LITTLE
DIVERSIFIED ARCHITECTURAL CONSULTING

PROJECT MANUAL

Public Safety Building

Compton Community College
Compton, California

Little Project Number #913-4675-01

November 16, 2017

1300 Dove Street
Suite 100
Newport Beach, CA 92660
Telephone: 949.698.1400
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PROJECT MANUAL

For the Construction

of

Public Safety Building

Compton Community College

for

Compton Community College District

Prepared By

Little

1300 Dove Street, Suite 100
Newport Beach, California 92660

Little #913-4675-01

November 16, 2017

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GENERAL DOCUMENTS

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DIRECTORY/CERTIFICATIONS

PROJECT

COMPTON COMMUNITY COLLEGE
Public Safety Building
Little Project No. 913-4675-00

OWNER

Compton Community College District
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Compton, CA 90221
Dr. Keith Curry, Provost
(310) 900-1600

ARCHITECT

Little Diversified Architectural Consulting
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CONSULTANTS

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MECHANICAL/PLUMBING
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(626) 445-8580

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150 S. Arroyo Parkway, Suite 100
Pasadena, CA 91105
(626) 445-8580

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
03 117673
AC FLS SS
Date DEC 12 2017

APPROVALS

DSA

DENTIFICATION STAMP
DIV OF THE STATE ARCHITECT

AC PLS
Date

SECTION 01 11 00

SUMMARY OF WORK

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Summary of work under this contract

1.1.2. Regulatory Requirements

1.1.3. Contractor use of site and premises.

1.1.4. Owner occupancy.

1.2. SUMMARY OF WORK

1.2.1. Work under this contract includes the following task areas, as shown on the drawings, specified in the Project Manual, and defined in the project contract documents, including but not necessarily limited to:

1.2.1.1. Demolition of certain existing site improvements.

1.2.1.2. Construction of new building structure and related work.

1.2.1.3. Associated site work and improvements.

1.2.1.4. Connection of utility systems as shown on drawings.

1.2.2. Perform all work in accordance with the requirements of the General Conditions and related Contract Documents.

1.3. REGULATORY REQUIREMENTS.

1.3.1. Perform Work in accordance with the applicable provisions of Parts 1-5, 7, 8, 10 and 12, Title 24, California Code of Regulations.

1.3.2. Perform Work in accordance with the applicable provisions of local Codes and Regulations, including the following as adopted by jurisdictional authority

1.3.2.1. California Building Code

1.3.2.2. California Mechanical Code

1.3.2.3. California Plumbing Code

1.3.2.4. National Electrical Code.

1.3.2.5. California Code of Regulations, Title 24; applicable sections related to accessibility requirements.

1.3.3. During the entire construction period, it shall be the sole responsibility of the Contractor to maintain conditions at the Project Site to meet the requirements of the Federal Occupational Safety and Health Administration (OSHA) and California occupational regulations. This provision shall cover the Contractor's employees and all other persons working upon or visiting the site. The Contractor shall become fully informed of all applicable standards and regulations and inform all persons and representatives responsible for work under this Contract.

1.4. CONTRACTOR USE OF SITE AND PREMISES

1.4.1. Contractors use of site and premises shall allow:

1.4.1.1. Work by Others and Work by Owner.

1.4.1.2. Use of site and premises by public.

1.4.2. Access to Site: Coordinate with Owner.

1.4.3. Building Exits During Construction: Maintain all exits. Do not obstruct at any time.

1.4.4. Time and Construction Schedule Considerations:

1.4.4.1. Schedule all construction operations with Owner.

1.4.4.2. Construction operations generating excessive noise, such as use of pneumatic tools and powder actuated fastener equipment, shall be scheduled with the Owner.

1.4.4.3. Locate all noise generating equipment, such as cut-off saws, in a remote location away from administrative or classroom areas.

1.4.4.4. Schedule replenishing construction materials with the Owner.

1.4.4.5. Owner reserves the right to modify such scheduled operations to accommodate school operations or classroom programs.

1.4.4.6. Provide Owner with 5 working days notice prior to commencing such operations.

1.4.4.7. Construction operations, such as material deliveries, debris removal, and crane operations, shall not occur when students, staff or visitors are present at construction site. Schedule such operations around school schedule, including recess and lunch periods. Where, in the sole opinion of the Architect, the construction site is sufficiently remote or isolated that students, staff or visitors are not exposed to such operations, construction operations may proceed as scheduled by Contractor in conformance with the Project Manual.

1.4.4.8. After Owner takes beneficial occupancy of portions of project the Contractor, subcontractors and all support staff will not be allowed to enter such school facilities during hours school is in session. Where access is required to complete the work, coordinate access and scheduling with Owner's representative for non-school time.

1.4.5. Utility Outages and Shutdown: Provide minimum 5 working days notice of any utility interruption. No deviation to the commencement nor duration of the outage or shutdown from the schedule agreed upon is allowed.

1.4.6. Construction Yard and Storage Areas: Coordinate with Owner. Coordinate location with areas required by work performed under separate contract by others. Owner will establish acceptable path for products, staging areas, and trash disposal.

1.4.6.1. Coordinate location of all equipment parking, material and stockpile storage and construction parking with Owner.

1.4.7. Equipment Relocation:

1.4.7.1. Prior to beginning work in any one area, relocate all equipment and furniture in all areas of work under this contract, including items prepared by Owner staff.

1.4.7.2. Prior to relocation, and in the presence of the Owner Inspector, prepare a written inventory and a video log of the condition of all equipment and furniture.

1.4.7.3. Protect fixed equipment and furnishings not relocated as directed by Owner.

1.4.7.4. Following completion of work in areas under this contract, return stored items to locations as directed by Owner. Owner staff will unpack boxed items originally packed by the Owner. Contractor shall install and locate all other relocated equipment and furnishings as directed by Owner.

1.4.7.5. Dispose of all boxes, waste, trash and debris off-site.

1.5. OWNER OCCUPANCY

1.5.1. The Owner will occupy the site and existing facilities during entire period of construction for the conduct of normal college operations.

1.5.2. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

1.5.3. Adjacent Floor/Area access: Coordinate scheduling of required access to adjacent rooms and floors incidental to the work of this contract. Provide minimum 5 working days notice to Owner for required access to such areas.

1.5.3.1. Do not core or drill through walls or floors into adjacent occupied areas.

2. PART 2 - PRODUCTS

\\Not Used

3. PART 3 - EXECUTION

\\Not Used

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Schedule of Values.

1.1.2. Applications for Payment.

1.2. SCHEDULE OF VALUES

1.2.1. Submit typed schedule on AIA Form G703-Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic print-out format may be considered, at Owners Representative's discretion.

1.2.2. Submit Schedule of Values per time periods defined in General Conditions.

1.2.3. Identification: Include on schedule of values the following:

1.2.3.1. Project name and Location.

1.2.3.2. Name of Architect.

1.2.3.3. Architect's Project Number.

1.2.3.4. Contractor's Name and Address.

1.2.3.5. Date of Submittal.

1.2.4. Format: Type in tabular form with separate columns to indicate the following for each item listed.

1.2.4.1. Work Task Name, using Project Manual table of contents as a content guide.

1.2.4.2. Related Specification Section.

1.2.4.3. Name of Subcontractor.

1.2.4.4. Name of manufacturer or fabricator where applicable.

1.2.4.5. Name of supplier where applicable.

1.2.4.6. Change Order amounts allocated to the line item.

1.2.4.7. Total Dollar value of item.

1.2.4.8. Percentage of Contract sum represented by item, rounded to nearest one hundredth percent, adjusted to total 100 percent.

1.2.5. Correlate line items with terms and identification used in other administrative work items, including schedules, list of subcontractors, list of products and suppliers, and submittal schedule.

1.2.6. Provide schedules as follows.

1.2.6.1. Provide separate schedule of values for each building, and a single schedule for site work.

1.2.6.2. Where an Application for Payment may include requests for equipment, components or materials purchased, stored or fabricated, but not yet installed, provide separate line item on the Schedule of Values for such items. Breakdown such line items to include component, equipment or material cost for each phase or sequence of construction, with associated staging, transport and installation cost.

1.2.7. The total of the amounts of all scheduled line items shall equal the Contract Sum. Round amounts to nearest dollar.

1.2.8. Provide separate line item for Contractor's overhead and profit.

1.2.9. Revise schedule to list approved Change Orders and Construction Change Directives, and submit with each Application For Payment.

1.2.10. The amounts shown on Schedule of Values may be used by Owner to determine the true value for additive or deductive change orders.

1.3. APPLICATIONS FOR PAYMENT

1.3.1. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

1.3.2. Payment Period: Monthly, scheduled as defined in General Conditions.

1.3.3. Submit application on AIA Form G702-Application and Certificate for Payment as follows:

1.3.3.1. Submit initial rough draft of pay application to Architect, Inspector of Record and Owner for review.

1.3.3.2. Architect will return initial rough draft of pay application to Contractor following review.

1.3.3.3. Submit six copies of adjusted pay application to Architect, consisting of 3 complete copies with all back-up and justification, 2 partial copies (cover sheet, schedule of values and releases) and one pencil copy showing corrections required by Architect on initial rough draft.

