or flange adapters on valves, apparatus, and equipment having 2-1/2 inch and larger connections.
- E. Hangers and Supports: Comply with the requirements of NFPA 13 and NFPA 14. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems. Provide coupling manufacturer's written instructions, for rigid systems. Provide protection from damage where subject to earthquake in accordance with NFPA 13.
- F. Make connections between underground and above-ground piping using an approved transition piece strapped or fastened to prevent separation.
- G. Install mechanical sleeve seal at pipe penetrations in foundation walls.
- H. Install test connections sized and located in accordance with NFPA 13 complete with shutoff valve. Test connections may also serve as drain pipes.
- I. Install pressure gage on the riser or feed main at or near each test connection. Provide gage with a connection not less than 1/4 inch and having a soft metal seated globe valve, arranged

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for draining pipe between gage and valve. Install gages to permit removal, and where they will not be subject to freezing.

3.03 PIPE JOINT CONSTRUCTION

- A. Welded Joints: AWS D10.9, Level AR-3.
- B. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Joint pipe, fittings, and valves as follows:
 - 1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - 2. Align threads at point of assembly.
 - 3. Apply appropriate tape or thread compound to the external pipe threads.
 - 4. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.
 - 5. Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of a pipe shall not be used.
- C. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.
- D. Mechanical Grooved Joints: Roll grooves on pipe ends dimensionally compatible with the couplings.
- E. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

3.04 VALVE INSTALLATIONS

- A. General: General install fire protection specialty valves, fittings, and specialties in accordance with the manufacturer's written instructions, NFPA 13 and authority having jurisdiction.
- B. Gate Valves: Install supervised-open gate valves so located to control all sources of water supply except fire department connections. Where there is more than one control valve, provide permanently marked identification signs indicating the portion of the system controlled by each valve. Refer to Division-15 Section "Mechanical Identification" for valve tags and signs.
- C. Install check valves in each water supply connection.
- D. Alarm Check Valves: Install valves in the vertical position, in proper direction of flow including the bypass check valve and retard chamber drain line connection. Install valve trim in accordance with the valve manufacturer's appropriate trim diagrams. Test valve for proper operation.

3.05 SPRINKLER HEAD INSTALLATIONS

- A. Use proper tools to prevent damage during installations.
- B. Where heads are subject to damage, such as in storage rooms, mechanical rooms, custodian rooms, gymnasiums, shower and locker rooms, etc., install approved type protective metal basket head guards.

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- C. In all removable or modular patterned ceilings, install all sprinkler heads centered on the modular ceiling panels.

3.06 FIELD QUALITY CONTROL

- A. Flush, test, and inspect sprinkler piping systems in accordance with NFPA 13.
- B. Replacing piping system components which do not pass the test procedures specified, and retest repaired portion of the system.

3.07 CORROSION PROTECTION

- A. All below ground metallic fittings, valves, flanges, bolts, etc., installed under this Section of the Specifications, shall be protected against corrosion.
- B. Refer to Division 15 Section "Earthwork for Mechanical Systems".

3.08 COORDINATION WITH OTHER TRADES

- A. The Contractor shall review the fire sprinkler design and coordinate the shop drawings, identified as "Working Plans", with other parts of the work, prior to submission to Architect for review.
- B. Architect/Engineer will review for concept only. Contractor/Installer shall review for possible conflict with other portions of the work.

3.09 HYDROSTATIC TESTS

- A. All new systems including yard piping shall be hydrostatically tested at not less than 200 psi pressure for 2 hours, or at 50 psi in excess of the maximum pressure, when the maximum pressure to be maintained in the system is in excess of 150 psi.

END OF SECTION

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SECTION 15411 - WATER DISTRIBUTION PIPING (INSIDE BUILDING)

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes potable cold water, hot water, and circulation hot water piping, fittings, and specialties within the building to a point of 5 feet outside the building.

1.02 RELATED SECTIONS

- A. The following sections contain requirements that relate to this section.
 - 1. Division 15 section "Water Distribution System" for water service piping (which connects the "Water Distribution Piping" public utilities).
 - 2. Section 02215: Structural Excavation and Backfill.
 - 3. Division 7 Section "Joint Sealers" for materials and methods for sealing pipe penetrations through rated walls and fire and smoke barriers.
 - 4. Division 15 Section "Valves."
 - 5. Division 15 Section "Meters and Gages" for thermometers and pressure gages.
 - 6. Division 15 Section "Mechanical Identification" for labeling and identification of piping systems.
 - 7. Division 15 Section "Plumbing Pumps" for pressure booster systems, circulators, circulation pumps, motors, and accessories.
 - 8. Division-15 Section "Supplementary Mechanical Requirements."
- B. Separate sections of Division 15 specify Basic Piping Materials and Methods, Hangers, and Supports, Expansion Compensation, piping system identification materials and requirements, general duty valves, pipe insulation, fire protection piping, and plumbing equipment.

1.03 DEFINITIONS

- A. Water Distribution Pipe: A pipe within the building or on the premises that conveys water from the water service pipe or meter to the points of usage.
- B. Water Service Pipe: The pipe from the water main or other source of potable water supply to the water distributing system of the building served.
- C. Pipe sizes used in this Specification are nominal pipe size (NPS).

1.04 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.
 - 1. Product data for each piping specialty and valve specified.
 - 2. Test reports specified in Part 3 of this Section.
 - 3. Maintenance data for each piping specialty and valve specified for inclusion in Maintenance Manual specified in Division 1 and Division 15 Section - "Basic Mechanical Requirements."

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1.05 QUALITY ASSURANCE

A. Codes and Standards

1. California Building Code 2001, Title 24, Part 2 for Accessibility Requirements.
 - a. Accessible plumbing fixtures for adults; dimensions shall comply with the requirements of CCT, T-24, Section 1115.B.
 - b. Heights and location of fixtures shall be according to CCR, T-24, Chapter 11-B and Table 1115.B-1.
 - c. Fixture Controls shall comply with CCR, T-24 Section 1115.B.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide factory-applied plastic end-caps on each length of pipe and tube, except for concrete, corrugated metal, hub-and-spigot, clay pipe. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.
- C. Protect flanges, fittings and specialties, from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.
- D. Store CPVC, and PVC pipe and fittings where protected from direct sunlight.
- E. Store pipe in a manner to prevent sagging and bending.

1.07 SEQUENCING AND SCHEDULING

- A. Coordinate the size and location of concrete equipment pads. Cast anchor-bolt inserts into pad. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- B. Coordinate the installation of pipe sleeves for foundation wall penetrations.

1.08 EXTRA MATERIALS

- A. Maintenance Stock: Furnish one valve key for each key-operated wall hydrant, hose bibb, fixture supply, or faucet installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer Uniformity: Conform to the requirements specified in Division 15 section "Basic Mechanical Requirements."
 1. Hose Bibbs:
 - a. Lee Brass Co.
 - b. Acorn
 - c. Watts Regulator Co.
 - d. Woodford Mfg. Co.
 2. Relief Valves:

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- a. Cash (A. W.) Valve Mfg. Corp.
- b. Watts Regulator Co.
- c. Zurn Industries, Inc. Wilkins Regulator Divs.
- 3. Water Hammer Arresters:
 - a. Precision Plumbing Products, Inc.
 - b. Smith (Jay R.) Mfg. Co.
 - c. Sioux Chief
 - d. Watts Regulator Co.
 - e. Zurn Industries, Inc.; Hydromechanics Div.
- 4. Vacuum Breakers for Hose Connections:
 - a. Cash (A.W.) Valve Mfg. Corp.
 - b. Conbraco Industries, Inc.
 - c. Watts Regulator Co.
- 5. Mechanical Sleeve Seals:
 - a. Thunderline Corp.
- 6. Pipe Escutcheons:
 - a. Chicago Specialty Mfg. Co.
 - b. Grinnell
- 7. Dielectric Waterway Fittings:
 - a. Epco Sales, Inc.
 - b. Victaulic Company of America
- 8. Dielectric Unions:
 - a. Eclipse, Inc.
 - b. Perfection Corp.
 - c. Watts Regulator Co.

2.02 PIPE AND TUBE MATERIALS, GENERAL

- A. Pipe and Tube: Refer to Part 3, Article "Application, General," for identification of systems where the below materials are used.
- B. Copper Tube: (Within Building) ASTM B88, Type L Water Tube, drawn temper.
- C. Copper Tube: (Underground) ASTM B88, Type K Water Tube, annealed temper.

2.03 FITTINGS

- A. Wrought Copper Solder-Joint Fittings: ANSI B16.22, streamlined pattern.
- B. Wrought Copper and Bronze Grooved-End Fittings: ASTM B75 Tube and ASTM B584 Bronze Castings.
- C. Unions: ASME B16.39, malleable iron, Class 150, hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces, female threaded ends. Threads shall conform to ASME B1.20.1.
- D. Dielectric Unions: Threaded, solder, or grooved-end connections as required to suit application; constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

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- E. Dielectric Unions: Flexible Connectors: Stainless-steel bellows with woven, flexible, bronze wire reinforced protective jacket; minimum 150 psig working pressure, maximum 250 degree F operating temperature. Connectors shall have flanged or threaded-end connections to match equipment connected and shall be 12" long and capable of 3/4-inch misalignment. Sweat ends are not acceptable.

2.04 JOINING MATERIALS

- A. Solder Filler Metal: ASTM B32, 95-5 Tin-Antimony.
- B. Brazing Filler Metals: AWS A5.8, BCUP Series.
- C. Gasket Material: Thickness, material, and type suitable for fluid to be handled and design temperatures and pressure.

2.05 GENERAL-DUTY VALVES

- A. General-duty valves (i.e., gate, globe, check, ball, and butterfly valves) are specified in Division 15 Section "Valves." Special duty valves are specified below by their generic name; refer to Part 3 Article "Valve Application" for specific uses and applications for each valve specified.

2.06 SPECIAL DUTY VALVES

- A. Balance Cocks: 400 PSI WOG, 2 piece, ball valve, handle, memory stop, with threaded-end connections conforming to ASME B1.20.1.
- B. Balance Cocks: 400 PSI WOG, 2 piece bronze, ball valve, handle, memory stop, with solder-end connections.

2.07 PIPING SPECIALTIES

- A. Water Hammer Arresters: Bellows type, with stainless steel casing and bellows, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201 shall be of the following sizes unless otherwise indicated on the drawings:

- 1. Self-closing valves, lavatories, sinks, etc.

<u>Supply or header pipe size</u>	<u>W.H.A. No.</u> (J.R. Smith or equal)
1/2"	5005
3/4"	5005
1"	5010

- 2. Flushometer, automatic and solenoid valves:

<u>Supply or header pipe size</u>	<u>W.H.A. No.</u> (J.R. Smith or equal)
3/4"	5010
1"	5010
1-1/4"	5030
1-1/2"	5040
2"	5050

- B. Y-Type Strainers: Provide strainers full line size of connecting piping, with ends matching piping system materials. Screens shall be Type 304 stainless steel, with 3/64" perforations at 233 per square inch. Strainers in copper lined to have bronze bodies.

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1. Provide strainers with 125 psi working pressure rating for low pressure applications, and 250 psi pressure rating for high pressure application.
 2. Threaded ends, 2" and Smaller: Cast-iron body, or bronze body, screwed screen retainer with centered blowdown fitted with pipe plug.
 3. Threaded Ends, 2-1/2" and Larger: Cast-iron body or bronze body bolted screen retainer with off-center blowdown fitted with pipe plug.
 4. Flanged Ends, 2-1/2" and Larger: Cast-iron body or bronze body, bolted screen retainer with off-center blowdown fitted with pipe plug.
- C. Hose connections: Hose connections shall have garden hose threaded outlets conforming to ASME B1.20.7.
- D. Hose Bibbs: Bronze body with chrome- or nickel-plated finish, with renewable composition disc, removable wheel handle, vacuum breaker, 3/4- inch solder inlet, hose outlet.
- E. Vacuum Breakers: Hose connection vacuum breakers shall conform to ASSE Standard 1011, with finish to match hose connection.
- F. Relief Valves: Sizes for relief valves shall be in accordance with ASME Boiler and Pressure Vessel Codes for indicated capacity of the appliance for which installed.
1. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Temperature relief valves shall be factory set at 210 degree F, and pressure relief at 150 psi.
- G. Escutcheons: Chrome-plated, stamped steel, hinged, split-ring escutcheon, with set screw. Inside diameter shall closely fit pipe outside diameter, or outside of pipe insulation.
- H. Sleeves:
1. Sheet-Metal Sleeves: 10 gage, galvanized sheet metal, round tube closed with welded longitudinal joint.
 2. Steel Sleeves: Schedule 40 galvanized, welded steel pipe, ASTM A53, Grade A.
- I. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine rough-in requirements for plumbing fixtures and other equipment with water connections to verify actual locations of piping connections prior to installation.

3.02 PREPARATION

- A. Ream ends of pipes and tubes, and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.

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3.03 PIPE APPLICATIONS

- A. Install Type L, drawn copper tube with wrought copper fittings and solder joints for pipe sizes 4 inches and smaller, above ground, within building.
- B. Install Type K, annealed temper copper tube for pipe sizes 2 inches and smaller, with minimum number of joints, below ground.
- C. Water piping in sizes 2-1/2 to 6 inches may be Type L drawn copper tube with roll-grooved ends and mechanical couplings, above ground within building.

3.04 PIPING INSTALLATION

- A. General Locations and Arrangements; Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.
- B. Use fittings for all changes in direction and branch connections.
- C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted unless expressly indicated.
- D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.
- E. Conceal all piping installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
- F. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1-inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.
- G. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.
- H. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4-inch ball valve, and short 3/4-inch threaded nipple and cap.
- I. Pipe sleeves smaller than 6 inches shall be galvanized steel pipe; pipe sleeves 6 inches and larger shall be galvanized steel sheet metal.
- J. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls with sleeves and mechanical sleeve seals.
- K. Fire Barrier Penetrations: Where pipes pass through fire-rated walls, partitions, ceilings, and floors, maintain the fire-rated integrity. Refer to Division 7 for special sealers and materials.

3.05 HANGERS AND SUPPORTS

- A. General: Hanger, support, and anchor devices conforming to MSS SP-69 are specified in Division 15 Section "Supports and Anchors." Conform to the table below for maximum spacing of supports:
- B. Pipe Attachments: Install the following:

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1. Adjustable steel clevis hangers, MSS Type 1, for individual horizontal runs less than 20 feet in length.
 2. Adjustable roller hangers, MSS Type 43, and spring hangers, MSS Type 41 with Type 49, for individual horizontal runs 20 feet and longer.
 3. Pipe roll, complete MSS Type 44 for multiple horizontal runs, 20 feet or longer, support on a trapeze.
 4. Spring hangers to support vertical runs.
- C. Install hangers for horizontal piping with the following maximum spacing and minimum rod sizes:

Nom. Pipe Size - In.	Steel Pipe Size - In. Max. Span - Ft.	Copper Tube Dia. - In.	Min. Rod
Up to 3/4	7	5	3/8
1	7	6	3/8
1-1/4	7	7	3/8
1-1/2	9	8	3/8
2	10	8	3/8
2-1/2	11	9	3/8
3	12	10	1/2
3-1/2	13	11	1/2
4	14	12	5/8 (1/2 for copper)
5	16	13	5/8 (1/2 for copper)
6	17	14	3/4 (5/8 for copper)
8	19	16	7/8 (3/4 for copper)

- D. Support vertical steel pipe and copper tube at each floor.

3.06 PIPE AND TUBE JOINT CONSTRUCTION

- A. Soldered Joints: Comply with the procedures contained in the AWS "Soldering Manual."
- B. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."
1. CAUTION: Remove stems, seats, and packing of valves and accessible internal parts of piping specialties before soldering and brazing.
 2. Fill the tubing and fittings during soldering and brazing with an inert gas (nitrogen or carbon dioxide) to prevent formation of scale.
 3. Heat joints to proper and uniform temperature.
- C. Threaded Joints: Conform to ASME B1.20.1, tapered pipe threaded for field-cut threads. Join pipe fittings and valves as follows:
1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 2. Align threads at point of assembly.
 3. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
 4. Assembly joint wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.
 - a. Damaged Threads: Do not use pipe with corroded or damaged threads. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

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- D. Flanged Joints: Align flange surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.
- E. Grooved-End Joints: Prepare pipe and tubing and install in accordance with manufacturer's installation instructions.

3.07 SERVICE ENTRANCE

- A. Extend water distribution piping to connect to water service piping, of size and in location indicated for service entrance to building. Water service piping is specified in separate section of Division 15.
- B. For trenching and backfill see Section 02215 "Structural Excavation and Backfill".
- C. Install sleeve and mechanical sleeve seal at penetrations through foundation wall for watertight installation.

3.08 VALVE APPLICATIONS

- A. General-Duty Valve Applications: The Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shut-off duty: Use gate, ball, and butterfly valves.
 - 2. Throttling duty: Use globe and ball valves.

3.09 INSTALLATION OF VALVES

- A. Sectional Valves: Install sectional valves on each branch and riser, close to main, where branch or riser serves 2 or more plumbing fixtures or equipment connections, and elsewhere as indicated. For sectional valves 2 inches and smaller, use gate valves; for sectional valves 2-1/2 inches and larger, use gate or butterfly valves.
- B. Shutoff Valves: Install shutoff valves at inlet and outlet of each plumbing equipment item and elsewhere as indicated.
 - 1. At plumbing equipment: 2" and smaller use gate or ball valves.
 - 2. At plumbing equipment: 2-1/2" and larger use gate or butterfly valves.
 - 3. For plumbing fixtures see fixture trim.
 - 4. All other locations, use gate valves.
- C. Drain Valves: Install drain valves on each plumbing equipment item, located to drain equipment completely for service or repair. Install drain valves at the base of each riser, at low points of horizontal runs, and elsewhere as required to drain distribution piping system completely. For drain valves use 3/4" hose end drain valve.
- D. Hose Bibbs: Install on exposed piping where indicated. Provide vacuum breaker.

3.10 INSTALLATION PIPING SPECIALTIES

- A. Install backflow Preventers at each connection to mechanical equipment and systems and in compliance with the plumbing code and authority having jurisdiction. Install air cap fitting and pipe relief outlet drain without valves to nearest floor drain. Identify all piping downstream of backflow preventers as "industrial water".

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- B. Install pressure-regulating valves with inlet and outlet shutoff valves and balance cock bypass. Install pressure gage on valve outlet.

3.11 INSTALLATION OF PIPING WATER HAMMER ARRESTORS

- A. Provide an air chamber at each valved water outlet or fixture supply for fixtures with manual closing valves. Air chamber shall be 18 inches long and one pipe size larger than supply to outlet. For a battery of fixtures, one air chamber 30 inches long and the full size of the header, but not less than 1 inch may be installed in lieu of individual air chambers. Precision Plumbing Products, JMJ "System Rated" arrestors are acceptable in lieu of air chambers.
- B. Install water hammer arrestors on supply line to fixtures with self-closing, automatic or Flushometer valves. Arrestors shall be as close as possible to individual fixtures and on the end of the header for a battery of fixtures. Arrestors shall be installed in the wall or furring, whenever possible, behind an access panel large enough to permit removal of the arrestor. Sizes as shown on the drawings or as specified hereinafter. Sizes and model numbers are J. R. Smith; equivalent arrestors by Josam, Wade or Zurn are acceptable.

3.12 EQUIPMENT CONNECTIONS

- A. Piping Runouts to Fixtures: Provide hot and cold water piping Runouts to fixtures of sizes indicated, but in no case smaller than required by plumbing code.
- B. Mechanical Equipment Connections: Connect hot and cold water piping system to mechanical equipment as indicated. Provide shutoff valve and union for each connection; provide drain valve on drain connection. For connections 2-1/2 inches and larger, use flanges instead of unions.

3.13 FIELD QUALITY CONTROL

- A. Inspections: Inspect water distribution piping as follows:
 - 1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the authority having jurisdiction.
 - 2. During the progress of the installation, notify the plumbing official having jurisdiction at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.
 - a. Rough-In Inspection: Arrange for inspection of the piping system before concealed or closed in after system is roughed in and prior to setting fixtures.
 - b. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to ensure compliance with the requirements of the plumbing code.
 - 3. Reinspections: Whenever the plumbing official finds that the piping system will not pass the test or inspection, make the required corrections and arrange for reinspection by the plumbing official.
 - 4. Reports: Prepare inspection reports signed by the plumbing official.
- B. Test water distribution piping as follows:
 - 1. Test for leaks and defects all new water distribution piping systems and parts of existing systems that have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
 - 2. Leave uncovered and unconcealed all new, altered, extended, or replaced water distribution piping until it has been tested and approved. Expose all such work for testing that has been covered or concealed before it has been tested and approved.

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3. Cap and subject the piping system to a static water pressure of 50 psig above the operating pressure without exceeding the pressure rating of the piping system materials. Isolate the test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair all leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
5. Prepare reports for all tests and required corrective action.

3.14 ADJUSTING AND CLEANING

A. Clean and disinfect water distribution piping as follows:

1. Purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired prior to use.
2. Use the purging and disinfecting procedure prescribed by the authority having jurisdiction or, in case a method is not prescribed by that authority, the procedure described in either AWWA C651, or AWWA C652, or as described below:
 - a. Flush the piping system with clean, potable water until dirty water does not appear at the points of outlet.
 - b. Fill the system or part thereof with a water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) the system or part thereof and allow to stand for 24 hours.
 - c. Drain the system or part thereof of the previous solution and refill with a water/chlorine solution containing at least 200 parts per million of chlorine and isolate and allow to stand for 3 hours.
 - d. Following the allowed standing time, flush the system with clean, potable water until chlorine does not remain in the water coming from the system.
 - e. Submit water samples in sterile bottles to the authority having jurisdiction. Repeat the procedure if the biological examination made by the authority shows evidence of contamination.

B. Prepare reports for all purging and disinfecting activities.

3.15 COMMISSIONING

A. Fill the system. Check compression tanks, where used, to determine that they are not air bound and that the system is completely full of water.

B. Before operating the system, perform these steps:

1. Close drain valve, hydrants, and hose bibbs.
2. Open valves to full open position.
3. Remove and clean strainers.
4. Check pumps for proper direction of rotation. Correct improper wiring.
5. Lubricate pump motors and bearings.

END OF SECTION

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SECTION 15420 - DRAINAGE AND VENT SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes building sanitary and storm drainage and vent piping systems, including drains and drainage specialties.

1.02 RELATED SECTIONS

- A. The following sections contain requirements that relate to this section:
 - 1. Section 02215 "Structural Excavation and Backfill", for trenching and backfilling materials and methods for underground piping installations.
 - 2. Division 15 Section "Mechanical Identification," for labeling and identification of drainage and vent piping.

1.03 DEFINITIONS

- A. Building Drain: That part of the lowest piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer.
- B. Building Sewer: That part of the piping within a public or private premises which conveys sewage, rain water or other liquid wastes to a point of disposal.
- C. Drainage System: Includes all the piping within a public or private premises which conveys sewage, rain water or other liquid wastes to a point of disposal. It does not include the mains of public sewer systems or a private or public sewage treatment or disposal plant.
- D. Vent System: A pipe or pipes installed to provide a flow of air to or from a drainage system, or to provide a circulation of air within such system to protect trap seals from siphonage and backpressure.

1.04 SUBMITTALS

- A. Product data for the following products:
 - 1. Drainage piping specialties

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the provisions of the following:
 - 1. California Plumbing Code (CPC): Current edition in use by authority having jurisdiction.

1.06 SEQUENCING AND SCHEDULING

- A. Coordinate the installation of roof drains, flashing, and roof penetrations.
- B. Coordinate flashing materials installation of roofing, waterproofing, and adjoining substrate work.
- C. Coordinate the installation of drains in poured-in-place concrete slabs, to include proper drain elevations, installation of flashing, and slope of slab to drains.

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- D. Coordinate with installation of sanitary and storm sewer system as necessary to interface building drains with drainage piping system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide drainage and vent systems from one of the following:
 - 1. Drainage Piping Specialties, including backwater valves, expansion joints, drains, trap primers, and vandal-proof vent caps:
 - a. Josam Mfg. Co.
 - b. Smith (Jay R.) Mfg. Co.
 - c. Tyler Pipe; Subs. of Tyler Corp.
 - d. Zurn Industries Inc; Hydromechanics Div.

2.02 ABOVE GROUND DRAINAGE AND VENT PIPE AND FITTINGS

- A. General: Select from the following options:
 - 1. Pipe Sizes Larger than 2": Cast-iron soil pipe. Conform to ASTM A74, for service weight, hub-and-spigot soil pipe and fittings, with clamps and compression gasket joints conforming to ASTM C564. Piping shall bear the CISPI stamp.
 - 2. Pipe Sizes Larger than 2": Hubless cast-iron soil pipe. Conform to CISPI Standard 301, Service weight, cast-iron soil pipe and fittings, with neoprene gaskets conforming to CISPI Standard 310. Piping shall bear the CISPI stamp.

2.03 UNDERGROUND BUILDING DRAIN PIPE AND FITTINGS

- A. Pipe and fittings shall have heavy coating of coal tar varnish or asphaltum on both inside and outside surfaces.
- B. General: For pipe and fittings below grade and/or below finish floor of floors on grade select from the following options:
 - 1. Pipe Sizes 15" and Smaller: Cast-iron soil pipe. Conform to ASTM A74, for standard weight hub and spigot soil pipe and fittings, with clamps and neoprene gasket, conforming to ASTM C564. Piping shall bear the CISPI stamp.
 - 2. Pipe Sizes 16" and Smaller: Hubless cast iron soil pipe, conform to CISPI Standard 301, service weight; with "Best" or "MG" cast iron joint connection couplings. Coupling body shall conform to ASTM A-48 or ASTM A-74 with neoprene gasket conforming to ASTM C-564. Piping shall bear the CISPI stamp.

2.04 DRAINAGE PIPE SPECIALTIES

- A. Trap Primers: Bronze body valve with automatic vacuum breaker, with 1/2 inch connections matching piping system. Complying with ASSE 1018.
- B. Expansion Joints: Cast-iron body with adjustable bronze sleeve, bronze bolts with wing nuts.
- C. Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1, countersunk head.

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2.05 CLEANOUTS

- A. Cleanouts on cast iron soil pipe, iron body with ABS plugs screwed into caulking ferrules. Cleanouts on steel pipe, ABS plugs. Cleanouts on vitrified clay pipe, vitrified clay pipe. Where cleanouts occur in finished interior surfaces, smooth polished chromium plated. Exposed parts of floor cleanouts in finished rooms, non-slip polished nickel bronze. Floor cleanouts adjustable type. Where cleanouts occur in carpeted floor areas, the cover shall be elevated so as to be flush with finished carpeted areas.
- B. Floor Cleanouts: Cast-iron body and frame, with cleanout plug and adjustable round top as follows:
 - 1. Floor level type in rooms with concrete floor: Smith #4021, Josam 58330-2, or Zurn Z1420-25 with cast iron top.
- C. Wall Cleanouts: Cast-iron body adaptable to pipe with ABS plastic plug; stainless steel cover including screws.
 - 1. Wall type for cast iron pipes: Smith #4532, Josam 58790-4, or Zurn Z-1445-1.
 - 2. Wall type for steel pipes: Smith #4472, Josam 58890-4, or Zurn 1460-8.
- D. Flashing Flanges: Cast-iron watertight stack or wall sleeve with membrane flashing ring. Provide underdeck clamp and sleeve length as required.
- E. Vent Flashing Sleeves: Cast-iron caulking type roof coupling for cast-iron stacks, cast-iron threaded type roof coupling for steel stacks.
- F. Vandal-Proof Vent Caps: Cast-iron body full size of vent pipe, with caulked base connection for cast-iron pipes, threaded base for steel pipes.

2.06 FLOOR DRAINS

- A. Floor drains are specified in Section 15440 "Plumbing Fixtures".

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify all dimensions by field dimensions. Verify that all drainage and vent piping and specialties may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.
- B. Verify existing grades, inverts, utilities, obstacles, and topographical conditions prior to installations.
- C. Examine rough-in requirements for plumbing fixtures and other equipment having drain connections to verify actual locations of piping connections prior to installation.
- D. Examine walls, floors, roof, and plumbing chases for suitable conditions where piping and specialties are to be installed.
- E. Do not proceed until unsatisfactory conditions have been corrected.

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3.02 PREPARATION FOUNDATION FOR UNDERGROUND BUILDING DRAINS

- A. Grade trench bottoms to provide a smooth, firm, and stable foundation, free from rock, throughout the length of the pipe.
- B. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid and backfill with clean sand or pea gravel to indicated invert elevation.
- C. Shape bottom of trench to fit bottom of pipe for 90-degrees (bottom 1/4 of the circumference). Fill unevenness with tamped sand backfill. At each pipe joint dig bell holes to relieve the bell of the pipe of all loads, and to ensure continuous bearing of the pipe barrel on the foundation.

3.03 PIPE APPLICATIONS - ABOVE GROUND, WITHIN BUILDING

- A. General: Select from following options:
 - 1. Install hub-and-spigot, service weight, cast-iron soil pipe with compression gasket joints for larger than 2 inches drainage and vent pipe. Piping shall bear the CISPI stamp.
 - 2. Install Hubless, service weight, cast-iron soil pipe and fittings for larger than 2 inch drainage and vent pipe. Piping shall bear the CISPI stamp.

3.04 PIPE APPLICATIONS - BELOW GROUND, WITHIN BUILDING

- A. General: Select from the following options:
 - 1. Install hub-and-spigot, heavy service weight, cast-iron, soil pipe and fittings with gasketed joints for 15 inch and smaller drainage pipe. Piping shall bear the CISPI stamp.
 - 2. Install hubless, service weight, cast-iron, soil pipe and "Best" or "MG" cast iron couplings with neoprene gaskets. Stainless steel couplings not acceptable below grade. Piping shall bear the CISPI stamp.

3.05 PIPE AND TUBE JOINT CONSTRUCTION

- A. Copper Tubing: Solder joints in accordance with the procedures specified in AWS "Soldering Manual."
- B. Cast-Iron Soil Pipe: Make lead and oakum caulked joints, compression joints, and hubless joints in accordance with the recommendations in the CISPI Cast Iron Soil Pipe and Fittings Handbook, Chapter IV.
- C. Install couplings per manufacturer's recommendations.

3.06 INSTALLATION

- A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into account many design considerations. So far as practical, install piping as indicated.
- B. Use fittings for all changes in direction and all branch connections.
- C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.
- D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

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- E. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
 - F. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Allow sufficient space above removable ceiling panels to allow for panel removal.
 - G. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.
 - H. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings and floors, maintain the fire rated integrity.
 - I. Make changes in direction for drainage and vent piping using appropriate 45 degree wyes, half-wyes, or long sweep quarter, sixth, eighth, or sixteenth bends. Sanitary tees or short quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long-turn tees where two fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than 90 degrees shall be made. Where different sizes of drainage pipes and fittings are connected, use proper size, standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.
 - J. Install underground building drains to conform with the plumbing code, and in accordance with the Cast Iron Soil Pipe Institute Engineering Manual. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
 - K. Install building drain pitched down at minimum slope of 1/4 inch per foot (2 percent) for piping 3 inch and smaller, and 1/8 inch per foot (1 percent) for piping 4 inch and larger.
 - L. Extend building drain to connect to sewer piping, of size and in location indicated for service entrance to building. Sewer piping is specified in a separate section of Division 15.
 - M. Install sleeve and mechanical sleeve through foundation wall for watertight installation.
- 3.07 HANGERS AND SUPPORTS
- A. General: Hangers, supports, and anchorage devices are specified in Division 15 Section "Basic Mechanical Materials and Methods." Conform to the table below for maximum spacing of supports:
 - B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet in length.
 - C. Install hangers at the following intervals:

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<u>PIPE MATERIAL</u>	<u>MAX HORIZ SPACING IN FT.</u>	<u>MAX VERT SPACING IN FT.</u>
Cast-Iron Pipe	5	15
Copper Tubing - 1-1/2 inch and smaller	6	10
Copper Tubing - 2 inch and larger	10	10

3.08 INSTALLATION OF PIPE SPECIALTIES

- A. Install backwater valves in sanitary building drain piping as indicated, and as required by the plumbing code. For interior installation, provide cleanout cover flush to floor centered over backwater valve cover and of adequate size to remove valve cover for service.
- B. Install expansion joints on vertical risers as indicated, and as required by the plumbing code.
- C. Above Ground Cleanouts: Install in above ground piping and building drain piping as indicated, and:
 - 1. As required by plumbing code.
 - 2. At each horizontal change in direction of piping greater than 135 degrees.
 - 3. At maximum intervals of 50' for piping 3" and smaller and 100' for larger piping.
 - 4. At base of each vertical soil or waste stack.
- D. Cleanouts Covers: Install floor and wall cleanout covers for concealed piping.
- E. Flashing Flanges: Install flashing flange and clamping device with each stack and cleanout passing through roof, secure over stack flashing in accordance with manufacturer's instructions.

3.09 INSTALLATION OF TRAP PRIMERS

- A. Install trap primers with piping pitched towards drain trap, minimum of 1/8 inch per foot (1 percent). Adjust trap primer for proper flow. Provide trap primer for all floor drains and floor sinks. Multiple outlet primers are acceptable.

3.10 CONNECTIONS

- A. Piping Runouts to Fixtures: Provide drainage and vent piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by the plumbing code.

3.11 FIELD QUALITY CONTROL

- A. Inspections:
 - 1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved by the authority having jurisdiction.
 - 2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.
 - a. Rough-In Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.

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- b. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.
 3. Reinspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for reinspection by the plumbing official.
 4. Reports: Prepare inspection reports, signed by the plumbing official.
- B. Piping System Test: Test drainage and vent system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows:
 1. Test for leaks and defects all new drainage and vent piping systems and parts of existing systems, which have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
 2. Leave uncovered and unconcealed all new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose all such work for testing, which has been covered or concealed before it has been tested and approved.
 3. Rough Plumbing Test Procedure: Except for outside leaders and perforated or open jointed drain tile, test the piping of plumbing drainage and venting systems upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water to the point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints for leaks.
 4. Finished Plumbing Test Procedure: After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas and water-tight. Plug the stack openings on the roof and building drain where it leaves the building, and introduce air into the system equal to a pressure of 1" water column. Use a "U" tube or manometer inserted in the trap of a water closet to measure this pressure. Air pressure shall remain constant without the introduction of additional air throughout the period of inspection. Inspect all plumbing fixture connections for gas and water leaks.
 5. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
 6. Prepare reports for all tests and required corrective action.

3.12 ADJUSTING AND CLEANING

- A. Clean interior of piping system. Remove dirt and debris as work progresses.
- B. Clean drain strainers, domes, and traps. Remove dirt and debris.

3.13 PROTECTION

- A. Protect drains during remainder of construction period, to avoid clogging with dirt and debris, and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

END OF SECTION

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SECTION 15440 - PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section specifies plumbing fixtures and trim and includes the following fixture types:

1. Lavatories (including accessible type)
2. Service Sinks
3. Water Closets (including accessible type)
4. Urinals (including accessible type)
5. Mop Basins
6. Faucets
7. Flush Valves
8. Fixture Supports (including accessible type)
9. Toilet Seats
10. Fittings, Trim, and Accessories
11. Floor Drains
12. Roof Drains

1.02 RELATED SECTIONS

- A. Separate grab bars and toilet accessories are not an integral part of plumbing fixtures and are specified in Division 10.
- B. Electrical Requirements for Mechanical Equipment, Water Heaters, and other plumbing equipment are specified in other Sections of Division 15.

1.03 SUBMITTALS

- A. Product Data: Submit Product Data and installation instructions for each fixture, faucet, specialties, accessories, and trim specified; clearly indicate rated capacities of selected models of water coolers, and water heaters.
- B. Shop Drawings: Submit rough-in drawings. Detail dimensions, rough-in requirements, required clearances, and methods of assembly of components and anchorages. Coordinate requirements with Architectural Woodwork shop drawings specified in Division 6 for fixtures installed in countertops and cabinets. Furnish templates for use in woodwork shop.
- C. Wiring Diagrams: Submit manufacturer's electrical requirements and wiring diagrams for power supply to units. Clearly differentiate between portions of wiring that are factory installed and field installed portions.
- D. Maintenance Data: Include data in Maintenance Manual specified in Division 1 and Section 15010.
- E. Quality Control Submittals:
1. Submit certification of compliance with specified ANSI, UL, and ASHRAE Standards.
 2. Submit certification of compliance with performance verification requirements specified in this Section.

1.04 QUALITY ASSURANCE

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A. Codes and Standards:

1. California Building Code 2007, Title 24, Part 2 for Accessibility Requirements.
 - a. Accessible plumbing fixtures for adults; dimensions shall comply with the requirements of CCR, T-24, Section 1115. B.
 - b. Heights and location of fixtures shall be according to CCR, T-24, Chapter 11-B and Table 1115B-1.
 - c. Fixture Controls shall comply with CCR, T-24 section 1118 B.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store fixtures where environmental conditions are uniformly maintained within the manufacturer's recommended temperatures to prevent damage.
- B. Store fixtures and trim in the manufacturer's original shipping containers. Do not stack containers or store in such a manner that may cause damage to the fixture or trim.

1.06 SEQUENCE AND SCHEDULING

- A. Schedule rough-in installations with the installation of other building components.

1.07 MAINTENANCE

- A. Extra Stock: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt in a quantity of one device for each 10 fixtures.
- B. Repair Kits: Furnish faucet repair kits complete with all necessary washers, springs, pins, retainer packings, O-rings, sleeves, and seats in a quantity of 1 kit for each 40 faucets.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer uniformity shall be as specified in Section 15010: "Basic Mechanical Requirements" under "Product Options."
- B. The following specification mentions manufacturers to establish a standard quality. The following fixtures and accessories are acceptable, if used throughout:
 1. Lavatories, Service Sinks, Water Closets, Urinals, Mop Basins, sinks:
 - a. Kohler Co.
 - b. American Standard
 2. Stainless Steel Sinks:
 - a. Elkay Mfg. Co.
 - b. Just Mfg. Co.
 3. Faucets:
 - a. Chicago Faucet Co.
 4. Flush Valves:
 - a. Sloan Valve Co.

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- 5. Water Closet Seats:
 - a. Bemis
 - b. Olsonite
 - c. Church Products
- 6. Fixture Supports:
 - a. Josam Mfg. Co.
 - b. Zurn Industries, Inc.; Hydromechanics Div.
 - c. Jay R. Smith Manufacturing Co.
- 7. Drains:
 - a. Josam Mfg. Co.
 - b. Jay R. Smith Manufacturing Co.
 - c. Zurn

2.02 FIXTURES

- A. Plumbing fixture trim and exposed supplies and wastes are to be brass with polished chromium plated finish unless otherwise specified. Provide individual lose key or screwdriver stops for all fixture supplies. Separately trap all wastes. Furnish chrome plated wall escutcheons for all exposed supplies and trap arms. Locate stops below fixtures or countertops. All fixtures for use by the physically disabled shall have exposed hot water pipe and tailpiece and trap insulated with pre-formed fitting covers.
- B. All plumbing fixture faucets submitted for review shall have identification label or certification showing compliance with California Title 24, Part 5, Article 1, "Energy Conservation Standards"; Article 1, T20-1406; Article 2, T20-1525 and Article 4, 1604, and 1606.

2.03 FIXTURE SUPPORTS

- A. Lavatory Supports: Adjustable cast iron, with thin concealed arms and sleeves, and complete with escutcheons and mounting fasteners.
- B. Urinal supports: Steel tubing upright with welded base, supporting studs and bottom bearing plate.

2.04 ESCUTCHEONS

- A. Select one of the two options below:
 - 1. Chrome-plated cast brass with set screw.
 - 2. Chrome-plated sheet steel with friction clips.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify all dimensions by field measurements. Verify that all plumbing fixtures may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.
- B. Examine rough-in for potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures.

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- C. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.
- D. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF FIXTURES

- A. Install plumbing fixtures level and plumb, in accordance with fixture manufacturer's written instructions, rough-in drawings, and pertinent codes and regulations, the original design, and the referenced standards.
- B. Comply with the installation requirements of ANSI A117.1 and Public Law 90-480 with respect to plumbing fixtures for the physically disabled.
- C. Install accessible water closets per CBC Section 1115.B.2.1. Height to be between 17 – 19 inches (432-483mm) when measured to top of a maximum 2 inch (51mm) high toilet seat. A 3 inch (76mm) high seat is permitted only in alteration where the existing fixture is less than 15 inches (381mm) high. Controls to be operable with one hand and shall not require tight grasping, pinching or twisting. Controls for flush valves to be mounted on wide side of toilet area, controls for flush valves to be no more than 44 inches (1,118mm) A.F.F. Force required to activate controls to be no greater than 5 lbs. force (22.2N).
- D. Install accessible urinals per CBC Section 1115.B.2.1.1. Rim to be between 14 – 17 inches (356-432mm) from face of wall, rim to be a maximum of 17 inches (432mm) A.F.F. Controls to be operable with one hand and shall not require tight grasping, pinching or twisting. Controls for flush valves to be mounted on wide side of toilet area, controls for flush valves to be no more than 44 inches (1,118mm) A.F.F. Force required to activate controls to be no greater than 5 lbs. force (22.2N). Electronic automatic flushing controls are acceptable (and preferred).
- E. Install accessible lavatory faucet controls per CBC Section 1115.B.2.1.2.1. Controls and operating mechanisms to be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. Force required to activate controls to be no greater than 5 lbs. force (22.2N). Controls to be lever operated, push type, or electronically controlled mechanism. Self-closing valves to remain open for at least 10 seconds.
- F. Install accessible drinking fountains per CBC Section 1115.B.2.1.5.1. Fixture to 18 inches (457mm) minimum in depth. Provide clear knee space under the drinking fountain of not less than 27 inches (686mm) in height and 8 inches (203mm) in depth – the depth measurement being taken from the front edge of the fountain. Provide toe clearance of 9 inches (229mm) in height A.F.F. and 6 inches (152mm) in depth from the front edge of fountain. Wall-mounted and post-mounted cantilevered drinking fountains and water coolers are to have a clear knee space of 30 inches (762 mm) minimum in width and also a minimum clear floor space 30 by 48 inches (762 by 1,219 mm) for a person in a wheelchair to approach it facing forward. The bubbler is to be activated by a manually operated system not requiring a force of more than 5 lbs. (22.2N).
- G. Per CBC 1115 B.2.1.5.3 bubbler activator to be located within 6 inches (152 mm) of the front edge of fountain – or an electronically controlled device. Bubbler outlet orifice to be located within 6 inches (152 mm) of the front edge of the fountain and within 36 inches (914 mm) of the floor. Water stream from the bubbler to be substantially parallel to the front edge of the fountain. Adjust the spout to provide a flow of water at least 4 inches (102 mm) high.
- H. Install lever-operated sink faucets per CBC Section 1115 B.2.1.6.1. Push-type and electronically controlled mechanisms are acceptable. Controls to be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. Force required to activate

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controls to be no greater than 5 lbs. force (22.2N). Provide pre-insulated fitting covers for hot water and drainpipes by "TrueBro" or approved equal. There shall be no sharp or abrasive edges under accessible sinks or lavatories. Accessible sinks shall have a max.

- I. Fasten plumbing fixtures securely to supports or building structure. Secure supplies behind or within wall construction to provide rigid installation.
- J. Securely attach wall hung fixtures to a 3/8 inch x 6 inch wide steel plate. Steel plate to extend at least one stud beyond first and last mounting point. Drill and tap plate at time of installation of fixture or fixture hanger. Support fixture hanger with 1/2" diameter threaded studs, jamb nuts, C.P. Acorn nuts and completely free of wall by means of a second set of jamb nuts. Weld plate to each metal stud crossed by means of a continuous vertical fillet weld and same size as stud thickness. Secure plate to each wood stud crossed by securely bolting to each stud crossed with two 1/2-inch steel bolts, 4-inch center with 1/8-inch maximum x 1-1/2 inch steel back up plates. Notch studs to set plate flush with surface.
- K. Set mop basins in a leveling bed of cement grout.
- L. Install a stop valve in an accessible location in the water connection to each fixture.
- M. Install chrome plated brass escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and with cabinets and millwork.
- N. Seal fixtures to walls and floors using silicone sealant as specified in Section 07900. Match sealant color to fixture color.
- O. Provide abrasive washers under all single drilling deck mounted trim.

3.03 INSTALLATION OF FLOOR DRAINS

- A. Install floor drains in accordance with manufacturer's written instructions and in locations indicated.
- B. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
- C. Trap all drains connected to the sanitary sewer.
- D. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
- E. Position drains so that they are accessible and easy to maintain.

3.04 INSTALLATION OF TRAP PRIMERS

- A. Install trap primers with piping pitched towards drain trap, minimum of 1/8 inch per foot (1 percent). Adjust trap primer for proper flow.

3.05 INSTALLATION OF ROOF DRAINS

- A. Install roof drains at low points of roof areas, in accordance with the roof membrane manufacturer's installation instructions.
- B. Install drain flashing collar or flange so that no leakage occurs between roof drain and adjoining roofing. Maintain integrity of waterproof membranes, where penetrated.

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- C. Position roof drains so that they are accessible and easy to maintain.

3.06 FIELD QUALITY CONTROL

- A. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning units, then retest.
- B. Inspect each installed unit for damage. Replace damaged fixtures.

3.07 ADJUSTING

- A. Adjust water pressure at drinking fountains, faucets, shower valves, and flush valves to provide proper flow and stream.
- B. Replace washers or leaking or dripping faucets and stops.
- C. Clean fixtures, trim, and strainers using manufacturer's recommended cleaning methods and materials.

3.08 CLEANING

- A. Clean fixtures, trim, and strainers using manufacturer's recommended cleaning methods and materials.

3.09 PROTECTION

- A. Provide protective covering for installed fixtures and trim.
- B. Do not allow use of fixtures for temporary facilities unless expressly approved in writing by Owner.

3.10 MOUNTING HEIGHTS SCHEDULE

<u>FIXTURE</u>	<u>MOUNTING HEIGHT</u>
Lavatory or Sink	See Architectural Drawings.
Accessible Lavatories	"
Water Closet	"
Accessible Water Closet	"
Standard Urinals	"
Accessible Urinals	"
Accessible drinking fountains	"

3.11 ROUGH-IN FOR FIXTURES

- A. Rough-in for all fixtures and/or equipment shown on any drawings, including the architectural drawings, which forms a part of the contract documents. This shall include all fixtures and equipment shown and/or noted as N.I.C. (not in contract) or as U.O.S. (furnished under another section of the specification). Stub out all piping to the exact location of the fixtures and set symmetrical with the fixture. Stub out for fixture supply pipes with drop ear fittings secured to stud or backing plate. Stub out two pipe diameter and terminate with pipe cap. When liens are indicated as capped or plugged at floor level, plug flush with the finished floor.

END OF SECTION

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SECTION 15458 - WATER HEATERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Extent of water heater work required by this section is indicated on drawings and schedules, and by requirements of this section.

1.02 RELATED SECTIONS

- A. Refer to other Division-15 sections for water piping, specialties, pumps, and breechings which are required external to water heaters for installation; not work of this section.
- B. Refer to other Division-15 sections for field installed automatic temperature controls required in conjunction with water heaters; not work of this section.
- C. Electrical Work: Refer to Division-15 section "Electrical Requirements of Mechanical Work" for requirements.
- D. Refer to Division-16 sections for other electrical wiring including motor starters, disconnects, wires/cables, raceways, and other required electrical devices; not work of this section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data including rated capacities and efficiencies of selected model clearly indicated; operating weights; furnished specialties and accessories; and installation and start-up instructions.
- B. Wiring Diagrams: Submit manufacturer's electrical requirements for electrical power supply wiring to water heaters. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring required for final installation of water heaters and controls. Differentiate between portions that are to be field-installed.
- C. Warranties: Submit certificates for all heaters requiring extended warranties.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of water heaters of types and capacities required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Codes and Standards:
 - 1. UL Compliance: Construct water heaters in accordance with the following UL standards:
 - a. UL 174, "Household Electric Storage-Tank Water Heaters".
 - b. UL 1453, "Electric Booster and Commercial Storage Tank Water Heaters".
 - 2. California Code of Regulations (CCR): All water heater models submitted for review shall have identification label on certification showing compliance with CCR Title 24, "Energy Conservation Standards".
 - 3. NEC Compliance: Install electric water heaters in accordance with requirements of NFPA 70, "National Electrical Code".
 - 4. NFPA Compliance: Install gas-fired water heaters in accordance with requirements of NFPA 54, "National Fuel Gas Code".

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5. AGA Label: Provide water heaters which are listed and labeled by American Gas Association.
6. ASHRAE Compliance: Provide water heaters with Performance Efficiencies not less than prescribed in ASHRAE 90A, "Energy Conservation in New Building Design".

1.05 DELIVERY, STORAGE, AND HANDING

- A. Handle water heaters and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged water heaters or components; remove from site and replace with new.
- B. Store water heaters and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.
- C. Comply with manufacturer's rigging and installation instructions for unloading water heaters, and moving units to final location for installation.

1.06 SPECIAL PROJECT WARRANTY

- A. Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, water heaters with inadequate or defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement only, and does not include labor for removal and reinstallation.

1. Warranty Period: 5 years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 COMMERCIAL GAS-FIRED WATER HEATERS

- A. General: Provide gas-fired water heaters of sizes and capacities as indicated on schedule.
- B. Tank constructed in accordance with ASME Code Section IV, stamped with the appropriate symbol, and hydrostatically tested at 190 psi minimum. Tank equipped with a removable modular energy package mounted on a flange with a minimum diameter of 23". Tank access gained by the removal of this energy package with ordinary hand tools. Tank shall be equipped with removable rear module-access cover with a minimum diameter of 23". Tank may be of modular design where more than one tank module is required to meet the total gallon capacity. Provide strata-baffle to divert the incoming cold water to allow 80% of tank storage to be effective at a useable temperature of ± 5 degree F from the set point of the operating thermostats. All fittings will be of type K heavy copper.
- C. Provide minimum of two operating thermostats. These operating controls set at 120 degree F for the lower and 130 degree F for the upper with a maximum circulating water temperature in the plumbing system not to exceed 130 degree F. Provide an ASME temperature and pressure relief valve set at not more than 125 psi and 210 degree F. Provide in the cold section of the tank as factory standard equipment, a thermal expansion control valve set to relieve pressures exceeding 100 psi.
- D. Tank insulated with heavy density fiberglass insulation, jacketed with segmented panels of 22 gauge steel with factory baked enamel finish. Each panel shall be interlocked, easily removable for field replacement should damage occur. Heat loss of the insulated tank shall not exceed 14 but/hr per square foot of tank surface area an ambient temperature of 65 degree F. Jacket heat

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loss must not exceed ASHRAE 90 Standards. Entire water heater shall rest on heavy duty skids for ease of movement.

- E. Tank shall be completely lined with polyshield polymeric lining. Tank warranty shall be ten (10) years from date of substantial completion and one (1) year service policy.
- F. Burner shall be forced draft power type to create an overfire pressure in all heating surfaces. The burner shall have a cast aluminum housing and be certified by Underwriters Laboratories.
- G. The entire water heater shall meet UL requirements, shall fit properly in the space provided and shall conform to drawing specifications. The complete installation shall be in accordance with all applicable federal, state, and local codes and installation drawings.
- H. Gas fired module guaranteed to produce a fuel-to-water operating efficiency of 83% minimum. This efficiency shall be certified by a nationally recognized certification agency when tested to ANSI Z.21.10.3 standards. Start up shall be performed by a factory authorized craftsman. Start up performance data, verifying the 83% shall be supplied to the Owner. With 140 degree F stored water, a minimum nomograph reading of 9-1/2% CO₂ with a maximum net stack temperature of 300 degree F will be required. The complete combustion chamber shall be 100% submerged in water and shall be completely lined with copper. All fire tubes shall be of pure copper.
- I. Manufacturers: Subject to compliance with requirements provide water heaters of one of the following:
 - 1. A. O. Smith
 - 2. Rheem Water Heater Div; City Investing Co.
 - 3. Or approved Equal

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which water heaters are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF WATER HEATERS

- A. General: Install water heaters in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
- B. Support: Place units on mounting platform, orient so controls and devices needing service and maintenance have adequate access.
- C. Piping: Connect hot and cold water piping to units with shutoff valves and unions. Connect recirculating water line to unit with shutoff valve, check valve, and union. Extend relief valve discharge to receptor, or as indicated.
- D. Gages: Provide thermometers on inlet and outlet piping of water heaters, in accordance with Basic Mechanical Materials and Methods Section "Meters and Gages."
- E. Gas-Fired Water Heaters: Connect gas supply to gas line with drip let, tee, gas cock, and union; full size of unit inlet connection. Locate piping so as not to interfere with service of unit.

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1. Flue: Connect flue to draft hood with gas-tight connection. Provide flue of minimum size as flue outlet on heater. Comply with gas utility requirements.

F. Electric Water Heaters:

1. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.
 - a. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-16 sections. Do not proceed with water heater start-up until wiring installation is acceptable to water heater Installer.

3.03 FIELD QUALITY CONTROL

- A. Start-Up: Start-up, test, and adjust electric water heaters in accordance with manufacturer's start-up instructions. Check and calibrate controls.

END OF SECTION

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SECTION 15488 - NATURAL GAS SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes distribution piping systems for natural gas and manufactured gas within the building and extending from the point of delivery to the building to the connections with gas utilization devices. Piping materials and equipment specified in this Section include:
 - 1. Pipes, fittings, and specialties;
 - 2. Special duty valves.
- B. Natural gas yard piping is not included in this section.

1.02 RELATED SECTIONS:

- A. The following Sections contain requirements that relate to this Section:
 - 1. Division 15 Section "Natural Gas Yard Piping" for fuel gas service piping which is underground, outside the building, and connecting the "Gas Distribution Piping" to public utilities (or connecting groups of buildings on the same site).
 - 2. Section 02215 "Structural Excavation and Backfill" for trenching and backfilling for installation of gas piping.
 - 3. Division 15 Section "Mechanical Identification" for labeling and identification of gas piping systems.

1.03 DEFINITIONS

- A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).
- B. Gas Distribution Piping: A pipe within the building which conveys gas from the point of delivery to the points of usage.
- C. Gas Yard Piping: That portion of gas distribution system which is underground.
- D. Gas Service Piping: The pipe from the gas main or other source of supply including the meter, regulating valve, or service valve to the gas distribution system and/or gas yard piping system being served.
- E. Point of Delivery is the outlet of the service meter assembly, or the outlet of the service regulator (service shutoff valve when no meter is provided).

1.04 SUBMITTALS

- A. Product data for each gas piping specialty and special duty valves. Include rated capacities of selected models, furnished specialties and accessories, and installation instructions.
- B. Maintenance data for gas specialties and special duty valves, for inclusion in operating and maintenance manual specified in Division 1 and Division-15 Section "Basic Mechanical Requirements."
- C. Test reports specified in Part 3. Submit for inclusion in operating and maintenance manual.

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1.05 QUALITY ASSURANCE

- A. Installation Qualifications: Installation and replacement of gas piping, gas utilization equipment or accessories, and repair and servicing of equipment shall be performed only by a qualified installer. The term qualified is defined as experienced in such work (experienced shall mean having a minimum of 5 previous projects similar in size and scope to this project), familiar with precautions required, and has complied with the requirements of the authority having jurisdiction. Upon request, submit evidence of such qualifications to the Architect.
- B. Qualifications for Welding Processes and Operators: Comply with the requirements of ASME Boiler and Pressure Vessel Code, "Welding and Brazing Qualification."
- C. Regulatory Requirements: Comply with the requirements of the following codes:
 - 1. NFPA 54 - National Fuel Gas Code, for gas piping materials and components, gas piping installations, and inspection, testing, and purging of gas piping systems.
 - 2. California Plumbing Code (CPC).

1.06 SEQUENCING AND SCHEDULING

- A. Notification of Interruption of Service: Except in the case of an emergency, notify all affected users when the gas supply is to be turned off.
- B. Work Interruptions: When interruptions in work occur while repairs or alterations are being made to an existing piping system, leave the system in safe condition.
- C. Coordinate the installation of pipe sleeves for wall penetrations.

1.07 UTILITY CHARGES

- A. Contractor shall be responsible for notifying the Owner when and where to apply for gas services. Owner shall pay for all charges for costs of modifying the existing gas meter delivery and services thereto.

1.08 EXTRA MATERIALS

- A. Valve wrenches: Furnish to Owner, with receipt, 2 valve wrenches for each type of gas valve installed, requiring same.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide gas piping system products from one of the following:
 - 1. Gas service cocks: Semi-steel 175 pound with tapered bronze plug and bolted yoke. Furnish one operating wrench for each valve.
 - a. Powell Fig. 2200 & 2201
 - b. Nordstrom Fig. 142 & 143
 - c. Walworth Fig. 1796 & 1797F
 - d. Homestead Fig. 611 & 612
 - 2. Gas valves at equipment: All bronze, flathead screwed gas cocks.

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- a. Powell Fig. 947
- b. Crane Fig. 270
- c. Healey Fig. 20F
- d. Walworth Fig. 591

2.02 PIPE AND TUBING MATERIALS

- A. General: Refer to Part 3, Article "PIPE APPLICATIONS" for identification of systems where the below specified pipe and fitting materials are used.
- B. Steel Pipe: ASTM A 53, Schedule 40, seamless, black steel pipe, beveled ends.

2.03 FITTINGS

- A. Malleable-Iron Threaded Fittings: ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1. Products of Ward Manufacturing, LLC. Are the District Standard. Any other manufacturer's products, except American made products, are not acceptable.
 - 1. Joint compound or tape suitable for gas being handled.
- B. Steel Fittings: ASTM A 234, seamless or welded, for welded joints.
- C. Steel Flanges and Flanged Fittings: ANSI B16.5, including bolts, nuts, and gaskets of the following material group, end connection and facing:
 - 1. Material Group: 1.1
 - 2. End Connections: Butt Welding.
 - 3. Facings: Raised face.

2.04 PIPING SPECIALTIES

- A. Unions: ANSI B16.39, Class 150, black malleable iron; female pattern; brass to iron seat; ground joint.
- B. Dielectric Unions: ANSI B16.39, Class 250; malleable iron and cast bronze; with threaded or soldered end connections suitable for pipe to be joined; designed to isolate galvanic and stray current corrosion.
- C. Protective Coating: When piping will be in contact with material or atmosphere exerting a corrosive action, pipe and fittings shall be factory-coated with polyethylene tape, having the following properties:
 - 1. overall thickness; 20 mils;
 - 2. synthetic adhesive;
 - 3. water vapor transmission rate, gallons per 100 square inch; 0.10 or less;
 - 4. water absorption, percent; 0.02 or less.
 - 5. Prime pipe and fittings with a compatible primer prior to application of tape.

2.05 VALVES

- A. Gas Cocks 2 inch and Smaller: 150 psi WOG, bronze body, straightaway pattern, square head, threaded ends.
- B. Gas Cocks 2-1/2" Inch and Larger: MSS SP-78; 175 psi, lubricated plug type, semi-steel body, single gland, wrench operated, flanged ends.

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- C. Ball Valves: Rated for 400 psi WOG pressure, two piece construction; with bronze body conforming to ASTM B62, Standard (or regular) post, chrome plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout proof stem, and vinyl covered steel handle; with threaded ends.
- D. Gas Line Pressure Regulators: Single stage, steel jacketed, corrosion-resistant gas pressure regulators; with atmospheric vent, elevation compensator; with threaded ends for 2 inch and smaller, flanged ends for 2-1/2 inch and larger; for inlet and outlet gas pressures, specific gravity, and volume flow indicated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Precautions: Before turning off the gas to the premises, or section of piping, turn off all equipment valves. Perform a leakage test as specified in "FIELD QUALITY CONTROL" below, to determine that all equipment is turned off in the piping section to be affected.
- B. Conform with the requirements in NFPA 54, for the prevention of accidental ignition.

3.02 PIPE APPLICATIONS

- A. Install steel pipe above ground with threaded joints and fittings for 2 inch and smaller, and with welded joints for 2-1/2" inch and larger.

3.03 PIPING INSTALLATIONS

- A. General: Conform to the requirements of NFPA 54 - National Fuel Gas Code.
- B. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Design locations and arrangements of piping. Take into consideration pipe sizing, flow direction, slope of pipe, expansion, and other design considerations. So far as practical, install piping as indicated.
- C. Concealed Locations: Except as specified below, install concealed gas piping in an air-tight conduit constructed of Schedule 40, seamless black steel with welded joints. Vent conduit to the outside and terminate with a screened vent cap.
 - 1. Above-Ceiling Locations: Gas piping may be installed in accessible above-ceiling spaces (subject to the approval of the authority having jurisdiction), whether or not such spaces are used as a plenum. Valves shall not be located in such spaces.
 - 2. Piping in Partitions: Concealed piping shall not be located in solid partitions.
 - 3. Prohibited Locations: do not install gas piping in or through a circulating air duct, clothes chute, chimney or gas vent, ventilating duct, dumb waiter or elevator shaft.
- D. Seal exterior wall penetrations.
- E. Seal pipe penetrations of fire barriers using fire barrier penetration sealers acceptable to State Fire Marshal.
- F. Use fittings for all changes in direction and all branch connections.
 - 1. Weldolets may be used in lieu of tees for branch connections two sizes or more smaller than main.

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- 2. Mitered elbows or tees not permitted.
- G. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.
- H. Install piping free of sags or bends and with ample space between piping.
- I. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
- J. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Allow sufficient space above removable ceiling panels to allow for panel removal.
- K. Locate groups of pipes parallel to each other, spaced to permit servicing of valves.
- L. Install gas piping at a uniform grade of 1/4 inch in 15 feet, upward to risers, and from the risers to the meter, or service regulator when meter is not provided, or the equipment.
- M. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side down.
- N. Connect branch outlet pipes from the top or sides of horizontal lines, not from the bottom.
- O. Hanger, supports, and anchors are specified in Division 15 Section "SUPPORTS AND ANCHORS." Conform to the table below for maximum spacing of supports:

<u>SIZE (NPS)</u>	<u>MIN. ROD SPACING IN FT.</u>	<u>SIZE IN INCHES</u>
(horizontal) 1/2	5	3/8
(horizontal) 3/4 to 1-1/4	6	3/8
(horizontal) 1-1/2 to 3	12	1/2
(vertical) all sizes		At every floor level

- P. Install unions in pipes 2 inch and smaller, adjacent to each valve, at final connections each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- Q. Install dielectric unions where piping of dissimilar metals are joined.
- R. Install flanges on valves, apparatus, and equipment having 2-1/2 inch and larger connections.
- S. Install strainers on the supply side of each control valve, pressure reducing valve, pressure regulating valve, solenoid valve, and elsewhere as indicated.
- T. Anchor piping to ensure proper direction of expansion and contraction. Install expansion loops and joints as indicated on the Drawings and specified in Division-15 Section "Basic Mechanical Materials and Methods."

3.04 PIPE JOINT CONSTRUCTION

- A. Welded Joints: Comply with the requirements in ASME Boiler and Pressure Vessel Code, Section IX.
- B. Threaded Joints: Conform to ANSI B1.20.1 tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:

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1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint. Refer to NFPA 54, for guide for number and length of threads for field threading steel pipe.
 2. Align threads at point of assembly.
 3. Apply appropriate tape or thread compound to the external pipe threads.
 4. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.
 5. Damaged Threads: Do not use pipe with threads which are corroded, or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.
- C. Flanged Joints: Align flange surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

3.05 VALVE APPLICATIONS

- A. General: The drawings indicate valve types, locations, and arrangements.
- B. Shut-off duty: Use gas cocks specified in Part 2 above.

3.06 VALVE INSTALLATIONS

- A. Install valves in accessible locations, protected from physical damage.
- B. Install a gas cock upstream of each gas pressure regulator. Where two gas pressure regulators are installed in series in a single gas line, a manual valve is not required at the second regulator.
- C. Install ball valves in all locations required for quick emergency shut off.
- D. Install pressure relief or pressure limiting devices so they can be readily operated to determine if the valve is free; so they can be tested to determine the pressure at which they will operate; and examined for leakage when in the closed position.
- E. Install low pressure gas check in primary gas supply line to each laboratory room. Valve to be installed immediately downstream of manual emergency shut off valve.

3.07 TERMINAL EQUIPMENT CONNECTIONS

- A. Install gas cocks upstream and within 6 feet of gas appliance. Install a union or flanged connection downstream from the gas cock to permit removal of controls.
- B. Sediment Traps: Install a tee fitting with the bottom outlet plugged or capped as close to the inlet of the gas appliance as practical. Drip leg shall be a minimum of 3 pipe diameters in length.

3.08 ELECTRICAL BONDING AND GROUNDING

- A. Install above ground portions of gas piping systems, upstream from equipment shutoff valves electrically continuous and bonded to a grounding electrode in accordance with NFPA 70 - "National Electrical Code."
- B. Do not use gas piping as a grounding electrode.

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- C. Conform to NFPA 70 - "National Electrical Code," for electrical connections between wiring and electrically operated control devices.

3.09 FIELD QUALITY CONTROL

- A. Piping Tests: Inspect, test, and purge natural gas systems in accordance with NFPA 54, and local utility requirements.
- B. Prepare test reports and submit.

END OF SECTION

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SECTION 15782 - ROOFTOP HEATING AND COOLING UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Section includes package rooftop heating and cooling units.

1.02 RELATED SECTIONS

- A. Division 15
 - 1. Section "Electrical Requirements for Mechanical Work."
 - 2. Section "Natural Gas Systems"
 - 3. Section "Ductwork"
 - 4. Section "Air Cleaning"
 - 5. Section "Testing, Adjusting, and Balancing"
- B. Division 16
 - 1. Section "Electrical Connections for Equipment"

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities at scheduled conditions of selected model clearly indicated, dimensions, required clearances, weights, furnished specialties and accessories; and installation and start-up instructions.
- B. Shop Drawings:
 - 1. Submit shop drawings detailing the manufacturer's electrical requirements for power supply wiring for rooftop heating and cooling units. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
 - 2. Submit shop drawings detailing the mounting, securing, and flashing of the roof curb to the roof structure.
 - 3. Submit shop drawings detailing method of securing rooftop unit to roof curb to meet seismic restraint requirement.
 - 4. If an equal unit is being proposed to be used in lieu of the base specified unit, the contractor shall coordinate all differences as hereinafter described and note such differences on the shop drawings and incorporate all changes (if any) required by the structural and electrical engineers to accommodate the equal unit.
- C. Operation and Maintenance Data: Submit maintenance data and parts list for each rooftop unit, including "trouble-shooting" maintenance guide, servicing guide and preventative maintenance schedule and procedures. Include this data in maintenance manual in accordance with requirements of Division 1.

1.04 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. Gas-Fired furnace section construction shall be in accordance with AGA safety standards. Furnace section shall bear the AGA label.
 - 2. Testing and rating of rooftop units of 135, 000 Btu/hr capacity or over shall be in accordance with ARI 360 "Standard for Commercial and Industrial Unitary Air-

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Conditioning Equipment".

3. Testing and rating of rooftop units under 135,000 Btu/hr capacities shall be in accordance with ARI 210 "Standard for Unitary Air-Conditioning Equipment", and provide Certified Rating Seal. Sound testing and rating of units shall be in accordance with ARI 270 "Standard for Sound Rating of Outdoor Unitary Equipment". Units shall bear Certified Rating Seal.
4. Refrigerating system construction of rooftop units shall be in accordance with ASHRAE 15 "Safety Code for Mechanical Refrigeration".
5. Energy Efficiency Ratio (EER) or (SEER) of rooftop units shall be equal to or greater than prescribed by Title 24 - California Code of Regulations" (CCR) or as scheduled.
6. Rooftop units shall be designed, manufactured, and tested in accordance with UL requirements.
7. Rooftop units shall comply with ASHRAE 62-04.
8. Rooftop units shall comply with SCAQMB Low NOx requirements

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Handle rooftop units and components carefully to prevent damage. Replace damaged rooftop units or components with new.
- B. Store rooftop units and components in clean dry place, off the ground and protect from weather, water, and physical damage.
- C. Rig rooftop units to comply with manufacturer's rigging and installation instructions for unloading rooftop units, and moving them to final location.

1.06 SCHEDULING AND SEQUENCING

- A. Coordinate installation of roof mounting curb with roof structure.
- B. Coordinate roof-opening locations for mechanical and electrical connections.

1.07 SPECIAL WARRANTY

- A. Warranty on Compressor (and Heat Exchanger): Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, compressors (and heat exchangers) with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement only, and does not include labor for removal and reinstallation.

1. Warranty Period: 4 years extension from date of basic 1-year warranty - See Division 1.

1.08 MAINTENANCE

- A. Extra Materials: Furnish to Owner, with receipt, the following spare parts for each rooftop heating and cooling unit:
 1. One set of matched fan belts for each belt-driven fan.

PART 2 - PRODUCTS

2.01 ROOFTOP UNITS (GENERAL)

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- A. General Description: Units shall be factory-assembled and tested, designed for roof or slab installation, and consisting of compressors, condensers, evaporator coils, heat exchanger, condenser and evaporator fans, refrigeration and temperature controls, filters, and dampers.
- B. Units as manufactured by Trane Corporation were used for the basis of design. Their capacities, weights and electrical characteristics are scheduled on the drawings. Units shall be designed for DX Cooling with R410A refrigerant.

2.02 ROOFTOP AIR CONDITIONING UNIT

- A. Unit shall be of the single-package type, combination air-to-air cooling and gas-fired heating. Unit shall be AGA certified and meet requirements of CCR Title 24 and ASHRAE 90.1-2004.
- B. Unit shall be EER or SEER rated in accordance with ARI Standard 210-81 and California Administrative Title 24.
- C. Compressor(s) - The unit shall contain (one or two) as scheduled, welded, fully hermetic scroll compressor(s) with suitable vibration isolators and crankcase heater and shall have a 5-year warranty.
- D. Coils shall be constructed of aluminum fins mechanically bonded to copper tubes. Provide an independent expansion device for each refrigeration circuit. Factory pressure tested at 450 psig and leak tested at 200 psig. Evaporator coils shall be equipped with capillary restrictor. Condenser coils facing the exterior of the unit shall be equipped with screen protection grille.
- E. Fans and motors - The evaporator air fan shall be of the forward-curved centrifugal type, direct-drive multi-speed or adjustable belt-driven as shown on the equipment schedule. Condenser fan motor shall have ball bearings. Sleeve type bearings are not acceptable. Condenser air fan shall be of the propeller type, directly driven and discharging upward.
- F. Heat exchanger shall be tubular in design and constructed of 409 stainless steel heat exchanger corrosion-resistant aluminized steel. Heat exchanger shall carry a 15-year non-prorated warranty.
- G. Safety controls - Cooling section shall be protected by low pressurestat, high pressure switch, compressor motor overloads, crankcase heaters, freezestat and lockout circuit that prevents compressor short cycling as a result of a rapid change in thermostat setting by automatically preventing compressor restart for at least 5 minutes.
- H. Heating controls shall consist of a redundant gas valve, intermittent pilot ignition system, limit switches, centrifugal switch, and rollout switch. Heating section shall be designed for induced-draft combustion. Forced-draft is not acceptable.
- I. Roof Curb.
 - 1. General: Roof Curb shall be of down-shot arrangement and shall be of an approved manufacturer as indicated on the drawings and specification section 15241 and shall include an insulated panel under compressor section to prevent condensation forming on the bottom. Dimensions shall be provided to allow for each duct location and connection to roof curb prior to unit placement. Roof curb shall be a minimum of 14 in. high, except otherwise noted on drawings. Curb design shall comply with National Roofing Contractors Association requirements.
 - 2. Roof Curb Type: Roof Curbs shall be of Prefabricated Isolation Curb type. Unit manufacturer shall furnish spring isolation curbs specifically designed for the air conditioning units. Isolation curb isolators must be pre-approved OSHPD. Pre-approval number must be included with the submittal. OSHPD approval Numbers must be included

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with the submittal. Numbers subject to approval will not constitute pre-approval. Springs must be a minimum of 2" deflection with seismic restraint. Curb shall have access doors for easy inspection and adjustment of each spring without dismantling any portion of the unit or curb assembly. Isolation curb must include a vandal-proof, galvanized steel counterflashing skirt to assure long-term air and water seal integrity. Exposed rubber skirt seals are not acceptable. Curb and flashing shall be fully welded. Field assembled and bolted construction not acceptable. Seismic attached (hold-down) clips with certified calculations by a registered California structural engineer shall be furnished with the isolation curb. Installation prior to submittal approval by mechanical engineer shall be subject to removal without any cost or obligation to the Owner. The contractor shall not install any unit without written approval.

- J. Power Exhaust and Economizer: Power exhaust shall have a modulating centrifugal blower provided with variable frequency drive (VFD). Economizer control (Down-shot) shall include return air (R.A.) and outdoor air filter and hood, and fully modulating electric control system with O.A. thermostat and mixed air thermostat. Economizer control shall be capable of introducing up to 100% outdoor air. Power Exhaust shall be capable of relieving 100% of system air. The control changeover from mechanical cooling to economizer operation shall be fully automatic through an adjustable integrated control sensing pre-assigned outside air requirements. Economizer shall be integrated type capable of simultaneous compressor and economizer operation for maximum benefit of outdoor air. Economizer shall utilize low-leakage, opposing blade, gear driven dampers with UL approved gears. Provide economizer control for all units unless specifically indicated otherwise. Economizer shall incorporate a full sized barometric relief that has the same face area as the outside air inlet. The relief shall be sized to relieve up to 100% relief air.
- K. Thermostat assembly shall provide staged heating and cooling, manual and automatic changeover, fan control and integrated time delay protection.
- L. Unit Casing
1. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating with removable access panels. Structural members shall be 18 gauge with access doors and removable panels of minimum 20 gauge.
 2. Units cabinet surface shall be tested 1000 hours in salt spray test in compliance with ASTM B117.
 3. Cabinet construction shall allow for all service/ maintenance from one side of the unit.
 4. Cabinet top cover shall be one piece construction or where seams exist, it shall be double-hemmed and gasket-sealed.
 5. Access Panels: Water- and air-tight panels with handles shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section.
 6. Units base pan shall have a raised 1 1/8 inch high lip around the supply and return openings for water integrity.
 7. Insulation: Provide 1/2 inch thick fiberglass insulation with foil face on all exterior panels in contact with the return and conditioned air stream. All edges must be captured so that there is no insulation exposed in the air stream.
 8. Provide 115-volt convenience outlet, factory-installed and unpowered, per NEC requirements.
 9. Provide openings either on side of unit or through the base for power, control, condensate, and gas connections.
 10. The base of the unit shall have 3 sides for forklift provisions. The base of the units shall have rigging/lifting holes for crane maneuvering.

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2.03 MANUFACTURERS

- A. Subject to compliance with the requirements project documents provide packaged rooftop air conditioning unit of one of the following manufacturer:
 - 1. Trane Corporation, Basis of design
 - 2. Carrier
 - 3. York
 - 4. Or approved equal
- B. Alternates must still comply with the performance and features as specified within these specifications and indicated on the design documents. Job will be awarded on basis of specified product. Prior approved manufacturer substitutions must be selected and approved within 14 calendar days after award of contract.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which rooftop units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION

- A. General: Install rooftop units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
- B. Support: Install and secure roof curb to roof structure, in accordance with National Roofing Contractor's Association (NRCA) installation recommendations and shop drawings. Install and secure rooftop units on curbs and coordinate roof penetrations and flashing.
 - 1. Provide substructure as required to set curbs plumb and level.
- C. Electrical Connections: Refer to Section "Electrical Connections for Equipment" for final connections to equipment and installation of loose shipped electrical components.

3.03 DEMONSTRATION

- A. Start-Up Services:
 - 1. Provide the services of a factory-authorized service representative to start-up rooftop units, in accordance with manufacturer's written start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- B. Operating and Maintenance Training:

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1. Provide services of manufacturer's service representative to instruct Owner's personnel in operation and maintenance of rooftop units. Training shall include start-up and shutdown, servicing and preventative maintenance schedule and procedures, and trouble shooting procedures plus procedures for obtaining repair parts and technical assistance. Review operating and maintenance data contained in the Operating and Maintenance Manuals specified in Division One.

END OF SECTION

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SECTION 15784 - SPLIT AIR CONDITIONING SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Split DX cooling only and heat pump system with indoor split DX fan coil and outdoor cooling/condensing unit.

1.02 RELATED SECTIONS

- A. Related sections include but is not limited to the following:
 - 1. Division 15
 - a. Section Basic Mechanical Requirements
 - b. Section Electrical Requirements for Mechanical Work
 - c. Section Temperature Control Systems required in conjunction with split cooling system
 - d. Section Testing, Adjusting and Balancing
 - e. Section "Maximum Sound Power Level for Fan Equipment"
 - 2. Division - 16:
 - a. Section Electrical Connections for Equipment

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, dimensions, required clearances, weights, furnished specialties and accessories; and installation and start-up instructions.
- B. Shop Drawings:
 - 1. Submit shop drawings detailing the manufacturer's electrical requirements for power supply wiring for rooftop cooling/condensing and DX fan coil units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
 - 2. Submit shop drawings detailing the mounting, securing, and flashing of the outdoor unit to redwood sleepers and sleepers to the roof structure. Indicate coordinating requirements with roof membrane system.
- C. Operation and Maintenance Data: Submit maintenance data and parts list for each split cooling system, including "trouble-shooting" maintenance guide, servicing guide and preventative maintenance schedule and procedures. Include this data in maintenance manual in accordance with requirements of Division 1.

1.04 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. Refrigerating system construction of split cooling system shall be in accordance with ASHRAE 15 "Safety Code for Mechanical Refrigeration".
 - 2. Energy Efficiency Ratio (EER) or (SEER) of rooftop units shall be equal to or greater than prescribed by Title 24 - California Code of Regulations" (CCR) or as scheduled.

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3. Split cooling system shall be designed, manufactured, and tested in accordance with UL requirements.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Handle split cooling system and components carefully to prevent damage. Replace damaged rooftop units or components with new.
- B. Store split cooling system and components in clean dry place, off the ground, and protect from weather, water, and physical damage.
- C. Rig outdoor units to comply with manufacturer's rigging and installation instructions for unloading outdoor units, and moving them to final location.

1.06 SCHEDULING AND SEQUENCING

- A. Coordinate installation of outdoor unit with roof structure.
- B. Coordinate roof-opening locations for mechanical and electrical connections.

1.07 SPECIAL WARRANTY

- A. Warranty on Compressor: Provide written warranty, agreeing to replace/repair, including all parts and labor within warranty period, compressors with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform a required provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period.
- B. Warranty period shall be for a period of one year from the agreed start of the District's beneficial use.
- C. Extended warranty period. Provide written warranty signed by manufacturer, agreeing to replace components parts only, for an additional four (4) years for all hermetically sealed compressors.

1.08 MAINTENANCE

- A. Extra Materials: Furnish to District, with receipt, the following spare parts for each split cooling system:
 1. One set new filters for each unit set.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide product of one of the following manufacturers:
 1. Carrier Corp.
 2. Mitsubishi, Basis of design
 3. York

2.02 SPLIT COOLING SYSTEM (GENERAL)

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- A. Split cooling only and heat pump system shall be factory assembled and tested, consist of an indoor, wall mounted direct expansion fan coil unit and an outdoor roof mounted, air cooled unit with a hermetic compressor, an air cooled coil, up-blast propeller type blow-through condenser fans, accumulator, holding refrigerant charge, and control box.

2.03 INDOOR UNIT

- A. General: Indoor, direct-expansion, wall-mounted or ceiling-mounted fan coil. Unit shall be complete with coil, fan, fan motor, piping connectors, electrical controls, microprocessor control system, integral temperature sensing, and a holding charge of R410A refrigerant. Unit shall be furnished with integral wall-mounting or ceiling-mounting bracket.
- B. Unit Cabinet: Cabinet discharge and inlet grilles shall be attractively styled, high-impact polystyrene.
- C. Fan: Shall be tangential blower type with air intake at the upper front face of the unit and discharge at the bottom front. Automatic motor-driven horizontal air sweep shall be provided standard.
- D. Coil: Shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins will be bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a drain connection for hose attachment to remove condensate.
- E. Motors: Shall be permanently lubricated with inherent overload protection. Fan motors shall be multi-speed.
- F. Controls: Shall consist of a microprocessor-based control system that shall control space temperature, determine optimum fan speed, and run self-diagnostics. The unit shall have:
 - 1. An automatic restart after power failure at the same operating conditions as at failure.
 - 2. A timer function to provide a minimum 15-hour timer cycle for system on or off.
 - 3. Temperature-sensing controls and a high discharge temperature shut down.
 - 4. Wired control or wireless infrared control to enter set points and operating controls (required accessory).
 - 5. Filter status indication after 250 hours of indoor fan operation.
 - 6. Test mode button to run self-diagnostics and aid in troubleshooting.
- G. Filters: Unit shall have filter track with factory-supplied cleanable filter.