1.3.3.3.1. Submit to Inspector of Record for signature prior to submittal to Architect.

1.3.3.4. Submit conditional lien releases for work covered by current application warranting that title to all work, labor, materials and equipment covered by the application is free and clear of all liens, claims, security interests or encumbrances, and notarized unconditional releases for work covered by previous months billings.

1.3.3.5. Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned without action.

1.3.3.6. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

1.3.3.7. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

1.3.3.8. By signing a certificate for payment, the Architect shall not be deemed to represent that the Architect has made exhaustive or continuous on-site inspections to check the quality or quantity of the work, has reviewed the construction means, methods, techniques, sequences or procedures, or has made an examination to ascertain how or for what purpose the Contractor has used previous payments.

1.3.3.9. Payments may be made by the Owner, in its sole discretion, on account of materials or equipment not incorporated into the work but delivered to the site and suitably stored and insured by the Contractor. Payments for materials or equipment stored shall only be considered upon submission by the Contractor of satisfactory evidence that it has acquired title to such material, that it will be utilized on the work under this contract and that it is satisfactorily stored, protected and insured, or such other procedures satisfactory to the Construction Manager, Inspector and Architect, to protect the Owner's interests.

1.4. PROGRESS PAYMENT COORDINATION

1.4.1. See Section 01 77 19 for requirements and relationship between progress payment and maintenance of record drawings.

1.4.2. See Section 01 33 00 for requirements and relationship between progress payment and construction schedule updates.

1.5. INSPECTOR OF RECORD PAYMENT PROVISIONS

1.5.1. In the event Contractor's performance of the work activities requires the Owner's Inspector of Record to work overtime, holidays or weekends, Inspectors cost shall be reimbursed by Contractor to Owner by deductive contract adjustment.

1.6. PAYMENT FOR CONTRACT MODIFICATIONS

1.6.1. The Contractor shall compensate the Owner, by Owner-Contractor Contract adjustment, for the Architect reasonable costs to modify Contract Documents required by work not performed in accordance with approved Contract Documents.

1.7. RETAINAGE

1.7.1. Subject to the requirements of state law, each Application for Payment shall be subject to retainage in the amount of ten percent. The amounts so reserved will be subject to claims of liens provided by applicable state law.

1.7.2. Pursuant to Section 22300 of the Public Contract Code of the State of California, the contract will contain provisions permitting the Contractor to substitute securities for any moneys withheld by the Owner to ensure performance under the contract.

1.7.3. The Contractor warrants and guarantees herewith that title to all work, Materials and equipment covered by an application for payment will pass to the Owner either by incorporation in the construction or upon the receipt of payment by the Contract, whichever occurs first, free and clear of all liens, claims, security interest or encumbrances, referred to in this article as "liens"; and that no work, materials or equipment covered by an application for payment will have been acquired by the Contractor, or by any other person performing work at the site or furnishing materials and equipment for the project, subject to an agreement under which an interest of an encumbrance is retained by the seller or otherwise imposed by the Contractor or such other person.

1.8. PROGRESS PAYMENTS

1.8.1. After a certificate of payment has been issued, the Owner shall make payment in the manner and within the time provided in the Contract Documents.

1.8.2. The contractor shall promptly pay each subcontractor (including suppliers, laborers and material men) performing labor or furnishing material for the work upon receipt of payment from the Owner out of the amount paid to the Contractor on account of the work of such subcontractor, supplier, laborer or material man, the amount to which said subcontractor is entitled, reflecting the percentage actually retained, if any, from payments to the Contractor on account of such work. The Contractor shall, by an appropriate agreement with each subcontractor, also require each subcontractor to make payments to his sub subcontractors in a similar manner.

1.8.3. The Owner may, on request, furnish to any subcontractor, if practicable, information regarding the percentages of completion or the amounts applied for the Contractor and the action taken by the Architect on account of the work done by such subcontractor.

1.8.4. Neither the Owner nor the Architect shall have any obligation to pay nor to see to the payment of any monies to a subcontractor except as may otherwise be required by law.

1.8.5. No certificate for a progress payment nor any progress payment nor any partial or entire use or occupancy of the project by the Owner shall constitute an acceptance of any work which is not in accordance with the Contract Documents.

1.8.6. The Contractor agrees to keep the work and the site on which work is to be performed free and clear of all liens and claims of liens on materials furnished pursuant to the Contract Documents.

1.9. PAYMENTS WITHHELD

1.9.1. The Architect may decline to certify payment and may withhold their certificate in whole or in part, to the extent necessary to protect the Owner, if in their opinion they are unable to make representations to the Owner as provided in this Section.

1.9.2. If the Architect is unable to make representations to the Owner and to certify payment in the amount of the application, the Architect will notify the Contractor as soon as possible. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly issue a certificate for payment in the amount for which the Architect is able to make such representations to the Owner.

1.9.3. The Architect may also decline to certify payment or any part thereof or, because of subsequent observations, Architect may nullify the whole or any part of any certificate for payment previously issued, to such extent as may be necessary in their opinion to protect the Owner from loss because of the following conditions.

1.9.3.1. Defective work not remedied;

1.9.3.2. Third party claims filed or reasonable evidence indicating probable filing of such claims;

1.9.3.3. Failure of the Contractor to make payments property to subcontractors or for labor, materials or equipment;

1.9.3.4. Reasonable evidence that the work cannot be completed for the unpaid balance of the contract sum;

1.9.3.5. Damage to the Owner or another contractor;

1.9.3.6. Failure to execute the work in accordance with the Construction schedule;

1.9.3.7. Failure to provide, maintain, and update record drawings;

1.9.3.8. Reasonable evidence that the work will not be or had not been completed within the contract time;

1.9.3.9. Failure to carry out the work in accordance with the Contract Documents;

1.9.3.10. Liens filed, or reason to believe it is probable a lien will be filed for any portion of the work;

1.9.3.11. Failure or refusal of the Contractor to fully comply with Division 1.

1.10. FINAL COMPLETION AND FINAL PAYMENT

1.10.1. Upon receipt of written notice from the Contractor as required in Section 01 77 19 that the work is ready for final inspection and acceptance and upon receipt of final application for payment, the Architect will promptly make such inspection, and when they find the work acceptable under the Contract Documents and the Contract fully performed, the Architect will issue a Final Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their observations and inspections, the work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor, and noted in said final certificate, is due and payable.

1.10.2. Retention of funds withheld will be released to the Contractor within 60 days of the date of completion of a work of improvement. Completion is defined as occurring when a Owner begins occupancy, beneficial use, and enjoyment of work of improvement (excluding an operation for testing, startup, or commissioning) accompanied by a cessation of labor on the work of improvement.

1.10.3. Neither final payment nor the remaining retainage percentage shall become due until the work is free and clear of any and all liens and the Contractor submits to the Owner:

1.10.3.1. An affidavit that all payrolls, bills for materials and equipment and other indebtedness connected with the work for which the Owner or his property might in any way be responsible, have been paid or otherwise satisfied.

1.10.3.2. Consent of surety, if any, to final payment.

1.10.3.3. If required by the Architect, other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Contractor, to the extent and in such form as may be designated by the Architect.

1.10.4. If, after substantial completion of the work, final completion thereof is materially delayed through no fault of the Contractor or by the issuance of change orders affecting final completion, and the Owner so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the contract, make payment of the balance due for that portion of the work fully completed and accepted.

1.10.5. The making of final payment shall constitute a waiver of all claims by the Owner against the Contractor except those arising from:

1.10.5.1. Unsettled liens and claims against the Owner, the Architect, or their employees, agents or representatives;

1.10.5.2. Faulty or defective work appearing after substantial completion;

1.10.5.3. Failure of the work to comply with the requirements of the Contract Documents;

1.10.5.4. Failure to provide fully updated and completes record drawings;

1.10.5.5. Any warranties contained in or required by the Contract Documents; or

1.10.5.6. Damages incurred by the Owner resulting from lawsuits brought against the Owner, the Architect, or their agents, employees or representatives because of failures or actions on the part of the Contractor, his subcontractors or sub subcontractors, or any of their employees, agents or representatives.

1.10.5.7. The acceptance of final payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the final application for payment

1.10.5.8. All provisions of this Agreement, including, without limitation, those establishing obligations and procedures, shall remain in full force and effect notwithstanding the making or acceptance of final payment prior to the Date of Substantial Completion of the Project.

1.10.6. PREPARATION OF APPLICATION FOR FINAL PAYMENT

1.10.6.1. Fill in application form as specified for progress payments.

1.10.6.2. Use continuation sheet for presenting the final statement of accounting.

1.10.6.3. Administrative actions and submittals, which must precede or coincide with submittal of the final payment Application for Payment include the following:

1.10.6.3.1. Occupancy permits and similar:

1.10.6.3.2. Warranties (guarantees) and maintenance agreements.

1.10.6.3.3. Test/adjust/balance records.

1.10.6.3.4. Maintenance instructions.

1.10.6.3.5. Meter readings.

1.10.6.3.6. Start-up performance reports.

1.10.6.3.7. Change-over information related to

1.10.6.3.8. Owner's occupancy, use, operation and maintenance.

1.10.6.3.9. Final cleaning.

1.10.6.3.10. Completion of Project closeout requirements, including all reports and certifications required by Authorities Having Jurisdiction.

1.10.6.3.11. Completion of items specified for completion after Substantial Completion.

1.10.6.3.12. Assurance that unsettled claims will be settled.

1.10.6.3.13. Assurance that Work not complete and accepted will be completed without undue delay.

1.10.6.3.14. Transmittal of required Project construction records to Owner.

1.10.6.3.15. Proof that taxes, fees and similar obligations have been paid.

1.10.6.3.16. Removal of temporary facilities and services.

1.10.6.3.17. Removal of surplus materials, rubbish and similar elements.

1.10.6.3.18. Change of door locks to Owner's access.

2. PART 2 - PRODUCTS

(NOT USED)

3. PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 25 00

PRODUCT OPTIONS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Product Options.

1.1.2. Substitutions.

1.2. PRODUCT OPTIONS

1.2.1. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

1.2.2. Products Specified by Naming a Manufacturers Product: Provide Products of the lead manufacturer named in compliance with specifications.

1.2.2.1. Products of alternate manufacturers not named are considered substitutions, and may be considered by Architect, provided products provide quality and performance equal to that specified.

1.2.2.2. Where another manufacturer is listed as an approved alternate manufacturer to the specified lead manufacturer, products supplied by listed alternate manufacturer shall comply with specified characteristics of the lead manufacturer, and demonstrate compliance by providing substitution documentation as required by this Section.

1.2.2.3. Where the substituted manufacturers standard product is not equal to that specified, the substituted manufacturer shall provide custom or non-standard products, system components, fabrication and configuration as necessary to comply with specified criteria, whether or not such criteria are the substituted manufacturers standard or stock item.

1.2.2.4. Consideration of whether a substituted product is equal to that specified will include all characteristics of the specified product, based on published data available from the specified manufacturer, whether listed in the specification or not.

1.2.2.5. Consideration of whether a substituted product is equal to that specified is solely the decision of the Architect.

1.2.2.6. Provide substitution documentation as specified in this Section.

1.2.3. Where product is specified followed by term "No Substitution Permitted", or similar phrase, do not submit alternate products for review. Any substitution request received will be returned rejected.

1.3. SUBSTITUTIONS

1.3.1. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period according to requirements specified in this Section.

1.3.2. Substitutions, including requests for substitution during bidding period, will be considered in accordance with the General Conditions and this Section.

1.3.3. Submit all Requests for Substitutions within **7** days after Notice to Proceed. Substitutions received after this date will be rejected.

1.3.3.1. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.

1.3.4. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents and as follows.

1.3.4.1. Submit each request separately, using form provided in this Section.

1.3.4.2. Provide a typed, line by line comparison of the characteristics and attributes of the specified item with those of the proposed substitution. Where necessary, convert test data of the proposed substitution to the same test method of the specified item or product.

1.3.5. By submitting a request, the Contractor stipulates that the Contractor:

1.3.5.1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.

1.3.5.2. Will provide the same warranty for the Substitution as for the specified Product.

1.3.5.3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.

1.3.5.4. Waives claims for additional costs or time extension which may subsequently become apparent.

1.3.6. Contractor agrees to compensate Architect, at Architect's current billing rates, for review of Substitution requests that require modification of the Contract Documents.

1.3.6.1. Compensation shall be made by an adjustment to the Contract amount.

1.3.6.2. Compensation as agreed upon shall be paid by the Contractor whether the change is approved or rejected.

1.3.6.3. Where required by agency having jurisdiction Division of State Architect (DSA) approval(s), the Contractor shall pay all plan check fees or fees required to obtain approval.

1.3.6.4. The Contractor shall pay the Architect and its Consultants for all services rendered for drawings, calculations, review time, and/or agency DSA plan check time for each substitute item(s) for approval.

1.3.7. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

1.3.8. Request for Substitution will only be considered when submitted within specified time period of Contract award, and when such request is accompanied by complete data substantiating compliance of proposed substitution with Contract Documents criteria and standard of quality.

1.3.9. Substitution Submittal Procedure:

1.3.9.1. Submit three copies of Request for Substitution for consideration. Limit each request to one proposed Substitution.

1.3.9.2. Submit Substitution Request Form as attached, shop drawings, Product data, certified test results and other documentation required by the Architect attesting to the proposed Product equivalence.

1.3.9.2.1. Substitution requests without such documentation will be rejected without review.

1.3.9.3. The Architect will notify Contractor, in writing, of decision to accept or reject request.

1.3.9.3.1. The Architect will review Substitution Request upon receipt and will request any additional data necessary to accept or reject substitution request.

1.3.9.3.2. Substitution Requests received after 9:00 AM on Friday will be logged as received on the following Monday at 8:00 AM.

1.3.9.3.3. The decision to accept or reject substitution request will be made within a reasonable period after Architect receives final documentation data.

1.3.9.3.4. Where substitution request is rejected, provide submittal for specified product within five days of receipt of notice rejection.

1.3.9.3.5. Where decision cannot be made within the time required for orderly and uninterrupted work progress, provide the specified product.

1.3.9.4. A maximum of one substitution request shall be submitted for any one item.

1.3.9.5. Substitutions with material effect on the project will be submitted for approval of agency having jurisdiction by DSA as a Change Order per Section 01 26 00, prior to fabrication or installation.

2. PART 2 – PRODUCTS

NOT USED

3. PART 3 – EXECUTION

NOT USED

END OF SECTION

CONTRACTOR'S SUBSTITUTION REQUEST FORM REQUEST #_____

Contractor: _____ LITTLE Proj. # 913-4675-01 Date: _____

To: LITTLE, Attn.:_____ LITTLE Project: Compton CCD, Public Safety Bldg

Reference: Drawing(s)_____ Spec Section(s)_____ Other _____

Disciplines Impacted: [ ] Structural [ ] Mechanical [ ] Electrical [ ] Architectural

[ ] Civil [ ] Landscape [ ] Kitchen [ ]_____

By submitting substitution, Contractor stipulates the following statements are correct:

1. Proposed substitution does not alter dimensions or dimensional relationships shown on drawings.
2. The Architect's costs caused by proposed substitution will be compensated per Section 01 25 00.
3. Proposed substitution does not adversely impact schedule or coordination of work by others.
4. Proposed substitution will not adversely impact warranty requirements.
5. Proposed substitution will not adversely impact availability of service, maintenance or replacement parts.

Summary of Proposed Substitution: _____

Reason for Proposed Substitution: _____

Comparison of proposed item to specified item per Section 01 25 00:	[ ] Attached	[ ] Under separate cover
Name and Location of three similar applications:	[ ] Attached	[ ] Under separate cover
Description of required changes to the drawings and project manual:	[ ] Attached	[ ] Under separate cover
Description of impact on applicable code requirements:	[ ] Attached	[ ] Under separate cover
Name and Location of maintenance service and parts supply:	[ ] Attached	[ ] Under separate cover

If Substitution Request is accepted, there will be:

Possible Cost Impact	[ ] Increase	[ ] Decrease	[ ] No Change
Possible Time Impact	[ ] Increase	[ ] Decrease	[ ] No Change

Action on this Substitution Request is requested as soon as possible, but no later than _____. **[ ] PRIORITY ATTENTION REQUIRED**

_____ Copies to: _____

Contractor's Representative

Architect's Response: Date: _____

[ ] Accepted [ ] Accepted as noted [ ] Denied [ ] Denied: Received late

_____ Copies to: _____

Architect's Representative

_____ Copies to: _____

Owner's Representative

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Schedule of Values.

1.1.2. Change procedures.

1.1.3. Request for Information Procedures.

1.2. SCHEDULE OF VALUES

1.2.1. Submit typed schedule complying with the format established in this Section. Contractor's standard form or electronic print-out format may be considered, at Architect's or Owner's discretion.

1.2.2. Submit Schedule of Values per schedule defined in General Conditions and as specified.

1.2.3. Identification: Include on schedule of values the following:

1.2.3.1. Project name and Location.

1.2.3.2. Name of Architect.

1.2.3.3. Architect's Project Number.

1.2.3.4. Contractor's Name and Address.

1.2.3.5. Date of Submittal.

1.2.4. Format: Type in tabular form with separate columns to indicate the following for each item listed.

1.2.4.1. Generic Name, using Project Manual table of contents as a content guide and also include items which appear only on drawings and not in the Project Manual.

1.2.4.2. Related Specification Section or drawing sheet.

1.2.4.3. Name of Subcontractor.

1.2.4.4. Name of manufacturer or fabricator where applicable.

1.2.4.5. Name of supplier where applicable.

1.2.4.6. Change Order amounts allocated to the line item.

1.2.4.7. Total Dollar value of item.

1.2.4.8. Percentage of Contract sum represented by item, rounded to nearest one hundredth percent, adjusted to total 100 percent.

1.2.5. Correlate line items with terms and identification used in other administrative work items, including schedules, list of subcontractors, list of products and suppliers, and submittal schedule.