2.04 OUTDOOR UNIT

- A. General: Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressor, and holding charge of R410A refrigerant.
- B. Unit Cabinet:
 - 1. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a baked enamel finish.
 - 2. Unit access panels shall be removable with minimal screws and shall provide full access to the compressor, fan, and control components.
 - 3. Compressor compartment shall be isolated and have an acoustic lining to assure quiet operation.
- C. Fans:

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1. Condenser fans shall be direct-drive propeller type, discharging air horizontally, and blowing air through the condenser coil.
 2. Condenser fan motors shall be totally enclosed, single-phase motors with class B insulation and permanently lubricated ball bearings. Motor shall be protected by internal thermal overload protection.
 3. Shaft shall have inherent corrosion resistance.
 4. Fan blades shall be corrosion resistant and shall be statically and dynamically balanced.
 5. Condenser fan openings shall be equipped with PVC grille cover and screen protection grille.
- D. Compressor:
1. Compressor shall be fully hermetic reciprocating or scroll type.
 2. Compressor shall be equipped with oil system, operating oil charge, and motor. Internal overloads shall protect the compressor from over temperature and current. Scroll compressors shall also have high discharge gas temperature protection.
 3. Motor shall be NEMA rated class F, suitable for operation in a refrigerant atmosphere.
 4. Reciprocating compressors shall be equipped with crankcase heaters to minimize liquid refrigeration accumulation in compressor during shut down and to prevent refrigerant dilution of oil.
 5. Compressor assembly shall be installed on rubber vibration isolators and shall have internal spring isolation.
- E. Condenser Coil: Shall be constructed of aluminum fins mechanically bonded to internally enhanced, seamless copper tubes that are cleaned, dehydrated, and sealed.
- F. Refrigeration Components: Refrigerant circuit components shall include external liquid line service valve with service port, suction line service valve with service gage connection port, service port connections on compressor suction and discharge lines with Schrader-type fittings, 4-way valve on heat pumps, accumulator, filter drier, pressure relief, and a holding charge of refrigerant.
- G. Controls and Safeties: Operating controls and safeties shall be factory selected, assembled, and tested. The minimum control function shall include:
1. Controls:
 - a. Time delay restart to prevent compressor short cycling.
 - b. Automatic restart on power failure.
 - c. Three-pole contactors on 3-phase units.
 - d. Safety lockout.
 - e. High and low pressure switches.
 - f. Automatic fan motor protection.
 - g. Start capacitor and relay only on single-phase units.
 - h. When heat pump units are matched with high wall and ceiling suspended units, defrost control shall be based on demand determined by the outdoor air temperature and the coil temperature.
 2. Safeties:
 - a. High temperature protection.
 - b. System diagnostics.
 - c. Compressor motor current and temperature overload protection.
 - d. High-pressure relief.
 - e. Condenser fan failure protection.
- H. Electrical Requirements:

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1. Unit electrical power shall be a single point connection.
2. Unit control voltage to the indoor fan coil shall be 24V.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which split cooling system is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION

- A. General: Install split cooling system in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
- B. Support: Install and secure redwood sleepers to roof structure, in accordance with National Roofing Contractor's Association (NRCA) installation recommendations and shop drawings.
- C. Electrical Connections: Refer to Division-16 Electrical Connections for Equipment for final connections to equipment and installation of loose-shipped electrical components.

3.03 DEMONSTRATION

- A. Provide the services of a qualified service representative to start-up split cooling system in accordance with manufacturer's written start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

END OF SECTION

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SECTION 15870 - POWER AND GRAVITY VENTILATORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Types of power and gravity ventilators specified in this section include the following:
 - 1. Power ventilators.
 - a. Centrifugal roof ventilators.
 - b. In-Line roof ventilators.
 - 2. Gravity ventilators.
 - a. Hooded gravity ventilators.
 - 3. Prefabricated roof curbs.

1.02 RELATED SECTIONS

- A. Refer to Division-15 Section "Testing, Adjusting, and Balancing" for balancing of power and gravity ventilators; not work of this section.
- B. Refer to Division-15 Section "Electrical Requirements for Mechanical Equipment".
- C. Refer to Division 16 sections for the following work; not included in work of this section:
 - 1. Power supply wiring from power source to power connection on ventilators. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
- D. Refer to Division-15 Section "Maximum Sound Power Level for Fan Equipment".
- E. Refer to Division-15 Section "Vibration Control"

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for power and gravity ventilators, including specifications, capacity ratings, dimensions, weights, materials, accessories furnished, and installation instructions.
- B. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, construction details, methods of assembly of components, and field connection details.
- C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to power ventilators. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field installed.
- D. Maintenance Data: Submit maintenance data and parts list for each type of power and gravity ventilator, accessory, and control. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Division 1.

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- E. Exhaust fan unit equipment manufacturer shall furnish calculations showing the estimated sound power levels for each supply air, return air and unit casing radiation for each fan-coil unit.
 - F. The results of the tests shall be certified by the testing agency and submitted to the Architect for approval. The report shall include the manufacturer's designation of the tested unit, a complete description of the testing conditions, the measurement procedure, and the calculated PWL values (dB re. 10^{-12} watts), and calculations showing how the sound power levels were obtained from test data.
- 1.04 QUALITY ASSURANCE:
- A. Codes and Standards:
 - 1. AMCA Compliance: Provide power ventilators, which have been tested and rated in accordance with AMCA standards, and bear AMCA Certified Rating Seal.
 - 2. UL Compliance: Provide power ventilators, which are designed, manufactured, and tested in accordance with UL 705 "Power Ventilators".
 - 3. NEMA Compliance: Provide motors and electrical accessories complying with NEMA Standards.
 - 4. Calculated sound power levels (PWLs) based on estimates using the ASHRAE method or other engineering methods are not acceptable. Calculated PWLs shall be based on laboratory acoustical measurements of equipment whose physical size, cfm. and static pressure values are no more than 20% higher than those for the submitted equipment. Calculations shall not be based on laboratory tests of equipment which is smaller than that submitted. All measurements shall be made in accordance with the latest version of ARI Standard 260, Sound Rating of Ducted Air Moving and Conditioning Equipment or a test standard approved by the acoustical consultant. See section for "Maximum Sound Power Level for Fan Equipment".

PART 2 - PRODUCTS

2.01 POWER VENTILATORS

- A. General: Except as otherwise indicated, provide standard prefabricated power ventilator units of type and size indicated, modified as necessary to comply with requirements and as required for complete installation.

2.02 CENTRIFUGAL ROOF VENTILATORS (EXHAUST AND SUPPLY)

- A. Centrifugal Roof Ventilators: Provide centrifugal roof type, curb mounted, power ventilators of type, size, and capacity as scheduled, and as specified herein.
- B. Type: Centrifugal fan, direct or belt driven as scheduled. Provide aluminum, or fiberglass weatherproof housings as scheduled. Provide square base to suit roof curb.
- C. Motors: Provide permanent split-capacitor type motor for direct driven fans; capacitor-start, induction-run type motor for belt driven fans.
- D. Electrical: Provide factory-wired non-fusible type disconnect switch at motor in fan housing. Provide thermal overload protection in fan motor. Provide conduit chase within unit for electrical connection.
- E. Bird Screens: Provide removable bird screen, 1/2" mesh 16-ga aluminum or brass wire.

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- F. Dampers: Provide gravity-actuated louvered dampers in curb bases unless noted to provide motorized louvered dampers with linkage in curb base.
- G. Manufacturer: Subject to compliance with requirements, provide centrifugal roof ventilators of one of the following:
 - 1. Cook Co., Loren.
 - 2. Greenheck Fan Corp.
 - 3. Twin City Fans

2.03 GRAVITY VENTILATORS

- A. General: Except as otherwise indicated, provide standard prefabricated gravity ventilator units of type and size indicated, modified as necessary to comply with requirements, and as required for complete installation.
- B. Hooded Gravity Ventilators: Provide gravity ventilators, hooded type, curb mounted, of size, type and capacity as scheduled, and as specified herein.
 - 1. Type: Stationary, natural draft type. Provide weatherproof housings to match power ventilators in materials and finish. Provide square or rectangular base to suit roof curb.
 - 2. Bird Screens: Provide removable bird screens, 1/2" mesh, 16-ga aluminum or brass wire.
 - 3. Dampers: Provide gravity-actuated louvered dampers in curb bases.
 - 4. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - a. Cook Co., Loren.
 - b. Greenheck Fan Corp.
 - c. Twin City Fans

2.04 PREFABRICATED ROOF CURBS

- A. General: Provide manufacturer's standard shop-fabricated units, modified if necessary to comply with requirements.
- B. Fabricate structural framing for units of structural quality, aluminum formed to profiles indicated or, if not indicated, to manufacturer's standard profiles for coordination with roofing, insulation and deck construction. Include 45-degree cant strips and deck flanges with offsets to accommodate roof insulation. Weld corners and seams to form watertight units.
- C. Reinforce continuous runs of over 3'-0" length by inserting welded stiffeners of heavy gage with flanges as required to provide sufficient rigidity and strength to withstand maximum lateral forces in addition to superimposed vertical loads.
- D. Sloping Roof Decks: For deck slopes of 1/4" per foot and more, fabricate support units to form level top edge.
- E. Gage and Height: Fabricate units of metal gage and to height above roof surface as indicated.
 - 1. Where gage or height is not indicated, fabricate units of 14-ga metal, and nominal height of 14".
- F. Provide treated wood nailer, not less than 1-5/8" thick, but not less than width of support wall assembly. Anchor nailer securely to top of metal frame unit.

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1. Provide lumber pressure treated with water-borne preservatives for "above ground" use, complying with AWPB LP-2.
- G. Insulate units inside structural support wall with rigid glass fiber insulation board of approximately 3-lb. density and 1-1/2" minimum thickness, except as otherwise indicated.
- H. Provide support liners where shown.
1. Use perforated metal for support liners, with approximately 1000, 3/32" diameter holes per sq. ft., to provide sound absorbing surfaces.
 2. Provide sound insulation insert for curbs so indicated. Construct of 1" thick rigid fiberglass panels secured in galvanized steel framework, with rounded edges to minimize airflow resistance.
- I. Manufacturer: Subject to compliance with requirements, provide prefabricated roof curbs of the same manufacturer as ventilator.
- 2.05 SOUND POWER LEVEL
- A. Refer to section 15971 "Maximum Sound Power Level for Fan Equipment".
- B. In the event the sound power level specification is exceeded by the submitted product, it shall be the option of the contractor, if approved in advance by the Architect and Mechanical Engineer, to provide additional sound traps or other sound attenuation devices to supplement the specified design in order to comply with the sound power level specification. The cost for the additional noise control shall be borne by the contractor. Calculations shall be provided which substantiate that the sound power levels produced by the substituted equipment and any required sound attenuation devices do not exceed the specified sound power levels.

PART 3 - EXECUTION

3.01 INSPECTION

- A. General: Examine areas and conditions under which power and gravity ventilators are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF POWER AND GRAVITY VENTILATORS

- A. General: Except as otherwise indicated or specified, install power ventilators in accordance with manufacturer's installation instructions and recognized industry practices to insure that products serve the intended function.
- B. Coordinate ventilator work with work of roofing, walls and ceilings, as necessary for proper interfacing.
- C. Ductwork: Refer to Division-15 Section "Metal Ductwork." Connect ducts to ventilators in accordance with manufacturer's installation instructions.
- D. Roof Curbs: Furnish roof curbs to roofing Installer for installation.
- E. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

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1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-16 Sections. Verify proper rotation direction of fan wheels. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.
- F. Remove shipping bolts and temporary supports within ventilators. Adjust dampers for free operation.
- 3.03 FIELD QUALITY CONTROL
- A. Testing: After installation of ventilators has been completed, test each ventilator to demonstrate proper operation of unit at performance requirements specified. When possible, field correct malfunctioning units, and then retest to demonstrate compliance. Replace units, which cannot be satisfactorily corrected.
- 3.04 ADJUSTING AND CLEANING
- A. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
- 3.05 SPARE PARTS
- A. General: Furnish to Owner, with receipt, one spare set of belts for each belt driven power ventilator.

END OF SECTION

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SECTION 15891 - METAL DUCTWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Rectangular and round metal ducts and plenums for heating, ventilating, and air conditioning system from negative 2" to positive 5" water gage.

1.02 RELATED SECTIONS

- A. Refer to other Division-15 sections for exterior insulation of metal ductwork; not work of this section.
- B. Refer to other Division-15 sections for ductwork accessories; not work of this section.
- C. Refer to other Division-15 sections for fans and air handling units; not work of this section.
- D. Refer to other Division-15 sections for testing, adjusting and balancing of metal ductwork systems; not work of this section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for metal ductwork materials and products.
- B. Record Drawings: At project closeout, submit record drawings of installed metal ductwork and ductwork products, in accordance with requirements of Division 1.
- C. Maintenance Data: Submit maintenance data and parts lists for metal ductwork materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual in accordance with requirements of Division 1.

1.04 QUALITY ASSURANCE

- A. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with metal ductwork systems similar to that required for project.
- B. Codes and Standards:
 - 1. SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.
 - 2. ASHRAE Standards: Comply with ASHRAE Handbook, Equipment Volume, Chapter 1 "Duct Construction", for fabrication and installation of metal ductwork.
 - 3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" and NFPA 90B "Standard for the Installation of Warm Air Heating and Air Conditioning Systems".
- C. Field Reference Manual: Have available for reference at project field office, copy of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".

1.05 DELIVERY, STORAGE, AND HANDLING

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- A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.
- B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.01 DUCTWORK MATERIALS

- A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.
- B. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A653/A653M, lock forming quality, with G90 zinc coating in accordance with ASTM A653/A653M; and mill phosphatized for exposed locations.

2.02 MISCELLANEOUS DUCTWORK MATERIALS

- A. General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.
- B. Fittings: Provide radius type fittings fabricated of multiple sections with maximum 18-degree change of direction per section. Unless specifically detailed otherwise, use 45-degree laterals and 45-degree elbows for branch takeoff connections. Where 90-degree branches are indicated, provide conical type tees.
- C. Duct Liner: Fibrous glass, complying with Thermal Insulation Manufacturer's Association (TIMA) AHC-101; of thickness indicated. 1 inch thick; 2" thick above roofline, unless indicated otherwise.
- D. Duct Liner Adhesive: Comply with ASTM C 916 "Specifications for Adhesives for Duct Thermal Insulation".
- E. Duct Liner Fasteners: Comply with SMACNA HVAC Duct Construction Standards, Article S2.11.
- F. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.
- G. Duct Cement. Non-hardening migrating mastic or liquid neoprene based cement, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for cementing fitting components, or longitudinal seams in ductwork.
- H. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.
- I. Flexible ducts: Spiral-Round spring steel with 1" thick continuous flexible fiberglass sheath, flameproof vinyl jacket, complying with UL 181; with factory installed metal collar connectors, maximum length 8 feet.

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- J. Under slab Ducts: For ductwork placed in concrete slabs, or under slabs on grade, fabricate ductwork of one of the following materials:

1. Galvanized Steel.

2.03 FABRICATION

- A. Shop fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.
- B. Shop fabricate ductwork of gages and reinforcement complying with SMACNA "HVAC Duct Construction Standards".
- C. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers.
- D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-15 section "Ductwork Accessories" for accessory requirements.
- E. Fabricate ductwork with duct liner in each section of duct where indicated. Laminate liner to internal surfaces of duct in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners.

2.04 FACTORY-FABRICATED LOW PRESSURE DUCTWORK

- A. General: At Installer's option, provide factory-fabricated duct and fittings, in lieu of shop-fabricated duct and fittings.
- B. Material: Galvanized sheet steel complying with ASTM A653, lock forming quality, with ASTM A653, G90 zinc coating, mill phosphatized.
- C. Gage: 28-gage minimum for round and oval ducts and fittings, 4" through 24" diameter.
- D. Elbows: One-piece construction for 90 degrees and 45 degree elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint.
- E. Divided Flow Fittings: 90-degree tees, constructed with saddle tap spot welded and bonded to duct fitting body.
- F. Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork of one of the following or equal:
1. Semco Mfg., Inc.
 2. United Sheet Metal Div., United McGill Corp.

PART 3 - EXECUTION

3.01 INSPECTION

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- A. General: Examine areas and conditions under which metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF METAL DUCTWORK

- A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type, which will hold ducts true-to-shape, and to prevent buckling. Support vertical ducts at every floor.
- B. Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements.
- C. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.
- D. Electrical Equipment Spaces: Do not route ductwork through transformer vaults and their electrical equipment spaces and enclosures.
- E. Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2". Fasten to duct and substrate.
 - 1. Where ducts pass through fire-rated floors, walls, or partitions, provide fire stopping between duct and substrate.
- F. Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
- G. Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards.

3.03 INSTALLATION OF DUCT LINERS

- A. General: Install duct liner in accordance with SMACNA HVAC Duct Construction Standards.

3.04 INSTALLATION OF FLEXIBLE DUCTS

- A. Maximum Length: For any duct run using flexible ductwork, do not exceed 8'-0" extended length.

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- B. Installation: Install in accordance with Section III of SMACNA's, "HVAC Duct Construction Standards, Metal and Flexible".
- C. Bends in flexible ducts shall have a radius of not less 1.5 times the internal diameters.

3.05 EQUIPMENT CONNECTIONS

- A. General: Connect metal ductwork to equipment as indicated; provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.

3.06 ADJUSTING AND CLEANING

- A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances, which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.
- B. Temporary closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.
- C. Balancing: Refer to Division-15 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.

END OF SECTION

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SECTION 15910 - DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Types of ductwork accessories required for project include the following:

1. Dampers
 - a. Low pressure manual dampers.
 - b. Control dampers.
 - c. Counterbalanced relief dampers.
2. Fire and smoke dampers.
3. Turning vanes.
4. Duct hardware.
5. Duct access doors.
6. Flexible connections.

1.02 RELATED SECTIONS

- A. Refer to other Division-15 sections for testing, adjusting, and balancing of ductwork accessories; not included in work of this section.
- B. Division-15 Section "Metal Ductwork".
- C. Division-15 Section "Control Systems".
- D. Division-15 Section "Mechanical Identification".

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions.

1.04 QUALITY ASSURANCE

A. Codes and Standards:

1. SMACNA Compliance: Comply with applicable portions of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".
2. Industry Standards: Comply with ASHRAE recommendations pertaining to construction of ductwork accessories, except as otherwise indicated.
3. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers".
4. Fire dampers shall bear California State Fire Marshal Listing Number.
5. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of ductwork accessories.

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PART 2 - PRODUCTS

2.01 DAMPERS

- A. Low Pressure Manual Dampers: Provide dampers of single blade type or multiblade type, constructed in accordance with SMACNA "HVAC Duct Construction Standards". "Jiffy" type dampers are not acceptable.

2.02 BACKDRAFT DAMPERS

- A. General: Provide backdraft dampers of types and sizes indicated. Construct casings of 0.090-thickness aluminum with mitered corners.
- B. Blades, 0.025" formed aluminum with extruded vinyl edge seals. Bearings, Zytel. Linkage 1/8" x 1/8" aluminum tie bars concealed in frame.
- C. Counterbalance: Zinc plated bar on blades (except top blade). Adjustable for final setting. Mill finish.
- D. Manufacturers: Subject to compliance with requirements, provide dampers of one of the following:
 - 1. Ruskin Manufacturing Co.
 - 2. Air Balance Co.
 - 3. Pottorff Company, Inc.
- E. Control Dampers: Refer to Division-15 section "Control Systems" for control dampers; not work of this section.
- F. Counterbalanced Relief Dampers: Provide dampers with parallel blades, counterbalanced and factory-set to relieve at indicated static pressure. Construct blades of 16-ga aluminum, provide 1/2" diameter ball bearings, 1/2" diameter steel axles spaced on 9" centers. Construct frame of 2" x 1/2" x 1/8" steel channel for face areas 25 sq. ft. and under; 4" x 1-1/2" x 16-ga channel for face areas over 25 sq. ft. Provide galvanized steel finish on frame with aluminum touch-up.
- G. Manufacturer: Subject to compliance with requirements, provide dampers of one of the following:
 - 1. Air Balance, Inc.
 - 2. Ruskin Mfg. Co.
 - 3. Pottorff Company, Inc.

2.03 FIRE AND SMOKE DAMPERS

- A. California State Fire Marshal approved, designed and constructed in accordance with NFPA 90A and UL Standard 555 and bear stamp showing compliance.
 - 1. Fire Dampers: Provide fire dampers, of types and sizes indicated. Construct casings of 11-ga galvanized steel. Provide fusible link rated at 160 to 165 degrees F (71 to 74 degrees C) (unless otherwise indicated.) Provide damper with positive lock in closed position.
- B. Manufacturer: Subject to compliance with requirements, provide fire and smoke dampers of one of the following:

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1. Air Balance, Inc.
2. Ruskin Mfg. Co.
3. Pottorff Company, Inc.

2.04 TURNING VANES

- A. Manufactured Turning Vanes: Provide turning vanes constructed of 1-1/2" wide curved blades set at 3/4" o.c., supported with bars perpendicular to blades set at 2" o.c., and set into side strips suitable for mounting in ductwork.
- B. Acoustic Turning Vanes: Provide acoustic turning vanes constructed of airfoil shaped aluminum extrusion with perforated faces and fiberglass fill.
- C. Manufacturer: Subject to compliance with requirements, provide turning vanes of one of the following:
 1. Aero Dynen Co.
 2. Airsan Corp.
 3. Anemostat Products Div.; Dynamics Corp. of America.
 4. Barber-Colman Co.
 5. Duro Dyne Corp.
 6. Environmental Elements Corp.; Subs, Koppers Co., Inc.
 7. Hart & Cooley Mfg. Co.
 8. Register & Grille Mfg. Co., Inc.
 9. Souther, Inc.

2.05 DUCT HARDWARE

- A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:
 1. Test Holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.
 2. Quadrant Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.
- B. Manufacturer: Subject to compliance with requirements, provide duct hardware of one of the following:
 1. Ventfabrics, Inc.
 2. Young Regulator Co.

2.06 DUCT ACCESS DOORS:

- A. General: Provide duct access doors where required.
- B. Construction: Construct of same or greater gage as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one size hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors.
- C. Manufacturer: Subject to compliance with requirements, provide duct access doors of one of the following:

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1. Air Balance Inc.
2. Duro Dyne Corp.
3. Register & Grille Mfg. Co., Inc.
4. Ruskin Mfg. Co.
5. Ventifabrics, Inc.
6. Zurn Industries, Inc.; Air Systems Div.

2.07 FLEXIBLE CONNECTORS

- A. General: Provide flexible duct connections wherever ductwork connects to vibration-isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse and torsional movement, and also capable of absorbing vibration of connected equipment.
- B. Manufacturer: Subject to compliance with requirements, provide flexible connections of one of the following:
1. American/Elgen Co.; Energy Div.
 2. Duro Dyne Corp.
 3. Flexaust (The) Co.
 4. Ventfabrics, Inc.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF DUCTWORK ACCESSORIES

- A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.
- B. Install turning vanes in square or rectangular 90-degree elbows in supply and exhaust air systems, and elsewhere as indicated.
- C. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.
- D. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.03 FIELD QUALITY CONTROL

- A. Operate install ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leak proof performance.

3.04 ADJUSTING AND CLEANING

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A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.

1. Label access doors in accordance with Division-15 section "Mechanical Identification".
2. Final positioning of manual dampers is specified in Division-15 section "Testing, Adjusting, and Balancing".

B. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.05 EXTRA STOCK

A. Furnish extra fusible links to Owner, one link for every 10 installed of each temperature range; obtain receipt.

END OF SECTION

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SECTION 15932 - AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Types of outlets and inlets required for project include the following:
 - 1. Linear slot diffusers and returns.
 - 2. Ceiling air diffusers, rectangular, square, round.
 - 3. Wall registers and grilles.

1.02 RELATED SECTIONS

- A. Refer to other Division-15 sections for ductwork and duct accessories required in conjunction with air outlets and inlets; not work of this section.
- B. Refer to other Division-15 sections for balancing of air outlets and inlets; not work of this section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following:
 - 1. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
 - 2. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.
 - 3. Performance data for each type of air outlet and inlet furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.
 - 4. ANSI/ASHRAE Standard 70-1991.
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air outlet and inlet, indicating materials and methods of assembly of components.
- C. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver air outlets and inlets wrapped in factory-fabricated fiberboard type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.
- B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors, when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

1.05 QUALITY ASSURANCE

- A. Codes and Standards:

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1. ANSI/ASHRAE Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ANSI/ASHRAE Standard 70-1991.
2. NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

PART 2 - PRODUCTS

2.01 CEILING AIR DIFFUSERS

- A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.
- C. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems, which will contain each type of ceiling air diffuser.

2.02 MANUFACTURER

- A. Subject to compliance with requirement diffusers of one of the following:
 1. Nailor Industries, Inc.
 2. Titus Air Distribution Products
 3. Anemostat Air Distribution Products
 4. Kreuger Mfg. Co.
- B. Manufacturers and model numbers are listed and/or scheduled to set a standard of quality. Equivalent manufacturers and models accepted by Architect/Engineer may be used. Equivalents must be for review.
 1. Equivalents: Other manufacturers offering a similar product which is in accordance with the design criteria indicated may be submitted upon architect's written acceptance prior to bidding. The cost to conduct all tests as may be directed by the architect to demonstrate that the equivalent product can achieve the criteria indicated, including all travel costs, shall be born by the submitting contractor.

2.03 LINEAR SLOT DIFFUSER AND RETURN

- A. General: Provide acoustical ceiling air distribution system. Consisting of ceiling slot air diffusers, base frames, air chambers and entry collars.
- B. Air Distribution Base Frames:
 1. Linear air diffusers base frames shall mechanically lock into the grid system. The base frames shall be extruded aluminum sections. Length shall be 48" unless otherwise noted or required.
 2. Provide air distribution base frame with full supply air pattern control air weir gates. When used for return air, these air weir gates act as a return airflow control damper. Close air weir gates where return is not necessary.

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3. Base frame shall present a substantially uniform appearance through the air slot when used as supply, returns or fully closed. All interior portions of the throat, including the vertical stems of the extrusions, shall be painted flat black to prevent unsightly visual deviations. Paint all exposed surfaces baked white enamel. Base frame shall be compatible with type of ceiling where linear slot diffuser is installed.
4. Base frame shall be provided with spacer channels located on the ceiling module. The spacer channel shall act as the support means for the adjustable full pattern control air weir gates, which are provided throughout the entire length of the base frame.
5. The noise criteria of the air distribution base frame shall be expressed in sound power levels (decibels 10-12 watts) in octave bands 2 through 7 with a room attenuation of 10 decibels and shall not exceed a noise criteria of 30. All data shall be based on tests performed in a certified laboratory.
6. Where noted on drawings or as required, blank-off airtight backside of supply air linear slot where duct connection is not made.

C. Supply or Return Air Chambers:

1. Supply or Return air plenum chambers shall be designed, tested, and fabricated by the same manufacturer that furnishes the base frames. Shop fabricated air chambers not acceptable. Provide with damper at inlet to plenum, which is accessible through face of linear diffuser for adjustment.
2. Provide adjustable air pattern controllers that are accessible through the base frame slot for field adjustment of the spread of the air stream. This will be accomplished without the removal of acoustical tile.
3. Provide a round neck air entry collar sized for maximum average air entry velocity of 750 FPM. A volume damper shall be installed at connection to plenum, which is accessible through face of diffuser for adjustment.
4. Construct supply air chamber from not less than 26 gauge galvanized steel and will be lined with one- quarter inch 2 lb./cu. ft. density thermal acoustical insulating. All surfaces visible through the slot will be painted flat black.
5. Provide spring clip keepers to securely attach the chamber to the base frame when in operation. These spring clips permit releasing of the air chamber for easy relocation.
6. The supply air chamber shall have been tested as composite assembly with the linear base frame for air distribution and noise level performance. The tests shall be conducted in accordance with ANSI/ASHRAE Standard 70-1991.
7. For return air plenums above the ceiling, install Krueger model DFRH plenum hood on all linear return air bars.

D. Manufacturer: Krueger model DFL linear slot diffuser.

2.04 CEILING RETURN AND EXHAUST GRILLES AND REGISTERS

(All constant air volume systems unless otherwise noted.)

- A. Concealed Spline - Krueger EGC5 or EGC5-01.
- B. Glued on Acoustile - Krueger EGC5 or EGC5-01.
- C. Plaster or drywall - Krueger EGC5 or EGC5-01.
- D. 24" x 24" T-bar - Krueger EGC5-F23 or EGC5-01-F23.

Note: For 24" x 48" T-bar ceilings, coordinate with ceiling installer for auxiliary tees as required to provide 24" x 24" space.

2.05 SIDEWALL SUPPLY AND RETURN REGISTERS AND GRILLES

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- A. Supply register - Krueger 1600.
- B. Return register - Krueger 5815.
- C. Return grille - Krueger 5815.

2.06 TRANSFER GRILLES

- A. Ceiling - Same as return grilles.

2.07 CEILING DIFFUSERS (SUPPLY)
(Constant air volume systems unless otherwise noted.)

- A. Concealed Spline - Krueger 1240-F22
- B. Glued on Acoustile - Krueger 1240-F22
- C. Plaster or Drywall - Krueger 1240-F22
- D. 24" x 24" T-Bar - Krueger 1240-F23

Note: For 24" x 48" T-bar ceilings, coordinate with ceiling installer for auxiliary tees as required to create 24" x 24" space.

2.08 MODULAR CEILING DIFFUSERS
(All V.A.V. systems unless otherwise noted.)

- A. Krueger model 1900SQ and shall have a frame style to interface with the ceiling grid system being used.
- B. Manufactured from extruded aluminum. Provided with air pattern control weirs, and an integral deflection rail allowing for one- to four-way direction air flow producing uniform ceiling effect.
- C. The air motion in the occupancy zone at maximum cubic feet per minute shall not exceed 50 feet per minute. Inner panel of matching acoustical tile shall provide an airtight joint.
- D. Supply, Return and Exhaust Chambers:
 - 1. Designed and fabricated by the manufacturer of the base frames. Field fabricated chambers will not be accepted. Chamber to be supplied with spring clips to attach to the base frame. Constructed from not less than 26 gauge galvanized steel and lined with 1/4" 2 LB./CU. FT. density thermal insulation. All surfaces visible through the air slot painted flat black.
 - 2. Chamber shall be supplied with a factory installed round entry collar for flex duct connection. Collar shall be sized for maximum average air entry velocity of 750 fpm. Chamber must be tested as a composite assembly with the base frame for air distribution and noise level performance by a certified testing laboratory. If used with side inlet, furnish and install vertical pressure equalizing baffle.

2.09 MODULAR CEILING RETURN
(All V.A.V. systems unless otherwise noted.)

- A. Krueger model 1900SQ return diffuser.
- B. Base frame from extruded aluminum. Frame shall have fixed weirs creating a continuous one-inch closed slot. Provide opposite blade volume damper.

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2.10 SUPPLY, RETURN AND EXHAUST CONNECTIONS TO METAL LINEAR CEILING

- A. Air Factors sheet metal air boot (eight-slot) for connecting to back of metal linear ceiling with slot openings (with labyrinths, as applicable) for supply, return, and exhaust. Air boot shall lock onto back of ceiling system.

2.11 CIRCULAR CEILING DIFFUSERS

- A. Krueger model RA2 circular diffuser with adjustable inner cone.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function.
- B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.
- C. Coordinate ceiling air diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling module.
- D. Supply outlets to provide the required air throw and spread with no apparent drafts or excessive air movement within space being supplied. Contractor to provide necessary accessories to accomplish satisfactory air distribution.
- E. Provide felt, cork or rubber gasket between finish surface and frame to prevent vibration and assure tight fit. Contractor shall be responsible for the correct location of ductwork and outlets.
- F. For filler panel type outlets the manufacturer shall coordinate his design with the ceiling suspension system being used. The Contractor and manufacturer shall match up sizes of outlets to properly fit in ceiling systems, between concrete or masonry components, between architectural items before fabrication.
- G. When installing removable core type outlets, secure to frame with screws.
- H. Secure outlets to ceiling suspension systems as required.

END OF SECTION

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SECTION 15990 - TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes testing, adjusting, and balancing HVAC systems (including the existing HVAC equipments) to produce design objectives, including the following:
 - 1. Balancing airflow and water flow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
 - 2. Adjusting total HVAC systems to provide indicated quantities.
 - 3. Measuring electrical performance of HVAC equipment.
 - 4. Setting quantitative performance of HVAC equipment.
 - 5. Verifying that automatic control devices are functioning properly.
 - 6. Measuring sound and vibration.
 - 7. Reporting results of the activities and procedures specified in this Section.
- B. Related Sections include the following:
 - 1. Testing and adjusting requirements unique to particular systems and equipment are included in the Sections that specify those systems and equipment.
 - 2. Field quality-control testing to verify that workmanship quality for system and equipment installation is specified in system and equipment Sections.

1.03 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.
- C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- E. Report Forms: Test data sheets for recording test data in logical order.
- F. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- G. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- H. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

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- I. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- J. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- K. Test: A procedure to determine quantitative performance of a system or equipment.
- L. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.
- M. AABC: Associated Air Balance Council.
- N. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.04 SUBMITTALS

- A. Quality-Assurance Submittals: Within 30 days from the Contractor's Notice to Proceed, submit 2 copies of evidence that the testing, adjusting, and balancing Agent and this Project's testing, adjusting, and balancing team members meet the qualifications specified in the "Quality Assurance" Article below.
- B. Contract Documents Examination Report: Within 45 days from the Contractor's Notice to Proceed, submit 2 copies of the Contract Documents review report as specified in Part 3 of this Section.
- C. Strategies and Procedures Plan: Within 60 days from the Contractor's Notice to Proceed, submit 2 copies of the testing, adjusting, and balancing strategies and step-by-step procedures as specified in Part 3 "Preparation" Article below. Include a complete set of report forms intended for use on this Project.
- D. Certified Testing, Adjusting, and Balancing Reports: Submit 2 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.
- E. Sample Report Forms: Submit 2 sets of standard report forms from AABC which will be used for testing, adjusting, and balancing on this project.
- F. Warranty: Submit 2 copies of special warranty specified in the "Warranty" Article below.

1.05 QUALITY ASSURANCE

- A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC.
- B. Testing, Adjusting, and Balancing Conference: Meet with the Owner's and the Architect's representatives on approval of the testing, adjusting, and balancing strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of testing, adjusting, and balancing team members, equipment manufacturers' authorized service representatives, HVAC controls Installer, and other support personnel. Provide 7 days' advance notice of scheduled meeting time and location.

- 1. Agenda Items: Include at least the following:
 - a. Submittal distribution requirements.

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- b. Contract Documents examination report.
 - c. Testing, adjusting, and balancing plan.
 - d. Work schedule and Project site access requirements.
 - e. Coordination and cooperation of trades and subcontractors.
 - f. Coordination of documentation and communication flow.
- C. Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:
- 1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
 - 2. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.
- D. Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing."
- E. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.
- F. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.
- 1.06 PROJECT CONDITIONS
- A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.
- 1.07 COORDINATION
- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.
- B. Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.
- C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.
- 1.08 WARRANTY
- A. General Warranty: The national project performance guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. National Project Performance Guarantee: Provide a guarantee on AABC'S "National Standards" forms stating that AABC will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
- 1. The certified Agent has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.

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PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
 - 1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
 - 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine project record documents described in Division 1 Section "Project Record Documents."
- D. Examine Architect's and Engineer's design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data, including fan and pump curves. Relate performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
- F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed. Provide a report of any discrepancies, mistakes, omissions or incomplete installation
- G. Examine system and equipment test reports.
- H. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

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- J. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- K. Examine terminal units, such as variable-air-volume boxes and mixing boxes, to verify that they are accessible and their controls are connected and functioning.
- L. Examine plenum ceilings, utilized for supply air, to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.
- M. Examine strainers for clean screens and proper perforations.
- N. Examine 3-way valves for proper installation for their intended function of diverting or mixing fluid flows.
- O. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- P. Examine equipment for installation and for properly operating safety interlocks and controls.
- Q. Examine automatic temperature system components to verify the following:
 - 1. Dampers, valves, and other controlled devices operate by the intended controller.
 - 2. Dampers and valves are in the position indicated by the controller.
 - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
 - 4. Automatic modulating and shutoff valves, including 2-way valves and 3-way mixing and diverting valves, are properly connected.
 - 5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 - 6. Sensors are located to sense only the intended conditions.
 - 7. Sequence of operation for control modes is according to the Contract Documents.
 - 8. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
 - 9. Interlocked systems are operating.
 - 10. Changeover from heating to cooling mode occurs according to design values.
- R. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

3.02 PREPARATION

- A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.
- B. Complete system readiness checks and prepare system readiness reports. Verify the following:
 - 1. Permanent electrical power wiring is complete.
 - 2. Hydronic systems are filled, clean, and free of air.
 - 3. Automatic temperature-control systems are operational.
 - 4. Equipment and duct access doors are securely closed.
 - 5. Balance, smoke, and fire dampers are open.
 - 6. Isolating and balancing valves are open and control valves are operational.
 - 7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 8. Windows and doors can be closed so design conditions for system operations can be met.

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3.03 GENERAL TESTING AND BALANCING PROCEDURES

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.
- C. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.04 FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- E. Check the airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling unit components.

3.05 CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES

- A. The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems. Additional procedures are required for variable-air-volume, multizone, dual-duct, induction-unit supply-air systems and process exhaust-air systems. These additional procedures are specified in other articles in this Section.
- B. Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer.
 - 1. Measure fan static pressures to determine actual static pressure as follows:

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- a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
2. Measure static pressure across each air-handling unit component.
 - a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.
 3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers under final balanced conditions.
 4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
 5. Adjust fan speed higher or lower than design with the approval of the Architect. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.
- C. Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.
1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submains and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submains and branch ducts to design airflows within specified tolerances.
- D. Measure terminal outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.
- E. Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than extractors and the dampers at the air terminals.
1. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.
- 3.06 VARIABLE-AIR-VOLUME SYSTEMS' ADDITIONAL PROCEDURES

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- A. Compensating for Diversity: When the total airflow of all terminal units is more than the fan design airflow volume, place a selected number of terminal units at a maximum set-point airflow condition until the total airflow of the terminal units equals the design airflow of the fan. Select the reduced airflow terminal units so they are distributed evenly among the branch ducts.

- B. Pressure-Dependent, Variable-Air-Volume Systems without Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
 - 1. Balance systems similar to constant-volume air systems.
 - 2. Set terminal units and supply fan at full-airflow condition.
 - 3. Adjust inlet dampers of each terminal unit to design airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units as described for constant-volume air systems.
 - 4. Readjust fan airflow for final maximum readings.
 - 5. Measure operating static pressure at the sensor that controls the supply fan, if one is installed, and verify operation of the static-pressure controller.
 - 6. Set supply fan at minimum airflow if minimum airflow is indicated. Measure static pressure to verify that it is being maintained by the controller.
 - 7. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow as described for constant-volume air systems.
 - a. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.
 - 8. Measure the return airflow to the fan while operating at maximum return airflow and minimum outside airflow. Adjust the fan and balance the return-air ducts and inlets as described for constant-volume air systems.

- C. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
 - 1. Set system at maximum design airflow by setting the required number of terminal units at minimum airflow. Select the reduced airflow terminal units so they are distributed evenly among the branch ducts.
 - 2. Adjust supply fan to maximum design airflow with the variable-airflow controller set at maximum airflow.
 - 3. Set terminal units being tested at full-airflow condition.
 - 4. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to design airflow. When total airflow is correct, balance the air outlets downstream from terminal units as described for constant-volume air systems.
 - 5. Adjust terminal units for minimum airflow.
 - 6. Measure static pressure at the sensor.
 - 7. Measure the return airflow to the fan while operating at maximum return airflow and minimum outside airflow. Adjust the fan and balance the return-air ducts and inlets as described for constant-volume air systems.

3.07 MULTIZONE SYSTEMS' ADDITIONAL PROCEDURES

- A. Set unit at full flow through the cooling coil if coil has that capacity.
- B. Adjust each zone damper to design airflow.

3.08 MOTORS

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A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer, model, and serial numbers.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating if high-efficiency motor.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.

3.09 BOILERS

A. Measure entering- and leaving-water temperatures and water flow.

3.10 TEMPERATURE TESTING

A. During testing, adjusting, and balancing, report need for adjustment in temperature regulation within the automatic temperature-control system.

B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of 2 successive 8-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.

C. Measure outside-air, wet- and dry-bulb temperatures.

3.11 TEMPERATURE-CONTROL VERIFICATION

A. Verify that controllers are calibrated and commissioned.

B. Check transmitter and controller locations and note conditions that would adversely affect control functions.

C. Record controller settings and note variances between set points and actual measurements.

D. Verify operation of limiting controllers (i.e., high- and low-temperature controllers).

E. Verify free travel and proper operation of control devices such as damper and valve operators.

F. Verify sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water-flow measurements. Note the speed of response to input changes.

G. Confirm interaction of electrically operated switch transducers.

H. Confirm interaction of interlock and lockout systems.

I. Verify main control supply-air pressure and observe compressor and dryer operations.

J. Record voltages of power supply and controller output. Determine if the system operates on a grounded or nongrounded power supply.

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- K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.12 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans: Plus 5 to plus 10 percent.
2. Air Outlets and Inlets: 0 to minus 10 percent.
3. Heating-Water Flow Rate: 0 to minus 10 percent.
4. Cooling-Water Flow Rate: 0 to minus 5 percent.

3.13 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article above, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.14 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 1. Include a list of the instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to the certified field report data, include the following:
 1. Pump curves.
 2. Fan curves.
 3. Manufacturers' test data.
 4. Field test reports prepared by system and equipment installers.
 5. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
- D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:
 1. Title page.
 2. Name and address of testing, adjusting, and balancing Agent.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of testing, adjusting, and balancing Agent who certifies the report.

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10. Summary of contents, including the following:
 - a. Design versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 11. Nomenclature sheets for each item of equipment.
 12. Data for terminal units, including manufacturer, type size, and fittings.
 13. Notes to explain why certain final data in the body of reports vary from design values.
 14. Test conditions for fans and pump performance forms, including the following:
 - a. Settings for outside-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings, including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- E. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present with single-line diagrams and include the following:
1. Quantities of outside, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
- F. Air-Handling Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data: Include the following:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches (mm), and bore.
 - i. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).
 - j. Number of belts, make, and size.
 - k. Number of filters, type, and size.
 2. Motor Data: Include the following:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches (mm), and bore.
 - f. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).
 3. Test Data: Include design and actual values for the following:
 - a. Total airflow rate in cfm (L/s).
 - b. Total system static pressure in inches wg (Pa).

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- c. Fan rpm.
 - d. Discharge static pressure in inches wg (Pa).
 - e. Filter static-pressure differential in inches wg (Pa).
 - f. Preheat coil static-pressure differential in inches wg (Pa).
 - g. Cooling coil static-pressure differential in inches wg (Pa).
 - h. Heating coil static-pressure differential in inches wg (Pa).
 - i. Outside airflow in cfm (L/s).
 - j. Return airflow in cfm (L/s).
 - k. Outside-air damper position.
 - l. Return-air damper position.
 - m. Vortex damper position.
- G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to the manufacturer's factory startup equipment reports, include the following:
- 1. Unit Data: Include the following:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Fuel type in input data.
 - g. Output capacity in Btuh (kW).
 - h. Ignition type.
 - i. Burner-control types.
 - j. Motor horsepower and rpm.
 - k. Motor volts, phase, and hertz.
 - l. Motor full-load amperage and service factor.
 - m. Sheave make, size in inches (mm), and bore.
 - n. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).
 - 2. Test Data: Include design and actual values for the following:
 - a. Total airflow rate in cfm (L/s).
 - b. Entering-air temperature in deg F (deg C).
 - c. Leaving-air temperature in deg F (deg C).
 - d. Air temperature differential in deg F (deg C).
 - e. Entering-air static pressure in inches wg (Pa).
 - f. Leaving-air static pressure in inches wg (Pa).
 - g. Air static-pressure differential in inches wg (Pa).
 - h. Low-fire fuel input in Btuh (kW).
 - i. High-fire fuel input in Btuh (kW).
 - j. Manifold pressure in psig (kPa).
 - k. High-temperature-limit setting in deg F (deg C).
 - l. Operating set point in Btuh (kW).
 - m. Motor voltage at each connection.
 - n. Motor amperage for each phase.
 - o. Heating value of fuel in Btuh (kW).
- H. Fan Test Reports: For supply, return, and exhaust fans, include the following:
- 1. Fan Data: Include the following:
 - a. System identification.
 - b. Location.
 - c. Make and type.

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- d. Model number and size.
- e. Manufacturer's serial number.
- f. Arrangement and class.
- g. Sheave make, size in inches (mm), and bore.
- h. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).
2. Motor Data: Include the following:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches (mm), and bore.
 - f. Sheave dimensions, center-to-center and amount of adjustments in inches (mm).
 - g. Number of belts, make, and size.
3. Test Data: Include design and actual values for the following:
 - a. Total airflow rate in cfm (L/s).
 - b. Total system static pressure in inches wg (Pa).
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg (Pa).
 - e. Suction static pressure in inches wg (Pa).
- I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 1. Report Data: Include the following:
 - a. System and air-handling unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F (deg C).
 - d. Duct static pressure in inches wg (Pa).
 - e. Duct size in inches (mm).
 - f. Duct area in sq. ft. (sq. m).
 - g. Design airflow rate in cfm (L/s).
 - h. Design velocity in fpm (m/s).
 - i. Actual airflow rate in cfm (L/s).
 - j. Actual average velocity in fpm (m/s).
 - k. Barometric pressure in psig (Pa).
- J. Air-Terminal-Device Reports: For terminal units, include the following:
 1. Unit Data: Include the following:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Test apparatus used.
 - d. Area served.
 - e. Air-terminal-device make.
 - f. Air-terminal-device number from system diagram.
 - g. Air-terminal-device type and model number.
 - h. Air-terminal-device size.
 - i. Air-terminal-device effective area in sq. ft. ((sq. m)).
 2. Test Data: Include design and actual values for the following:
 - a. Airflow rate in cfm (L/s).
 - b. Air velocity in fpm (m/s).

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- c. Preliminary airflow rate as needed in cfm (L/s).
 - d. Preliminary velocity as needed in fpm (m/s).
 - e. Final airflow rate in cfm (L/s).
 - f. Final velocity in fpm (m/s).
 - g. Space temperature in deg F (deg C).
- K. Compressor and Condenser Reports: For refrigerant side of unitary systems, stand-alone refrigerant compressors, air-cooled condensing units, or water-cooled condensing units, include the following:
- 1. Unit Data: Include the following:
 - a. Unit identification.
 - b. Location.
 - c. Unit make and model number.
 - d. Manufacturer's compressor serial numbers.
 - e. Compressor make.
 - f. Compressor model and serial numbers.
 - g. Refrigerant weight in lb (kg).
 - h. Low ambient temperature cutoff in deg F (deg C).
 - 2. Test Data: Include design and actual values for the following:
 - a. Inlet-duct static pressure in inches wg (Pa).
 - b. Outlet-duct static pressure in inches wg (Pa).
 - c. Entering-air, dry-bulb temperature in deg F (deg C).
 - d. Leaving-air, dry-bulb temperature in deg F (deg C).
 - e. Condenser entering-water temperature in deg F (deg C).
 - f. Condenser leaving-water temperature in deg F (deg C).
 - g. Condenser water temperature differential in deg F (deg C).
 - h. Condenser entering-water pressure in feet of head or psig (kPa).
 - i. Condenser leaving-water pressure in feet of head or psig (kPa).
 - j. Condenser water pressure differential in feet of head or psig (kPa).
 - k. Control settings.
 - l. Unloader set points.
 - m. Low-pressure-cutout set point in psig (kPa).
 - n. High-pressure-cutout set point in psig (kPa).
 - o. Suction pressure in psig (kPa).
 - p. Suction temperature in deg F (deg C).
 - q. Condenser refrigerant pressure in psig (kPa).
 - r. Condenser refrigerant temperature in deg F (deg C).
 - s. Oil pressure in psig (kPa).
 - t. Oil temperature in deg F (deg C).
 - u. Voltage at each connection.
 - v. Amperage for each phase.
 - w. The kW input.
 - x. Crankcase heater kW.
 - y. Number of fans.
 - z. Condenser fan rpm.
 - aa. Condenser fan airflow rate in cfm (L/s).
 - bb. Condenser fan motor make, frame size, rpm, and horsepower.
 - cc. Condenser fan motor voltage at each connection.
 - dd. Condenser fan motor amperage for each phase.
- L. Instrument Calibration Reports: For instrument calibration, include the following:
- 1. Report Data: Include the following:

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- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.15 ADDITIONAL TESTS

- A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

END OF SECTION

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SECTION 16010 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

- A. Work included: Labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing operations in connection with furnishing, delivery and installation of the electrical work, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to, the following:
1. Examine all other sections for work related to those other sections and required to be included as work under this section.
 2. General provisions and requirements for electrical work.
 3. Site investigations prior to bidding to verify and establish existing conditions.
 4. Temporary power and lighting facilities for construction.
 5. All work required by the utility companies and city departments for utility services to the project. This may include transformer pads, substructures, trenches, conduits, concrete encasements, conductors, pullboxes and grounding. The contractor shall coordinate utility requirements prior to the commencement of any work.
 6. Interior and exterior area lighting.
 7. Cutting, patching, sealing and painting as applicable.
 8. Flashing of conduits at roof penetrations.
 9. Trenching, excavation, backfill and compaction required for installation of underground work and as specified elsewhere in the contract documents. Provide shoring and bracing as required by OSHA to prevent collapse.
 10. Concrete encasement of below grade conduits.
 11. Grounding systems.
 12. Lighting and power branch circuit wiring, including control devices, disconnect switches, outlets, devices, plates, materials, etc., for a complete installation.
 13. Lighting fixtures and lamps.
 14. Switchgear, distribution panelboards, panelboards, transformers and feeders.
 15. Mechanical, plumbing and irrigation equipment connections and controls. Refer to the drawings and specifications of other trades for additional requirements.
 16. Include an allowance of \$400.00 for the material cost of any lighting fixture where an outlet is shown on drawings without a fixture type designation.
 17. Testing.
 18. Related work specified for other sections.
 19. Guarantees / warranties.
 20. Closeout package and shop drawings.
 21. Permits.
 22. Low voltage system.
 23. Provisions for Signal systems.
 24. Access panels where required.
 25. Record drawings.
 26. Identification/detection and documentation of existing below grade utilities in areas of new work.

1.02 TERMINOLOGY

- A. Term "signal system" shall apply to clock, bell, fire alarm, annunciator, sound, public address, buzzer, telephone, television, intercommunication, security and data systems.

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- B. Term "Control Devices" shall apply to relays, contactors, switches, sensors, motor control equipment and time switches.
- C. Term "low voltage" shall apply to systems operating at 600 volts and under.
- D. Term "provide" used on Drawings and elsewhere in the Specifications shall be considered to mean "furnish, install and connect."
- E. Term "UL" means Underwriters Laboratories Inc.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Provide electrical work as specified in other sections of the drawings and specifications.
- B. Painting of exposed conduit or equipment.
- C. Excavation, grading and backfill.
- D. Temporary facilities.
- E. Cutting and patching.
- F. Concrete work.
- G. Access panels.

1.04 GENERAL SUMMARY OF ELECTRICAL WORK

- A. The construction documents are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or material for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.
- B. Refer to the drawings and shop drawings of other trades for additional details that affect the proper installation of this work. Diagrams and symbols showing electrical connections are diagrammatic only. Wiring diagrams do not necessarily show the exact physical arrangement of the equipment.
- C. Prior to submitting a bid, the Contractor shall familiarize himself with all features of the construction documents and site, which may affect the execution of the work.
- D. If there are omissions or conflicts between the drawings and specifications, clarify these points with the Architect prior to submitting a bid.
- E. Contractor shall provide access panels as required for the proper access of electrical equipment and devices. Refer to the architectural drawings and specifications for installation requirements.
- F. All exposed conduits and boxes shall be painted to match the surfaces adjacent to installation.
- G. All trenches outside of barricade limits shall be backfilled and paved no later than 72 hours after being opened. During the time that trenches are open in traffic areas the Contractor shall provide traffic plates.

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- H. Where existing structural walls are cored for new conduit runs, separation between cored holes shall be 3" from new or existing holes, unless directed otherwise by structural engineer.
- I. The representation of physical placement of existing conduits has been developed from the best information available to the Owner at the time the drawings were prepared. The Owner provides this information only as a general guideline for the convenience of Bidders/Contractors and does not guarantee or warrant in any way, expressed or implied, the accuracy of these representations. Nothing in this disclaimer affects, in any way, the duty of the Contractor to furnish accurate "As Built" Drawings after completion of the contract.
- J. When trenching for new underground conduits, exercise care to avoid damage to existing underground utilities.

1.05 QUALITY ASSURANCE

- A. In addition to the requirements of all governing codes, ordinances and agencies, conform to the requirements of the following codes and standards:
 - 1. Requirements of the National Electrical Code, latest adopted edition.
 - 2. Requirements of CAL-OSHA, State Fire Marshal, State and Municipal Building and Electrical Safety ordinances.
 - 3. All products shall be UL labeled and shall conform to all requirements of the National Board of Fire Underwriters for electrical wiring apparatus.
 - 4. Requirements of all other authorities having jurisdiction.
 - 5. Regulations of the serving utility companies as applicable to the work performed under this contract.
 - 6. Work and material shown on the drawings and in the specifications are new and included in the contract unless specifically indicated as existing or N.I.C. (not-in-contract).
 - 7. Keep a copy of all applicable codes available at the job site at all times while performing work under this section. Nothing in plans or specifications shall be construed to permit work not conforming to the most stringent of codes.

1.06 JOB CONDITIONS

- A. In addition to the requirements of all governing codes, ordinances and agencies, conform to the requirements of the following codes and standards:
 - 1. The drawings are diagrammatic and indicate the locations of the components of the work, and further indicate the required size and points of termination of the conduit, number and size of conductors and diagrammatic routing. Provide all conduits, wire outlet boxes and necessary connections for a complete electrical installation. Coordinate conduit runs with building structure and work of other trades.
 - 2. Unless otherwise approved by the Architect, the following conditions shall be adhered to:
 - a. Outlets in gypsum board are to be symmetrical with respect to walls and other architectural features.
 - b. Outlets in acoustical ceilings are to be in the center of the acoustical tile.
 - c. Do not mount control devices more than 6 ft. 6 in. above finished floor.
 - d. Do not locate panelboards in closets, toilet rooms or in any room having its only access through a toilet room.
 - e. Group outlets and wiring devices within close proximity horizontally or vertically for a uniform and neat appearance.

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- f. Do not locate panelboards, cabinets, outlets or other equipment in two-hour rated walls.
 - g. All equipment and material located outdoors or in hazardous or other special areas shall be UL labeled for the conditions to be encountered.
 - h. Prior to installation, the Architect reserves the right to relocate any outlet of device within size fee of the location indicated on the plans and at no additional cost to the contract by the Contractor.
 - i. Outlets on opposite sides of a wall shall be separated by a 24-inch minimum horizontal separation.
 - j. Verify exact locations and routing of existing systems in the field. Include all costs in the bid for adjustments required to accommodate existing conditions.
3. Structural Considerations for Conduit Routing
- a. Where conduits are to pass through or will interfere with any Structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other buildings elements, to accommodate the electrical work, such work shall conform to State Building Code, Part 2, Title 24, Section 1906.3 for conduits and pipes embedded in concrete and Section 2320.11.9 and 2320.11.10 for notches and bored holes in wood; for steel.
 - b. Where a concrete encasement for underground conduit abuts a foundation wall or underground structure which the conduits enter, encasement shall rest on a haunch integral with wall or structure, or shall extend down to footing projection, if any, or shall be doweled into structure unless otherwise indicated. Underground structures shall include manholes, pullboxes, vaults and buildings.
4. Electrically Operated Equipment and Appliances
- a. Equipment and Appliances Furnished by Contractor:
 - 1) Electrical work shall include furnishing and installing wiring enclosures for and the complete connection of all electrically operated equipment and appliances and any electrically controlled devices that are specified to be furnished and installed in this or other Sections of these Specifications. All wiring enclosures shall be installed concealed except where exposed work is indicated on Electrical Drawings.
 - 2) Connections shall be made as necessary to completely install equipment ready for use. Equipment shall be tested for proper operation and, if motorized, for proper rotation. If outlets of incorrect electrical characteristics or if any equipment fails to operate properly, Contractor shall report to the Owner's Inspector in writing, listing building and rooms in which the defect is located, the name, make and serial number of equipment, and a description of defect.
 - b. Equipment and Appliances Furnished by Others:
 - 1) Equipment and appliances indicated on drawings as N.I.C. (Not in Contract), "Furnished by Others", or "Furnished by the Owner", will be delivered to the site. Required electrical connections shall be made for all such equipment and appliances in accordance with accepted trade practices under direction of the Owner Electrical Inspector. All motorized equipment will be furnished factory-wired to a control panel or junction box unless otherwise indicated. Appliances will be furnished equipped with portable cord and cap. Provide disconnect switches were required.
 - 2) Connections to equipment furnished under other Sections of this Specification shall be part of the Electrical Work. Work shall

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include internal wiring, installation, connection and adjustment of bolted drive motors in which the motor is supplied as a separate unit and connections only for equipment furnished with factory-installed internal wiring, except as further limited by drawings and other Sections of these Specifications. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push button stations, selector switches, conduit, junction boxes and wiring necessary for a complete Electrical installation. Work shall also include furnishing and installing conduit and boxes, for HVAC control system, furnished under Mechanical. Devices and equipment furnished shall be of same type used elsewhere on job or as specified.

- 3) Electrical equipment furnished under other Sections of this Specification for installation and connection under work of this Section shall be delivered to the installation location by the Contractor furnishing the equipment.
- 4) Suitability and condition of equipment furnished by other Sections of this Specification shall be determined in advance of installation. Immediate notice of damage, unsuitability or lack of parts shall be given to the Architect.

1.07 LOCATIONS OF EQUIPMENT

- A. The drawings indicate diagrammatically the desired location or arrangements of conduit runs, outlets, equipment, etc., and are to be followed as closely as possible. Proper judgment must be exercised in executing the work so as to secure the best possible installation into space limitation or interference of structural conditions encountered.
- B. Electrical Drawings indicate required size and points of termination of conduits, number and size of wires, and suggest routing for conduit. It shall be the Contractor's responsibility to install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and meet all applicable code requirements. Routing of conduits may be altered for discovered conditioning if approved by the Owner Electrical Inspector.
- C. Where outlets are placed on a wall, locate symmetrically with respect to one another and other architectural elements. Notwithstanding fact that locations indicated on drawings may be distorted for clarity.
- D. In the event changes in the indicated locations or arrangements are necessary, due to developed conditions in the building construction or rearrangement of furnishings or equipment, such changes shall be made without additional cost, providing the change is ordered prior to the installation of the work involving the subject change.
- E. Coordinate and cooperate in every way with other trades in order to avoid interference and assure a satisfactory job.
- F. Architectural and Structural Drawings take precedence over Electrical Drawings in representation of general construction work. Drawings of various trades take precedence in representation of work of those trades. Contractor shall refer to all Drawings and specifications to coordinate the Electrical work with work of other trades.

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1.08 POWER, TELEPHONE AND OTHER SERVICES

A. General

1. Power and metering facilities shall conform to the requirements of the serving utility companies. Contractor shall verify service locations and requirements prior to bid.
2. Conform to all requirements of the serving utility companies. Locations of structures and routing of service conduits indicated on the drawings are approximate and shall be verified with the serving utility company prior to installation. Installation of service shall not begin until approved drawings have been received from the serving utility company.
3. Within 30 calendar days of receipt of notice that the contract has been awarded, the Contractor shall notify the New Business Departments of the Owner Office of the serving utility companies and shall provide information as requested by the serving utility company. The Contractor shall furnish at the same time information as to the estimated completion date of job or the date when the respective utility company circuits, will be ready for installation, energizing and activation of the service.
4. In addition to the requirements of the serving utility companies, all power, telephone and cable service conduits for utility companies shall be completely encased with concrete.
5. Perform all work for electric power, cable television and public telephone services in accordance with the requirements of said companies and/or city departments. Services shall be complete to the point of connection as designated by the serving utility company.
6. Prior to bid date, Contractor shall consult utility company and verify all service locations, utility company and/or city requirements. Include costs in the bid for all work required.
7. Coordinate hook-up of final service with utility company or city so as to cause no delay in the progress of the work. Include the cost of overtime, off-hours and weekend work as may be required.
8. Notify the Architect immediately of any major changes required to the work of this section as a result of said utility company and/or city requirements.
9. Interrupting capacity of the main circuit breaker and distribution circuit breakers shall be equal to or greater than available short circuit current at said point as obtained by utility company or as computed by the Engineer. Selective coordination between main and feeder circuit breakers is required.

B. Installation

1. Service conduits shall terminate at service poles or other service points as indicated by the serving utility company and shall extend underground to main service terminating pull section as indicated. All bends in conduits shall be long radius type and all sweeps shall have a radius of not less than 10 times conduit trade size. Underground conduits shall be encased in concrete 3" thick on all sides with multiple conduits spaced not less than 1-1/2" apart.
2. Service cable, if overhead, shall be connected to metering compartment of switchboard or, if underground, in service terminating pull section as required and directed by utility company.
3. Provide grounding/bonding including ground rods at utility service equipment per serving utility company requirements.

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- C. Conduits Crossing Public Dedicated Property
 - 1. Where service or other conduits cross a street, alley, highway or any other public dedicated property, Contractor shall make necessary arrangements to open and close public property and shall pay all costs in connection with required licenses, permits, fees and deposits. Conduits shall be installed in a manner required by authorities having jurisdiction.
- D. Structural Conditions
 - 1. Where conduits are to pass through or interfere with any structural member, where notching, boring or cutting of structure is necessary, where special openings are required through walls, floors, footings, or other building elements, to accommodate electrical work, all such work shall be done as directed and approved by Architect/Structural Engineer of Record.
 - 2. Placement of conduits in concrete slabs and structural members shall comply with requirements of applicable section of CCR, Title 24, Public Works and shall be approved by the Architect.
 - 3. Where a concrete encasement for underground conduits abuts a foundation wall or underground structure which conduits enter, encasement shall be maintained in position in relation to structure, or shall extend down to footing projection, or shall be doweled into structure. Underground structures shall include manholes, pull boxes, vaults and buildings.
 - 4. All cutting and patching of rough and finish construction work shall be done as required for installation of work under this section. Patching shall be of same materials, workmanship and finish and shall accurately match the surrounding work. Work shall be done under direction of the architect.

1.09 PERMITS, FEES AND INSPECTIONS

- A. Obtain and pay for all permits and licenses required for the electrical work, and arrange and schedule all required inspections. Obtain permits prior to commencing any work.
- B. Pay all fees or charges levied by the utility company or city for permanent and temporary services to the project, and any other imposed fees.

1.10 COORDINATION

- A. Perform all coordination work with serving utility companies and city departments insuring proper locations and sizes for conduits, conductors, structures and service entrance requirements, for a complete operable coordinated installation.
- B. Verify and coordinate all sizes of equipment to be installed with the manufacturer, ensuring adequate clearances, ventilation and access.
- C. Coordinate work of mechanical, plumbing, and landscape trades for work required as a part of this section, and verify quantity, sizes and location of all work.
- D. Coordinate the work of all other trades, verifying all required electrical requirements, clearances, proper sleeves, supports, door swings and other items affecting this work. Determine in advance the methods of installing and connecting all equipment, outlets and other items.
- E. Include allowances for site conditions including, but not limited to, structural, civil, architectural, landscape, mechanical, plumbing and other disciplines.

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1.11 SUBMITTALS

A. General

1. Review of contractors' submittals is for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for quantities; dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of work with all other trades and satisfactory performance of their work.
2. More than one manufacturer for any one item of equipment, or listing items "as specified", without both make and model or type designation, is not acceptable. Shop drawings shall not be submitted before approval of manufacturers list. The right is reserved to require submission of samples of any material whether or not particularly mentioned herein.
3. The Contractor shall review each submittal in detail for compliance with the requirements of the contract documents prior to submittal to the Architect. The Contractor shall "Ink Stamp" and sign each item of the submittal with a statement "CERTIFYING THE SUBMITTAL HAS BEEN REVIEWED BY THE CONTRACTOR AND COMPLIES WITH ALL THE REQUIREMENTS OF THE CONTRACT DOCUMENTS". The CONTRACTOR shall clearly and specifically identify each individual proposed substitution or proposed deviation from the requirements of the contract documents with a statement "THIS ITEM IS A SUBSTITUTION".
4. All requests for product substitutions shall be made in accordance with the following:
 - a. Quality and performance are equivalent to or better than the specified item.
 - b. Unit fits in the allotted space and unit is accessible for maintenance.
 - c. Unit has a similar appearance.
 - d. Unauthorized product substitutions will be removed from the job site at the Contractor's expense.
5. Submittals, which are to be reviewed as substitutions or departures from the contract documents, must be specifically noted as such or the requirements of the contract documents will prevail regardless of the acceptance of the submittal.
6. Shop drawings shall include dimensioned plans, elevations, details, wiring diagrams and descriptive literature of component parts where applicable.
7. The Contractor shall verify dimensions of equipment and be satisfied as to fit and that they comply with all code requirements relating to clear working space about electrical equipment prior to submitting shop drawings for approval.
8. The Contractor shall be responsible for incidental, direct and indirect costs resulting from the substitution of specified contract materials or work.
9. Submit product data sheets for all raceways, fittings, outlet boxes, floor boxes, wiring devices, device plates, relays, contactors, timeswitches, fuses, mounting accessories for outlet boxes and safety switches.
10. Submit product data sheets for all racks, hooks, supports, ladders, covers, grounding, manholes, vaults, pullboxes, joint sealing compound etc.
11. Submit detailed shop drawings including dimensioned plans, elevations, details, schematic and point-to-point wiring diagrams and descriptive literature for all component parts for transformers, relays, time clocks and photocells.
12. Submit re-drawn scaled floor plans of electrical/signal rooms and electrical/signal closets indicating proposed layouts/locations of the electrical equipment, switchgear, panelboards, transformers, terminal cabinets, signal equipment, etc. Dimensions shall be based on the equipment submitted. Where new equipment is located in rooms where existing equipment is to remain, the Contractor shall

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include locations and dimensions of existing equipment. The Architect/Engineer will not provide electronic files of these rooms. The Contractor shall create said drawings by hand or electronically.

- B. Equipment order list
1. Within twenty (20) days after award of contract, deliver to the Architect six (6) copies of a complete list of equipment and materials ordered giving description, model numbers, date of orders and requested delivery dates. Arrange delivery of proper quantities so that the progress of the work will not be delayed. Reference all listings to the specification section which each is applicable to.
 2. If such lists are not delivered to the Architect, the Owner reserves the right to purchase the required materials and equipment and deduct the cost thereof from the contract sum.
- C. Shop drawings
1. Within thirty-five (35) days after award of contract, and before any of the materials of this section are delivered to the job site, submit complete shop drawings to the Architect in accordance with the specifications. Indicate proof of UL or other recognized testing laboratory's approval for all materials. Show wording for all required nameplates.
- D. Maintenance and Operating Manuals
1. The Contractor shall furnish three (3) copies of typewritten maintenance and operating manuals for all electrical equipment, fire alarm equipment, special signal systems, etc., to the Owner and instruct Owner's personnel in correct operation of all equipment at completion of project.
 2. Maintenance and operating manuals shall be bound in three-ring, hardcover plastic binders and shall be delivered to the Owner with letter of transmittal, carbon copy to the Architect.
- E. Portable or Detachable Parts: The Contractor shall retain in his possession, and shall be responsible for all portable and detachable parts or portions of the installation such as fuses, keys, locks, adapters, locking clips, and inserts until final completion of contract work. These parts shall then be delivered to the Owner or his authorized representative and an itemized receipt obtained, with copies of receipt sent to the Architect.
- F. Record Drawings
1. Provide and maintain in good order at the job site a complete set of electrical contract prints. Changes to the contract to be clearly recorded on this set of prints. At the end of the project, the Contractor shall transfer all changes to a CD Rom disk utilizing AutoCAD version 14 or greater. Deliver .DWG files to Architect at the completion of the work.
 2. The actual location and elevation of all buried lines, boxes, monuments, vaults, stub-outs and other provisions for future connections shall be referenced to the building lines or other clearly established base lines and to approved bench marks. All measurements shall be witnessed by the project inspector who shall make his own record of the dimensions. Before the inspector signs the record drawings, he shall check his own dimensions against those on the drawings. If any necessary dimensions are omitted from the record drawings, the Contractor shall, at his own expense, do all excavation required to expose the buried work and to establish the correct locations.

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3. The Contractor shall keep the "record" prints up to date and current with all work performed.

1.12 PRODUCT HANDLING

A. Protection

1. Take all precautions necessary to protect the materials of this section before, during and after installation.

B. Repairs

1. In the event of damage, immediately repair all damaged and defective work to the approval of the Architect, at no additional cost to the Owner.

C. Owner-furnished equipment

1. Accept and become responsible for all Owner-furnished equipment. Inspect all equipment for proper nameplates, voltages and any deficiencies. Immediately notify the Owner of any defects or deficiencies. Failure to notify the Owner shall mean that the Contractor warrants that all equipment is of proper quantity, design and is free from all defects. Properly store all equipment and install as required.

1.13 GUARANTEE / WARRANTY

- A.** All materials and equipment furnished and installed under this section of the specifications shall be guaranteed in writing for a period of one (1) year from the date of final acceptance of the building against defective material, design and workmanship. In addition, all high intensity discharge (H.I.D.) ballasts shall be guaranteed from any defects for a period of two (2) years. Upon receipt of notice from the Owner of the failure of any part of the work during the guarantee period, the affected work shall be replaced promptly with new work by and at the expense of the Contractor and at no cost to the Owner. Refer to other sections for additional guarantee/warranty requirements.

1.14 CLEANING EQUIPMENT, MATERIALS, PREMISES

- A.** All parts of the equipment shall be thoroughly cleaned of dirt, rust, cement, plaster, debris, overspray, etc., and all cracks and corners scraped out clean. Surfaces to be painted shall be carefully cleaned of grease and oil spots and left smooth, clean and in proper condition to receive paint finish. Remove from the site all debris and rubbish caused by the electrical work.

1.15 CUTTING AND PATCHING

- A.** Perform cutting and patching of the construction work, which may be required for the proper installation of the electrical work. Patching shall be of the same material, thickness, workmanship and finish as existing and accurately match surrounding work to the satisfaction of the Architect. Cutting of structural members shall not be done without notifying the Architect and obtaining structural approval.

1.16 IDENTIFICATION

- A.** Panelboards, terminal cabinets, circuit breakers, disconnect switches, starters, relays, time switches, contactors, pushbutton control stations, and other apparatus used for the operation or control of feeders, circuits, appliances, or equipment shall be properly

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identified by means of descriptive nameplates or tags permanently attached to the apparatus and wiring.

- B. Nameplates shall be engraved, laminated phenolic. Shop drawings with dimensions and format shall be submitted to the Architect before installation. Attachment to equipment shall be with escutcheon pins, rivets, self-tapping screws or machine screws. Self-adhering or adhesive backed nameplates shall not be used.
- C. Plates: All cover and device plates shall be furnished with engraved or etched designations under any one of the following conditions:
 - 1. Three gang or larger gang switches.
 - 2. Lock switches.
 - 3. Pilot light switches.
 - 4. Switches in locations from which the equipment or circuits controlled cannot be readily seen.
 - 5. Manual motor starting switches.
 - 6. Switches that serve other than lighting loads.
 - 7. Where so indicated on the drawings.
 - 8. As required on all control circuit switches, such as heater controls, etc.
 - 9. Where receptacles are other than standard duplex receptacles to indicate voltage and phase.
- D. Provide black-on-white laminated plastic nameplates engraved in minimum ¼" high letters to correspond with the designations on the drawings. Provide other or additional information on nameplates where indicated.
- E. For equipment containing or operating on circuits of more than 240 volts nominal, provide red-on-white laminated warning signs engraved in ½" high letters to read: "CAUTION – 480 (or as applicable) VOLTS KEEP OUT AUTHOURIZED PERSONNEL ONLY".
- F. Tags shall be attached to feeder wiring in conduits at every point where runs are broken or terminated. Circuit, phase, and function shall be indicated. Neutrals shall be tagged indicating circuits shared with. Branch circuits shall be tagged in panelboards and motor control centers. Neutrals shall be tagged indicating phase circuits shared with. Tags may be made of pressure sensitive plastic or embossed, self-attached, stainless steel or brass ribbon.
- G. Cardholders and cards shall be provided for circuit identification in panelboards. Cardholders shall consist of a metal frame retaining a clear plastic cover permanently attached to the inside of the panel door. List of circuits shall be typewritten on card. Circuit description shall include name or number of circuit, area, and connected load. Refer to other specification sections for additional requirements.
- H. Junction and pull boxes shall have covers/plates stenciled with panel designation and circuit numbers according to panel schedule. Data shall be lettered in a conspicuous manner with a color contrasting to finish. A permanent marker may be used where not exposed to normal view (i.e. ceiling spaces, utilitarian rooms/enclosures, floor spaces, etc.).
- I. Devices such as receptacles and junction boxes exposed to normal view on the interior/exterior of buildings shall have covers/plates stenciled with panel designation and circuit numbers according to panel schedule. Data shall be affixed neatly to front of plates. Utilize machine printed pressure sensitive tape, white background, black lettering with ¼" high block lettering.

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- J. At building ground bus, provide red-on-white laminated signs engraved in ½" high letters to read: "MAIN GROUND BUS".

1.17 HEATING, VENTILATION, AIR CONDITIONING AND PLUMBING EQUIPMENT

- A. Provide electrical work, raceways, wiring, materials and control components required for proper operation of the mechanical and plumbing systems as indicated by the electrical, mechanical, and plumbing drawings and specifications. Refer to the mechanical and plumbing drawings and specifications for additional electrical requirements. Include all electrical related costs in bid.

1.18 TESTING

- A. The Contractor shall obtain an independent NETA certified testing service that will provide all instrumentation and tests on the electrical system and equipment as hereinafter described and further directed by the Architect. The test shall be performed after the completion of all electrical systems. All tests shall be recorded, documented and submitted to the Architect for review. Submit three (3) copies on an official form indicating project location, test engineer, test conditions, test equipment data, ground system layout or diagram and final test results.

1. Test for Phase to Ground/Defective Insulation Condition:
 - a. Open main service disconnect.
 - b. Isolate the system neutral from ground by removing the neutral disconnect link located in the service switchboard.
 - c. Close all submain disconnects.
 - d. Close all branch feeder circuit breakers.
 - e. Measure the resistance of each phase to ground. A properly calibrated "Megger" type test instrument to be used. The test voltage shall be 500 volts.
 - f. Record all readings after one-minute duration and document into a complete report.
2. Isolating Grounds: In the event that low resistance grounds are found in the system, they shall be isolated and located by testing each circuit individually as outlined above. Make proper corrections to restore the resistance values to an acceptable value.

- B. Method of obtaining ground resistance shall be in accordance with the latest edition of the James G. Biddle (Plymouth Meeting, Pennsylvania) manual published on this subject.

1. Perform "fall-of-potential" tests on the main grounding electrode of system per IEEE Standard No. 81, Section 8.2.1.5 when suitable locations for test rods are not available, a low resistance dead earth or reference ground will be utilized.
2. Perform the two-point method test per IEEE Standard No. 81, Section 8.2.1.1, to determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points, ground rod and building steel, utility piping such as water and gas and panelboard grounds. Metal railings at building entrances and handicap ramps shall also be tested.
3. Acceptable testing equipment: Vibroground by Associated Research, Inc.; Megger Earth Tester by James G. Biddle Company; or equivalent by Megger.

- C. Provide a complete circuit breaker coordination study from the main circuit breaker at the main switchboard down to branch circuit breakers at the panelboards. The system shall be fully coordinated such that a fault anywhere in the system will only affect the next circuit protective device ahead of the fault.

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- D. All instrumentation and personnel required for testing shall be provided by the Contractor at the Contractors expense.
- E. All ground fault equipment shall be tested by a certified testing laboratory and shall be set as recommended by the switchgear manufacturer so as to be coordinated with other protection devices within the electrical design. Copies of the coordination test and settings shall be sent to the Architect.
- F. Take and record ampere and line voltage measurements under full load on all panels and switchboard feeders and motor circuits over 10 horsepower and/or 14 amperes. Record measurements at the equipment served and submit to the Architect for review.
- G. If, in the opinion of the Architect, the voltages and regulations are not met within acceptable limits, make arrangements with the serving utility for proper electrical service and then verify that such has been provided.
- H. Refer to testing (additional requirements) elsewhere in this specification for additional testing requirements.
- I. The maximum resistance to ground shall not exceed 5 ohms.
- J. Upon completion of work, the Contractor shall make additional tests as necessary to satisfy the Owner or the Architect or his representative that the true intent and meaning of the drawings and specifications have been carried out. Contractor shall provide all instruments and labor necessary to make such tests. Any work showing faults under test, and any work not in accordance with the specifications, shall be made good by the Contractor at his own expense. Such tests may occur at anytime during the guarantee period.

1.19 POWER OUTAGES

- A. All electrical services in all occupied facilities of the contract work are to remain operational during the entire contract period. Any interruption of the electrical power for the performance of this work shall be at the convenience of the Owner and performed only after consultation with the Owner. Work involving circuit outages shall be only at such a time and of such duration as approved in writing. Work involving power outages for the work required to connect new equipment and disconnect existing equipment shall be performed at the convenience of the Owner.
- B. Work involving system outages to the building data, fire alarm, intrusion detection, telephone, computer, intercommunications, energy management, television, or clock systems shall be performed only after consultation with the Owner and shall be only at such a time and of such duration as approved in writing.
- C. Provide overtime work, double shift work, night time work, Saturday, Sunday, and holiday work to meet outages schedule.
- D. Provide temporary electrical power to meet the requirements of this Article.
- E. Any added costs to the contractor due to necessity of complying with this Article shall be included in the Contract scope of work.
- F. When electrical work involving power disruptions to existing areas is initiated, the work shall proceed on a continuous basis without stopping until electric power is restored to the affected areas.

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- G. The Contractor shall request in writing to the Owner a minimum of three weeks in advance for any proposed electrical outage.

1.20 TEMPORARY ELECTRICAL POWER

- A. Provide temporary electrical power if work requiring power outages cannot be completed in time permitted and approved by the Owner.
- B. Temporary electrical power shall be a standby diesel generator. Voltage, frequency, regulation, etc. shall be equal to that of normal utility source. Exhaust system shall have a critical silencing muffler. Generator voltage shall match the existing secondary voltage required at the site. The Contractor shall furnish all necessary cables, switches, etc. to make all required connections to existing panels, feeders, etc. Generator shall be sized to adequately carry the demand load. If record of demand load is not available, size generator to match corresponding transformer capacities and as directed by the Architect.
- C. After completion of the required usage of the temporary generator, prior to completion of the project, the Contractor shall remove the generator. All temporary cables, switches, etc. shall be removed and all permanent equipment left in satisfactory condition.
- D. The generator shall be housed in security type sound attenuated housing to prevent access by unauthorized personnel. Temporary power cables, connections, etc. shall be protected from unauthorized personnel.
- E. The Contractor shall be responsible for complete operation of the generator including personnel, fuel supplies, proper safety precautions, etc. Generator shall not be left unattended while in operation.
- F. The Contractor shall provide his own temporary construction lighting and power as required in areas where work is being performed, when normal site power is disrupted. Temporary power arrangements, outages, installation, work schedules, etc., shall be submitted in writing three (3) weeks prior to requested outage date, and approved by the Owner prior to start of work.