1.2.6. Provide schedules as follows.

1.2.6.1. Provide schedule of values for site work.

1.2.6.2. Where an Application for Payment may include requests for equipment, components or materials purchased, stored or fabricated, but not yet installed, provide separate line item on the Schedule of Values for such items. Breakdown such line items to include component, equipment or material cost for each phase or sequence of construction, with associated staging, transport and installation cost.

1.2.7. The total of the amounts of all scheduled line items shall equal the Contract Sum. Round amounts to nearest dollar.

1.2.8. Provide separate line item for Contractor's overhead and profit.

1.2.9. Revise schedule to list approved Change Orders and Construction Change Directives, and submit with each Application For Payment.

1.2.10. The amounts shown on Schedule of Values may be used by Owner to determine the true value for additive or deductive change orders.

1.3. INSPECTOR OF RECORD PAYMENT PROVISIONS

1.3.1. In the event Contractor's performance of the work activities requires the Owner's Inspector of Record to work overtime, holidays or weekends, Inspectors cost shall be reimbursed by Contractor to Owner by deductive contract adjustment.

1.4. CHANGE PROCEDURES

1.4.1. General

1.4.1.1. Contractor shall establish measures as needed to assure familiarity of the Contractor's staff and employees with procedures for processing changes to the Contract Documents.

1.4.1.2. The Contractor shall maintain and coordinate a Register of RFIs, DSA CCDs, Contractor Change Order Requests and Change Orders at the job site, accurately reflecting current status of all pertinent data as submitted by the Contractor. Any files kept by the Inspector of Record will not be accessible for Contractor's use.

1.4.2. Architect's Supplemental Instructions: The Architect will advise of minor changes in the Work that do not involve an adjustment to Contract Price or Contract Time by issuing supplemental instructions on DSA Form 141 [CCD type B], AIA Form G710, Bulletin or other Architect issued document.

1.4.3. Construction Change Document [DSA CCD]: A CCD will be issued by the Architect to document changes in the work.

1.4.3.1. DSA CCD type A, DSA form 140: Will be issued for substantive changes to the project which require formal submission and approval by DSA.

1.4.3.1.1. Contractor shall not proceed with work as defined by the CCD Type A document prior to DSA approval.

1.4.3.2. DSA CCD type B, DSA form 141: Will be issued for minor changes to the project which are not required to be submitted to DSA.

1.4.3.2.1. Contractor shall proceed with all work as defined by the CCD Type B without delay to the approved project schedule.

1.4.3.3. The Inspector of Record will maintain copies of all CCDs in the project file for review by DSA's Site Engineer.

1.4.3.4. If Contractor considers that a change indicated represents a change in the contract, Contractor shall immediately notify the Architect of Contractor's intention to make a claim via a Change Order Request (COR).

1.4.3.5. Contractor agrees to compensate Architect, at Architect's current billing rates, for review and processing of DSA CCD that require modification of the Contract Documents as a result of Contractor error, miscoordination of the work, or request to substitute or change means or methods.

1.4.4. Proposal Request (PR): At the Owner's request, the Architect may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications.

1.4.4.1. Analyze the described change and its impact on costs and time. Submit response within 10 days. If accepted by Owner, Architect will prepare Change Order.

1.4.4.2. When requested, meet with the Architect as required to explain costs and, when appropriate, determine other acceptable ways to achieve the desired objective.

1.4.4.3. Alert pertinent personnel and subcontractors as to the impending change and, to the maximum extent possible, avoid such work as would increase the Owner's cost for making the change, advising the Architect in writing when such avoidance no longer is practicable.

1.4.4.4. Following review, and if accepted by Owner, Architect will prepare a CCD and the Contractor will prepare a COR.

1.4.5. Change Order Request (COR):

1.4.5.1. Contractor may submit a COR to the Architect via the Construction Manager, for changes in conditions, Owner changes, or other direction from the Architect, jurisdictional authority or Inspector of Record.

1.4.5.2. Document the proposed change and its complete impact, including its effect on the cost and schedule of the work.

1.4.5.3. Present total cost and schedule impacts in documentation, including all mark-ups permitted by General Conditions. Provide detailed back-up as required by Architect, Inspector of Record or Owner including supplier costs, sub-contractor labor time and rates, and all other data deemed necessary by Architect for Owner's and Architect's review of COR.

1.4.5.4. Following final review by Architect, Inspector of Record, and Owner and if COR is accepted, Contractor shall prepare a Change Order.

1.4.6. Change Order (CO): Change Orders will be issued by the Contractor in accordance with procedures established in General Conditions.

1.4.6.1. Change Order Forms: Per attached form at end of this Section, unless indicated otherwise in the General Conditions.

1.4.6.2. Execution of Change Orders: Contractor shall issue Change Orders for signatures of Owner, Architect, Inspector of Record and Contractor as provided in the General Conditions of the Contract.

1.4.7. Following agreement on cost of the work presented to the Owner as a COR, a Change Order will be prepared.

1.4.8. No payment on Time and Materials basis will be made without signature of Inspector of Record certifying time spent and materials used Architect and Inspector of Record shall establish documentation and reporting procedure for Time and Material certification.

1.4.9. All changes in contract for construction, regardless of effect on Contract Price or Contract Time, require the approval of DSA in accordance with Section 4-338, Part 1, T-24 CCR, "Addenda and Change Orders".

1.4.10. Architect will provide a single copy of all documents issued under this Article for transmission to Contractor. Contractor shall prepare copies as required for distribution to subcontractors, suppliers and others at no cost to Owner.

1.5. PROGRESS PAYMENT COORDINATION

1.5.1. See Division 00 and 01 for requirements and relationship between progress payment and maintenance of record drawings.

1.5.2. See Division 00 and 01 for requirements and relationship between progress payment and construction schedule updates.

1.5.3. See General Conditions for additional information on payment procedures.

1.5.4. Submit application on AIA Form G702-Application and Certificate for Payment as follows:

1.5.4.1. Submit initial rough draft of pay application to Architect, See General Conditions Article 9.4 for application.

1.5.4.2. Submit conditional lien releases for work covered by current application, and unconditional releases for work covered by previous months' billings.

1.5.5. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

1.5.6. Payment Period: Monthly, scheduled as defined in General Conditions.

1.5.7. Application Preparation:

1.5.7.1. Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned without action.

1.5.7.2. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

1.5.7.3. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

1.6. PAYMENT FOR CONTRACT MODIFICATIONS

1.6.1. The Contractor shall compensate the Owner, by Owner-Contractor Contract adjustment, for the Architect reasonable costs to modify Contract Documents required by work not performed in accordance with approved Contract Documents.

1.7. REQUEST FOR INFORMATION (RFI)

1.7.1. The Architect will respond to legitimate and bonafide Requests for Information (RFI) initiated by Contractor.

1.7.2. Submit all RFIs on attached form. Use of Contractor's form will not be accepted. RFIs submitted by subcontractors or suppliers will not be reviewed.

1.7.3. The Contractor shall compensate the Architect, Inspector, or Construction Manager, by Owner-Contractor Contract adjustment, for the Architect's reasonable costs to respond to RFI's if the Architect determines:

1.7.3.1. The RFI does not reflect careful study and review of the documents, or;

1.7.3.2. Demonstrates a lack of knowledge or construction competency reasonably expected of a Contractor performing the work.

1.7.4. The Architect's action will be taken with such reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review.

1.7.5. RFI's received in Architect's office after 9:00 AM Friday will be logged in as received by Architect on Monday, 8:00 AM. This applies to all forms of communication, including RFI's arriving via email transmission.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

CONTRACTOR'S REQUEST FOR INFORMATION

RFI # _____

From: _____ LITTLE Proj. # 913-4675-01 Date: _____

To: LITTLE, Attn: _____ LITTLE Project: Compton CCD, Public Safety Bldg

Disciplines Impacted:	[ ] Structural	[ ] Mechanical	[ ] Electrical	[ ] Architectural
	[ ] Civil	[ ] Landscape	[ ] Kitchen	[ ] _____

Reference: Drawing(s)_____ Spec Section(s) _____ Other _____

Please clarify or provide the following information:

Possible Cost Impact	[ ] Increase	[ ] Decrease	[ ] No Change	[ ] Unknown
Possible Time Impact	[ ] Increase	[ ] Decrease	[ ] No Change	[ ] Unknown

This information is required as soon as possible, but no later than_____

[ ] PRIORITY ATTENTION REQUIRED

Copies to: _____

_____ _____

Contractor's Representative

Architect's Response: Date: _____

_____ Copies to: _____

Architect's Representative

SECTION 01 31 13

PROJECT COORDINATION

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Coordination.

1.1.2. Cutting and Patching

1.1.3. Preconstruction conference.

1.1.4. Progress meetings.

1.1.5. Preinstallation conferences.

1.2. COORDINATION

1.2.1. Contractor shall comply with the following project start-up and administrative requirements for work under the Contract:

1.2.1.1. Coordinate the work and work of subcontractors with work by others under separate contract on Project.

1.2.1.2. Establish procedures for the orderly progress and prosecution of the work, including, but not limited to, attendance at project meetings, communication and documentation procedures, submittal processing, and control of the site.