1.21 ASBESTOS, POLYCHLORINATED BIPHENYL (PCB) OR HAZARDOUS WASTE:

- A. It is understood and agreed that this contract does not contemplate the handling of asbestos, PCB or any hazardous waste material. If asbestos, PCB or any hazardous waste material is encountered, notify the Owner immediately. Do not disturb, handle or attempt to remove.

1.22 SERIES RATED EQUIPMENT

- A. Circuit protective devices identified as "Series Rated" or "Current Limiting" (i.e. CLCB – current limiting circuit breaker; CLF – current limiting fuse; etc.) shall be series rated and tested (UL 489 and CSA5) by the manufacturer with all equipment and circuit protective devices installed down stream of the identified series rated or current limiting devices. Provide nameplates on all equipment located down stream including the CLCB and CLF devices, to comply with N.E.C. paragraphs 110-22 and 240-83 "CAUTION SERIES RATED SYSTEM – NEW DEVICE INSTALLATIONS AND REPLACEMENTS SHALL BE THE SAME MANUFACTURER AND MODELS."

1.23 SPARE FUSES

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- A. Provide three (3) spare fuses at each location to match the installed fuses where the fuses are provided as part of the contract. Provide spare fuse holders on inside door of each respective fuse compartment. Provide engraved nameplate on front of fuse access door indicating fuse type/catalog number, ampere rating and manufacturer of fuse. Spare fuses for safety switches for equipment shall be turned over to the Owner.

1.24 KEYS AND LOCKS

- A. Contractor shall provide (2) keys with each door lock furnished, including cabinet door locks, switchboard locks etc.; and shall provide (2) keys for each lock switch on switchboards or control panels; and shall provide (2) keys with each interlock or other lock switch furnished. Deliver keys to the Owner's Inspector. Unless otherwise specified, keys shall be Corbin 60.
- B. Locks shall be keyed to a Corbin 60 key for access to operate equipment. Special keys and locks shall be provided where specified.

1.25 BELOW GRADE UTILITY DETECTION

- A. The Contractor shall obtain the services of a company engaged in the business of detection of existing below grade utilities to identify and document existing utilities in the areas of the new work. Services shall be provided utilizing the latest detection equipment available. The company obtained shall have been engaged in the business of below grade utility detection for the past five years. Services are available from Underground Technology Incorporated at (800) 366-7801.
- B. Existing below grade utilities and their locations may or may not be indicated by these documents or may be partially indicated at what is believed to be the approximate location(s). The information has not been independently verified by the Owner or the Owner's Representatives. The Architect and the Architect's Consulting Engineers are not responsible for the locations of existing below grade utilities and the accuracy of said information. The Contractor shall verify and identify the existing utilities in the areas of the new work and take the necessary steps to avoid damage to existing utilities. In addition, the Contractor shall identify existing said below grade utilities and formulate the best trenching route(s) for the new installation. No trenching/excavation shall take place until this has been verified.
- C. In conjunction with the below grade utility detection, the Contractor shall prepare and provide a scaled site plan indicating the locations of all below grade utilities encountered and identified. The "as-built/existing condition" site plan shall be turned over to the Owner as part of the Close-out package.

1.26 ELECTRICAL WORK CLOSEOUT

- A. Prepare the following items and submit to the Architect before final acceptance:
 - 1. Two (2) copies of all test results as required under this section.
 - 2. Two (2) copies of local and/or state codes enforcing authority's final inspection certificates.
 - 3. Copies of as-built record drawings as required under the General Conditions, pertinent Division One sections and Basic Electrical Requirements.
 - 4. Two (2) copies of all receipts transferring portable or detachable parts to the Owner when requested.
 - 5. Notify the Architect in writing when installation is complete and that a final inspection of this work can be performed. In the event any defect or deficiencies

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are found during this final inspection, they shall be corrected to the satisfaction of the Architect before final acceptance can be issued.

6. Two (2) copies of the as-built/existing conditions site plan.
- B. The Contractor shall complete the following work before any electrical equipment is energized:
1. All equipment shall be permanently anchored.
 2. All bus connections shall be tightened per manufacturer's instructions and witnessed by the Owner's representative or inspector.
 3. All ground connections shall be completed and identified. Perform and successfully complete all required megger and ground resistance tests.
 4. All feeders shall be connected and identified.
 5. The interiors of all electrical enclosures including busbars and wiring terminals shall be cleaned of all loose material and debris, paint, plaster, cleaners or other abrasive's overspray removed and equipment vacuumed clean. The Owner's Representative or inspector shall observe all interiors before covers are installed.
 6. All dry wall work and painting shall be completed within the main electrical room.
 7. All doors to electrical equipment rooms shall be provided with locks in order to restrict access to energized equipment.
 8. Electrical rooms shall not be used as a storage room after power is energized.
 9. The coordination study for the power distribution system shall be complete, circuit breakers ground relays set, tested and calibrated accordingly.

PART 2 - PRODUCTS

2.01 OUTLET AND JUNCTION BOXES

- A. Flush or concealed outlet and junction boxes: Pressed steel, hot-dip galvanized, knockout type with conduit entrances sized to match conduits. Provide boxes of proper code size for the number of wires or conduits passing through or terminating therein, but in no case shall box be less than 4" square by 2-1/8" deep, unless specified elsewhere or noted otherwise on the drawings. Provide extension rings tile and/or plaster on flush outlets to finish flush with finished surfaces. Boxes installed in concrete shall be UL approved for installation in concrete, and shall allow the placing of conduit without displacing reinforcing bars.
1. Provide fixture-supporting device in outlet boxes for surface mounted fixtures as required.
 2. Provide solid gang boxes for three or more switches, for mounting behind a common device plate. Provide barriers for all 277-volt devices where more than one device is installed in an outlet box.
 3. Telephone and television outlets: 4-11/16" square by 2-1/8" deep with single-gang ring.
 4. Computer and intrusion detection system outlets: 4" square by 2" deep boxes with 2-gang rings.
- B. Surface mounted outlet boxes: Cast iron type FS or FD, with threaded hubs as required. Provide plugs in all unused openings. Provide weatherproof gaskets for all exterior boxes.
- C. Individual Floor Boxes/Pedestals

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1. Boxes in concrete floors 3" thick or less shall be rectangular cast iron, and shall have leveling screws, $\frac{3}{4}$ " threaded conduit hubs, and brass collar. Boxes shall be UL Listed and comply with UL514A scrubwater requirements.
 - a. Single-gang: Hubbell #B2414 or equivalent
 - b. Two-Gang: Hubbell #B4214 or equivalent
 - c. Three-gang: Hubbell #B4314 or equivalent
 2. Boxes in concrete floors 3" thick or greater shall be rectangular cast iron, and shall have leveling screws, adjustment mechanism to permit leveling of the box after the concrete pour, $\frac{3}{4}$ " threaded conduit hubs, and brass collar. Boxes shall be UL Listed to comply with UL514A scrubwater requirements.
 - a. Single-gang: Hubbell #B2436 or equivalent
 - b. Two-gang: Hubbell #B4233 or equivalent
 - c. Three-gang: Hubbell #B4333 or equivalent
 3. Floor box covers shall be rectangular brass and shall be provided on each floor box. Covers shall be UL Listed to comply with UL514A scrubwater requirements. Covers shall be as follows:
 - a. Duplex receptacle: Hubbell #S3825 or equivalent
 - b. Single receptacle: Hubbell #S3425 or equivalent
 - c. Signal system outlet: Hubbell #S2625 or equivalent
 - d. Pedestal outlet or Furniture feed: Hubbell #S2425 or equivalent
 - e. Low Voltage devices: Hubbell #S3826 or equivalent
 4. Carpet flanges shall be rectangular brass and shall be provided for boxes and covers installed under carpet (per drawings).
 - a. Single-gang: Hubbell #SB3083 or equivalent
 - b. Two-gang: Hubbell #SB3084 or equivalent
 - c. Three-gang: Hubbell #SB3085 or equivalent
 5. Pedestal outlets shall be brushed aluminum housing with die cast aluminum frame and $\frac{3}{4}$ " chase nipple to thread to floor box cover. Device plates shall be stainless steel and shall cover devices per drawings.
 - a. Pedestal kit: Hubbell #SC3098A or equivalent
 - b. Device plates:
 - Blank: Hubbell #SC309B
 - Duplex: Hubbell #SC309D
 - Single Recept: Hubbell #SC309S
 - Signal: Hubbell #SC309DS
 - Bushed Hole: Hubbell #SC309T
 - Furniture feed: Hubbell #SC309SF
 6. Boxes in a wood flooring systems shall be rectangular, stamped steel, 3.13" deep, and shall have concentric knockouts on sides and bottom. Boxes shall accept rectangular brass floor box device plates and carpet flanges if required. Boxes shall be UL Listed and comply with UL514A scrubwater requirements.
 - a. Single-Gang: Hubbell #B2481 or equivalent
 - b. Two-Gang: Hubbell #B2482 or equivalent
 - c. Three-Gang: Hubbell #B2483 or equivalent
- D. Recessed Combination Power/Signal Floor Box – Six Gangs
1. Floor box shall be cast iron for slab on grade installations.
 - a. Hubbell #LCFBCA or equivalent
 2. Floor box shall be stamped steel for installations above grade level.
 - a. Hubbell #LCFBSSA or equivalent
 3. Floor box shall be UL listed for concrete installation under carpet or tile, and shall have six separate compartments / gangs for power and low voltage / datacom

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services. Integral dividers shall be provided. Box and cover shall comply with US514 A scrubwater requirements. Devices shall be recessed inside the box under a metallic hinged access cover.

4. Floor box access cover shall be metallic. Access cover assembly shall be hinged for access into the recessed box, and shall provide two covered and hinged wire/cable egress openings. Cover assembly shall include carpet flange and shall provide a recessed area for carpet or tile insert. Cover assembly for tile installation do not have carpet flange as part of assembly. Cover assembly shall meet UL514A scrubwater requirements, and shall have rotating locking mechanism to secure access cover when closed.
 - a. Metallic access covers for carpet applications shall include painted cover, flange, and cable doors. Color/finish as selected by the Architect.

1)	Brass finish	Hubbell #LCFBCBRSC or equivalent
2)	Aluminum finish	Hubbell #LCFBCALC or equivalent
3)	Gray finish	Hubbell #LCFBGYC or equivalent
4)	Black finish	Hubbell #LCFBBKC or equivalent
 - b. Metallic access covers for tile applications shall include painted cover, flange, and cable doors. Color/finish as selected by the Architect.

1)	Brass finish	Hubbell #LCFBCBRST or equivalent
2)	Aluminum finish	Hubbell #LCFBCALT or equivalent
3)	Gray finish	Hubbell #LCFBGYT or equivalent
4)	Black finish	Hubbell #LCFBBKT or equivalent
5. Device face plates shall be custom gray nylon, appropriate for the various power and datacom wiring devices, and shall be Hubbell "HBL" series to install in "LCFB" series floor box.

E. Device Insert Plates

1. Provide device insert plate(s) for outlet boxes requiring signal and power devices. Coordinate insert plate for signal system devices with signal system contractor to obtain correct insert plate to accept devices/jacks to be installed.

2.02 SHEET STEEL PULL BOXES

- A. Sizes as indicated on the drawings and in no case of less size or material thickness than required by the governing code.
 1. General-purpose sheet steel pull boxes: Install only in dry protected locations with removable screw covers. Manufacturer's standard baked enamel finish.
 2. Weatherproof sheet steel pull boxes: Fabricate of code gauge, hot-dip galvanized steel with gasketed weathertight cover of same material. Manufacturer's standard baked exterior enamel finish.
 3. Where multiple conduits enter sheet steel pull boxes, boxes shall be field punched. Do not use boxes with concentric knock-outs.

2.03 CONCRETE PULL BOXES AND MANHOLES

- A. Each concrete pre-cast section shall be identified by having the manufacturers name and address cast into an interior face or permanently attached thereto. Associated Concrete Products-Quickset, Brooks Products or equal.
- B. Structure Construction

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1. The pre-cast steel reinforced concrete structure walls, floor and roof shall safely sustain the loads and pressure resulting from vertical and lateral earth loadings and vehicular loadings.
2. Pre-cast structure shall be designed to withstand forces due to additional inward load of 4,000lbs (working load) with safety factor of 2, acting perpendicular to the surface at any pulling iron.
3. Structures shall be single piece or horizontal multi-section construction as required for field installation conditions. Multi-sections shall interlock with "Tongue and groove" joint mating surfaces to insure a rigid assembly.
4. All structure pre-cast joints shall be sealed with preformed cold field applied plastic joint sealing compound. Joint sealing compound shall not leak, sag or flow at the joints with 10 psi water pressure applied for 24 hours. Chemically resistant to acid, alkalies and saturated hydrogen sulfide.
5. Each pre-cast structure section shall have suitable knockouts or openings in the vertical walls for the duct banks and conduits entering the structure. Provide a 1" diameter knockout in each corner of the floor slab, 6" from adjacent walls, for installation of ground rods.
6. Pullboxes shall have deep recess conduit knockout concrete extensions at two opposite end walls. Additional shallow recess knockouts shall be provided on the other two walls for conduit entrances.
7. Pullboxes shall be provided one precast concrete 6" extension grade ring "tongue and groove" mating surfaces to insure rigid assembly.
8. Pullbox sizes shall be as indicated on drawings but in no case less than required by applicable codes. Minimum depth of the pullbox shall not be less than 42".
9. The pullbox floor sump shall extend through the concrete floor into the gravel bedding, below the pullbox.
10. Cover and frame assemblies:
 - a. Traffic rated cover shall be hot dip galvanized steel flush fitting with
 - b. threaded flush, slotted head, and stainless steel studs.
 - c. Top ring frame shall be hot dip galvanized steel angle frame where the pullbox is installed in paving or concrete work. Assembly shall be rated for H-20 bridge loading.
 - d. Top ring frame shall be armor bank type where the pull box is installed in exposed earth or landscaping. Assembly shall be rated for H-10 loading.
 - e. Covers for 2'-0" x 3'-0" pullboxes shall be a single plate assembly Quikset TE-1000 series or equivalent.
 - f. Covers for pullboxes larger than 2'-0" x 3'-0" shall be a double leaf, torsion spring-assisted hinged assembly. Quickset TL-400 Series or equivalent.
 - g. Covers shall be permanently marked in the cover metal as follows:
 - 1) "E" or "Electric" for covers on structures containing power circuits under 600 volts and "HV" or "High voltage" for covers on structures containing power circuits over 600 volts.
 - 2) "Signal" for covers containing signal circuits.
11. Furnish complete with galvanized pull irons, cable racks, hooks and porcelain insulator cable cradles.
12. Provide a drainage sump, 6" diameter minimum, with a cast iron grate over the sump. Extend to gravel bedding below.

C. Manholes

1. The pre-cast concrete roof of each manhole shall be provided with a 36" minimum diameter opening, and shall be equipped with necking ring suitable for installation of cover assembly. Provide pre-cast concrete manhole grade ring(s) to bring the top of the cover to the required elevation. Concrete grade ring(s)

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shall be of sufficient height to provide 24" minimum finish earth cover over the top of the manhole roof. Rings shall be tongue and groove mating surfaces to insure rigid assembly.

2. A pre-cast concrete grade ring cone shall set on top of the grade ring(s) to support the cast iron cover ring.
3. Ladders shall be hot dip galvanized steel; length as required for manhole depth. Cast iron ladders' swing joint retaining hook and grade ring steps shall be provided in the manhole necking grade rings. Provide a ladder for each manhole.
4. Manhole sizes shall be as indicated on drawings. Dimensions are inside clear, but in no case shall the manhole inside height floor to ceiling be less than 7'-0" and minimum length and width shall not be less than 6'-0" x 8'-0".
5. 30" diameter clear opening, flush fitting in cover frame ring.
6. Cover frame ring shall be cast iron and attach to the pre-cast concrete grade ring cone with ½" diameter inserts and adjustable slotted head, threaded stainless steel studs, minimum of four.
7. Provide two lifting "Eye" holes in cover.

2.04 SWITCHES

- A. Provide circuit switches totally enclosed, bakelite or composition base, toggle type with 277V AC rating for full capacity or contacts for incandescent or fluorescent lamp loads. Switch ratings shall be 20 ampere only. Color as selected by Architect. Switches controlling circuits connected to emergency power shall be red.
- B. Where switches are mounted in multiple gang assembly and are operating at 277 volts and/or 277 volts and 120 volts mounted in same outlet box, there shall be a barrier installed between switches/compartments of different voltages.
- C. Toggle type switches shall be heavy-duty specification grade rated 20 ampere, 120-277V AC, and shall be UL Listed and conform to Federal Spec WS896 requirements. Switches shall have fully enclosed heat resistant thermoset red (indicating 20 ampere) base, be quiet operating, include back and side wiring capabilities, and have integral grounding terminal and grounding clip.
- D. Catalog numbers shown below are to establish the quality of the device only and are not necessarily the color required by the Architect.
 1. Catalog Numbers
 - a. Single pole: Hubbell #HBL1221 or equivalent
 - b. Double pole: Hubbell #HBL1222 or equivalent
 - c. Three-way: Hubbell #HBL1223 or equivalent
 - d. Momentary: Hubbell #HBL1557 or equivalent
 - e. Double Throw: Hubbell #HBL1385 or equivalent
- E. Locking type switches for high security applications shall be heavy-duty industrial type and feature a barrel type six-point tumbler cylinder locking mechanism and key. Such switches shall be rated 20 ampere, 120-277V AC. Tamper-resistant wall plate screws shall be used where indicated on drawings.
 1. Switches:
 - a. Single Pole: Hubbell #HBL1221RKL
 - b. Double Pole: Hubbell #HBL1222RKL
 - c. Three-way: Hubbell #HBL1223RKL

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- d. Four-way: Hubbell #HBL1224RKL
- F. Momentary contact switches with single pole/double throw action shall be 20 ampere, 120/277V AC, and shall be UL Listed.
 - 1. Double throw: Hubbell #HBL1557 or equivalent
- G. Maintained contact switches with single pole/double throw action shall be 20 ampere, 120-277V AC, and shall be UL Listed.
 - 1. Double throw: Hubbell #1385 or equivalent
- H. Pilot lights used in conjunction with circuit switches shall be neon type with red jewel, P & S #437 (120 volt) or #438 (277 volt) or approved equivalent.
- I. Micro-switches: For control of non-heated air curtains/air doors with single pole, single throw action shall have contacts rated 4 ampere minimum, voltage as required by the equipment manufacturer, Allen-Bradley #802B Compact series or approved equivalent.

2.05 DIMMER SWITCHES

- A. Dimmer switches shall be as indicated herein unless specifically noted otherwise on the drawings.
- B. Dimmer cover plate shall be the same color as switch cover plates in the same area.
- C. Dimmer switches shall be self-cooling and shall not require forced air-cooling when individually or gang mounted. All dimmers shall be by the same manufacturer and the same appearance.
- D. Dimmers shall include "RF" filters and be voltage stabilized.
- E. Incandescent lighting wall dimmer switches shall be preset type with color as selected by Architect and shall be the following products or equivalent:
 - 1. 120 volt lighting fixtures:
 - a. Lutron: #N-2000P
 - 2. Low voltage lighting fixtures:
 - a. Lutron: #NLV-2000P
 - 3. Dimmer wattage shall be rated 2000 watts unless noted otherwise on the drawings.
- F. Fluorescent dimmers, voltages as indicated on the drawings.
 - 1. Fluorescent dimmers (individual dimmers controlling less than 24 lamps per dimmer) Lutron "Nova" series or equivalent.
 - 2. Fluorescent dimmers (more than 24 lamps)
 - a. Lutron #FDA-40 up to 40 lamps per controller.
 - b. Lutron #FDA-80 up to 80 lamps per controller.
 - c. Provide a minimum of 3-20 amp on all 120-volt units and on 277V 80 amp units.
 - d. Control stations Lutron "Nova" series.
 - e. Provide all material and labor for a complete and operable system.

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- G. Low voltage (transformer type) incandescent light dimmers shall be specifically designed for dimming low voltage light fixture transformers. Atmos "LU" series or Lutron.

2.06 RECEPTACLES

- A. All receptacles in flush type outlet boxes shall be installed with a bonding jumper to connect the box to the receptacle ground terminal. Grounding through the receptacle mounting straps is not acceptable. The bonding jumper shall be sized in accordance with the branch circuit protective device as tabulated herein under "Grounding". Bonding jumper shall be attached at each outlet to the back of the box using drilled and tapped holes and washer head screws 6-32 or larger (except isolated ground receptacles). For receptacles in surface mounted outlet boxes direct metal-to-metal contact between receptacle mounting strap (if it is connected to the grounding contacts) and outlet box may be used. Color as selected by Architect. Catalog numbers shown below are intended to establish the quality of the device only and are not necessarily the color required by the Architect. Receptacles connected to emergency power circuits shall be red.
- B. Duplex convenience receptacles shall be grounding type, 120 volt, 15 ampere, NEMA 5-15R configuration and shall have two current-carrying contacts and one grounding contact which is internally connected to the frame. Receptacle shall be back and side wired and have a full wrap-around support strap. Face shall be impact resistant nylon. Device shall be UL listed and have Fed Spec certification.
1. Hubbell #CR5262
 2. P & S #5262
 3. Leviton #5262
- C. Duplex 20 ampere convenience outlets same as 15 ampere except ampacity shall be used where duplex receptacles are supplied by separate 20-ampere circuit:
1. Hubbell #CR5362
 2. P & S #5362
 3. Leviton #5362
- D. Isolated Ground Receptacles
1. The receptacle insulation barrier shall isolate the receptacle ground contact system from ground. Connect the ground plug contact to a separate dedicated insulated ground-bonding conductor. The receptacle ground plug contact shall not be grounded to the raceway outlet box. Duplex convenience receptacle 20 amp minimum, with two current carrying contacts, NEMA 5-20R, or as noted on the drawings.
 2. Receptacle shall have an orange impact resistant nylon face, brass-mounting strap, and have back and side wiring capability. Identify receptacle with an orange triangle on the receptacle face. Red body for receptacles connected to emergency power.
 - a. Hubbell #IG5362
 - b. P&S #IG6300
 - c. Leviton #5362IG
- E. Ground Fault Convenience Receptacles

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1. Provide separate ground fault receptacle at each location as indicated on drawings.
 2. Duplex GFCI receptacles shall meet 2003 UL 943 requirements.
 3. Receptacle shall have impact resistant nylon face and shall be back and side wired.
 4. GFCI shall be rated 20 ampere 125 volt, NEMA 5-20R.
 - a. Hubbell #GFR5352A
 - b. Leviton #6898
- F. Weatherproof receptacle: Ground fault type duplex receptacle, mounted in a flush hinged door enclosure with lock and key. Enclosure shall be P&S #4600-26 with a P&S #1591 receptacle or equal by C.W. Cole. On exposed conduit runs or on roofs, weatherproof ground fault type receptacle as herein before specified, installed in "FS" box with the following spring door type covers.
1. Hubbell #WP26M
- G. Special outlets shall be as indicated on the drawings.

2.07 FLOOR OUTLETS

- A. Flush duplex convenience receptacle in a cast iron floor box as hereinbefore specified shall be grounding type, 125 volts, 15 amperes, and shall have two current carrying contacts and one grounding contact which is internally connected to the frame. Receptacle shall be P&S or Hubbell #CR5262 or equivalent, with standard length mounting strap as required by the manufacturer of floor box being furnished.
- B. Flush floor microphone and projector outlets shall be installed in a cast iron floor box as hereinbefore specified.
- C. Pedestal type above floor outlet shall be aluminum housing, secured by a ¼" threaded nipple to rectangular cast iron floor box, and shall have device plates to cover devices per drawings.
1. Pedestal shall be Hubbell #SC3098A or equivalent.
 2. Device plates shall be stainless steel or cast aluminum for furniture feed.

Blank:	Hubbell #SS309B or equivalent
Duplex:	Hubbell #SS309D or equivalent
GFCI/StyleLine:	Hubbell #SS309DS or equivalent
Furniture feed ½" Knockout:	Hubbell #SS309SF or equivalent
Telephone cable opening:	Hubbell #SS309T or equivalent
 3. Floor box cover with threaded hub for pedestal nipple shall be aluminum, rectangular and have threaded plugs for ¾" nipple. Hubbell #SA2425.

2.08 FIRE RATED POKE THROUGH FITTINGS (FRPT)

- A. Provide fire rated poke through service fittings for power and/or signal floor outlets in upper floors other than first floor and roofs. FRPT fittings shall be UL listed for fire resistance in 1-4 hour rated floors and shall meet UL 514A standards for scrubwater ingress.

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- B. Flush FRPT for “power“ furniture feed applications shall be single service, have ¾” conduit feed tube, and shall be installed into a 3” cored hole in floor. FRPT shall consist of a through-floor fitting and brass service fitting.
1. Through-floor fitting shall install into floor thickness range 2-1/4” to 7”.
Hubbell #PT71SD or equivalent.
 2. Service fitting shall be round, brushed brass, and have ¾” trade knockout for conduit.
Hubbell #FRF1BRS or equivalent.
- C. Flush FRPT for “data/communications“ furniture feed applications shall be single service, have 2” conduit feed tube, and shall be installed into a 4” cored hole in floor. FRPT shall consist of a through-floor fitting and brass color service fitting.
1. Through-floor fitting shall install into floor thickness range 2-1/4” to 7”.
Hubbell #PT2FIT or equivalent
 2. Service fitting shall be round, aluminum, brass painted finish, and have 1-1/4” trade and 2” trade knockouts for conduit.
Hubbell #FF2BRS or equivalent
- D. Flush FRPT for “combination“ power and data/communication shall be dual service, have four 20A 125V power outlets and space for up to four (4) Cat. 5e or Cat. 6 data jacks. Unit shall install into a 4” cored hole in floor. Receptacles may be wired for isolated ground and two circuits. Service fitting shall have solid brass carpet flange and brass finish nonmetallic cover. Complete unit shall consist of a through-floor fitting and service fitting.
1. Through-floor fitting: Hubbell #PT4X4FIT or equivalent
 2. Service fitting: Hubbell #PT4X4SFBFRS or equivalent
- E. Flush FRPT for either “power” or “data/communication” single service shall have one (1) opening for a duplex power or low voltage device. FRPT shall have solid brass cover and carpet flange.
1. Complete FRPT including through-floor fitting and solid brass cover and flange.
Hubbell #PT7FSDBRS2A or equivalent.
 2. For data/communications only installations, install a 4-port data jack frame in place of duplex receptacle.
Hubbell #DJ106BK or equivalent

2.09 RELAYS, CONTACTORS, AND TIMESWITCHES

A. Individual Control Relays (HVAC/Plumbing Control Functions)

1. Individual control relays shall have convertible contacts rated a minimum of 10 amperes, 600 volts regardless of usage voltage. Coil voltage, number and type of contacts shall be verified and supplied to suit the specific usage as shown in the wiring diagrams and/or schedules on the electrical, mechanical and plumbing specifications and drawings. Coil control circuit shall be independently fused, sized to protect coil. Relays shall be installed on prefabricated mounting strips. Each relay shall have a surge supreme to limit coil transient voltages. Furnished in the NEMA Type I enclosure unless indicated otherwise.
2. The following relays are approved:

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<u>Manufacturer</u>	<u>Type</u>
Cutler Hammer	M-600
General Electric	CR120BP
Square D Co.	Class 8501, Type X
Allen Bradley	700N

B. Contactors and/or Relays

1. Contactors and/or relays for control of lighting and/or feeders and/or panels shall be 600 volt AC, electrically operated, mechanically held units, open type for panel mounting with number of poles and of size as indicated on the drawings. Provide auxiliary control relay for operation of each contactor and/or relay with a two-wire and/or three wire control circuit as described on the plans.
2. Contactors and/or relays shall be mounted in panelboards in barriered section under separate hinged lockable doors or in contactor and/or relay cabinets as called for on the drawings. Contactors and/or relays shall be installed on Lord sound absorbing rubber mounts.
3. Contactors and/or relays shall be Automatic Switch Co. (ASCO) Bulletin #920 Series for 2 and 3 pole, and Automatic Switch Co. Bulletin 917 Series for contactors and/or relays containing 4 or more poles. Coil control circuit shall be independently fused, sized to protect coil.
4. Contactors and/or relays shall be equipped with a switch, in the proper configuration, to disconnect the control circuit controlling the coil of the respective device. Control circuit disconnect switch shall be labeled showing function of device.

C. Timeswitches

1. All timeswitches shall be solid-state devices for operation on 120 volts, 60 Hertz, AC and shall be furnished with a battery to retain memory. Contacts shall be rated 10 amps per pole at 120 volts. Timeswitches shall be 365-day, six channel, six SPDT Astronomic Feature with minimum of six (6) ON and OFF operations per day. Tork #K601Z series or equivalent by Paragon or Intermatic.
 - a. The output channels of the time controller shall be connected and set to control exterior lighting as follows:
 - 1) Channel 1: Exterior night lights.
 - 2) Channel 2: Exterior lights on other than night lights.
 - 3) Channel 3: parking lot lights.
 - 4) Channel 4: Walkways lights.
 - 5) Channel 5: Spare
 - 6) Channel 6: Spare
 - 7) Set all timeswitches per direction of Owner
 - b. Timeswitches for HVAC control shall be 7day, 24 hour with day-omitting device, DPST and reserve power. Tork 7200L Series or equivalent by Paragon or Intermatic.
2. All timeswitches shall be mounted in separate section in top of panelboards or in separate enclosure unless otherwise indicated on drawings. Clear opening for timeswitch shall be a minimum of 12" x 12".
3. System shall include a photocell equal to Tork #2101 connected to a 6-pole control relay for the purpose of preventing exterior lights from turning on during the day.
4. System shall include lighting contactors as indicated complete with auxiliary control relays so as to be compatible, with the output of the time controller. .

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- D. Photocell with rating of 2000 watts, 16.6 amps, 120V, 60Hz AC. Suitable for –30° Fahrenheit to 158° Fahrenheit and weatherproof. Load to remain “ON” in case of cell failure and a time delay of 15 seconds Tork 2001/2002 Series of Paragon CW201 Series or equivalent unless herein specified otherwise, photocell to face north.
- E. Contactors and/or Relays/Timeswitch Cabinet
 - 1. Each contactor, relay, and/or timeswitches not indicated to be mounted in electrical panels shall be mounted in a cabinet, size as required, with hinged lockable door keyed same as panelboards. Construction of cabinet shall be similar to terminal cabinets.
 - 2. Contactor cabinets shall be of the same manufacturer as the panelboards.
 - 3. Where relays and/or contactors occupy the same enclosure as timeswitches they shall have a clear acrylic shield installed over each relay or contactor to guard line exposed parts from accidental contact by non-authorized personnel.
- F. Control Power Transformer – Provide low voltage, 60HZ control power transformers, VA as required for HVAC controls.

2.10 SAFETY/DISCONNECT SWITCHES

- A. Switches shall be rated 600 or 250 volt AC as applicable, NEMA Type HD, quick-make, quick-break, h.p. - rated, non-fusible or fusible, Class "R", in NEMA Type I enclosure, lockable in the "open" and "closed" positions with number of poles and amperage as required per equipment nameplate. Where enclosure is located exterior, in kitchens, at HVAC and plumbing equipment, where water is present or indicated W.P. (weatherproof) switches shall be rain tight NEMA Type 3R enclosure, lockable. Maximum voltage, current and horsepower rating clearly marked on the switch enclosure and switches having dual element fuses shall have rating indicated on the metal plate.
- B. Non-fusible disconnect switches shall be same type as specified for fusible disconnect switches; except for single-phase motors 2H.P. or less, manual motor starters may be used.

2.11 INDIVIDUAL STARTERS

- A. Manual Motor Starters
 - 1. Provide flush or surface mounting manual motor starters with number of poles and size of thermal overload heaters as required for the motor being controlled (equipped with overload heaters, one for each motor lead). Back boxes shall be supplied with all flush mounting starters whether they are toggle type requiring only a 4" square outlet box or the larger type requiring a special box and cover designed to accept the particular unit.
 - 2. Unless otherwise noted on the drawings, all manual starters for single phase motors, smaller than 1 hp, shall be the compact toggle type. Manual starters for all single phase motors, 1 to 5 hp, and all three phase motors up to 5 hp. shall be the heavy duty type.
 - 3. Where manual motor starter is shown with pilot light, the pilot light shall be installed in a separate outlet box adjacent to the starter outlet, and engraved nameplate to indicate function of pilot light.
 - 4. Motor starters as manufactured by the following:

<u>Manufacturer</u>	<u>Single Phase 1 hp and Below</u>	<u>Others</u>
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Arrow Hart	Type RL	Type LL
General Electric	CR 101	Class CR 1062
I.T.E.	Class C10, C11,C12	Class C20
Square D Company	Class 2510, Type A	Class 2510, Type B & C
Allen Bradley	Equivalent	Equivalent

B. Individual Magnetic Motor Starters

1. Three phase magnetic motor starters NEMA size 1 and larger controlling three phase motors 5 horsepower and larger shall provide integral motor single phasing protection. The starter shall automatically "open", turn off electrical power to the connected motor in the event of the loss of one or more circuit phases, lock out and require manual resetting of the single phase protection to restart the magnetic motor starter. Provide single phase annunciator. provide adjustable time delay, minimum range 0-3 seconds for initiating single phase shut down.
2. Magnetic motor starters shall be AC line voltage, across-the-line units in NEMA Type I enclosure, unless other types of enclosures are indicated.
3. All starters located outside of a building whether or not indicated shall be W.P. (weatherproof), and all starters noted W.P. shall be furnished in NEMA type 4 cast or stainless steel enclosures.
4. Starters shall be horsepower rated for the motor controlled, and shall be equipped with properly sized overload elements. Every pole shall be with overload element.
5. Verify the exact motor current and voltage characteristics with the supplier of the motor before installation of a starter.
6. Each starter shall be equipped with "Hand-Off-Auto" switch or stop- start pushbutton as required.
7. Coils shall be designed to operate on voltage indicated on control diagrams and have built-in-under the voltage release for coil circuit to drop motor starter off the line when the line voltage drops below normal operating voltage.
8. The coil control circuit shall be independently fused, sized to protect coil.
9. Starters to be equipped with running pilot light indication with a "Push-to-Test" feature.
10. Magnetic starters shall have a minimum of two auxiliary contacts. Additional auxiliary contacts shall be provided as required to comply with the requirements of the wiring diagrams on the Electrical, Mechanical and Plumbing drawings and the description of the function in the Mechanical and Plumbing Sections of the Specifications.
11. Minimum starter size shall be NEMA size I unless indicated otherwise.
12. Magnetic motor starters as manufactured by the following:

<u>Manufacturer</u>	<u>Type</u>
General Electric	Class CR 106
I.T.E.	Class A20
Square D Co.	Class 8536

2.12 INDIVIDUAL COMBINATION MOTOR STARTERS

- A. Combination starter shall incorporate fused disconnect switch and individual magnetic motor starter in a common enclosure. Combination starters shall be mounted in general purpose enclosures unless otherwise indicated on the plans. Provide oversized enclosures where required to accommodate the components and/or wiring indicated.

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Starters shall comply with NEMA standards, size and horsepower as indicated on drawings General Electric, Square D, Westinghouse or I.T.E.

- B. The disconnect handle used on combination starters shall control the disconnect device with the door opened or closed. The disconnect handle shall be clearly marked as to whether the disconnect device is "ON" or "OFF", and shall include a two-color handle grip, the black side visible in the "OFF" position indicating a safe condition, and the red side visible in the "ON" position indicating an unsafe or danger condition.
- C. Each starter shall be equipped with an integral control circuit transformer with secondary voltage or as indicated.
- D. All starters used in combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes, and horsepower ratings. These starters shall be furnished with three melting alloy type thermal overload relays.
- E. Thermal units shall be of one-piece construction and interchangeable. The starter shall be inoperative if a thermal unit is removed.

2.13 FUSES FOR MOTOR CONTROL

- A. Fuses shall be dual element, current limiting type, U.L. Class RK-1 unless otherwise indicated on the drawings. Provide one spare set of fuses of each size and type.
- B. Verify the full load amperes of all motors for which fuses are to be provided. Size fuses for the motor full load amps according to the recommendations of the fuse manufacturer.

2.14 PLATES

- A. Provide plates for every switch, receptacle, telephone, television, computer, wall speaker outlet, etc. All plates shall be 0.040" stainless steel, Type 302/304 alloy composed of 18% chromium and 8% nickel. Plates shall be Hubbell "S" stainless steel or equivalent by P & S, Leviton, or equivalent.

2.15 VANDALPROOF FASTENINGS

- A. Provide approved vandal-resistant type screws, bolts, nuts where exposed to sight throughout the project. Screws for such items as switch plates, receptacle plates, fixtures, communications equipment, fire alarm, blank covers, wall and ceiling plates to be spanner head stainless steel, tamper-resistant type. Provide six (6) screwdrivers for this type of screw.
 - 1. Tamper-resistant screws: Hubbell #HBL7342RKL or equivalent
 - 2. Spanner head driver: Hubbell #HBL7372RKL or equivalent

2.16 SOUND DAMPENING MATERIAL

- A. Lowery clay pads.

2.17 PLYWOOD BACKBOARDS

- A. Douglas fir plywood, exterior grade, 8' high X ¾" thick (minimum) finished on all surfaces with fire resistive primer. Provide finish coat of light gray enamel on front (finished) side.

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2.18 STRUCTURAL AND MISCELLANEOUS STEEL

- A. Structural and miscellaneous steel used in connection with electrical work and located out-of-doors or in damp locations, to be hot-dip galvanized unless otherwise specified. Included are underground pull box covers, pre-formed steel channel, hardware and similar electrical items. Galvanizing average 2.0 ounce per square foot and conform to ASTM A123.

2.19 FLASHING ASSEMBLIES

- A. Provide Semco Fig. #1100-4 Series seamless lead flashing assemblies at all roof penetrations. Seal the joint between flashing and pipe with waterproofing compound. Coordinate flashing type and installation with roof manufacturer so as to comply with roofing warranties.

2.20 CONDUIT, FITTINGS AND CONDUIT OUTLET BODIES

- A. Rigid galvanized steel conduit: Hot-dip galvanized, zinc coated. Threads shall be galvanized after fabrication. Couplings, connectors and fittings shall be threaded. Western Tube & Conduit or equivalent.
- B. Intermediate Metallic Conduit (IMC): Hot-Dip galvanized. Threads shall be galvanized after fabrication. Couplings, connectors and fittings shall be threaded. Western Tube & Conduit or equivalent.
- C. Electrical metallic tubing: Galvanized. Allied Tube & Conduit or equivalent. Couplings and connectors, seamless steel construction and of the water-tight compression type with factory-applied permanently-attached insulated throat. Thomas & Betts Co. #5123 or #5031 Series or approved equal connectors and #5120 or #5030 series or equal couplings.
- D. Flexible conduit: Galvanized steel. AFC or equivalent. Connector shall be screw-in type with factory-applied permanently-attached insulated throat. Bridgeport #520-DCI/521-DCI series or equal by Efcor.
- E. Liquid-tight flexible conduit: Sealtite Type U.A. with Appleton Series "ST" connectors.
- F. Nonmetallic conduit: Polyvinyl chloride, Schedule 40 and Schedule 80, Carlon or equivalent.
- G. Seismic deflection/expansion fittings shall be - O.Z. Company Type DX series or equivalent with bonding jumper.
- H. Conduit outlet bodies shall be as manufactured by Appleton – “Mogul Unilet” series large bending radius or equivalent.
- I. Weatherproof threaded hubs: Myers or equivalent.