1.2.1.3. Coordinate work with all inspection and testing, including compliance with all agency inspection criteria, including DSA inspections.

1.2.1.4. Coordinate and monitor use of temporary utilities, conserving energy where feasible.

1.2.1.5. Prepare detailed schedule for all subcontractors in compliance with Section 01 33 00. Coordinate scheduling of work, submittals, and inspection/testing to assure the efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later. Monitor schedules for compliance with completion dates, modify and recommend adjustments. Manage subcontractors work, including monitoring of work force, work completed and impact on schedule

1.2.1.6. Coordinate completion and clean up the Work in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.

1.2.1.7. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.2.2. Contractor shall comply with the following requirements for coordinating the Work:

1.2.2.1. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

1.2.2.2. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

1.2.2.3. Unless otherwise indicated, where piping, ducts, and wiring occurs in finished areas, conceal such pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

1.3. CUTTING AND PATCHING

1.3.1. Provide for cutting and patching in accordance with the General Conditions, as specified, or as required to implement the work of this Contract, whether shown or not.

1.3.2. Employ skilled and experienced installer to perform cutting and patching.

1.3.3. Submit written request 72 hours in advance of cutting or altering elements which affects:

1.3.3.1. Structural integrity of element.

1.3.3.2. Integrity of weather-exposed or moisture-resistant elements.

1.3.3.3. Efficiency, maintenance, or safety of element.

1.3.3.4. Visual qualities of sight-exposed elements.

1.3.4. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:

1.3.4.1. Fit the several parts together, to integrate with other Work.

1.3.4.2. Uncover Work to install or correct ill-timed Work.

1.3.4.3. Remove and replace defective and non-conforming Work.

1.3.4.4. Remove samples of installed Work for testing.

1.3.4.5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

1.3.5. Execute work by methods which will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.

1.3.6. Cut rigid materials using masonry saw or core drill unless otherwise approved by Architect.

1.3.7. Restore Work with new products in accordance with requirements of Contract Documents.

1.3.8. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

1.3.9. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

1.3.10. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

1.4. PRECONSTRUCTION CONFERENCE

1.4.1. Project manager and Architect will schedule a conference upon execution of the Contract.

1.4.2. Attendance Required: Owner, Owner's Project Manager, Owner's Project Inspector, Owner's Testing Service representative, Architect, Contractor and major Sub-contractors, including assigned superintendent and foreman. Obtain Architect's prior approval of major subcontractors attendance.

1.4.3. Agenda:

1.4.3.1. Organizational structure of project, schedule overview and other project characteristics.

1.4.3.2. Designation of responsible staff representing the parties required for implementation of the project, including Contractor, Architect and others.

1.4.3.3. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.

1.4.3.4. Procedures and processing of field decisions, submittals, substitutions, proposal request, Change Orders and Contract closeout procedures.

1.4.3.5. Scheduling, including coordination with work of others.

1.4.3.6. Use of premises by Owner and Contractor.

1.4.3.7. Owner's requirements and partial occupancy.

1.4.3.8. Construction facilities and controls provided by Owner.

1.4.3.9. Temporary utilities considerations.

1.4.3.10. Security and housekeeping procedures.

1.4.3.11. Procedures for testing.

1.4.3.12. Procedures for maintaining record documents.

1.4.3.13. Requirements for start-up of equipment.

1.4.3.14. Inspection and acceptance of equipment put into service during construction period.

1.5. PROGRESS MEETINGS

1.5.1. Schedule and administer meetings throughout progress of the Work at approximately weekly intervals maximum.

1.5.1.1. Contractor shall assign the same staff members to represent and act on behalf of the Contractor at all progress meetings.

1.5.2. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

1.5.3. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, Project Manager, Project Inspector and others as appropriate to agenda topics for each meeting.

1.5.4. Agenda:

1.5.4.1. Review minutes of previous meetings.

1.5.4.2. Review of Work progress.

1.5.4.3. Field observations, problems, and decisions.

1.5.4.4. Identification of problems which impede planned progress.

1.5.4.5. Review of submittals schedule and status of submittals.

1.5.4.6. Review of off-site fabrication and delivery schedules.

1.5.4.7. Maintenance of progress schedule.

1.5.4.8. Corrective measures to regain projected schedules.

1.5.4.9. Planned progress during succeeding work period.

1.5.4.10. Coordination of projected progress.

1.5.4.11. Maintenance of quality and work standards.

1.5.4.12. Effect of proposed changes on progress schedule and coordination.

1.5.4.13. Other business relating to Work.

1.6. PREINSTALLATION CONFERENCES

1.6.1. When required in individual specification Section, convene a pre-installation conference at work site prior to commencing work of the Section.

1.6.2. Require attendance of parties directly affecting, or affected by, work of the specific Section.

1.6.3. Notify Project Manager, Architect, Owner and Inspector of Record a minimum four (4) days in advance of meeting date.

1.6.4. Prepare agenda, preside at conference, record minutes, and distribute copies within two days after conference to participants, with two copies to Project Manager and Architect.

1.6.5. Review conditions of installation, preparation and installation procedures, and coordination with related work.

1.7. MINUTES OF MEETINGS

1.7.1. Project manager shall compile detailed minutes of the meetings, except pre-installation conferences, and furnish one copy to the Architect, Owner, Contractor and Inspector. Minutes shall record discussion, actions taken, and issues assigned to parties responsible for resolution.

1.7.2. Recipients of minutes may make additional copies as they desire.

1.7.3. Published minutes will be accepted as properly stating the activities and decision of the Meeting unless they are challenged in writing prior to the next regularly scheduled Progress Meeting.

1.7.3.1. Persons challenging published minutes are responsible to reproduce and distribute copies of challenge to all recipients of the particular minutes being challenged.

1.7.3.2. Settle challenge as priority item of 'old business' at the next regularly scheduled meeting.

1.7.4. Except for pre-installation conferences, Contractor shall not prepare or distribute meeting minutes. Architect will not review or take action on any meeting minutes prepared by Contractor.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Construction Schedule Criteria.

1.1.2. Submittal procedures.

1.2. SUBMITTAL PROCEDURES

1.2.1. Transmit required schedule to Architect per criteria in the General Conditions and as specified.

1.2.2. Failure to make timely submittals will not be reason for extension of Contract Time.

1.2.3. Transmit each submittal separately with Architect accepted form.

1.3. CONSTRUCTION PROGRESS SCHEDULE

1.3.1. Submit Construction Schedule in accordance with the General Conditions.

1.3.2. Initial/Baseline Schedule

1.3.2.1. The Contractor shall prepare and submit to the Owner's Representative with copy to the Architect, the Contractor's Initial Construction Schedule within thirty (30) calendar days after the issuance of the Notice to Proceed. The Initial Construction Schedule shall be in the form of a Critical Path Method (CPM) network diagram and shall be in sufficient detail to show the sequence of activities required for the complete performance of all work, including submittals affecting the critical path.

1.3.2.2. The Schedule shall be in precedence format (PDM).

1.3.2.3. No activity in the schedule shall have a duration longer than twenty (20) workdays, with the exception of fabrication and procurement activities, unless otherwise approved by the Owner's Representative. Activity durations shall be the total number of actual days required to perform the work including consideration of weather impacts.

1.3.2.4. The Contract Price shall be distributed over all activities (hereinafter "cost loading"). Cost loading should cumulatively equal the Contract Price. Mobilization, bond and insurance costs may be shown separately; however, other general requirement costs, such as overhead and profit, shall be prorated throughout all activities.

1.3.2.5. The Contractor shall identify the labor requirement anticipated to complete each work activity. The labor requirement shall be assigned to each schedule activity requiring resources using the resource management capabilities of the scheduling software. For activities involving a number of trades, a written summary of manpower allocation by trade shall be submitted with the schedule.

1.3.2.6. The schedule activities shall be coded to include activity Responsibility and Area of work. Area codes shall distinguish construction activities related to individual buildings or areas within buildings (e.g. gymnasium classrooms, lobby, locker rooms) and site work.

1.3.2.7. Contractor staff preparing schedules shall be qualified and experienced in the scheduling method specified and capable of fulfilling the scheduling requirements of this section for the duration of the contract.

1.3.2.8. Contractor shall provide Initial Schedule on CD-ROM disk in the proper Schedule Format.

1.3.2.9. The Owner's Representative will meet with the Contractor to review and comment on the Contractor's Initial Schedule within five (5) days of its receipt.

1.3.2.10. The Contractor will finalize and re-submit the schedule within five (5) days of the review meeting on the specified media. Upon acceptance by the Owner Representative, the approved Initial Schedule will become the project Baseline Contract Schedule. The Baseline Schedule shall not be revised without written approval of the Owner Representative.

1.3.2.11. The Owner shall have the right to withhold progress payments from the Contractor at its discretion if the Contractor fails to finalize and obtain approval for the Baseline Contract Schedule within the prescribed period.

1.3.2.12. Failure of the Contractor to incorporate all elements of work required for the performance of the contract or any inaccuracy in the Baseline Contract Schedule shall not excuse the Contractor from performing all work required for a completed project within the specified contract time period, notwithstanding the Owner Representatives acceptance of the Baseline Contract Schedule.

1.3.3. Monthly Interval Updates

1.3.3.1. The Contractor shall submit to the Owner's Representative each month, with one copy to the Architect, an up dated Schedule of the work. The schedule shall be submitted no later than five (5) workdays from the status date.

1.3.3.2. The Updated Schedule shall include:

1.3.3.2.1. The Contractor's estimated percentage complete (progress) for each activity in progress.

1.3.3.2.2. Actual start/finish dates for activities.

1.3.3.2.3. Identification of errors, if any, from the previous updated schedule.

1.3.3.3. The Schedule Update Reports shall consist of:

1.3.3.3.1. A bar chart showing the previous month's work and a projected three (3) month look ahead of the work. The data included on the bar chart shall consist of the activity number, activity description, early start and finish date, original duration, remaining duration, percent complete, resource units per day, and total float.

1.3.3.3.2. A CPM tabular report sorted by responsibility, early start date that includes activity number, activity description, original duration, remaining duration, early and late start dates, early and late finish dates, total float, percent complete, activity budget cost, and activity earned cost.

1.3.3.3.3. Email attachment or DVD Disc of the entire Updated Schedule in the proper Schedule Format.

1.3.3.4. The Owner shall have the right to withhold progress payments from the Contractor at its discretion until the required monthly updates are submitted and approved.

1.3.4. The Schedule Reports shall consist of:

1.3.4.1. Time scaled network logic diagram(s) reflecting the activities, the interrelationships and logic ties between activities, activity duration and float. The diagram(s) shall be organized by Area. Diagrams shall be no smaller than "D" size (24" x 36") and no larger than "E" size (36" x 48").

1.3.4.2. A CPM tabular report sorted by responsibility, early start date that includes Activity number, activity description, original duration, remaining duration, early and late start dates, early and late finish dates, total float, percent complete, activity budget cost, and activity earned cost.

1.3.4.3. Email attachment, or DVD disc of the entire Initial Schedule in the proper Schedule Format.

1.3.5. Schedule Format

1.3.5.1. The Contractor shall use Primavera Project Planner software (current version) or have the means of providing the Owner's Representative with files onDVD or other Owner-accepted format, in a form that can be completely restored into Primavera without requiring the use of a conversion program or utilizing other software.

1.3.6. Short Interval Schedule

1.3.6.1. Short Interval Schedules (SIS) shall be submitted to the Owner Representative with copy to the Architect during the weekly site meetings.

1.3.6.2. The SIS interval shall be three weeks and shall include the past week, the week submitted and the week thereafter; the SIS may be hand generated.

1.3.6.3. The SIS shall be based on the Contract Schedule and shall be in bar chart form. The SIS shall be in sufficient detail to evaluate the Contractor's performance in the preceding week and planned progress in upcoming weeks vis a vis the Contract Schedule and Updates thereof.

1.3.6.4. Following review and revisions as necessary, the SIS will be accepted by the Owner Representative.

1.3.7. Float Time

1.3.7.1. Float or slack time is defined as the amount of time between the earliest start date and the latest start date of the earliest finish date and the latest finish date of a scheduled activity.

1.3.7.2. Float or slack time is not for the exclusive use or benefit of either the Contractor or the Owner. The Contractor acknowledges and agrees that actual delays affecting path of activities containing float, will not have any effect upon the Contract completion date, provided that the actual delay does not exceed the float time associated with those activities.

1.3.8. Construction Schedule Revisions

1.3.8.1. Updating the construction schedule to reflect actual progress shall not be considered to be a revision of the Schedule.

1.3.8.2. If during the process of schedule updating it becomes apparent that the Construction Schedule no longer represents the actual prosecution and progress of the work, the Owner's Representative may require the Contractor to submit a revised schedule at no additional cost to the Owner. The Owner shall have the right to withhold progress payments from the Contractor at its discretion, if the Contractor fails to submit a timely, detailed and workable Recovery schedule.

1.3.9. Final CPM Schedule at Completion of Contract: At the completion of the contract and prior to the release of any bonds or final payment by the Owner, the Contractor shall submit to the Owner's Representative, with copy to the Architect for approval, a final CPM schedule, showing the actual job history.

1.3.10. Early Completion of Project: In the event the Contractor wishes to complete work earlier than the specified contract completion date, and the Owner/Architect approve such earlier completion, the following conditions apply:

1.3.10.1. The contract completion date shall not be amended by the Owner Representative approval of Contractor's proposed earlier completion date.

1.3.10.2. Contractor shall not, under any circumstances, receive additional compensation from the Owner for indirect, general, administrative or other forms of overhead costs, for the period between the time or earlier completion proposed by the Contractor and the official contract completion date.

1.3.11. Time Extension Requests

1.3.11.1. The monthly Updated construction schedules submitted by the Contractor shall not show a completion date later than the Contract Time, subject to any time extensions granted by the Owner.

1.3.11.2. If the Contractor believes that it is entitled to an extension of the Contract Time due to a Change Order of delay/disruption, the Contractor, within ten (10) workdays of the qualifying event(s), shall submit:

1.3.11.2.1. A Time Extension Request notification letter with a detailed narrative justifying the time extension requested;

1.3.11.2.2. Fragmentary Network (Fragnet) Analysis of the delay impact, identifying all schedule activities that are impacted by the subject occurrence;

1.3.11.2.3. Tabular report of the qualifying update of the CPM schedule the analysis is based on; and

1.3.11.2.4. A schedule analysis entitled "Time Extension Request Schedule" That incorporated the findings of the Fragnet analysis into the latest (qualifying) update of the CPM schedule;

1.3.11.2.5. The Fragnet and time extension request schedules shall be time scaled, utilizing a computer generated network analysis unless otherwise approved by the Owner's Representative.

1.3.11.3. The time extension request shall forecast the adjusted project completion date and impact to any intermediate milestones.

1.3.11.4. Float is not for the exclusive use or benefit of either the Owner or Contractor. Contract time extensions shall be granted only to the extent the equitable time adjustments to the activity or activities affected by a change order of delay/disruption exceed the total float of a critical activity (or path) and extend the Contract Completion Date.

1.3.11.5. When Contractor does not submit a Time Extension Request within ten (10) working days, it is mutually agreed that the particular Change Order (including Proposed Change Order) or delay/disruption does not impact the construction schedule and hence no time extension is due to the Contractor.

1.3.11.6. The Owner shall not have any obligation to consider any time extension request unless the requirements of the contract documents are complied with. The Owner shall not be responsible or liable to the Contractor for any constructive acceleration due to failure of the Owner to grant time extensions under the terms of this contract, should Contractor fail to comply with the time extension submission and justification requirements stated herein.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Submittal procedures.

1.1.2. Construction progress schedules.

1.1.3. Proposed Products list.

1.1.4. Deferred Approvals

1.1.5. Shop drawings.

1.1.6. Product data.

1.1.7. Samples.

1.1.8. Manufacturers' instructions.

1.1.9. Manufacturers' certificates.

1.2. SUBMITTAL PROCEDURES

1.2.1. Transmit required submittals to Architect per criteria in the General Conditions and as specified.

1.2.1.1. Transmit submittals within time periods established by the General Conditions and as required to maintain orderly and sequential progress of the work.

1.2.1.2. Maintain complete and current submittal log, indicating status of all submittals and re-submittals. Provide summary of submittal status at pay request meeting.

1.2.2. Failure to make timely submittals will not be reason for extension of Contract Time.

1.2.3. Architect's review of submittals shall not relieve the Contractor for compliance with the Contract Documents, or for responsibility for deviations from Contract Documents.

1.2.3.1. In review of submittals, Architect will not provide dimensions or elevations for field conditions, or for conditions available from a detailed review of documents.

1.2.4. Electronic Documents for Contractors Use.

1.2.4.1. At Architect's sole discretion, Architect will provide a file containing selected electronic file backgrounds for Contractor's use in shop drawing preparation.

1.2.4.2. Contractor shall sign Architect provided release form regarding such electronic file information.

1.2.4.3. Electronic files will be provided in AutoCAD format, in the Architects current version, as background views only, without dimensions, doors, notes and similar information. No seals, title blocks or approval stamps will be included on backgrounds.

1.2.4.4. Unless otherwise established, and at Architects sole discretion, only plan and section views of architectural, structural, mechanical, and electrical documents will be provided. Under no circumstances will the complete project AutoCAD file be provided.

1.2.4.5. The Architect will provide a single CD based file containing backgrounds for all discipline for the contractors use. Contractor shall be responsible for distribution of background files to subcontractors and vendors.

1.2.4.6. The Architect will prepare a cost for preparation of electronic file package. If the Contractor agrees to such cost, the cost will be processed as a deductive change order to the contract.

1.2.5. Copying of Contract Documents for use as submittals is not acceptable. Contractor shall produce original documents for shop drawings and other submittals.