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2.21 WIRE AND CABLE

A. All wire and cable shall be copper, 600 volt, #12 AWG minimum unless specifically noted otherwise. Conductors #10 AWG and smaller shall be solid. Conductors #8 AWG and larger shall be stranded. Type of insulation as noted on drawings and as follows:

1. Type THHN/THWN insulation used for #4 AWG and smaller.
2. Type THW or THHN/THWN insulation used for #2 AWG and larger.
3. Type THW, THHW used for all panel feeders and service conductors.
4. Type THHN insulation used for circuit conductors installed in fluorescent lighting fixture raceways, for conductors connected to the secondary of fluorescent or mercury vapor fixture ballast or other hot locations.
5. Type XHHW or THWN insulation shall be used where conductors are installed in conduit exposed to the weather.
6. The following color code for branch circuits and feeders:
Neutral . . . White (Tape feeder neutrals with white tape near connections) where separate neutral conductors are indicated for branch circuits, color code the white neutral conductor with a colored stripe corresponding to the phase of the respective line conductors.
 - a. Normal Power

<u>120/208 Volt</u>		<u>480/277 Volt</u>	
Ground	Green	Ground	Green
Phase A	Black	Phase A	Brown
Phase B	Red	Phase B	Orange
Phase C	Blue	Phase C	Yellow
 - b. Emergency power same insulation color as normal power except as follows:

<u>120/208 Volt</u>		<u>480/277 Volt</u>	
Provide a continuous color stripe on each conductor insulation, orange or yellow except ground		Provide a continuous stripe on each conductor insulation blue or black, except ground	
7. Feeders identified as to phase or leg in each panelboard with printed identifying tape.
8. Fire alarm conductors: Use 600-volt, type THHN/THWN conductors and color-coded per equipment manufacturer's recommendations. Provide #12AWG minimum for signaling circuits unless specifically noted otherwise on the drawings.
9. Color coding for mechanical and plumbing control wiring shall be an agreed upon color code between the Mechanical/Plumbing Contractor and the Electrical Contractor, and color code shall be submitted to the Architect in writing for approval prior to installation.
10. Color coding for master clock – pink, gray and orange.

B. Aluminum conductors shall not be used.

2.22 WIRE AND CABLE TERMINATIONS

A. Use only plated copper alloy connectors or lugs. Aluminum connectors or lugs are not acceptable. The following connectors are provided for copper conductors:

1. For wire No. 10 AWG and smaller: 3M "Scotchloc", Ideal "Supernut", Buchanan "B3".

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2. For wire No. 8 AWG and larger: Burndy "Versitaps" and heavy-duty connectors, O.Z. solderless connectors or the equivalent by Buchanan, Kearney or Penn-Union.

2.23 FLEXIBLE CORDS AND CABLES

A. General

1. Multi-conductor insulated flexible cable with jacket rated extra heavy duty and extra hard-use duty; ozone, grease, oil and water resistant; rated for indoor/outdoor use.
2. Quantity of conductors and conductor sizes as indicated on the drawings but in no case less than 16 AWG.
3. Characteristics
 - a. Conductors – Stranded copper, soft annealed with conforming ASTM-B-174 and ASTM-B-172. 600 volt individually insulated and color-coded. Separate green insulated ground conductor.
 - b. Insulation – rubber conforming with UL 62; temperature range plus 105° Centigrade to minus 50° Centigrade.
 - c. Flame resistance shall conform with MSHA-P123-103.
 - d. Jacket – black for equipment connections and yellow for outlet connections. Rated for temperature range plus 105° Centigrade to minus 50° Centigrade. Permanently mark jacket a minimum of 40" on center with rated voltage; manufacturer's name; wire/insulation type: Conductor AWG size (minimum 24" on center).

2.24 SURFACE RACEWAY/WIREWAY – BUILDING INTERIOR

A. General

1. Unless noted otherwise raceways indicated exposed on the interior of buildings shall comply with the provisions of this specification section.
2. Single and multi-compartment raceways shall consist of base, covers, wireclips, fittings, transitions, elbows, couplings, connectors, tees, end fittings, dividers (as applicable), outlets (as applicable), outlet boxes (as applicable), mounting hardware, conductors and wiring devices (as applicable) and wiring device coverplates (as applicable) complete per manufacturer's recommendations.
3. Raceway system shall comply with U.L.-5 and National Electrical Code.
4. As manufactured by Wiremold Company or equivalent.
5. Raceway system shall be standard lengths, custom length field cut and installation locations as shown on the drawings.
6. Provide device bracket support frames and sub-coverplates for each outlet shown in the drawings. Coverplate color and type shall be as specified elsewhere in these specifications.
7. Color of raceway and all associated fittings, devices, boxes, etc. shall be white or ivory as selected by the Architect. Where installed in areas of existing similar raceways match existing color currently installed.
8. Conductors from only one system shall occupy a single compartment. Combining of conductors from unlike systems in a single compartment will not be allowed unless noted otherwise.

B. Raceways

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1. Raceways shall be suitable for installation of power and/or signal conductors and shall be continuous the entire length.
2. The entire length of the raceway shall contain cutouts for outlets and devices where indicated on the drawings.
3. Where a single device outlet for a single system (i.e. power, telephone, data, television, etc.) is indicated on the drawings provide Wiremold #800BC series or equivalent single compartment raceway unless noted otherwise.
4. Where multiple device outlets for a single system (i.e. power, telephone, data, television, etc.) is indicated on the drawings provide Wiremold #800BC series or equivalent single compartment raceway unless noted otherwise.
5. Where multiple device outlets for two systems (i.e. power and data; power and telephone; power and television, etc.) is indicated on the drawings provide Wiremold #5400 series or equivalent two compartment raceway unless noted otherwise.
6. Where multiple device outlets for three systems (i.e. power, data, and telephone, etc.) is indicated on the drawings provide Wiremold #5500 series or equivalent three compartment raceway unless noted otherwise.

C. Internal dividers

1. Where multi-compartment raceways are specified provide internal continuous divider barrier(s) the length of the raceway to create multiple continuous internal isolated raceways under the following conditions:
 - a. Power and signal/control circuits in the same raceway.
 - b. Emergency and normal power circuits in the same raceway.
 - c. Where indicated on the drawings.

D. Raceway size

1. The drawings do not indicate raceway size. Provide the size of raceway to accommodate the required conductors or as specified herein.
2. Provide cutouts in the back of the raceway base, sized to match the outlet box behind the raceway. Where a raceway divider is installed, cutout shall not extend past divider. Provide continuous grommet shields around perimeter edges of the cutout. Provide a stainless steel coverplate over the outlet box where the outlet box opening extends beyond the edge of the raceway.

E. Outlet Boxes (Additional Requirements)

1. Where multi-compartment raceways are specified or are indicated at new walls provide an outlet box flush in the wall centered behind the multioutlet raceway where shown on the drawings, but in no case shall the boxes be less than 20 feet on center along the length of the raceway or any portion thereof. Where divider(s) are installed in the raceway, provide outlet boxes as described above, with dedicated boxes for each divided raceway.
2. Provide conduit knockouts in outlet boxes to accommodate conduits shown on the drawings and specified herein.

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- F. Conductors: (Additional Requirements)
1. The minimum power conductor size installed in the multioutlet raceway shall be #12 AWG (THHN/THWN insulation).
 2. The drawings may or may not indicate the size or quantity of the branch circuit conductors in the multioutlet raceways. Provide the quantity and size of conductors required for the outlets shown on the drawings.
 3. Provide internal conductor retention clips 36" on center and within 6" of each side of wiring devices in the raceway.
- 2.25 DUCT SEALANT
- A. Dottie LHD Series or equivalent.
- 2.26 FIRESTOP SEALANT
- A. 3M Company fire seal / fire barrier / firestop system Hilti Inc., Wiremold or equivalent. System shall be UL listed for type of structure penetrated, element penetrating structure and maintain the fire rating of the structure penetrated. System shall be approved by the authorities having jurisdiction.
- 2.27 APPARATUS SUPPORTS
- A. Swing connectors for steel rods supporting hanging electrical equipment (transformers, junction boxes, etc.) shall be equal to Steel City E-165, E-170, and E-232.
- 2.28 CONDUIT SUPPORTS ON ROOFS
- A. Supports for conduits routing exposed across roofs of buildings and covered walkways shall be Erico Caddy Pyramid 50, or equivalent.
- 2.29 CONCRETE WORK
- A. Portland Cement:
1. ASTM C33-67, Type II, Low Alkali Cement. Composed of Portland cement, coarse aggregate, fine aggregate, and water.
 - a. Concrete for use as electrical equipment footings, lighting pole bases and equipment slabs on grade, concrete shall attain minimum 28 day compressive strength of 3000 psi, using not less than 5 sacks of cement per cu. yd. of wet concrete.
 - b. Concrete for duct/conduit encasement, shall be 2.00 sacks of concrete per cubic yard of 3/8" pea gravel slurry.
 - c. Mix shall obtain a 6" slump, measured with standard slump cone per ASTM C145-58.
 2. Coarse Aggregate: Uniformly graded between maximum size not over 1-1/2" and not less than 3/4" and minimum size #4, crushed rock or washed gravel. For concrete encased ducts only, maximum aggregate size shall be 1/2".
 3. Fine Aggregate: Clean, natural washed sand of hard and durable particles varying from fine to particles passing 3/8" screen, of which at least 12% shall pass 50 mesh screen.
- B. Water: Clean and free from deleterious quantities of acids, alkalis, salts, or organic materials.

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- C. Reinforcement:
1. All reinforcing steel shall be placed in conformance with Title 24, Part 2, Chapter 26, Section 2607; U.B.C. Chapter 27, Section 2607, and Building Code requirement for reinforced concrete (ACI 318-89).
 2. Reinforcing bars shall conform to Title 24, Part 2, Chapter 26, Section 2603(f) and requirements of A.S.T.M. A-615 grade 60, or ASTM A-706 grade 60 for bars requiring welds, except #3 and #4 bars may be grade 40.
 3. All reinforcing bar bends shall be made cold.
 4. Welded wire fabric shall conform at A.S.T.M. A-185.
- D. Form Material: For exposed work, use PS 1-66 "B-B Concrete Form" plywood forms, or equal. Elsewhere, forms may be plywood, metal, or 1" x 6" boards. Forms for round lighting pole bases shall be sono-tube. Provide sandblast finish to eliminate sono-tube swirl lines in concrete.

PART 3 - EXECUTION

3.01 STORAGE

- A. All materials and equipment in storage, and during construction, shall be covered in such a manner that no finish surface will be damaged or marred, and all moving parts shall be kept perfectly clean and dry.

3.02 OUTLET AND JUNCTION BOXES

- A. Outlet boxes shall be a minimum size per Part 2 or larger as required by NEC, exclusive of cover rings.
- B. Use cast metallic boxes where legally required or exposed to the weather, located in unheated areas, or where subject to mechanical injury, herein defined as exposed boxes less than 8 feet above the floor in areas accessible to anyone other than authorized operating or maintenance personnel. Cast conduit bodies may be used in lieu of boxes except where boxes contain devices.
- C. Use solid type gang boxes where required or more than two devices or for barrier outlets. Use concrete boxes for outlets in concrete construction. For boxes not indicated, provide types and mountings as required to suit the equipment or as directed.
- D. Provide plaster and/or tile rings of proper depth, size and type on flush outlets to finish flush with finished surfaces. Where outlets are located at surfaces to receive tile finish or finish to an exposed split face block, masonry or stucco surface utilize tile rings. Where outlets are located at surfaces to receive gypsum board finish, provide plaster rings. In walls or ceilings with a non-combustible surface of concrete, tile, gypsum, plaster, etc. rings shall be installed such that the front edge of the ring or box will not set back of the finished surface more than 6 mm (1/4"). In walls or ceilings with a combustible surface such as wood ring or box shall be set flush with the finish surface. Contractor shall coordinate ring depth with the Architectural/Structural drawing with regard to wall/ceiling construction.

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- E. Surfaces around rings/boxes that are broken, incomplete, or cut oversize shall be repaired such that there will be no gaps or open spaces greater than 3 mm (1/8") between the edge of the box or ring and the surrounding surface membrane.
- F. Accurately place boxes and securely fasten to structural members. Where outlets are shown at same location but at different mounting heights, install outlets in one vertical line. Where outlets are shown at same location and mounting height, mount outlets as close together as possible. Where switches and receptacles are shown at the same location and mounting height, mount in common outlet box with barriers between devices. Where switches are shown on wall adjacent to hinge side of doors, box shall be installed to clear door when door is fully opened.
- G. Flush mounted boxes shall be attached to two studs or structure members by means of metal supports so that all boxes are rigid with no deflection under 100 lb horizontal force. On wood construction, provide 2" x 4" blocking between studs in lieu of metal supports.
- H. Boxes above accessible ceilings shall be attached to structural members. Where boxes are suspended, they shall be supported independently of conduit system by means of preformed steel channels. Boxes shall be supported independently of all piping, duct work, equipment, ceiling hanger wires and suspended ceiling grid system.
- I. Where surface exposed conduit is connected to an outlet box, the outlet box shall be surface mounted.
- J. Surface mounted outlets shall be attached to concrete or masonry walls by means of expansion shields.
- K. Floor boxes shall be installed square and level with finish floor and within adjustable limits of floor ring. Coordinate ring/flange type and box adjustment height with finish floor surface (tile, carpet, etc.) and provide/install accordingly. Boxes in tile floors to be set flush with finish tile. Where outlets are shown at same or adjacent location, use recessed multi-gang or combination power/signal floor boxes.
- L. Floor boxes installed in Gymnasium or stage/platform wood flooring systems shall be set on top of the concrete slab and adjusted to the finish height of the floor. Provide blocking around box perimeter to prevent the wood floor from deflecting around the box.
- M. Provide a moisture barrier where recessed steel floor boxes are installed in concrete slabs on grade.
- N. Outlet boxes installed flush in walls shall be horizontally separated by not less than 24" from device outlet boxes and rings in common wall surfaces located on the opposite (back) side of the same wall. Where the separation cannot be maintained, provide a solid backing behind the outlet box. The backing shall extend the width of the wall cavity (i.e. between "Studs" or masonry cells) behind the box and 12" above and below the outlet box center line. The backing shall consist of 5/8 inch thickness gypsum board anchored in place for "stud" wall construction and solid "mortar" to completely fill the outlet box "cell" in masonry construction.
- O. Provide pullboxes, pulling ells, junction boxes, and condulets on metallic conduit runs whose total number of bends is 360° or greater. Pulling and splicing enclosures shall be located in accessible ceiling spaces unless noted otherwise.

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- P. All boxes shall be of proper code size for number and sizes of conductors passing through or terminating therein.
- Q. Provide covers of the types most suitable for the fixtures or devices used at the outlets. In brick, concrete block, stone or tile walls, use square cornered tile covers of proper depth to permit a facing of the material to frame the cover. In outlets supporting lighting fixtures, provide 3/8 in. adjustable fixture studs.
- R. Use extension rings with blank covers for making exposed conduit connections from flush wall or ceiling outlet boxes.
- S. Use outlet boxes serving fixtures or devices as pull or junction boxes wherever possible. Where not possible, locate pull and junction boxes in accessible ceilings, in accessible areas not subject to public view or elsewhere as directed. Pull or junction boxes shall not be located in finished areas unless approved by the architect.
- T. All outlet boxes that finish to an exposed split face block, masonry or stucco surface shall utilize deep tile rings and shall be set deep enough to allow a masonry facing over the tile ring to frame the opening. Rings shall not be grouted into exposed masonry walls. Center outlet in a course of masonry.
- U. Where outlet boxes are surface mounted to split face block, irregular, masonry, stucco or plaster surfaces, surface shall be grinded smooth to allow for a flat mounting surface for the box to attach to. Caulk joint between the surface and the box with Architect approved colored caulk to match surrounding surface color.
- V. Take particular care in locating outlet boxes in acoustical tile, masonry, paneling or other modular type finishes. Where Architect's documents do not dictate location or control, consult with trades concerned so that outlets may be symmetrically placed in the finished module. Center outlets horizontally in vertical wall panels and vertically in masonry courses. (Adjust indicated heights to suit.)
- W. All outlet boxes shall be accurately placed and securely fastened to the structure independently of the conduit. The plaster ring shall be set flush with the finish surface of the ceiling or wall. Approved bar hangers shall be used to support outlet boxes in all furred ceilings and stud walls. Hangers for light outlets shall have adjustable studs.
- X. Before roughing in boxes for switches at doors, Contractor shall verify door swing to make sure that switch is on the strike side of door.
- Y. Low voltage and signal outlets in solid walls shall be 4-11/16" square, at least 2-1/8" deep with single gang 1-1/4" deep plaster ring. Ratings for outlets in fire rated walls shall exceed the wall rating. Single gang at wall phone locations.

3.03 SHEET PULL BOXES

- A. Where indicated or required to serve as pull boxes or junction boxes, provide sheet steel boxes with screw-on covers for surface or flush mounting. Where multiple conduits enter sheet steel pullboxes, boxes shall be field punched. Do not use boxes with concentric knock-outs.

3.04 CONCRETE PULLBOXES AND MANHOLES

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- A. Excavate for installation of pre-cast structures remove excess excavated material from the site. Saw cut existing paving and concrete as required for excavation. Where multiple conduits enter sheet steel pull boxes, boxes shall be field punched. Do not use boxes with concentric knockouts.
- B. Provide a minimum of 6" deep sand bedding base under each pull box and manhole. Bedding shall be level and well compacted by a minimum of four passes with a plate type mechanical vibrator.
- C. Install a floor drain in every concrete pullbox into a sump containing 10 cubic feet of 1" crushed rock; minimum size 48" deep and 36" diameter. Provide 36" length of tile pipe extending down into the sump. Provide a grille over the top opening of pipe.
- D. Back fill and compact earth around pre-cast structure after installation of the structure to 95% minimum compaction in horizontal lifts of 8" thickness or as stated by compaction equipment. Replace paving, concrete, landscaping above structure to match existing.
- E. Install pre-cast structures per manufacturers recommendations to provide a dry watertight installation. Set cover flush with existing grade or finish surface. Where pre-cast structure is installed in pedestrian walkway or vehicular traffic way with a sloping finish grade. Slope cover to match existing.
- F. Install structures to avoid surface water drainage flow lines, and existing utilities.
- G. Entrances of conduits/ducts shall terminate with endbells inside the pre-cast structure.
- H. Where pullboxes/manholes are shown to intercept existing conduit, remove portion of existing conduit approximately 4 ft. back from wall, re-grade and excavate conduit entrance and extend existing conduit into pullbox. Pot hole as required to locate conduit(s).
- I. Provide 10' long x 3/4" diameter copper clad, steel, driven ground rods through the floor of the pre-cast structure. Ground rod shall extend 6" above the floor line. Where rock bottom is encountered, bury ground rod in horizontal trench with projection into pre-cast structure. Seal off openings around ground rod.
- J. Ground permanently and effectively together all metal equipment cases, cable racks, etc., with #4 bare copper bonding conductor. Provide U.L. compression bonding fittings at each ground connection.
- K. After cables have been pulled and inspected, seal box between cover and frame with a mastic compound similar to Parmagum or Dukseal.
- L. Exterior concrete walls, tops and bases of pre-cast structure shall be damp-proofed with two coats of a bituminous damp-proofing material, minimum finish thickness 4-mil.
- M. Connections to Pre-cast Structure:
 - 1. Lines connecting to pre-cast structures shall be constructed to have a cast in place concrete tapered section adjacent to the structure and extending a minimum of 48" out from the structure to provide shear strength.
 - 2. Pre-cast structure shall be constructed to provide for keying the concrete envelope of the conduit/duct line into the wall of the structure. Mechanical

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vibrators shall be used when this portion of the envelope is poured to assure a seal between the envelope and the wall of the pre-cast structure.

3. Provide end bells in duct entrances. Terminate each metal conduit with insulated bushing having grounding terminal, O.Z. Type "Big".
- N. Place pulling irons on opposite walls and below horizontal centerlines of ducts and bricked-up openings, and in bottom. Install pulling irons with each end hooked around a reinforcing bar.
- O. Identify all power and signal cables by tagging in all manholes and pull boxes. Tie securely to cables with nylon cord or insulated type TW wire. Tie so that turns of wires do not form a closed electrical circuit.
- P. Manholes, vaults and pull-boxes required by utility company, and installed by Electrical Contractor, shall meet all requirements of utility company.

3.05 DIMMER SWITCHES

- A. Do not break off dimmer cooling fins.
- B. Large dimmers shall be surface wall mounted at the location indicated on the drawings.

3.06 SAFETY/DISCONNECT SWITCHES

- A. For all motors or equipment out of sight of the controller or more than 50 feet from the controller, provide a disconnect switch at the motor or equipment location.
- B. Provide a fusible disconnect within sight of and readily accessible from air conditioning equipment, per NEC 440-14. Size fuses per equipment nameplates.

3.07 SPARE FUSE CABINETS

- A. Provide a cabinet in the main electrical room or other designated area. Cabinet shall be as specified for "Terminal Cabinets" and shall be of sufficient size to contain all spare fuses hereinbefore specified. Provide clips (2 per fuse) for each spare fuse. Mount clips in plywood backboard in cabinet. Label cabinet "SPARE FUSES".

3.08 MOTOR CONTROL INTERLOCKS, CONTROL DEVICES AND RATINGS

- A. Refer to mechanical and plumbing drawings and specifications and provide all control devices including timeswitches, relays and interconnection of starters as required.
- B. Mount all relays and timeswitches in a separate compartment in motor control center unless otherwise indicated.
- C. Whether shown on mechanical and plumbing drawings or control center schedules or not, where motors are controlled by external devices (i.e., thermostats, relays, float or pressure switches, etc.) or interlocked with other motors, each motor starter to be equipped with a "Hand-Off-Auto" selector switch in starter cover. Other starters equipped with a "start-Stop" pushbutton station in starter cover.
- D. Provide low voltage, 60Hz control power transformer(s), VA as required for HVAC and plumbing controls.

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- E. Motor horsepower ratings and enclosures shown are minimum expected. This does not limit the equipment size. When motors furnished differ from the minimum ratings indicated, make the necessary adjustments to wiring, conduit disconnect devices, motor starters, branch circuit protection, and other affected material or equipment to accommodate the motors actually installed, at no additional cost to the Owner.

3.09 TRENCHING, FOOTINGS, SLEEVES

- A. Provide trenching, concrete encasement of conduits, backfilling, and compaction for the underground electrical work, in accordance with applicable sections of this specification. Back fill and compact earth after installation of duct bank/apparatus to 95% minimum compaction in horizontal lifts of 8" thickness or as stated by compaction equipment. Replace paving, concrete, landscaping to match existing as applicable.
- B. Provide footings for all post and/or pole-mounted lighting fixtures: concrete shall conform to the applicable sections of this specification.
- C. Sleeves
 - 1. Provide sleeves for raceways, conduit and pathway for future cabling passing through the following construction elements:
 - a. Concrete foundations, floors, walls and slabs.
 - b. Lath and plaster walls and ceilings.
 - c. Building structures (i.e. foundations, walls, floors, ceilings, roofs) with a fire rating exceeding 20 minutes.
 - d. Full height interior walls.
 - 2. Provide sleeves through inaccessible ceiling areas to create a cabling path to the main signal/data room(s) to allow for the installation of future cabling.
 - 3. Sleeves shall be flush with walls and foundations. Sleeves shall be installed at exact penetration locations and angles to accommodate raceway and conduit routings.
 - 4. Joists, girders, beams, columns or reinforcing steel shall not be cut or weakened. Where construction necessitates the routing of conduit or raceways through structural members, framing or under footings, written permission to make such installation shall first be obtained from the Architect. Such permission will not be granted, however, if any other method of installation is possible.
 - 5. The layout and design of raceways and conduits located in or routed through masonry or reinforced beams or walls shall be reviewed by the Architect before any work is performed. All sleeving shall be accomplished according to the instructions of the Architect and shall be accepted before any concrete is poured.
 - 6. Sleeves, raceways and conduit shall be located to clear steel reinforcing bars in beams. Reinforcing bars in walls shall be offset to clear piping and sleeves.
 - 7. Provide ½" continuous clearance between inside of sleeve and exterior of conduits and raceways passing through the sleeve, unless otherwise specified. Where sleeves pass through outside walls below grade, provide full 1" clearance between exterior of conduits and raceways passing through the sleeve. For seismic joints, clearance shall be 3".
 - 8. Sleeves set in fire rated walls, or floors shall be sealed. Sleeving shall maintain the fire rating of the wall or floor. A UL listed fireseal / fire barrier / firestop system shall be installed in accordance with the manufacturer's requirements. Provide sleeves, wrapping, caulk and supports.
 - 9. Sleeve material:
 - a. In concrete walls and footings: Schedule 40 black steel pipe. When installed in outside walls, seal outer surface watertight.

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- b. In lath and plaster partitions and ceilings: 24 gauge galvanized iron or steel.

3.10 CONDUIT

- A. The sizes of the conduits for the various circuits shall be as indicated on the drawings and as required by code for the size and number of conductors to be pulled therein. Conduits to be concealed except as noted otherwise.
- B. Unless specifically noted otherwise minimum conduit size shall be $\frac{3}{4}$ ".
- C. Rigid steel conduit shall be used in the following locations:
 - 1. Exposed on interior of buildings below nine feet.
 - 2. Exposed on exterior of building.
 - 3. Damp or wet locations.
 - 4. Exposed on roofs
 - 5. Embedded in concrete or masonry walls.

Rigid galvanized steel conduit shall not be installed in direct contact with earth or sand.

- D. PVC Schedule 40 nonmetallic conduit shall be used for all underground runs unless specifically noted or specified otherwise. Nonmetallic conduit shall not be run in walls, above ceilings or exposed. End bells shall be provided at conduit terminations.
- E. Risers on underground conduit runs shall be PVC Schedule 80 below grade and rigid galvanized steel where the run turns up above finished floor. File the inside ends of the Schedule 80 conduit to match the inside diameter of the Schedule 40 conduit.
- F. Electrical metallic tubing up to and including 4 inch may be installed as permitted by codes except as otherwise referenced within these specifications.
- G. Flexible Steel Conduit:
 - 1. The use of flexible steel conduit above ceilings shall be limited to final connections to lighting fixtures from outlet boxes or to clear obstructions above ceilings.
 - 2. Flexible steel conduit shall be used where concealed horizontally in metal stud walls. Flexible steel conduit shall not be used in vertical runs exceeding 36".
 - 3. Flexible steel conduit shall not be used in wood stud walls.
 - 4. Homerun conduits shall not be flexible steel conduit.
- H. Liquid-tight flexible conduit shall be used for final connection to transformers, motors, control devices, etc. mounted on or between vibrating or rotating equipment, mechanical, plumbing and kitchen equipment indicated on drawings to have flexible conduit connections, and in all areas where exposed flexible connections are required.

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I. Conduit Installation:

1. Securely and rigidly support all conduits from building structure. Provide supports maximum of ten feet on centers and within three feet of all bends, outlets, junction boxes, cabinets, panels and fittings. Conduits shall be supported independent of all piping, duct work, equipment ceiling hanger wires, and suspended ceiling grid systems. Secure by means of approved pipe clamps or straps. The use of "plumbers tape" is prohibited. Raceway spanning will not be acceptable. Provide raceway backing as required for direct mounting to building structure between code required support points.
2. Individual suspended conduits shall be supported by means of hanger rods and pipe clamps. Multiple suspended conduits shall be supported by means of trapeze type hangers and pipe clamps. Conduits and conduit support systems shall be guyed to prevent swaying in any direction.
3. Individual conduits placed against brick, masonry or concrete walls or slabs shall be secured with pipe clamps and expansion shields. Individual conduits placed against dry wall or plaster construction shall be secured by means of pipe clamps and screws attached to studs or other structural members. The use of toggle bolts is prohibited. Provide preformed channel supports for all multiple conduits placed against walls or slabs.
4. Rigid type conduit (i.e. RGS, IMC, EMT, etc.) shall not be strapped, fastened or connected to equipment subject to vibration or to equipment mounted on shock absorbing bases such as motors, transformers, etc. Final connections to equipment subject to vibration shall be by liquid-tight flexible conduit.
5. Conduit rising from floor for motor connection independently supported if over 24" above floor. Support shall not be to a motor or duct work which may transmit vibrations.
6. Branch circuit and signal conduits turned up from floor into interior demountable partitions or to equipment not adjacent to a wall shall terminate in flush coupling at floor and then extend into partition or to equipment. Refer to architectural drawings for location of demountable partitions.
7. Conduit run exposed shall be run at right angles or parallel to the walls or structures. All changes in directions, either horizontally or vertically, shall be made with conduit outlet bodies as manufactured by Crouse Hinds or equal. Conduits run on exposed beams or trellis work shall be painted to match surrounding surfaces. Conduits run exposed on roofs shall be installed pursuant to the roofing manufacturer's requirements. Provide Erico-Caddy Pyramid 50, pipe supports maximum 5-foot on center.
8. Provide two locknuts and an insulated bushing at threaded metallic conduit terminating at outlet boxes, junction boxes, terminal cabinets, switchboards and panelboards. Provide insulated bushing at each metallic conduit stub-up location. Bushings shall have ground lugs when installed on a metallic extension of PVC conduit run.
9. Conduits rising out the top of switchgear, panels, equipment, etc. Exposed to weather shall utilize weatherproof threaded hubs.
10. From each panel and signal system cabinet, which is flush mounted in a wall, stub up from top of the panel a minimum of four (4) 3/4" conduits to the nearest ceiling spaces or other accessible location and cap for future use.
11. Individual conduits penetrating a fire-rated floor, wall, or ceiling shall be installed using an approved fire-stop sealant system. Install in accordance with the manufacturer's requirements. Provide sleeves, wrapping, caulk and supports.
12. Conduit risers from underground conduit runs to panelboards, terminal cabinets, and control panels shall be enclosed in a 2-inch high concrete housekeeping pad, which extends at least 1 inch beyond all conduits enclosed.

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13. Underground conduits entering concrete pullboxes shall enter the sidewalls of the pullbox unless indicated otherwise. Provide end bell fitting on the end of each conduit 2" or larger entering the pullbox. Provide waterproof sealant after conductors have been installed.
14. Where underground conduits penetrate a waterproof or geo-membrane, the membrane shall be bonded around each conduit individually to maintain the watertight integrity of the membrane.
15. Provide metallic or plastic caps on all conduit during construction until installation of conductors.
16. Unless otherwise restricted by structural drawings and specifications, the maximum size conduit permitted in concrete walls shall not be greater than $\frac{1}{4}$ of the concrete thickness.
17. Provide expansion and deflection fittings, and bonding jumper at all building expansion crossings, seismic joint crossings, and where conduits cross the separation between adjacent relocatable classrooms.
18. Provide all trenching, excavation, shoring and backfilling required for the proper installation of underground conduits. Bottoms of trenches to be cut to grade. Make trenches a minimum of 12" wider than the duct bank. Compaction to be as directed by Architect and as recommended by the soils report. Back fill and compact earth around duct banks after installation of the structure to 95% minimum compaction in horizontal lifts of 8" thickness or as stated by compaction equipment. Replace paving, concrete, landscaping to match existing as applicable.
19. Install underground conduit, except under buildings, not less than 24" below finished grade in non-traffic areas and 30" below finished grade in traffic areas, including roads and parking areas. Install long radius bends in all underground conduits in excess of 100 feet long.
20. Conduits shall not be installed within concrete floor slabs.
21. Conduit below slab on grade or underground exterior to building shall be spaced a minimum of 3" between identical systems and 12" between power and all other systems except at termination points. Multiple conduits in common trenches shall be racked on prefabricated plastic spacers a minimum of 10 feet on center over the length of the trench. Utility company conduits shall be installed in a separate trench.
22. Size all conduit as required, or larger where indicated or preferred. Where portions of a conduit run are increased in size for whatever reason, make all remaining portions in that run the same size and increase junction box sizes or fittings as required.
23. Where conduit is underground, under slab or grade, exposed to the weather or in wet locations, make joints liquidtight and gastight.
24. Keep bends and offsets in conduit runs to an absolute minimum. For the serving utilities, make large-radius bends to meet their requirements. Replace all deformed, flattened or kinked conduit.
25. Route conduit to avoid drains or other gravity lines. Where conflicts occur, relocate conduit as required.
26. All rigid conduit stubs-up in concrete floors shall have couplings flush with finished floor unless noted otherwise.
27. Terminate above-grade stubs with plugged couplings set flush with building exterior.
28. All underground metallic conduits shall be half-lapped wrapped with 3M "Scotchrap" PVC tape.
29. All conduits below grade shall be fully encased in concrete.
30. Utility company conduits shall be fully encased in concrete over their entire length, including under building slabs.

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31. Where concrete encasement is specified, provide a minimum of 3" of concrete between each conduit, the top, bottom and sides of the duct bank.
32. The Contractor shall demonstrate the usability of underground raceways installed as part of this contract. A round tapered rigid mandrel with a diameter approximately 1/4" smaller than the diameter of the raceway shall be pulled through after the raceway installation is completed. Conduits which stubout only, shall have the mandrel pulled before and after the concrete encasement is completed, but prior to completing the backfill. The raceway testing for usability shall be witnessed by the Owner representative and by a representative of the respective utility company where applicable. Contractor shall repair/replace any conduit, which will not readily pass the mandrel test.
33. Provide a yellow magnetic detector tape over the entire length of all underground conduits. Place tape in backfill at a depth not to exceed 12" below finish grade or as required by the manufacturer.
34. All ductbanks shall be backfilled to within 12" of finished grade with damp sand. Remainder of backfill to be native having no stones or aggregate greater than 3". Do not backfill until installation has been approved and as-built drawings are up to date. Promptly install all conduits after excavation has been done, so as to keep the excavations open as short a time as possible. All excess soil from trenching shall be removed from the site.
35. Slope underground ducts to handholes or pull boxes (3" per 100 linear feet) or where impractical, provide a duct drain in the low point of the run. The finished grade elevation at the top of the underground pull boxes shall be lower than the elevation of the finished floor at the point of stub-up within the building.
36. Provide insulated bushing at each metallic conduit stub location. Bushings shall have ground lugs when installed on metallic extension of PVC conduit run.
37. Provide expansion and deflection fittings, and bonding jumper at all building expansion crossings, seismic joint crossings, and where conduits cross the separation between adjacent relocatable classrooms.
38. Conduits which are installed at this time and left empty for future use shall have polyvinyl rope left in place for future use. Provide 3/8" minimum rope for Utility Company conduits per their requirements.
39. Conduits stubbed outside of building line for future use shall be terminated a minimum of five feet clear of building or adjacent concrete walks or AC paving and capped. Provide concrete monuments, 6" x 6" x 15" deep, buried flush with grade over the capped ends. The face of monument shall be furnished with 3" square brass plates securely mounted and engraved with the number and size of conduits and type of service (i.e., "POWER", "TEL.", etc.).
40. Below grade low voltage, fire alarm, data and signal conduits shall be 1" minimum size. 1" conduit bends shall have 12" minimum radius. 1-1/4" and larger conduit shall have 30" minimum radius. No coupling shall be placed in bends. Each run of conduit shall have a maximum of two 90° bends whether or not indicated by the drawings. Install additional concrete pull boxes if more than two bends are required per run. Where conduit enters building, keep conduit free of contact with reinforcing steel and other metallic structures or pipe.

3.11 ROOF PENETRATIONS

- A. At built-up roofing, provide pitch pockets at all roof stubs. For other type roofs, provide a lead roof jack of the proper size for each conduit that stubs-up through a roof. Flash and counter flash. Coordinate this work with affected trades. Install roof seals in such a manner as not to void roof guarantees.

3.12 SURFACE RACEWAY/WIREWAY – BUILDING INTERIOR

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- A. Surface raceways shall be installed at right angles parallel and perpendicular to adjacent building surfaces. Unless noted otherwise on the drawings, the mounting height of the raceway shall be as follows:
 - 1. 18" above finish floors where fixed counter tops do not occur.
 - 2. +6" above the back splash of fixed counter tops
 - 3. +6" above the counter top where back splash does not occur.

- B. Horizontal runs shall be routed level. Horizontal runs feeding device outlets mounted between 0-20" above finish floor or below counter tops shall be routed horizontally at the same elevation as the mounting height of the device. The run shall continue at this elevation from the last outlet to the area of vertical rise specified elsewhere in this section.

- C. Horizontal runs feeding outlets above countertops shall be routed horizontally and parallel to the countertop surface. Where counter backsplash does not occur, mount surface raceway to wall and 6" from countertop surface. Where counter back splash occurs, mount surface raceway to wall and 6" from top of back splash.

- D. Vertical runs shall be routed plumb and shall rise up walls at the following locations only:
 - 1. In corners where two walls meet.
 - 2. In corners where casework meets wall.
 - 3. In corners between walls and door jamb.
 - 4. In corners between walls and window frame.

- E. Outlets mounted at +60" or greater above finish floor may be fed from a vertical run of raceway dropping down from the ceiling directly into the top of the outlet box.

- F. Raceways shall not be routed in any manner that will conflict with doors, casework, drawers, windows, etc. Coordinate as required with Casework Contractor to allow for cut-outs/notching as may be required for installation of raceway.

- G. Attach and anchor multi-outlet raceway base to building structure not less than 16" on center. Raceway attachment anchor shall be made directly to building wall stud, backing, masonry surface, or structural member. Do not anchor raceways to drywall, plaster or tile surfaces as the only support for the raceway. Raceway spanning will not be acceptable. Provide raceway backing as required for direct mounting to building structure.

- H. Provide wiring outlet devices in multi-outlet raceway as shown on the drawing. The raceway outlet locations shown are approximate. Verify exact installation locations with the Owner's representative prior to installation.

- I. Where multi-outlet raceways extend through building partitions, the raceway cover shall be removable to within 3" of the partition.

- J. The face of the wiring device coverplate shall be engraved with the circuit number and supply source name, (i.e., p-1,3 or MSB-5, etc.).

- K. Color of raceways, covers, fittings, devices, plates, etc. shall match existing where applicable. In new construction color shall be as selected by the Owner or as specified elsewhere by the construction documents.

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3.13 SURFACE RACEWAY/WIREWAY–BUILDING INTERIOR GROUNDING (ADD'L REQUIREMENTS):

- A. Provide a #10 AWG (minimum) ground/bond conductor in all raceways (one in each divided raceway, where a raceway divider is installed). Connect the ground conductor to the metal feeder raceway(s) supplying the multioutlet raceway and to the ground/bond conductor in the feeder raceway(s).
- B. Provide a #12 AWG minimum ground jumper from the wiring device grounding connection to the raceway base. Provide a ground lug connection at the raceway base for each device.
- C. Isolated ground wiring devices provide a dedicated, individual, insulated ground conductor from the wiring device to the branch circuit source ground bus. Wiring device ground shall be isolated from the multioutlet raceway ground.

3.14 WIRE AND CABLE

- A. Store conductors out of the weather and where not subject to damage or deleterious conditions.
- B. Before installing conductors, remove debris and moisture from conduit and equipment enclosures. Where necessary use linseed soap, minerallac or other specifically approved wire pulling compound to facilitate the installation of conductors. Do not use oil, grease or similar substances.
- C. Connections made with non-insulated type connectors shall be taped with rubber-tape 1-1/2 times the thickness of the conductor's insulation. Then covered with 3M Scotch "No. 33 plus" tape, or equivalent.
- D. Neatly arrange and lace conductors in switchboards, panelboards, gutters and terminal cabinets by means of nylon Tie-Wraps, Thomas & Betts or equivalent. Tag all spare conductors.
- E. Branch circuit and fixture joints for #10 AWG and smaller wire shall be made with UL-approved connectors listed for 600 volts, approved for use with copper and/or aluminum wire. Connector to consist of a cone-shaped, expandable coil spring insert, insulated with a nylon shell and 2 wings placed opposite each other to serve as a built-in wrench or shall be molded one-piece as manufactured by 3M "Scotchlok", Ideal "Supernut" or equivalent.
- F. Branch circuit joints of #8 AWG and larger shall be made with screw pressure connectors made of high strength structural aluminum alloy and UL-approved for use with both copper and/or aluminum wire as manufactured by Thomas & Betts. Joints shall be insulated with plastic splicing tape, half-lapped and at least the thickness equivalent to the conductor insulation. Tapes shall be fresh and of quality equal to Scotch.
- G. Use U.L. listed pulling compound for installation of conductors in conduits.
- H. Pulling of #1/0 and larger conductors shall only be done with an approved cable pulling machine.