1.2.6. Provide submittals as required for the orderly progress of the work. Where no time period is established, provide submittals no later than the midpoint between notice of award and scheduled start date of the work related to the submittal. Where submittals are not submitted within project requirements, the Architect may delay certification of Payment Request until submittals are received.

1.2.7. The Architect's action will be taken within a reasonable time period, while allowing sufficient time, in the Architect's professional judgment, to permit adequate review.

1.2.8. Transmit each submittal separately with Architect accepted form.

1.2.8.1. Combine required material for a single specification Section into a single submittal. Incomplete or partial submittals will be returned without action for re-submittal in proper form.

1.2.8.2. Do not combine data from more than one specification section or drawing component into a single submittal. Such submittals received will be returned without action for re-submittal in proper form.

1.2.8.3. Submittals not reviewed by General Contractor will be returned without action for proper review and re-submittal.

1.2.8.4. Unless otherwise specified, submit product data in quantity required by Contractor for construction, plus three copies for Architect's use. Architect will review a maximum of six (6) copies of submittal.

1.2.9. Sequentially number the transmittal forms. Re-submittals to have original number with an alphabetic or numeric suffix.

1.2.10. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.

1.2.11. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

1.2.12. Schedule submittals to expedite the Project, and deliver to Architect at business address. Coordinate submission of related items.

1.2.13. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

1.2.13.1. Clearly identify, with bold clouding, or other graphic notation, all deviations from Contract Documents. Provide boxed note at clouded deviation specifically requesting approval of proposed change. Provide documentation of proposed change, including additional graphics and data as required by Architect.

1.2.14. Provide space for Contractor and Architect review stamps.

1.2.15. Revise and resubmit submittals as required, identify all changes made since previous submittal.

1.2.15.1. Provide re-submittals within seven days of receipt of returned submittal.

1.2.16. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.2.16.1. Distribute all copies of reviewed submittals at no additional cost to Owner for duplication, blueprinting, mailing or other costs.

1.2.17. Do not send submittals unless required by Specification. Submittals transmitted to Architect not required by specification will be returned without review.

1.2.18. Architect will notify Contractor of availability of documents for pickup at Architect's office, and log such date as the date returned to Contractor. Architect is not obligated to transmit or deliver submittals to Contractor.

1.2.19. Submittal Procedure:

1.2.19.1. Submit completed documentation in accordance with scheduling criteria where defined in contract documents.

1.2.19.2. The documents will be reviewed by Architect for consistency with specified criteria. If necessary, Architect will return submittal to Contractor for corrections. Any corrections, if any, shall be made by Contractor and returned to Architect within 7 days.

1.2.19.3. No contract time extensions will be granted for document modification caused by non-conformance with specified criteria.

1.2.19.4. Architect will submit documents to DSA reviewing authority for review and comment. Architect will return documents to Contractor following DSA/OSHPD review

1.2.19.5. Where required, Contractor shall make all changes or corrections required by DSA reviewing authority. Contractor shall pay all fees and provide all coordination and management necessary to obtain approval, including all meetings, correspondence and communications. Once corrections are made, Contractor shall return to Architect for resubmittal.

1.2.19.6. After receiving DSA final approval, Architect will furnish Contractor one complete set of DSA approved documents for Architects use in construction.

1.2.20. Samples: Provide samples as specified in each Section.

1.2.21. Manufacturer's Data: Provide descriptive data on all accessory items and operation.

1.2.22. Installation Data: Submit descriptive data on installation procedures.

1.3. PROPOSED PRODUCTS LIST AND PRODUCT DATA

1.3.1. Where specified in individual sections, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number for each product and supporting product data.

1.3.1.1. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.3.2. Unless otherwise specified, submit product data in quantity required by Contractor for construction, plus three copies for Architect's use. Architect will review a maximum of six (6) copies of submittal.

1.3.3. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project. Mark out items that are not applicable to the project.

1.3.4. After review, distribute in accordance with this Section and provide copies for Project Record Documents described in Section 01 77 19 – Closeout Requirements.

1.4. SHOP DRAWINGS

1.4.1. Submit in the form defined in the General Conditions and as specified.

1.4.1.1. Submit shop drawings in black or colored image on white bond paper format – blue print copies are not acceptable.

1.4.1.2. Submit a minimum of four (4) and maximum of six (6) copies. Architect will retain three copies for Architect's use.

1.4.1.3. Architect will return one copy of marked up and stamped shop drawing to Contractor.

1.4.2. Provide the following information on each sheet:

1.4.2.1. Project name and location.

1.4.2.2. Contractor name and address.

1.4.2.3. Subcontractor, manufacturer, or fabricator name and address.

1.4.2.4. Date and scale of drawings

1.4.2.5. Space for Contractor's review and approval stamp.

1.4.3. After review, reproduce and distribute in accordance with this Section and as described for Project Record Drawings in Section 01 77 19 – Closeout Requirements.

1.5. MANUFACTURER'S INSTRUCTIONS AND CERTIFICATES

1.5.1. When specified in individual specification Sections, submit manufacturers certificates and instructions for delivery, storage, assembly, installation, start - up, adjusting, and finishing, in quantities specified for Product Data.

1.5.2. Identify conflicts between manufacturers' instructions and Contract Documents.

1.5.3. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.5.4. Certificates may be recent or previous test results on material or Product, but must address current regulatory requirements and be acceptable to Architect.

1.6. SAMPLES

1.6.1. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1.6.2. Include identification on each sample, with full Project information.

1.6.3. Submit the number of samples of selected finish color, texture, and pattern as specified in individual specification Sections, with a minimum of five samples provided. Where multiple samples are specified, the Architect will retain four sets.

1.6.4. Submittal Procedure for Color Section:

1.6.4.1. Initial Submittal: Using manufacturers standard sample delivery system, submit two sets of samples of colors and finishes from the full range of manufacturers' standard colors (and custom colors if specified), textures, and patterns for Architect initial selection.

1.6.4.2. The Architect will notify Contractor of initial selection by ASI.

1.6.4.3. Following receipt of initial selection, submit the number of samples of selected finish color, texture, and pattern as specified in individual specification Sections, with a minimum of five samples provided. Where multiple samples are specified, the Architect will retain three sets.

1.7. CONSTRUCTION PROGRESS SCHEDULES

1.7.1. Submit Construction Schedule in accordance with Section 01 32 16.

1.7.2. Submit Construction Schedule in accordance with the General Conditions and as specified.

1.7.3. Contractor shall engage at his own expense all necessary personnel skilled in preparation of time and cost application of network techniques for construction projects.

1.7.4. Initial Schedule preparation:

1.7.4.1. Submit Initial Schedule within 14 days of date of Notice to Proceed.

1.7.4.2. Architect and Owner will meet with the Contractor to review and comment on the Contractor's Initial Schedule within five (5) days of its receipt.

1.7.4.3. The Contractor shall finalize and re-submit the schedule within five (5) days of the review meeting. Upon acceptance by the Owner, the accepted Initial Schedule will become the project Baseline Contract Schedule. The Baseline Schedule shall not be revised without written approval of the Owner.

1.7.4.4. Contractor's failure to incorporate all elements of work required for the performance of the contract or any inaccuracy in the Baseline Contract Schedule shall not excuse the Contractor from performing all work required for a completed project within the specified contract time period, notwithstanding the Owner's acceptance of the Baseline Contract Schedule.

1.7.5. Monthly Interval Updates

1.7.5.1. The Contractor shall submit to the Owner each month, with one copy to the Architect, an up-dated Schedule of the work. The schedule shall be submitted no later than five (5) workdays from the status date.

1.7.5.2. The Updated Schedule shall include:

1.7.5.2.1. The Contractor's estimated percentage complete (progress) for each activity in progress.

1.7.5.2.2. Actual start/finish dates for activities.

1.7.5.2.3. Identification of errors, if any, from the previous updated schedule.

1.7.5.3. Submit updated schedule with each pay request, reflecting all adjustments in construction schedule and sequence.

1.7.5.4. Contractor shall submit a narrative report as part of his monthly review and update, in form agreed upon by Contractor and Architect. Narrative report shall include description of problem areas; current and anticipated delaying factors and their estimated impact on performance of other activities and completion dates; and an explanation of corrective action taken or proposed.

1.7.6. Pay Requests will not be processed without submission of updated schedule.

1.7.7. Schedule Format and Content: Provide overall schedule in horizontal bar chart form or other Architect approved format, for each building and site work, with separate line for each major work activity, and scheduled on a weekly basis. Integrate all portions of project to identify critical path. Where specified, prepare schedule based on Phases as shown on drawings and specified.

1.7.7.1. The data included on the bar chart shall consist of the activity number, activity description, early start and finish date, original duration, remaining duration, percent complete, resource units per day, and total float.

1.7.7.2. The schedule activities shall be coded to include activity responsibility and the area of work. Area codes shall distinguish construction activities related to individual buildings or areas within buildings (e.g. gymnasium classrooms, lobby, locker rooms) and site work.

1.7.7.3. No activity in the schedule shall have a duration longer than twenty (20) workdays, with the exception of fabrication and procurement activities, unless otherwise approved by the Owner. Activity durations shall be the total number of actual days required to perform the work including consideration of weather impacts.