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- I. Correspond each circuit to the branch number indicated on the panel schedule shown on the drawings except where departures are approved by the Architect or the Owner's inspectors.
- J. At all outlets for light, power and signal equipment, pigtail splices with 8" circuit conductor leads shall be provided for connection to fixtures, equipment and devices.
- K. Wire switchboards, panel cabinets, pull boxes and other cabinets shall be neatly grouped and tied in bundles with nylon ties at 10" intervals. At switchboards, panels and terminal blocks, wires shall be fanned out to terminals.
- L. Keep conductor lengths to a minimum within the wiring space. Conductors must be long enough to reach the terminal location in a manner that avoids strain on the connection lug.
- M. Exercise care to maintain the conductor required bending radius.
- N. Each neutral conductor larger than #6 gauge which is not color identified throughout its entire length shall be taped white wherever it appears in a switchboard, cabinet, gutter or pull box. Neutral conductors #6 gauge and smaller shall be white color identified throughout their entire length. Neutral conductors shall be tagged with the phase circuits shared.
- O. Lighting, power, low voltage feeder wires and cables shall be identified at each point conduit run is broken by a cabinet, box, gutter, etc. Where terminal ends are available, identification shall be by means of a heat shrink wire marker, which provides terminal strain relief, Raychem Shrinkmark, or Brady Permasleeve markers. Identification in other areas shall be by means of wraparound tape markers Raychem Cable Markers, or Brady Perma-Code. All markers shall include the feeder designation, size and description.
- P. Splices, joints and connectors joining conductors shall be covered with insulation equivalent to that on conductors. Free ends of conductors connected to an energized source shall be taped. Voids in irregular connectors shall be filled with insulating compound before tap-in. Thermoplastic insulating tape approved by UL for use as sole insulation of splices shall be used and shall be applied according to manufacturer's printed specifications.
- Q. All wiring, including low voltage, shall be installed in conduit.
- R. Control wiring to conform to the mechanical and plumbing specifications and wiring diagrams shown on the drawings and the manufacturer's wiring diagrams.
- S. All splices in exterior pull boxes and light poles shall be cast resin encapsulated. Power conductor splices – 3M Scotchcast Series 82/85/90; Plymouth or equal. Below grade shall not be made for control, fire alarm and/or signal circuits.
 - 1. Power conductor splices – 3M Scotchcast Series 82/85/90; Plymouth or equivalent.
- T. Terminals for signal systems cabinets to be Cannon Type "SS" or equal unless indicated otherwise.

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3.15 TESTING (ADDITIONAL REQUIREMENTS)

- A. All wiring and connections shall be tested for continuity, shorts and improper grounds in accordance with the requirements of the National Electrical Code. All receptacle outlets shall be tested for proper grounding. Any and all repairs resulting from the tests or preliminary operation of the equipment shall be made by the Contractor at his expense.
- B. Visual and mechanical inspection of cables - 600 volts and less.
 - 1. Inspect cables for physical damage and proper connection.
 - 2. Test cable mechanical connections to manufacturer's recommended values with a calibrated torque wrench.
 - 3. Check cable color coding and labeling of conductors and spares.
- C. Electrical Tests of cables - 600 volts and less.
 - 1. Ground resistance test. Check for shorts and/or phase-to-ground/phase-to-phase/phase-to-neutral conditions. Repair any deficiencies.
 - 2. Ground fault protection.

3.16 GROUNDING

- A. Grounding shall be executed in accordance with all applicable codes and regulations, both of the State of California and local authorities having jurisdiction.
- B. All metallic objects on the premises that enclose electrical conductors or that are likely to be energized by electrical currents shall be effectively grounded.
- C. All metal equipment parts such as enclosures, raceways and equipment grounding conductors and all earth grounding electrodes shall be solidly joined together into a continuous electrically conductive system.
- D. All metallic systems shall be solidly interconnected to the electrical system as provided by the service entrance and for each grounded separately derived system that is installed.
- E. A separately derived AC source shall be grounded to the equipment grounding conductor and to a separate made electrode.
- F. Non-current-carrying metal parts of high voltage equipment enclosure, signal and power conduits, switchboard and panelboard enclosures, motor frames, equipment cabinets, and metal frames of buildings shall be permanently and effectively grounded.
- G. Metallic or semi-conducting shields, and lead sheaths of cables operating at high voltage, shall be permanently and effectively grounded at each splice and termination.
- H. Neutral of service conductors shall be grounded as follows:
 - 1. Neutral shall be grounded at only one point within school site for that particular service. Preferable location of grounding point shall be at service switchboard, or main switchboard.
 - 2. Equipment and conduit grounding conductors shall be bonded to that grounding point via a ground bus.
 - 3. If other buildings on campus are served from a switchboard or panelboard in another building, power supply is classified as a feeder and not as a service.

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4. Equipment grounding conductor is carried from switchboard to each individual building. At building, grounding conductor is bonded with power equipment enclosures, metal frames of building, etc., to "ground bus" for that building.
 5. Neutral feeder shall not be grounded.
- I. If there is a distribution transformer at a building, secondary neutral conductor shall be bonded to the "Ground Bus" serving the building.
 - J. Within every building, main switchboard or panel, shall be bonded to the cold water line. Metallic piping systems (gas, fire sprinkler, etc.) shall be bonded to cold water line or ground bus.
 - K. Provide a green color insulated ground conductor of code size within all conduits (both non-metallic and metallic) and terminate properly to the equipment enclosure (or device or fixture) at each end. (Use separate ground busbars in all panelboards and switchboards.) Increase conduit (ground conductors may or may not be indicated on Drawings), fittings and pullbox sizes as required to accommodate the additional conductor.
 - L. Provide bonding devices, fittings or jumpers at expansion fittings or wherever continuity of grounding is not certain or where required by inspecting authorities.
 - M. The Contractor shall install the proper sized copper ground wire in the conduit with the branch circuit and feeder for use as an equipment ground. The electrical metallic raceway system shall be grounded to this ground wire.
 - N. The maximum resistance to ground shall not exceed 5 ohms.
 - O. A green insulated, copper ground wire, sized in accordance with the following table, shall be installed. Install ground wire in each conduit with phase conductors.

<u>1. Feeder, Subfeeders & Branch Circuit Protection</u>	<u>Minimum Ground Wire Size</u>
15 Amp	#12
20 Amp	#12
30 to 60 Amp	#10
70 to 100 Amp	#8
101 to 200 Amp	#6
201 to 400 Amp	#2
401 to 600 Amp	#1
601 to 800 Amp	1/0
801 to 1000 Amp	2/0
1001 to 1200 Amp	3/0
1201 to 1600 Amp	4/0
1601 to 2000 Amp	250 kcmil
2001 to 2500 Amp	350 kcmil
2501 to 4000 Amp	500 kcmil
 - P. Where conductors are run in parallel in multiple raceways, the grounding conductor shall be run in parallel. Each parallel equipment grounding conductor shall be sized on the basis of the ampere rating of the overcurrent device protecting the circuit conductors in the raceway. When conductors are adjusted in size to compensate for voltage drop, grounding conductors, where required, shall be adjusted proportionately in size.

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- Q. Ground conductors for branch circuit wiring shall be attached at each outlet to the back of the box using drilled and tapped holes and washer head screws, 6-32 or larger.
- R. Each panelboard, switchboard, pull box or any other enclosure in which several ground wires are terminated shall be equipped with a ground bus secured to the interior of the enclosure. The bus shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.
- S. In addition to all cold water and structural steel grounds provided to meet this specification, there shall be a main ground system in each building consisting of UFER grounds which shall be a minimum of 30 feet of #4/0 AWG bare copper cable embedded horizontally in exterior concrete footing of each building, so that all portions of the cable are between 2" and 4" from the earth and with the center of the cable terminated at each building's main ground bus in the electrical room.
- T. The interior metal water and gas piping system of each building shall be bonded to the building ground bus in each respective building, provide 1#4/0 ground in 1" conduit.
- U. Provide 1#4/0 in 1" conduit from the building main cold water pipe and fire sprinkler piping (if available) to the building ground bus.
- V. Provide 1#4/0 in 1" conduit from the nearest effectively grounded structural steel member of each building, to the respective building ground bus.
- W. Provide 1#4/0 bond connection from the UFER ground electrode at each relocatable building to the metal frame of the building and between the metal frames of each adjacent building.
- X. Each building shall be equipped with a minimum 12 inch long building ground bus consisting of a bus bar, two porcelain insulators, terminal lugs on lug for each conductor and nameplate.
- Y. Provide 1#6-3/4" conduit from each MDF, IDF, telephone backboard, data backboard and television backboard to the building ground bus.
- Z. Where structural steel and/or cold water are not adequate or available to achieve maximum resistance provide "made electrodes" as follows:
1. Yard boxes shall be pre-cast concrete and shall be approximately 14" wide, 19" long, and 12" deep (outside dimensions), or larger, if necessary, to obtain required clearances. Boxes shall be equipped with bolt-down, checkered, cast iron covers and a cast iron frame cast into box. Yard boxes shall be Christy or approved equal.
 2. "Made" electrodes shall be approved copper-clad steel ground rods, minimum 3/4" diameter, 10'-0" long. Provide ground rods spaced a minimum 10-feet apart until total resistance of system is measured at 5-Ohms or less.
- AA. Grounding electrodes shall be located in nearest usable planting area, whether or not otherwise indicated on the drawings. Each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, concrete yard box shall be 2" above planting surfaces.

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- BB. Grounding rods shall be driven to a depth of not less than 8'-0". A permanent ground enhancement material shall be used at each ground rod to improve grounding effectiveness. The manufacture's guidelines shall be used for each installation.
- CC. When using grounding rods, if resistance to ground exceeds 5 ohms, provide required quantity of rods connected in parallel, and spaced a minimum of 10-feet apart to meet specified maximum grounding resistance requirements.
- DD. Ground rods shall be separated from one another by not less than 10'-0".
- EE. Parallel grounding rods shall be connected together with approved fittings and approved grounding conductors in galvanized rigid steel conduit, buried not less than 12" below finish grade.

3.17 PLYWOOD BACKBOARDS

- A. For telephone, data, and television communication system terminals or for other equipment assemblies, provide backboards of size indicated or larger if required. Where backboards are indicated in signal rooms provide full height from floor to ceiling.

3.18 CONCRETE WORK

- A. Concrete work shall be executed in accordance with all applicable codes and regulations of the California Code of Regulations, Title 24, Part 2, Chapter 26.
- B. Form
 - 1. Space forms properly with spreaders and securely tie together. Do not use twisted wire form ties. Keep forms wet to prevent joints from opening up before concrete is placed. Replace improper construction as directed. Do not use wood inside forms.
 - 2. Build in and set all anchors, dowels, bolts, sleeves, iron frames, expansion joints and other materials required for the Electrical Work. Place all items carefully, true, straight, plumb and even.
 - 3. Carefully remove all exposed forms. Cut nails and tie wires below face of concrete and fill all holes. Rubbish will not be allowed to remain in, under, or around concrete.
- C. Mixing: Use batch machine mixer of approved type. After ingredients are in mixer, mix for at least 1-1/2 minutes.
- D. Transit mixing: In lieu of mixing at site, transit mixing may be used if rate of delivery, haul time, mixing time, and hopper capacity is such that concrete delivered will be placed in forms within 90 minutes from time of introduction of cement and water mixer.
- E. Placing of Concrete:
 - 1. Before placing concrete, remove wood, rubbish, vegetable matter and loose material from inside forms. Thoroughly wet down wood forms to close joints.
 - 2. Clean reinforcement; remove paint, loose rust, scale and foreign material. Bars with bends not called for will be rejected. Hold securely in place to prevent displacement. Lap bar splices 30 diameters, min; lap fabric one mesh min. tie intersections, corners, splices with 16 ga. Annealed wire, or as otherwise called for.

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3. Place concrete immediately after mixing. Do not use concrete that has begun to set; no tempering will be allowed. If chuting issued, avoid segregation. In placing new concrete against existing concrete, use bonding agent per manufacturer's directions.
4. Give careful and thorough attention to curing of concrete. Keep concrete and forms wet for a minimum of 10 days, after placing concrete.

F. Concrete Finish:

1. Finish of Exposed Concrete: Horizontal surfaces, steel troweled monolithic finish; vertical surfaces, smooth and free of fins, holes, projection, etc.
2. Exposed lighting pole bases shall be finished to a smooth finish. Provide sandblast finish to create texture and eliminate swirl lines from forms.

3.19 SOUND CONTROL

- A. Before the work will be accepted as complete, quietness of operation, to a degree satisfactory to the Architect, shall be attained for apparatus, equipment, fixtures, etc., included under the electrical work. Provide isolation and vibration protection required.
- B. It is the objective of this specification to provide the necessary design for the avoidance of excessive noise or vibration in the building due to the operation of machinery or transformers, and/or due to interconnected conduit.
 1. Furnish and install the vibration isolation devices as specified herein.
 2. Do not install any equipment or conduit as specified in the schedule, which makes rigid contact with the "building" unless it is approved in this specification or by the Architect. "Building" includes slabs, beams, studs, walls, lath, etc.
 3. Coordinate work with other trades to avoid rigid contact between equipment or conduit as specified in the schedule and the building. Inform other trades following his work, such as plastering, to avoid any contact, which would reduce the vibration isolation.
 4. Bring to the Architect's attention, prior to installation, any conflicts with other trades which will result in unavoidable contact to the equipment or conduit as specified in the schedule, described herein due to adequate space, etc. Corrective work necessitated by conflicts after installation shall be at the responsible Contractor's expense.
 5. Bring to the Architect's attention any discrepancies between the specifications and field conditions, changes required due to installation. Corrective work necessitated by discrepancies after installation shall be at the Contractor's expense.
 6. Obtain written and/or oral instructions from the vibration isolation manufacturer as to the proper installation and adjustment of vibration isolation devices.
 7. Correct, at no additional cost, all installations, which are deemed to be defective workmanship or materials by the Architect.
- C. Isolators shall be provided at transformers and electrical equipments where indicated on the drawings. Isolators shall be OSA approved and manufactured by California Dynamics Corporation RJEQ Series or Sausse RMLS Series or Mason Industries BR Captive Mounting Series.
- D. Provide flexible conduit or an approved vibration isolation device between any transformer, and building structure and/or between any transformer and equipment mounted directly to building structure.

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- E. Electrical panels shall be connected to transformers by flexible conduit. Do not contact stud or masonry partitions. Isolate panels from the floor as specified herein.
- F. Provide flexible conduit connections at all air conditioning, plumbing, etc., or any rotating or oscillating equipment requiring electrical motors. Base the length of flexible conduit required for each motor upon the requirements for a 360° loop in the conduit between the electrical motor and electrical box. (Do not actually twist the conduit into a loop).
- G. As an alternative, a Neoprene or rubber bushing between the conduit and the electric motor to break the metal-to-metal contact may be used. Provide a flexible ground strap to complete the electrical ground.

END OF SECTION

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SECTION 16460 - PANELBOARDS AND TERMINAL CABINETS

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: All labor, materials, appliances, tools, equipment necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to the following:
 - 1. Examine all other specification sections and drawings for related work required to be included as work under Division Sixteen.
 - 2. General provisions and requirements for electrical work.

1.02 SUBMITTALS (ADDITIONAL REQUIREMENTS)

- A. Provide manufacturers catalog data for panelboards, cabinets and circuit breakers.
- B. Provide shop drawings showing panelboard circuit arrangements, size, voltage, ampacity, overcurrent protective devices, etc.
- C. Provide nameplate-engraving schedule.
- D. Provide scaled and/or dimensioned re-drawn floor plans and wall elevations of each of the proposed locations of each panelboard, distribution panelboard and/or terminal cabinet provided. Drawings shall include locations of all new and existing equipment, devices, enclosures, etc. surrounding said equipment and indicate compliance with working space requirements with respect to Article 110.26 of the National Electrical Code. Include existing and proposed racway routing on the elevation plan as applicable.
- E. Coordination study; refer to Sections 16010 and 16420 for additional requirements.

PART 2 - PRODUCTS

2.01 PANELBOARDS

- A. Panelboards shall be flush or wall mounted as indicated by the drawing with circuit breakers as shown on the panel schedule, hinged lockable doors, index cardholders and proper bussing.
- B. Where indicated on the drawings and herein specified, panelboards shall be furnished with subfeed breakers and/or lugs, split bussing, contactors, time switches, relays, etc., as required.
- C. All panelboards shall be finished with one coat of zinc chromate and a coat of primer sealer after a thorough cleaning. Prime coated panelboard shall be painted to match surroundings after installation. Panelboards shall be fabricated of sheet steel of the following minimum gauges: Door and trim #12; Enclosure - code gauge steel.
- D. Panelboards shall have flush locks and keys. Corbin Cat 60. All panelboards shall be keyed alike.

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- E. Fasten the trim to panelboards by means of concealed, bolted or screwed fasteners accessible only when the door is open.
- F. Panelboards 120/208 volt, three phase, 4 wire, solid neutral or 120/240 volt, single phase, 3 wire, solid neutral.

Panelboard types as manufactured by:

- | | | |
|----|------------------|-------------------|
| 1. | Cutler Hammer | Pow-R-Line Series |
| 2. | General Electric | Type A Series |
| 3. | Square D | Type NQOD |
| 4. | Siemens | Type S Series |

- G. Panelboard for bussing sizes thru 400 ampere shall be 20" wide. Recess mounted type shall have a 20" wide (max.) recess metal enclosure with trim plate cover extending 1" on all sides of enclosure. Depth shall be 5-3/4" nominal. Height of panel is as required for devices.
- H. Provide 6" additional gutter space in all panels where double lugs are required, or where cable size exceeds bus size. Minimum bottom gutter space shall be 6" high.
- I. Distribution panelboards with buss sizes 400 ampere and greater shall be 40" wide (max.) by 12" deep (max.) units. Distribution panelboards shall be as manufactured by:

2.	General Electric	Type CCB or QMR
3.	Square D	Type HCN or HCM
4.	Siemens	Type S Series or F Series
- J. Panelboards shown on the drawings with relays, time clocks or other control devices shall have a separate metal barriered compartment mounted above panel with separate hinged locking door keyed to Corbin Cat 6 to match panelboard. Provide mounting subbase in cabinet for control devices and wiring terminal strips.
- K. Panelboard shall have a circuit index cardholder, removable type, with clear plastic cover. Index card shall have numbers imprinted to match circuit breaker numbers.
- L. Panelboard enclosures shall be furnished without prepunched or (concentric) conduit knockouts. Conduit knockouts shall be custom punched in field.
- M. Panelboards shall be manufactured by the same manufacturer as the switchboard.
- N. Outdoor cabinets shall be NEMA 3R. Construction shall be formed from code gauge galvanized steel with an ANSI #61 gray enamel finish. Provide a heavy-duty 3 point latching vault type door handle with padlocking provisions. Provide stainless steel butt hinges on each door. Padlocks must be furnished and keyed to a Corbin Cat 60 key.

2.02 CIRCUIT BREAKERS

- A. Main circuit breakers in distribution panelboards with a frame size of 400 amps or larger shall conform to the following:
 - 1. Circuit breaker shall employ current sensors and static electronic automatic trip system. Three phase or single phase operation as noted on the drawings.

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Current carrying components shall be completely isolated from the static trip units. The trip unit shall be independent of external power sources.

2. Breaker solid state trip control functions shall provide the following field adjustable features:
 - a. Adjustable ampere setting to vary the continuous current carrying capacity, minimum range of 80% through 100% of full load trip rating.
 - b. Fixed long-time pickup and delay.
 - c. Adjustable short-time pickup to vary the level of high current the breaker can carry for short periods of time, minimum range of 2 times through 8 times of ampere setting.
 - d. Fixed short-time delay I^2T .
 - e. Fixed or field adjustable instantaneous trip.
 - f. Individual fault trip indicators shall provide local indication on the breaker for overload and short circuit (and ground fault where applicable) conditions.

- B. Branch circuit breakers in panelboards shall be series-rated with their respective upstream overcurrent devices for the full fault duty rating of those upstream devices.

- C. Panelboards and circuit breakers shall be products of the same manufacturer and shall be rated as indicated on the drawings.

- D. Circuit breakers shall be arranged in the panels so that the breakers of the proper trip settings and numbers correspond to the numbering in the panel schedules on the drawings. Circuit numbers of breakers shall be black-on-white micarta tabs or other previously approved method. Circuit number tabs, which can readily be changed from front of panel, will not be accepted. Circuit number tabs shall not be attached to or be a part of the breaker.

- E. Where two or three pole breakers occur in the panels, they shall be common trip units. Single pole breakers with tie-bar between handles will not be accepted.

- F. Where branch circuit breakers supply the power to motors, the fire alarm control panel, and head end equipment for signal systems, the breakers shall be furnished with lockout clips, mounted in the "on" position. The breakers shall be able to trip automatically with lockout clips in place.

- G. Panelboard circuit breakers shall be bolt on type. Ground fault intermeters shall be incorporated into circuit breakers where indicated on the drawings and where required by code. GFI circuit breakers shall be listed by UL as a ground fault device.

2.03 SWITCH AND FUSE FEEDER PROTECTIVE DEVICES

- A. Fusible Switches: Quick-make, quick-break type with rejection clips for use with Class "R" fuses. Switches with ratings up to and including 100 ampere shall be twin mounted. Switches shall be removable from front of panelboard without disturbing adjacent units or bus structure.

- B. Fuses shall be time delay current limiting type, U.L. Class RK-1 unless otherwise indicated on the drawings. Provide one (1) spare set of fuses of each size and type in each panelboard.

2.04 BUSSING

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- A. Bussing shall be rectangular cross section plated copper. Bussing shall be the full length of the enclosure.
- B. Bussing shall be braced to withstand symmetrical short circuit ratings as follows or as noted on drawings. In no case shall bus short circuit bracing be less than specified circuit breakers:
 - 1. Panelboards:
 - a. 240 volt and below - 10,000 amp.
 - 2. Distribution panelboards: 22,000 amp.
- C. Each panelboard shall be equipped with a ground bus secured to the interior of the enclosure. The bus shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.
- D. Provide space and all hardware and mounting attachments for future devices as indicated on the drawings.

2.05 TERMINAL CABINETS

- A. Terminal cabinets shall be fabricated of code gauge sheet steel, size as indicated on the drawing, complete with hinged lockable doors and the number of 2-way screw terminals required for termination of all conductors. The door to terminal cabinets shall be continuously hinged on one side and be the same size as the cabinet so as to allow maximum termination space within the cabinet. Terminal cabinets shall have 3/4" plywood backing finished in black insulating varnish.
- B. All terminal cabinets shall be finished with one coat of zinc chromate and a coat of primer sealer after a thorough cleaning. Prime coated terminal cabinets shall be painted to match surroundings after installation.
- C. Terminal cabinets shall have flush locks and keys. Cabinet Cat 60.
- D. Terminal cabinet enclosures shall be furnished without prepunched or (concentric) knockouts. Conduit knockouts shall be custom punched in the field.
- E. Outdoor cabinets shall be NEMA 3R. Construction shall be formed from code gauge galvanized steel with an ANSI #61 gray enamel finish. Provide a heavy-duty 3-point latching vault-type door handle with padlocking provisions. Provide stainless steel butt hinges on each door. Padlocks must be furnished and keyed to a Corbin Cat 60 key.
- F. Terminals for signal systems cabinets to be Cannon Type "SS" or equal unless indicated otherwise.
- G. Provide engraved nameplate on each cabinet indicating its designation and system (i.e., "Fire Alarm System – Terminal Cabinet 'FATC'").

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3.01 INSTALLATION

- A. Flush mounted panelboards and terminal cabinets shall be securely fastened to at least two studs or structural members. Trim shall be flush with finished surface.
- B. Surface mounted panelboards and terminal cabinets shall be secured to walls by means of preformed steel channels securely fastened to at least two studs or structural members.
- C. Panelboards shall be installed to insure the top circuit protective device (including top compartment control devices) are not more than 6'-6" above finish floor in front of the panel and the bottom device is a minimum of 12" above the floor. Manufacturer shall specifically indicate on shop drawing submittals each panel where these conditions cannot be met.
- D. The equipment location shall have sufficient working space to comply with the National Electrical Code.
- E. Panelboard locations shall have sufficient working space to comply with the California Electrical Code.
- F. Panelboards installed outdoors shall be specifically approved for wet locations and shall be in a weatherproof NEMA 3R enclosure.
- G. Conduits shall be installed so as to prevent moisture or water from entering and accumulating within the enclosure.
- H. Conductor lengths shall be kept to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.
- I. Maintain the required bending radius of conductors inside the cabinet.
- J. Distribute and arrange conductors neatly in the wiring gutters.
- K. Torque values shall be those recommended by manufacturer.
- L. Manually exercise all circuit breakers to make certain they operate freely.
- M. Remove all debris from the panelboard interior.
- N. Follow all manufacturer's instructions for installation.
- O. Where free-standing equipment is installed at exterior locations or in locations below grade, concrete pads shall be provided as described under Section 03300: Cast-In-Place Concrete or elsewhere in Division 16 specifications. Provide pad size as required.
- P. Anchor bolts for free-standing equipment shall be designed to meet code seismic requirements. Equipment shall be anchored to new slab with $\frac{3}{4}$ " redhead wedge anchor bolts. The $\frac{3}{4}$ " anchor bolts shall be tested to withstand 150 ft./lbs. torque. A minimum of four (4) anchor bolts per switchboard section is required.

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3.02 GROUNDING

- A. Grounding shall comply with all applicable codes and regulations, both of the State of California and the legal authorities having jurisdiction. Refer to other specification sections and drawings for additional grounding requirements.
- B. Identification plates and numbers shall be attached with screws or twist lock fasteners. Adhesive attachment of any kind shall not be used.
- C. Panelboard Index Card Schedule: Contractor shall prepare a neatly typewritten index card schedule with number or name of room or area, or load served by each panelboard circuit. Room numbers or names used shall be determined at site and shall not necessarily be those used on Drawings. Schedule shall also indicate panel designation, voltage and phase, building and distribution panel or switchboard from which it is fed. Schedule shall be mounted in a frame under transparent plastic 1/32" thick on inside of each panelboard cabinet door.

END OF SECTION

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SECTION 16500 - LIGHTING FIXTURES

PART 1 - GENERAL

1.01 GENERAL

- A. Provide light fixtures complete including lamps, ballasts, lamp sockets, housings, ceiling trim rings for special ceilings, brackets, diffusers/lenses and outlet boxes.
- B. The catalog numbers included in the description of the various types of lighting fixtures shall be basically considered to establish the type or class of the fixture with a particular manufacturer only. The fixture length, number of lamps, component materials, accessories, mounting type and all other features required to fulfill the total description of the fixture based on all drawing and specification information shall be complied with regardless of whether or not the catalog number specifically includes these features. If any conflict exists between the catalog number and the description, the Contractor shall either resolve the conflict with the Architect prior to submittal of his bid or furnish the fixture to meet the intent as later interpreted by the Architect without change in contract price.
- C. Lighting fixtures shall be of types as indicated in fixture schedule on the drawings.
- D. Include an allowance of \$400.00 for the material cost of any lighting fixture where outlet is shown on drawings without a fixture type designation. Include all labor and transportation costs in base bid.
- E. All fixtures of one type shall be of one manufacturer and of identical finish and appearance, unless indicated otherwise on drawings.
- F. All fixtures shall be installed per manufacturer's requirements.

1.02 SCOPE

- A. Work Included: All labor, materials, appliances, tools, equipment necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to the following:
 - 1. Examine all other specification sections and drawings for related work required to be included as work under Division Sixteen.
 - 2. General provisions and requirements for electrical work.

1.03 SUBMITTALS (ADDITIONAL REQUIREMENTS)

- A. Submit certification letter from manufacturers of lamps and ballasts stating the specific lamp and ballast combination comply with manufacturers' approval for the combined use, shown on the drawings.
- B. If requested by the Architect, provide a sample of any fixture proposed as a substitution for a specified fixture. Sample fixture shall be complete with lamps, cord and plug for 120 volt operation. Fixture shall be delivered to the Engineer's office for review and shall be picked up within ten (10) working days after review comments have been received; any samples left over this time will be discarded by the Engineer. Decision of Engineer regarding acceptability of any fixture is final.

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- C. Provide complete manufacturer's catalog data information for each light fixture, ballast and lamp.
- D. Where fixture color is indicated "As selected by the Architect", contact the Architect to determine color tone. Obtain and provide two color chip samples for each similar hue selected by the Architect. Submit chip samples with the fixture shop drawing submittal for review and selection.

- E. Where fixture color is not specified on the Fixture Schedule submit standard Manufacturer's color choices for each fixture type to the Architect for selection and approval.

PART 2 - PRODUCTS

2.01 FLUORESCENT BALLASTS

A. General:

1. Fluorescent fixtures shall be equipped with UL, ANSI, ETL approved CBM certified high power factor (90% minimum) ballasts. Class "A" or better sound rating. Fluorescent fixtures shall be designed to accommodate universal start lamps, except where specified otherwise. Ballasts shall have Class "P" protection. Fluorescent ballasts shall be full light output rated with specified lamps.
2. Ballasts shall comply with FCC Part 18 and NEMA limits as to EMI or RFI and not interfere with normal electrical or electronic data processing equipment
3. Ballast open circuit voltage and lamp operating voltage shall comply with requirements of the manufacturer of the specified lamps.
4. Ballasts shall be for use specifically with rapid start fluorescent lamps only. Ballasts rated for use with instant start fluorescent lamps or other non-rapid start fluorescent lamps are not acceptable.
5. Ballasts shall be suitable for use with automatic occupancy sensing type switching "on-off" control systems with multiple "on-off" cycles per hour, on a 24 hour a day basis, without loss of performance in ballast and/or lamp operating characteristics.
6. Ballasts shall be marked with manufacturer's name, part number, supply voltage, power factor, open circuit voltage, current draw for each lamp type and U.L. listed.

B. Solid State Electronic

1. Except where indicated otherwise, fluorescent ballasts shall be instant start integrated circuit electronic type for T8 series lamps, as manufactured by MagneTek, Advance, Motorola, Sylvania or Phillips.
2. Ballast manufacturer shall have been producing electronic ballasts for a minimum of five years.
3. Ballast shall operate lamps at frequency of 20 to 35 KHZ without visually detectable flicker and shall deliver lamp manufacturers normal rated lamp life.
4. Ballast shall be surge and transient protected to 6000 volts, provide soft/stable start of rapid start lamps and maintain cathode heat during operation. Maximum total harmonic distortion created on the line side of the ballast shall not exceed 25%.
5. The ballast shall provide an isolated output to the lamps. Ballast case shall be positively grounded to the light fixture metal housing.
6. The ballast shall incorporate transient surge protection to prevent damage to the ballast due to line side transients complying with ANSI/IEEE C62.41, Category A.
7. The ballast lamp current crest factor shall be less than 1.6.
8. The ballast factor shall be a minimum of 87.
9. T8 rapid Start Lamps

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<u>Lamp Wattage</u>	<u>Max. Line Input Watts</u>
Two - 32W	62
One - 32W	39

- 2.02 Ballasts for HID and fluorescent fixtures shall be high power factor, with lowest sound rating available. Ballasts which are judged by the Architect to be excessively noisy to be removed and replaced.
- 2.03 Fixtures located in ambient temperatures below 50°F or above 85°F shall have ballasts rated for the best operation at the temperatures to be encountered.
- 2.04 Light fixtures shown connected to both normal power and emergency power branch circuits, shall be furnished with separate lamp ballasts for the normal and emergency power circuits. A factory label shall be secured to the wireway which states "Caution - Emergency and normal branch circuits contained within this fixture".
- 2.05 HIGH INTENSITY DISCHARGE (HID) BALLASTS
- A. Metal halide fixtures shall be supplied with encased and potted constant wattage 90% minimum power factor ballasts and shall have best available sound rating for type and lamp size.
 - B. High pressure sodium ballasts shall be encased and potted, high power factor, constant wattage auto transformer types.
- 2.06 EMERGENCY BATTERY PACKS
- A. Where indicated by the drawings, provide internal emergency battery packs for emergency lighting fixtures. The emergency battery pack shall consist of a high-temperature, maintenance-free nickel-cadmium battery, charger, electronic circuitry, solid-state charging indicator light to monitor the charger and battery, and a single pole test switch. The pack shall be UL Listed 924 and for installation inside, on top of or remote from the fixture and shall include a 5-year warranty. The pack shall be capable of wiring as a switched or unswitched component. Unit shall produce a minimum of 40% rated lamp lumens. Power pack shall be Bodine, IOTA or equivalent.
- 2.07 LAMPS
- A. Lamps shall be new, of wattage indicated and shall be as manufactured by General Electric, Philips or Osram/Sylvania. Each fixture or lighting outlet shall be supplied with the proper lamp.
 - B. Fluorescent lamps shall have the following characteristics:

LAMP TYPE		WATTS	INITIAL LUMENS	LIFE (HOURS)
1.	F32T8	32	2950	20,000
2.	F31T8U6	31	2800	20,000
3.	CFT13W/G23	13	825	10,000
4.	CFQ13W/G24q	13	860	10,000
5.	CFQ18W/G24q	18	1250	10,000
6.	CFQ26W/G24q	26	1800	10,000
7.	Other types as noted on drawings.			
8.	Color rendering index (CRI) shall be of 80 or above, unless noted otherwise.			
9.	All compact fluorescent lamps shall be four pin, unless noted otherwise.			
10.	Color temperature shall be 3500°K, unless noted otherwise.			

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- C. Metal halide lamps installed in the interior shall have a minimum CRI of 70 for 175 watts and above and 80 for 100 watts and below. Color shifts for the lamps 100 watts and below shall not exceed $\pm 250^{\circ}\text{F}$. Lamps shall be suitable for use in open or enclosed fixtures. Lamp characteristics shall not be less than the following:

LAMP WATTAGE		INITIAL LUMENS	LIFE (HOURS)
1.	70 Watt	5,700	7,500
2.	100 Watt	8,500	10,000
3.	175 Coated	13,000 Vertical Lamp 11,000 Horizontal Lamp	10,000 6,000
4.	250 Coated	20,000 Vertical Lamp 18,000 Horizontal Lamp	10,000 6,000
5.	400 Coated	33,900 Vertical Lamp 30,000 Horizontal Lamp	20,000 15,000

- D. High pressure sodium lamps installed on the exterior shall be clear unless noted otherwise. Lamps shall be rated for a minimum of 24,000 hours of life. Lamps shall be manufactured for universal burn and open or enclosed fixtures. Lamps shall have the following minimum characteristics:

LAMP WATTAGE		INITIAL LUMEN OUTPUT
1.	35	2,250
2.	50	4,000
3.	70	6,400
4.	100	9,500
5.	150	16,000
6.	250	30,000
7.	400	50,000

2.08 LIGHT FIXTURES

- A. Lighting fixtures shall have all parts and fittings necessary to completely install the fixtures. Wiring running in fixtures shall be type "THHN". Fixtures shall be equipped with lamps of size and type as shown in the Fixture Schedule. Items of trim or decoration shall be supplied and properly installed after other trades have finished their work and cleaned the area.
- B. Prior to ordering fixtures, verify voltages, mounting methods, ceiling types, space and finishes. Coordinate fixture installation with framing members to assure proper fit and installation. Any framing issues hindering the installation of the specified fixtures shall be brought to the attention to the Architect prior to ordering and releasing fixtures so that an alternate size may be coordinated without additional cost to the Contract.
- C. Surface and/or wall mounted lighting fixtures shall not have any exposed chase nipples or conduit knockouts visible to view within fixture housing. Lighting fixtures mounted in continuous rows shall have conduit knockouts with chase nipples between lighting fixture housings, but shall not have visible chase nipples/conduit knockouts on the visible ends of the continuous row of lighting fixtures.
- D. Provide a rustproof plaster frame for every fixture recessed in a plaster ceiling. Wherever available, provide the flush trim type of plaster frame or mount reversible type trims for a "minimum trim" installation.

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- E. Lamp enclosure, reflectors and finish wiring shall not be installed until plastering is completed. Finish trim shall not be installed until finish painting of the adjacent surface is completed.
- F. All lighting fixtures shall bear Underwriters' label of approval for the wattage, mounting and environmental application installed. Fixtures shall be UL listed for feed through wiring.
- G. Lighting fixtures installed in contact with insulation shall incorporate thermo protection as required by Code whether or not indicated by the fixture description and/or catalog number.
- H. Light fixtures installed outdoors in damp or wet locations shall be U.L. labeled for said location. Fixtures shall be sealed and gasketed to prevent light leaks, insect and dust accumulation, water entry, etc.
- I. Where color is not specified on the Fixture Schedule provide choice of manufacturer's standard color finishes for review and selection by the Architect.

2.09 LENS AND DIFFUSERS

- A. Acrylic diffusers and lenses shall be formed from a sheet of 100% virgin acrylic having a minimum thickness of 0.125" and shall be of sufficient thickness and or proper construction and camber to prevent the diffusers from having any noticeable sag over the entire normal life of the installation. Diffusers shall be formed from cast sheet by a vacuum and/or pressure technique. Virgin acrylic lenses shall be manufactured by either injection molding or by extrusion.

2.10 VANDALPROOF FASTENINGS

- A. Provide approved vandal-resistant type screws, bolts, nuts for lighting fixtures where specified on the schedule or where exposed on the exterior of the project whether or not specified by the schedule. Screws shall be spanner head stainless steel, tamper-resistant type. Provide six (6) screwdrivers for this type of screw.
 - 1. Tamper-resistant screws: Hubbell #HBL7342RKL or equivalent
 - 2. Spanner head driver: Hubbell #HBL7372RKL or equivalent

PART 3 - EXECUTION

3.01 LIGHT FIXTURE INSTALLATION

- A. It is the Contractor's responsibility to verify actual ceiling construction type as defined on the architectural drawings and furnish all lighting fixtures with the correct mounting devices and proper operating voltage whether or not such variations are indicated by fixture catalog number. The Contractor shall verify depth of all recessed lighting fixtures with architectural drawings prior to ordering fixtures. Any discrepancies that would cause recessed lighting fixtures not to fit into ceiling shall be reported to the Architect prior to ordering the fixtures.
- B. Align rows of suspended and surface wall/ceiling-mounted fixtures to form straight lines at uniform elevations. Utilize laser technology to assure straight lines.
- C. Lighting fixtures installed in ceiling grids, susp. lay-in "T-Bar" & concealed spline ceilings.
 - 1. Provide two seismic clips at opposite ends of each recessed light fixture connected to the ceiling grid main runners and the light fixture.
 - 2. Each light fixture shall be supported independent of the ceiling grid support system.

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3. Each light fixture located in a "heavy duty" grid system shall be connected with a minimum of two independent slack safety support wires; one wire at each opposite diagonal fixture corner. Each 4 ft. x 4 ft. light fixture shall be supported in the same manner, except provide a minimum of four independent slack safety wires, one at each fixture corner.
 4. Each light fixture located in other than a "heavy duty" grid system shall be supported with a minimum of four taut independent support wires, one wire at each fixture corner.
 5. The support wires for light fixture support shall be 12-gauge steel (minimum). The wires, including their building and light fixture attachments, shall provide support capacity of not less than four times the weight of the light fixture assembly. Provide additional light fixture support wires and building anchors to meet these requirements as part of the contract. The support wires shall be anchored to the building structural elements above the ceiling.
- D. Light fixtures surface-mounted to suspended "tee" ceiling shall be installed with a one and one half (1-1/2) inch steel channel or angle which spans across and above the main runners. Each channel or angle member shall be provided with a minimum of two threaded studs for attaching to the fixture housing through the lay-in tile. Two channel or angle members shall be installed for each four foot fixture. Install the channels or angles within six inches of each end of the light fixture to span a minimum of two ceiling grid main runners. Provide two switch clips connecting the main runners to each channel or angle. Provide support wires connecting to the channels or angles in lieu of connecting to the light fixtures. Bolt the light fixtures to the threaded studs on the channels or angles.
- E. Pendant mounting fixtures shall be supplied with swivel hangers. Fixtures shall swing in any direction a minimum of 45 degrees of gravity, position. Fixtures shall have special stem lengths to give the mounting height indicated on the drawings. Stem to be 1-piece without coupling and to be finished the same color as the canopy and the fixture, unless otherwise noted. The Contractor shall check all lock-nuts and set screw to rigidly secure the socket to the stem, and the stem to the outlet box. Fixtures to be plumb and vertical. Where obstructions occur restricting 45 degree swing of fixtures, the fixtures shall be guy wired to prevent fixtures from striking obstructions. Method of guying shall be approved by Architect. Swinging fixtures shall have a safety cable attached to the structure and the fixture at each support capable of supporting four times the vertical load.
- F. Suspended fixtures weighing in excess of 50 pounds shall be supported independently of the fixture outlet box. Provide "air craft" hanger cable (minimum 12 gauge) for suspended fixtures; route cable concealed or in pendant where possible. Each cable and attachment shall support four times the weight of the fixture assembly. Securely attach the cable to the building structure.
- G. On acoustical tile ceilings, fixture outlets shall be accurately located in the center, at the intersection of the four corners or at the center of the joints of two tiles.
- H. Surface-mounted fixtures installed on drywall or plaster ceilings and weighing less than 50 pounds may be supported from outlet box. Provide structural supports above drywall or plaster ceilings for installation of fixtures weighing more than 50 pounds and secure fixture to structural supports. The use of toggle bolts is prohibited.
- I. Lighting fixtures in mechanical spaces are shown in their approximate location only. Do not install light outlets or fixtures until mechanical piping and duct work are installed, and then install lights in a location to provide best lighting combined with best coordination.
- J. Surface-mounted fixtures and outlets for surface-mounted fixtures are shown diagrammatically on drawings and shall be located so as to clear all door swings including casework door swings. Where it is not possible to clear a door swing, the Contractor shall verify clearances above the top of the door with architectural drawings, details, sections, elevations and door schedules.

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- K. Contractor shall aim and verify all adjustable interior light fixtures in the presence of the Owner. Provide lift equipment as required for access.
- L. Contractor shall aim and verify positions of adjustable exterior light fixtures after dark in the presence of the Owner. Provide lift equipment for access.
- M. Repair or replace any fixtures having light leaks.
- N. Where lighting fixtures are surface-mounted to split face block, irregular masonry, stucco or plaster surfaces, surface shall be ground smooth to allow for a flat mounting surface for the fixture to attach to. Caulk joint between the surface and the box and/or housing with Architect-approved colored caulk to match surrounding surface color.
- O. Light Standard / Pole Installation
 - 1. Set standards/poles plumb and straight in concrete footings. Grout and drypack after leveling/ plumbing standards. Concrete, grout and drypack requirements and procedures are specified in "Site Concrete Work".
 - 2. Ground fixture heads and poles.
 - 3. Each standard shall be provided with handhole, anchor bolts, fixture mounting brackets, accessories and bonding lugs.
 - 4. Poles shall be designed to withstand a sustained wind velocity for the installed area as outlined by the American Society of Civil Engineering ISOTACH wind map.
 - 5. Provide a fuse assembly in handhole of each light standard; Busmann Type KTK in hex. holder, or approved equivalent. Fuse assembly shall easily disconnect power to pole standard for servicing. Fuse ratings shall be as required by applicable codes and fixture wattage.
 - 6. Provide #10 AWG conductors from handhole to head(s). Bonding conductor shall be #10 AWG.

3.02 RECESSED LIGHTING FIXTURES

- A. Lighting fixtures recessed in ceiling or wall which has a fire resistive rating of 1 hour or more shall be enclosed in a box which has a fire rating equal to that of the ceiling or wall. The space from the fixture to the enclosure to be a minimum of 3".
- B. Installations in fire-rated areas to be done according to code requirements. Recessed portions of fixture enclosures, other than at points of support, shall be spaced at least ½ inch from combustible materials.
 - 1. Insulation shall not be installed within 3 inches of the recessed fixture enclosure, wiring compartment, or ballast and shall not be so installed above the fixture as to entrap heat and prevent the free circulation of air unless the fixture is otherwise identified for installation within thermal insulation.

3.03 LAMPS

- A. Fluorescent and H.I.D. lamps shall be operated (aged) for 100 continuous hours without interruption, prior to occupancy of the building by the Owner.

3.04 LENS AND DIFFUSERS

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- A. Lens and diffusers shall be completely cleaned of all dust, dirt and fingerprints after light fixtures, ceilings, painting, lamps, etc. have been completed yet prior to occupancy of the facility by the Owner.
- B. Specular, semi-specular, aluminum or any exposed finishes subject to fingerprints shall be installed with cotton gloves.

3.05 BALLASTS / BATTERY PACKS AND DIMMING

- A. Field/architectural conditions may require the installation of ballasts and/or battery packs remote from the lighting fixture housing. Additional wiring and conduit shall be provided by the Contractor between the lighting fixture housing and the remote ballast/battery pack. Provide required quantity of "THHN" conductors wire to operate said fixture(s) from remote components.
- B. Provide proper size and quantity of conductors in conduit for proper operation of dimming system, whether or not indicated by the drawings.

3.06 FLUORESCENT LIGHT FIXTURE TANDEM WIRING CONNECTIONS

- A. The Contractor shall provide tandem wiring for fluorescent lighting fixtures.
- B. The tandem wiring harness shall be the product of the lighting fixture manufacturer.
- C. The tandem connection shall provide pre-assembled wiring harness connecting two fluorescent lamps in adjacent lighting fixtures with a master lamp ballast, remote adjacent fixture slave lamp.
- D. The wiring harness shall contain the wiring in flexible steel conduit or enclosed metal raceway/jacket for installation in an air plenum.

3.07 TESTING

- A. Check and adjust fixtures for even illumination.
- B. Replace defective lamps, ballasts, starters, capacitors and sockets with new.

3.08 SPARE PARTS

- A. Furnish 20% spare lamps for each type specified (minimum one spare lamp for each type).
- B. Furnish 10% spare ballasts for each type specified (minimum one spare ballast for each type).

END OF SECTION

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SECTION 16721 - FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Furnish and install a complete stand-alone Fire Alarm System as specified herein and indicated on the drawings for the above-named project to be wired, connected, installed and left in first class operating condition. The system shall include, but not be limited to, control panels, annunciators, detectors, signal and monitor modules, ADA visual power supplies, audible and visual alarm devices, wire, wire terminations and all accessories required for a completely operable fire alarm system.
- B. The Contractor is responsible for the complete system design, engineering, installation and testing of the system. The Contractor is to obtain the services of an acceptable fire alarm system equipment supplier/distributor as outlined in the project specifications to serve as a sub-contractor to the fire alarm electrical contractor. System warranty for one (1) year after final acceptance of the system by Owner is to be provided by the Contractor. This shall include the first year annual testing, as required by NFPA 72, by the equipment supplier. It is the responsibility of the fire alarm contractor to verify local requirements by local jurisdiction. Any changes or additions required by local jurisdiction during construction and up to obtaining the final occupancy certificate is the responsibility of fire alarm contractor.
- C. The Fire Alarm System shall consist of all necessary hardware, equipment, signal power and software programming to perform the following functions:
 - 1. Fire alarm and detection operations per all applicable codes.
 - 2. Remote automatic control of smoke control equipment for fan systems, door hold-open devices, fire suppression appliances, remote monitoring of sprinkler system and PIV valves and monitoring of pre-action panels as indicated on drawings.
 - 3. Provide duct detectors as indicated on the drawings for air handling units (AHUS) and smoke/fire dampers per code.
- D. Provide an approved two-line telephone communicator to communicate to an approved off-site monitoring company.

1.02 RELATED WORK

- A. The work covered by this section of the specifications shall be coordinated with the related work as specified elsewhere in the project specifications.
- B. Provide a set of dry contacts at the FACP to defeat the complete sound, music and video systems in the event of a fire alarm. The music and video shutdown shall include, but not be limited to, the intermission music and the projection systems.
- C. Fan shutdown control wiring from the duct detector to the fan control shall be by mechanical contractor.

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1.03 CODES AND STANDARDS

- A. The latest editions of the publications listed below, form a part of this specification.
 - 1. 2007 California Building Code (CBC) (Part 2, Title 24): C.C.R.
 - 2. 2007 California Electrical Code (CEC) (Part 3, Title 24): C.C.R.
 - 3. 2007 California Mechanical Code (CMC) (Part, Title 24): C.C.R.
 - 4. 1999 National Fire Code with California amendments.
 - 5. 2007 California Reference Standards code (Part 12, Title 24):
 - a. 2001 edition of the UBC standards.
 - b. 1990 Public safety (Title 19), State Fire Marshall.
 - c. 2006 NFPA 72, National Fire Alarm Code.

1.04 SUBMITTALS

- A. Provide complete shop drawings of the Fire Alarm System including the following items on the plans for approval by the Architect and the local AHJ (Authority Having Jurisdiction) prior to the start of system installation.
 - 1. Floor plans showing layout of all alarm initiating and signaling devices, panels, low voltage systems and electrical power supply circuits, annunciators, etc. Drawings shall show locations of and connection to, all other devices and equipment, which are included in the complete function of the Fire Alarm System, specified herein.
- B. Submit original and complete manufacturer's specification sheets for each individual item of the fire alarm system. Each item supplied shall be clearly identified on each sheet.
- C. Provide proof of current listing by Underwriter's Laboratories or Factory Mutual for all system components.
- D. Complete battery load calculations (in both alarm and standby conditions), power supply calculations and amplifier calculations.
- E. Complete voltage drop calculations.
- F. Number, size and type of wires to each device.
- G. Complete riser diagrams and point-to-point.
- H. Accurate symbol legend for all fire alarm devices shown on the drawings.
- I. Include a system input/output matrix that summarizes the system sequence of operation on a device type basis.
- J. The shop drawings shall serve as a complete stand-alone document with the approval by the local AHJ and architect. The shop drawings shall be used to locate all fire alarm devices, panels, conduit, cable, etc.
- K. The submittal drawings should include detailed panel termination drawings, representing the exact configuration of the fire alarm control panel to be installed and the appropriate panel terminations. Panel termination detail drawings should include, but not be limited to, the following: AC power (including circuit breaker and electrical panel schedule), circuit and zone identifiers for each conductor (including a wire numbering scheme) and all auxiliary control wiring. The drawings should also be approved by the Owner's representative.

1.05 QUALITY ASSURANCE

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- A. Fire Alarm Contractor must be an authorized distributor of the equipment supplied, utilize factory trained personnel for the installation and testing of the system and have been employed in the furnishing and installation of such systems of this size and scope in this county for a period of at least five years.
- B. Each and every item of the Fire Alarm System unless otherwise noted herein shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters Laboratories, Inc. (UL) and shall bear the "UL" label. All control equipment is to be listed under UL category UOJZ as a single control unit. Partial listing is not acceptable. All control equipment must have transient protection devices to comply with UL 864 requirements.

1.06 QUALIFICATIONS OF PRODUCTS

- A. Substitution of Products purported to be equal to those specified herein will be considered only when the following requirements have been met:
 - 1. A complete list of such substituted products with three (3) copies of working and shop drawings thereof shall be submitted to, and approved by, the architect and/or consulting engineer, not less than ten (10) calendar days prior to the scheduled date for the opening of the bids.
 - 2. The Contractor shall furnish satisfactory manufacturer's proof that the substituted products are, in fact, equal in quality and performance to those specified herein. Such evidence shall be submitted to, and accepted by, the architect and/or consulting engineer not less than ten (10) calendar days prior to the opening of bids.
 - 3. A bidder intending to use substituted products shall submit two (2) price quotations: One based on the use of the products specified herein; the other shall define the substitute products and list the cost differentials as related to the basic quotation.
 - 4. All substituted products shall be approved by Underwriter's Laboratories and California State Fire Marshal approved.

1.07 FUNCTIONAL DESCRIPTION

- A. FACP and Annunciator alphanumeric displays shall display English language descriptions of all alarms, trouble signals, supervisory signals, monitoring actions, system and component status and system commands.
- B. General Alarm. Activation of any manual pull station, automatic detector or sprinkler flow shall cause the following to occur:
 - 1. Indicate both visually and audibly the general alarm condition at the FACP and Annunciator panels. Once silenced the visible indicator shall latch on.
 - 2. Identify the particular device(s) which is (are) in alarm at the above panels.
 - 3. Display the alarm a LCD display integral to the FACP.
 - 4. Initiate a tone output followed by an automatic voice evac-message.
 - 5. Initiate all visible notification appliances.
 - 6. Upon activation of the paging microphone, the automatic, digital message shall be overridden.
 - 7. All alarm notification appliances shall operate continuously until the System Reset Switch is operated.
 - 8. The elevator shall be recalled to the first floor or the alternate floor if smoke is detected at the first floor elevator lobby.
 - 9. Send signal to shut down all HVAC units and close smoke/fire dampers.
 - 10. Any subsequent device or zone alarm shall reactivate the alarm notification appliances.
 - 11. In addition, a normally closed contact in the FACP shall open to automatically shutdown all auditorium projectors & silence the associated sound systems. Coordinate this interlock with the Projector systems installer.

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- C. Smoke Sensor Sensitivity Adjustment
 - 1. The FACP shall continuously monitor the environment where each smoke sensor is installed. The internal sensitivity of each sensor shall be increased or decreased automatically to maintain a constant sensitivity.
- D. Sprinkler tamper switch operation shall activate at the building FACP a supervisory audible signal and illuminate the LED.
- E. Recording of events: Record all alarm, supervisory and trouble events by means of a system printer. Printouts shall be by zone, device and function.
- F. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible and visible appliances shall cease operation.
- G. Power Requirements:
 - 1. The power feed provided by others for the FACP shall be 3-wire, 120VAC single phase, 20A fused circuit, permanently labeled "FIRE ALARM CONTROL POWER", terminating at the fire alarm control and supervisory panels in the electrical room where the FACP is indicated. A lock-on device shall be placed on the dedicated circuit, provided by others.
 - 2. The FACP shall be equipped with a supervised DC battery to activate an audible alarm and LED in case of a power failure on the AC circuit.
 - 3. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120VAC power in a normal supervisory mode for a period of twenty-four (24) hours with fifteen (15) minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operation shall be automatic.
 - 4. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visibly indicated at the building FACP.

1.08 ELECTRICAL SUPERVISION

- A. Addressable signaling line circuits shall be Style 4.
- B. Initiating device circuits shall be Style A.
- C. Visible appliance circuits shall be Style Y (Class B) independently supervised indicating circuits so that a fault in any one circuit shall not affect any other zone.
- D. Speaker circuits shall be independently supervised.
- E. All sprinkler valve switches shall be supervised.
- F. Incoming power to the system shall be supervised so that any power failure shall be audibly and visually indicated at the FACP and Annunciator. A green "power on" LED shall be displayed continuously while incoming power is present.
- G. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated and the FACP and Annunciator.
- H. Remote annunciator wiring shall be supervised for open and ground conditions.
- I. Panel expansion modules shall be supervised so that a system trouble indicator shall illuminate and an audible shall sound at the FACP.

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1.09 MANUFACTURERS

- A. Acceptable equipment manufacturers are Notifier and Gamewell. All equipment supplied shall be from one single manufacturer and shall fully meet the performance criteria described below.

PART 2 - PRODUCTS

2.01 FIRE ALARM CONTROL PANEL (FACP)

- A. The FACP shall be microprocessor-based, and UL listed. The system shall be modular in design, addressable, easily field-configurable on-site, programmable and editable. The system shall continuously scan devices for any change of system status. The FACP shall indicate when an individual sensor is dirty by panel annunciation.
- B. The FACP shall have one-way audio capability utilizing a standard digital evac message as well as a microphone for spoken messages. In addition, the FACP shall have a dry contact, which will drop power to the sound and music systems in the event of a fire condition.
- C. The FACP shall be housed in a lockable, code gauge steel cabinet with an 80 character LCD, super-twist display for wide viewing, master controller operator's panel, indicating lamps, silence switch and reset switch mounted on cabinet front. The fire alarm control panel shall be located as indicated on Drawings. Signal duration shall be field programmable.
- D. The FACP shall have standardized software for on-site customization of the system. The FACP shall be capable of providing a 600 event historical log with zone or point-selectable alarm verification.
- E. The unit shall support 127 addressable points per module and one output point, SPST contact per zone. Provide the number of modules necessary to control and supervise fire alarm devices as shown on the drawings. The FACP shall support remote annunciation and an event printer.
- F. The FACP shall be capable of providing a Walk Test so that one person can test all initiating devices.
- G. The System Reset button shall be used to return the system to its normal state after an alarm condition has been remedied. The LCD display shall step the user through the reset process with simple language messages.
- H. Additional function keys shall be provided to access status data for the following points:
 - 1. Initiating device circuits
 - 2. Indicating appliance circuits
 - 3. Auxiliary relays
 - 4. Any other input/output points
- I. All control module LEDs shall be supervised for burnout or disarrangement. Should a problem occur, the LCD should display the module and LED location numbers to facilitate location of the fault.

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J. Access Levels:

1. There shall be four (4) access levels with level 4 being the highest level. Level 1 shall not require a passcode.
2. The following shall have access levels associated with them:
 - a. Alarm silence
 - b. System Reset
 - c. Set time/day
 - d. Manual control
 - e. On/off/auto control
 - f. Disable/enable
 - g. Clear historical alarm log
 - h. Clear historical trouble log
 - i. Walk Test
 - j. Change alarm verification
3. Acknowledge keys shall also require privileged access. If the operator presses an "ACK" key with insufficient access, an error message will be displayed.

2.02 EMERGENCY POWER SUPPLY

- A. General: Components include battery, charger and automatic transfer switch.
- B. The battery shall be a sealed lead acid or nickel-cadmium type. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120VAC power in a normal supervisory mode for a period of twenty-four (24) hours with fifteen (15) minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operation shall be automatic.

2.03 REMOTE LCD ANNUNCIATOR

- A. Provide where shown on drawings a remote LCD Annunciator. The flush-mounted Annunciator shall have a two line, 80-character LCD display and control switches for System Acknowledge, Alarm Silence, and System Reset. There shall be four (4) Programmable Control Switches. Communication shall be over a single twisted, shielded pair. Provide brushed aluminum trim plate.

2.04 SMOKE DETECTION DEVICES

- A. Detectors shall be addressable analog with a flashing LED on the base to verify proper detector operation. The alarm set point for each sensor shall be determined at the FACP to be less sensitive or more sensitive as the application requires.
- B. Each sensor set point may be individually varied automatically by time of day allowing for different sensitivities when building is not occupied.
- C. FACP shall constantly monitor each sensor and maintain a moving average of the output. Environmental factors are thus filtered out so that sensor sensitivity is constantly maintained. When a detector is dirty, an LED will light steadily at the detector base. Each device shall have its own unique address, but shall also be grouped by separate zones for remote annunciation and alarm report purposes. Detectors shall be installed in all areas required for a building of this type of occupancy. Device installation/spacing and distance away from air diffusers/ceiling obstructions shall be in accordance with NFPA 72. Smoke detectors shall be provided within each room a FACP is installed plus all electrical equipment rooms.
- D. "Moving average" type. They shall be provided by F/A contractor per drawings and mounted by the Mechanical Contractor. Duct detectors shall Control AHU shutdown per code. Control of fan

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shutdown from detector to fan control shall be by Mechanical Contractor. Refer to the drawings as to fans, which are to shutdown, interface to fan motor control centers or building automation systems upon detector activation. Duct detectors shall be installed in locations that are permissible to be serviced with the use of a standard ladder or access panels. The use of lifts or removal of the ceiling tile grid / framework to access duct detectors for routine maintenance and testing will not be acceptable.

- E. Heat detectors shall be addressable, fixed temperature x rate of rise, fixed at 135-F and a 15-F/min rate of rise. Sensors shall be of "moving average" type to compensate for environmental factors-s. There shall be a flashing LED on detector base to indicate proper detector operation. When a detector is dirty, the LED will light steadily at the detector base. Refer to the drawings for locations and auxiliary functions.
- F. Air duct smoke detector by the mechanical contractor for installation on mechanical air ducts. Two air tubes shall extend across the entire width of the air duct. The second tube shall allow air to escape back into the duct.

2.05 MANUAL FIRE ALARM STATIONS

- A. Manual fire alarm stations shall be non-coded, addressable, single-action, non-breakglass type with a key operated test-reset lock so designed that after actual emergency operation, they cannot be restored to normal except by use of a key. Key shall be same as panel key. Manual stations shall be constructed of high-impact LEXAN, with the word FIRE in white on the stations in raised letters, one-half inch in size or larger. Stations shall be suitable for semi-flush mounting and shall have a trim plate for each unit. Each station shall be supplied with an anti-vandalism device, as manufactured by Safety Technology International, Inc. type Stopper II with horn, Part Number STI-1130. Refer to the drawings for locations of manual stations.
- B. Provide manual pull stations in Auditoriums only as required by code or local jurisdiction.

2.06 ADDRESSABLE DEVICE MODULES

- A. Arrange to monitor system components such as waterflow and tamper switches that are not otherwise equipped for multiplexing communication, Modules shall transmit identification and status to the FACP. Furnish and install where indicated on drawings.

2.07 ALARM SPEAKER/STROBE DEVICES

- A. Furnish and install where indicated on the plans, alarm speaker/strobe devices and mount semi-flush on walls, and surface mounted with auditoriums.
- B. The speaker shall be have a frequency response of 400Hz to 4KHz with 4 power wattage taps for a minimum of 82dBA at 10 ft per UL Standards 464 and 1480.
- C. The visual section shall be a strobe using a Xenon flashtube in a clear housing. The strobe section shall have a minimum intensity rating of 75 cd. on axis with a flash rate of one hertz to meet ADA requirements. Higher candela intensities may be used where indicated on drawings.
- D. Speaker/strobe device shall be of the semi-flush type designed for mounting to a standard 4" square electrical outlet box. Each device shall be provided with a semi-flush accessory plate.
- E. Refer to the drawings for speaker/strobe locations. The speakers are to be tapped and spaced throughout the building so as to achieve a minimum sound pressure level of 15dBa above ambient noise levels upon activation of the voice message announcement

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2.08 VISIBLE ONLY DEVICES

- A. The visual device shall be a strobe using a Xenon flashtube in a clear housing. The strobe section shall have a minimum intensity rating of 75 cd. on axis with a flash rate of one hertz. Higher candela intensities may be used where indicated on drawings.
- B. Refer to the drawings for strobe locations. Spacing/coverage shall be in accordance with NFPA 72 and provide the required illumination to alert the hearing impaired.

Note: All visible warning devices shall be of the type suitable for synchronized flashing and shall operate accordingly.

2.09 DOOR HOLD-OPENS

- A. Provide 24VDC door hold-opens per drawings, which shall be wall-mounted, surface type. Holdopens shall automatically close with signal from FACP where and when required by local jurisdiction.

2.10 WIRING

- A. All wiring shall be in accordance with the National Electrical Code (NFPA 70), Local Codes, the National Fire Protection Association Standard and all other applicable codes listed elsewhere in this specification.
- B. Interior, dry location wiring for low voltage initiating circuits shall be #18 AWG copper, twisted shielded pair minimum, signaling circuits shall be No. 14 AWG minimum, speaker wire shall be twisted pair #14 and wiring for 120 volt circuits shall be No. 12 AWG minimum. All wiring shall be color-coded, solid copper conductor. Use of power limited cable shall be restricted to controls listed for this purpose. Single conductors shall be type THHN/THWN copper.
- C. Wire markers shall be provided for each wire connected to equipment. The marker shall be of the taped bank type, of permanent material, and shall be suitable and permanently stamped with the proper identification. The markers shall be attached in a manner that will not permit accidental detachment. Changing of wire colors within circuits shall be unacceptable.
- D. The Fire alarm speakers and the speakers as part of a speaker/strobe shall have an isolated ground wire routed to them. The speakers and strobes shall not share a grounding conductor due to noise traversed from the strobe unit to the speaker. This noise can effect THX certification.
- E. Wire gauge and shielding shall be in accordance with the fire alarm equipment manufacturer's requirements. When using 12 AWG wire, stranded conductors will be acceptable. All other conductors' sizes shall be installed with solid copper conductors.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The installation shall be accomplished by factory-authorized installers and technicians in accordance to the plans and specifications according to NFPA standards and all applicable standards referenced in Part 1, 1.3.
- B. Plenum rated wiring shall be installed unless the local authority having jurisdiction (AHJ) requires cabling within the conduit – coordinate with the architect and century theaters. All junction boxes shall be identified and/or labeled as Fire Alarm. When installing the fire alarm system with the

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use of plenum rated wiring, the contractor shall install all devices with the appropriate back boxes as identified by the device manufacturer and in accordance with applicable codes and standards. Plenum cable assemblies shall enter and exit device back boxes or junction box with the use of proper bushings and strain reliefs as required by code. Plenum rated cable assemblies shall not be installed into a device back box or junction box through knock-outs without proper protection. System shall be installed to ensure a complete, operable system in compliance with all applicable codes and regulations. If required conduit shall be installed in accordance with respective Division 16 Section.

- C. The contractor shall verify, prior to bid, the requirement for conduit by the authority having jurisdiction. If conduit is required, the contractor shall qualify the bid and/or contract price and provide a complete raceway system for the requirements set forth by the authority having jurisdiction.
- D. System shall be installed using material, supplies and methods of wiring previously covered under other applicable sections. Wiring for low voltage indicating circuits shall be #14 minimum and #18 twisted, shielded pair shall be used for the initiation circuits.
- E. Contractor shall provide a complete schematic of terminal to terminal wiring within the FACP and show destination of all wires leaving the FACP. These are to be submitted with O&Ms after final inspection.
- F. Surface mount devices or appliances shall be mounted with the appropriate device / appliance manufacturer's back boxes.
- G. Where possible cabling shall be run concealed within walls and/or ceiling spaces.
- H. Where cabling can not be run concealed, contractor shall provide protective raceway complete with junction boxes, fittings, connectors and hardware to ensure cable is protected from physical damage. Coordinate said raceway system with the architect to ensure minimal exposure. Paint exposed raceways as directed by the architect.
- I. Fire alarm devices located within auditorium spaces shall be mounted to backboxes as recommended by the fire alarm manufacturer. Flush mount backboxes in duct liner board. Refer to typical architectural and electrical detail(s) for additional mounting requirements.
- J. Raceways/cabling penetrating any rated wall system shall be provided with steel pipe sleeving and sealant as indicated by typical architectural and electrical penetration details. Refer to other sections of the specifications for additional requirements. The penetration rating shall meet or exceed that of the rating of the element penetrated.

3.02 TESTS

- A. Upon completion of installation, the system shall be subjected to operational tests. When all necessary corrections have been accomplished, the Architect shall be advised and will schedule a final inspection test by a representative of the Owner.
- B. The Contractor shall furnish all instruments, labor, and materials required for the tests and a qualified technician to conduct the tests. Any deficiencies found shall be corrected by the Contractor and system retested as necessary prior to final acceptance. Tests shall be per NFPA and as a minimum shall include the following:
 - 1. Operation of each signal initiating device. Special equipment required for testing heat detectors shall be provided by the Contractor at the time of the test.
 - 2. Operation of all features of the system under normal operation.
 - 3. Operation of all supervisory features of the system.

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4. Operation of all features of the system on standby power with primary powers "OFF".

3.03 WRITTEN INSTRUCTIONS

A. Furnish to the Owner manufacturers written instructions for operation and maintenance of the system furnished under this section.

3.04 DOCUMENTATION

A. Contractor shall provide the following to the local fire official at the time of final inspection:

1. As-builts of fire alarm system.
2. NFPA Certificate of Compliance stating that the system has been installed in accordance with approved plans and specifications.

B. The Contractor shall provide record drawings, operation and maintenance manuals, system program, permit documents, and approved job card at the end of the project to Owner prior to final testing, final acceptance and final payment.

3.05 WARRANTY

A. All equipment, devices, material and workmanship shall be warranted for one year from the date of final inspection.

3.06 TESTING

A. Test the complete Fire Alarm system in the presence of the Owners representative & the Fire Marshall to ensure the entire system & all devices operate satisfactorily. The installing contractor shall make all corrections to the system as necessary at no additional cost to the Owner.

3.07 SEQUENCE OF OPERATION MATRIX

DEVICE ACTION	MANUAL PULL STATION	AREA HEAT/ SMOKE DETECTOR	DUCT SMOKE DETECTOR	SPRINKLER WATER FLOW SWITCH	SPRINKLER VALVE TAMPER SWITCH	SPRINKLER POST INDICATOR SWITCH	120VAC POWER FAILURE
SOUND CONTROL PANEL TROUBLE BUZZER	YES	YES	YES	YES	YES	YES	YES
ACTIVATE RELAY FOR MONITORING (ALARM OR TROUBLE)	YES	YES	YES	YES	YES	YES	YES
SOUND SPRINKLER BELL	NO	NO	NO	YES	NO	NO	NO
ANNUNCIATE AT FIRE CONTROL PANEL (ALARM OR TROUBLE)	YES	YES	YES	YES	YES	YES	YES
ANNUNCIATE AT REMOTE FIRE ALARM ANNUNCIATOR (ALARM OR TROUBLE)	YES	YES	YES	YES	YES	YES	YES
ACTIVATE AUDIBLE/ VISUAL ALARM SIGNAL THROUGHOUT BUILDING	YES	YES	YES	YES	NO	NO	NO
SHUT DOWN ALL AIR HANDLING (HVAC) THROUGHOUT BUILDING	YES	YES	YES	YES	NO	NO	NO

END OF SECTION

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SECTION 16931 – OCCUPANCY SENSORS / LIGHT LEVEL CONTROLLERS

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: All labor, materials, applications, appliances, tools, equipment necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete, as shown on the drawings and/or specified herein. Work includes, but is not limited to, the following:
 - 1. Examine all other specification sections and drawings for related work required to be included as work under Division Sixteen.
 - 2. General provisions and requirements for electrical work.

1.02 SUBMITTALS (ADDITIONAL REQUIREMENTS)

- A. Submit data sheets on sensors, cabling, wiring diagrams, relays, transformers, junction boxes, and mounting accessories.

1.03 EQUIPMENT QUALIFICATIONS

- A. The manufacturer shall have a minimum of five (5) years experience in the sensor and lighting control industry.
- B. System shall be Watt Stopper, Novitas, Leviton or equivalent.
- C. Occupancy sensor systems shall be compatible with the specific lighting fixture ballast(s) and lamps controlled. (Several unique types of ballasts may occur in a given area). Premature failure or life expectancy reductions of the lamps, ballasts, relays and/or occupancy sensors will not be acceptable.
- D. Light level controllers shall be compatible with the specific lighting fixture ballast(s) and lamps controlled. (Several unique types of ballasts may occur in a given area). Premature failure or life expectancy reductions of the lamps and/or ballasts will not be acceptable.

1.04 PERFORMANCE REQUIREMENTS

- A. Occupancy sensor systems shall be provided in every location throughout the facility where interior lighting is utilized with the exception of designated electrical rooms containing switchgear and power distribution equipment.
- B. Coordinate final occupancy sensor locations with the Architectural and Structural drawings. Mount at location(s) as recommended by the manufacturer for 100% unobstructed area coverage.
- C. It shall be the Contractor's responsibility to provide the quantity of sensors required for complete and proper volumetric coverage, without gaps, within the range of coverage(s) of controlled areas. Rooms shall have 90% to 100% volumetric coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). Contractor shall consult with the proposed sensor manufacturer for correct model type and exact placement.

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- D. Occupancy sensors in rooms 145 square feet or less may utilize a wall switch mounted sensor.
- E. Areas such as hallways/corridors, restrooms or other minor movement areas other than classrooms shall employ ultrasonic technology. Where multiple ultrasonic sensors are utilized in a common area, alternate the frequency of units to avoid cross interference.
- F. Classrooms, labs, kindergarten, multi-function or any other rooms utilized for the purpose of education shall incorporate dual technology sensors.
- G. Sensitivity and time-on after activation shall be such that there will be no nuisance on/off switching of the lights by the occupancy sensor while the room is occupied.
- H. The failure of a sensor shall cause the load contacts to close so that the occupancy sensor function is automatically bypassed.
- I. All sensors shall be provided with an indicator light to verify that motion is being detected and that the unit is operation.
- J. All sensors shall be California Energy Commission Title 24 approved and certified.
- K. Light level controller systems shall be provided in location(s) where indicated by the drawings.
- L. Coordinate final light level controller locations with the Architectural and Structural drawings. Mount at location(s) as recommended by the manufacturer for coverage of areas receiving natural daylighting.

PART 2 - PRODUCTS

2.01 OCCUPANCY SENSORS

- A. Passive Infrared Wall Switch Sensors with Daylight Controls
 - 1. Housing shall be white and impact resistant.
 - 2. Sensors shall be capable of detecting presence in floor area to be controlled by detecting changes in infrared energy. Small movements shall be detected such as when a person is writing while seated at a desk.
 - 3. Passive infrared sensors shall utilize a dual-element sensor and a multi-element fresnel lens.
 - 4. Sensors shall be furnished with a daylight filter, which ensures that sensor is insensitive to short-wavelength infrared waves, such as those emitted by the sun.
 - 5. Sensors shall be furnished with convenient bypass provisions which enable lighting to be turned on in case of failure.
 - 6. Time delay range shall be adjustable from 15 seconds to 15 minutes.
 - 7. Sensitivity adjustment shall range from 0 (off) to 10 (maximum).
 - 8. Adjustment and mounting hardware shall be concealed under a removable cover to prevent tampering.
 - 9. Each sensor shall cover up to 200 square feet, with a field-of-view of 150 degrees.
 - 10. Sensors shall be 2-wire completely self-contained control system that replaces standard toggle switch. Power supply shall be an internal transformer. Switching mechanism shall be a latching dry contact relay.
 - 11. Sensors shall be capable of switching from 50 to 1000 watt, incandescent or fluorescent loads.

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12. Sensors shall be furnished with a daylight feature, adjustable from 10 to 400 footcandles that maintain lighting off until a desired footcandle level is present.
13. Sensors shall be dual voltage, 120 volt and 277 volt.

B. Dual Technology Sensors

1. Housing shall be white and impact resistant.
2. Sensors shall be dual technology infrared-ultrasonic capable of detecting presence in floor area to be controlled by detecting Doppler shifts in transmitted ultrasound and infrared technology.
3. Detection shall be maintained when a person moves only within a maximum distance of 12 inches, in either a horizontal or vertical manner, at approximate speed of 12 inches per second. Lights shall not go off when a person is reading or writing while seated at a desk.
4. Each sensor shall be furnished with a convenient shunt provision, which will enable a person to by-pass sensor in the event of failure.
5. Sensitivity shall not change more than 10% in temperature range of 0 degrees F to 120 degrees F, and in a humidity range of 10% to 80%. Sensitivity adjustment shall be provided for each technology.
6. Time delay range shall be adjustable from 15 seconds to 15 minutes.
7. Sensors shall operate on DC power (12 volts to 24 volts). Power supply shall be provided by power pack or control unit, consisting of a transformer and contact closure relay in one package. Power output of transformer shall be capable of operating a minimum of 2 sensors.
8. Provide with ceiling or wall mounting accessories as recommended by the manufacturer for 100% coverage of space.

C. Passive Infrared Sensors

1. Housing shall be white and impact resistant.
2. Sensors shall be capable of detecting presence in floor area to be controlled, by detecting changes in infrared energy. Small movements shall be detected such as when a person is writing seated at a desk.
3. Passive infrared sensors shall utilize a dual-element sensor and a multi-element fresnel lens.
4. Each sensor shall be furnished with a convenient shunt provision, which will enable a person to by-pass sensor in the event of failure.
5. Sensors shall be furnished with a daylight filter which ensures that sensor is insensitive to short-wavelength infrared waves, such as those emitted by the sun.
6. Sensors shall be furnished with convenient bypass provisions which enable lighting to be turned on in case of failure.
7. Time delay range shall be adjustable from 15 seconds to 15 minutes.
8. Sensitivity adjustment shall range from 0 (off) to 10 (maximum).
9. Adjustment and mounting hardware shall be concealed under a removable cover to prevent tampering.
10. Provide sensors with proper range and field of view for 100% coverage of space as recommended by the manufacturer.
11. Sensors shall be furnished with a daylight feature, adjustable from 10 to 400 footcandles that maintain lighting off until a desired footcandle level is present.
12. Sensors shall operate on DC power (12 volts to 24 volts). Power supply shall be provided by power pack/control unit consisting of a transformer and contact closure relay in one package. Power output of transformer shall be capable of operating a minimum of 2 sensors.

D. Ultra Sonic Sensors

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1. Housing shall be white and impact resistant.
2. Sensors shall be ultrasonic capable of detecting presence in floor area to be controlled, by detecting Doppler shifts in transmitted ultrasound technology.
3. Detection shall be maintained when a person moves in either a horizontal or vertical manner. Lights shall not go off when a person is reading or writing while seated at a desk.
4. Each sensor shall be furnished with a convenient shunt provision, which will enable a person to by-pass sensor in the event of failure.
5. Time delay range shall be adjustable from 15 seconds to 15 minutes.
6. All ultrasonic sensors shall comply with the State of California Safety and Health Requirements. Decibel levels for ultrasonic sensors shall comply with the following California Energy Commission criteria for ultrasonic emissions:

MAXIMUM DECIBEL LEVELS FOR ULTRASONIC EMISSIONS	
Midfrequency of Sound Pressure Third-Octave Bank (kHz)	Minimum dB Level Within Third-Octave Band (in dB reference 20 micropascals)
Less than 20	80
20 or more to less than 25	105
25 or more to less than 31.5	110
31.5 or more	115

The Contractor shall certify in writing that all installed ultrasonic sensors comply with the specified California Energy Commission criteria for ultrasonic sound.

7. Sensors shall operate on DC power (12 volts to 24 volts). Power supply shall be provided by power pack/control units consisting of a transformer and contact closure relay in one package. Power output of transformer shall be capable of operating a minimum to two sensors.

E. Light Level Controller

1. Controller shall be capable of detecting changes in lighting levels; it shall utilize an internal photoconductive cell to measure light levels through 50% diffused lens.
2. Controller shall be capable of controlling any type of lighting. It shall be a self-contained 24 VDC device that controls lighting through use of power packs / control units.
3. Controller shall be capable of turning lighting on and off between 10 and 200 footcandles.
4. Controller shall be furnished with an adjustable dead-band feature of 10% to 100%, to prevent lighting from cycling when lighting goes on and off and from minor changes due to cloud cover.
5. Controller shall be furnished with a dual color LED indicating status of sensor. LED shall have an On level with one color and an Off level with another.
6. Adjustment and mounting hardware shall be concealed under a removeable cover to prevent tampering.
7. Each controller shall be furnished with a convenient by-pass provision which will enable lighting to be turned on in the event of failure.

2.02 POWER PACK / CONTROL UNIT

- A. Power pack/control unit shall be an integrated self-contained unit consisting internally of load switching mechanical control relay and a transformer of sufficient capacity to provide low-voltage power to a minimum of two (2) sensors. Solid-state electronic-type relay

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contacts shall not be used. Control unit shall incorporate design provisions to protect unit from premature failure due to high inrush ballasts.

- B. Relay contacts shall be dry types with ratings of:
 - 1. 10A – 120 VAC Tungsten
 - 2. 20A – 120 VAC Ballast
 - 3. 20A – 277 VAC Ballast
- C. Power pack/control unit shall be U.L. listed.

PART 3 - EXECUTION

- 3.01 Install occupancy sensors and light level controllers in accordance with manufacturer's instructions.
- 3.02 Whether or not indicated by the drawings, sensors shall be wall and/or ceiling mounted at a height to avoid obstructions which may inhibit the effectiveness of the device.
- 3.03 Whether or not indicated by the drawings, sensors shall be pendant mounted in areas where fixtures are pendant mounted or other obstructions inhibit the effectiveness of a ceiling mounted device.
- 3.04 Wiring between sensors and power packs/control units shall be plenum rated 18 AWG, stranded U.L. Classified, PVC jacketed and insulated.
- 3.05 All wiring shall be installed in conduit, except low voltage sensor cabling between sensor and power packs / control units.
- 3.06 Power packs / control units shall be located in accessible ceiling spaces and be powered from the lighting circuit which they control.
- 3.07 Enclosures for power packs/ control units shall be pressed steel, NEMA I construction with mounting plates and barriers to provide separation between line and low voltage wiring or standard 4" deep junction box with control unit mounting to cover plate with ½" knockout.
- 3.08 Adjust and test each sensor/control unit in accordance with the manufacturer's recommendations. Be certain that no obstructions block proper sensor coverage of areas desired and minimize sensor pickup zone.

NOTE: Occupancy sensors may be affected by various conditions in the room. It may be necessary for the Contractor to make adjustments, change the location or type of sensor to obtain proper operation in a specific room. The Contractor shall have final responsibility for proper operation of the system in each room and should therefore make labor and material allowances for changes and adjustments.

- 3.09 Contractor shall warrant all equipment furnished in accordance to this specification to be undamaged, free of defects in materials and workmanship, and in conformance with the specifications. The supplier's obligation shall include repair or replacement, and testing without charge to the Owner, all or any parts of equipment which are found to be damaged, defective or non-conforming and returned to the supplier. Warranty on sensors and control units will be for a period of at least two (2) years. The warranty shall commence upon Owner's acceptance of the project. Warranty on labor shall be for a period of minimum one (1) year.

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- 3.10 The Contractor shall provide the training necessary to familiarize the Owner's personnel with the operation, use and adjustment of the devices.
- 3.11 Furnish 10% spare occupancy sensors of each type with a minimum of one (1) spare sensor of each type.

END OF SECTION