1.7.7.4. Identify all utility and service interruptions and connections, including disconnection of existing buildings.

1.7.7.5. Detailed network activities shall include, in addition, submittal and approval of shop drawings, procurement of critical materials and equipment, fabrication of special material and equipment and their installation and testing. All activities of the Owner that affect progress, and contract required dates for completion of all or parts of the work shall be shown.

1.7.7.6. Sheet size of diagrams shall be at least 30 by 42 inches. Each updated copy shall show a date of the last revision.

1.7.7.7. Initial submittal and complete revisions shall be submitted in six (6) copies.

1.7.7.8. Periodic reports shall be submitted in six (6) copies.

1.7.8. Float Time

1.7.8.1. Float or slack time is defined as the amount of time between the earliest start date and the latest start date or the amount of time between the earliest finish date and the latest finish date of a scheduled activity.

1.7.8.2. Float or slack time is not for the exclusive use or benefit of either the Contractor or the Owner. The Contractor acknowledges and agrees that actual delays affecting path of activities containing float, will not have any effect upon the Contract completion date, provided that the actual delay does not exceed the float time associated with those activities.

1.7.9. For scheduling purposes, the Owner/ will be officially closed on the following holidays during each school year:

Holiday	Month
New Year's Day	January
Martin Luther King Birthday	January
Lincolns Day	February
Presidents Day	February
Spring Break	April
Memorial Day	May
Independence Day	July
Labor Day	September
Veterans Day	November
Thanksgiving Break	November
Winter Break	December & January

1.7.9.1. It shall be the responsibility of the Contractor to confirm the month, day, and year for the above holidays with the Owner facilities management. Contractor shall coordinate and schedule his work accordingly. The project site will be available to the Contractor during the holidays but there is no guarantee that other Owner facilities or services will be made available to the Contractor during the holiday schedule.

1.7.10. Construction Schedule Revisions

1.7.10.1. Updating the construction schedule to reflect actual progress shall not be considered to be a revision of the Schedule.

1.7.10.2. If during the process of schedule updating it becomes apparent that the Construction Schedule no longer represents the actual prosecution and progress of the work by more than **"Contract"** days, the Owner may require the Contractor to submit a revised schedule at no additional cost to the Owner. The Owner shall have the right to withhold progress payments from the Contractor at its discretion, if the Contractor fails to submit a timely, detailed and workable schedule showing recovery necessary to achieve scheduled completion.

1.7.11. Final Schedule: At the completion of the contract and prior to the release of any bonds or final payment by the Owner, the Contractor shall submit to the Owner, with copy to the Architect for approval, a final schedule, showing the actual job history.

1.7.12. Time Extension Requests: The monthly updated construction schedules submitted by the Contractor shall not show a completion date later than the Contract Time, subject to any time extensions approved by the Owner.

1.7.12.1. Contractor shall submit Time Extension Requests within 10 days of an event Contractor believes qualifies for a contract time extension, including contract modifications provided by Architect or Owner.

1.7.12.2. The Time Extension Request shall include a notification letter with a detailed narrative justifying the time extension requested.

1.7.12.3. Accompanying letter, provide schedule analysis entitled "Time Extension Request Schedule" incorporating narrative analysis into the latest (qualifying) update schedule.

1.7.12.4. Time Extension Request shall forecast the adjusted project completion date and impact to any intermediate milestones.

1.7.12.5. When Contractor does not submit a Time Extension Request within ten (10) working days, it is mutually agreed that the particular event, including ASI's, RFI response, or CCD/Change Order (including Proposed Change Order) or delay/disruption does not impact the construction schedule and hence no time extension is due to the Contractor.

1.7.12.6. The Owner shall not be under any obligation to consider any time extension request unless the requirements of the contract documents are complied with. The Owner shall not be responsible or liable to the Contractor for any constructive acceleration due to failure of the Owner to grant time extensions under the terms of this contract, should Contractor fail to comply with the time extension submission and justification requirements stated herein.

1.8. CONSTRUCTION PROGRESS SCHEDULES

1.8.1. Submit Construction Schedule in accordance with the General Conditions and as specified.

1.8.1.1. Submit initial schedule within 10 days of date of Notice to Proceed.

1.8.1.2. Submit updated schedule with each pay request, reflecting all adjustments in construction schedule and sequence.

1.8.1.3. Pay Requests will not be processed without submission of updated schedule.

1.8.2. Provide overall Construction Schedule in horizontal bar chart form or other Architect approved format, for each building and site work, with separate line for each major work activity, and scheduled on a weekly basis. Integrate all portions of project to identify critical path. Prepare schedule based on Phases as shown on drawings and specified.

1.8.3. Group related and coordinated activities. Identify early/late start and finish dates, major milestones, float dates, and duration of each activity.

1.8.4. Identify all utility and service interruptions and connections, including disconnection of existing buildings.

1.9. SUBSTITUTIONS

1.9.1. Substitutions will be considered in accordance with the General Conditions and Section 01 25 00.

1.9.2. Substitutions will not be considered when indicated or implied on shop drawings or other forms of submittal without separate written request for substitution.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not used

END OF SECTION

SECTION 01 35 93

OFF-SITE IMPROVEMENT PROCEDURES

NOTE TO CONTRACTOR: NO PERSON SHALL MAKE ANY EXCAVATION OR IMPROVEMENTS IN, ON, OR UNDER THE SURFACE OF ANY RIGHT OF WAY AND NO PERSON SHALL USE OR OCCUPY THE RIGHT OF WAY WITH A TEMPORARY OCCUPANCY CONSISTING OF ANY STRUCTURE, CONTAINER, MATERIALS, EQUIPMENT, VEHICLES, OR CONSTRUCTION SIGNS RELATED TO WORK ON PRIVATE PROPERTY WITHOUT FIRST OBTAINING A PERMIT FROM THE CITY OF LONG BEACH AUTHORIZING SUCH PERSON TO MAKE SUCH EXCAVATION, IMPROVEMENT, OR TEMPORARY OCCUPANCY.

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surface Improvements: Street work, sidewalks, curbs and gutters.

B. Utilities: Underground utilities, fire hydrants, streetlights, catch basins, parkway drains, and culverts.

C. Public Works Permit.

D. Traffic Control.

E. Long Beach Water District (LBWD) Construction Requirements.

F. Tree Planting.

1.02 RELATED SECTIONS

A. Division 01 Sections.

B. Division 31 Sections.

C. Division 32 Sections.

D. Division 33 Sections

1.03 SYSTEM DESCRIPTION

A. Regulatory Requirements:

B. Unless prior written approval is obtained from the local jurisdiction(s) construction is limited to working hours per that agency's Ordinances, Resolutions and/or permit(s).

C. No spoils, backfill material, pipeline materials, or equipment shall be left by the Contractor on any public right of way job site, at the end of each workday, without the prior written authorization of the local jurisdiction.

D. The Contractor shall obtain and pay for all permits, licenses and inspections required by authorities having jurisdiction over the area.

E. All pavement striping, stop bars, legends, traffic signs, traffic control loops, or other traffic control facilities that are damaged or altered during construction shall be replaced as directed by the local jurisdiction at the Contractor's expense.

F. Bonds: Post as required by authorities having jurisdiction over the area.

G. The purpose of the Encroachment Permit is to allow street construction in the public right-of-way. The public right-of-way generally consists of street easements that contain City streets, lanes, alleys, parkways, and sidewalks. The public right-of-way also includes public easements and unimproved streets. Construction within the public right-of-way is under the jurisdiction of the City in which it takes place.

H. The Encroachment Permit will be issued for street construction once the Contractor provides all of the necessary information and complies with Encroachment Permit requirements.

1.04 SUBMITTALS

A. Public Works Permit.

B. Traffic Control Plan to City of Long Beach.

C. The Contractor shall submit a certificate of insurance for worker's compensation, general liability and automobile liability to the governing agency. Proof of general liability and automobile liability shall each be in the amount of one million dollars.

1.05 PERMITS AND LICENSES

A. The LBUSD has not applied for any permits or licenses for this Project. The Contractor shall be solely responsible for obtaining and complying with any permits and/or licenses required to execute the project, at its sole expense. No additional allowance will be made therefore. The estimated time required to obtain the City of Long Beach encroachment permit is 6 weeks.

B. The Contractor will be required to obtain an excavation permit from the City of Long Beach. Contractor shall notify the City of Long Beach Public Works, Construction Inspector at (562) 570-5160, 48 hours prior to excavation.

C. Contractor shall provide LBWD Inspection at 562-570-2322 a minimum of 48 hours notice before the start of work in the public right of way.

D. No water or liquids, except potable water, shall be discharged onto city streets at anytime for any reason without proof of a NPDES permit approving of the discharge. The Contractor will be required to perform self-inspections to evaluate if minimum appropriate controls to reduce pollutant discharges from entering the storm drain system are being met. The Contractor shall make monthly self-inspections during the dry season and weekly self-inspections during the rainy season, October 1st through April 15th. Best Management Practices (BMP's) are made a part of this permit from the City. The discharge of liquids from concrete truck washouts into storm drains, streets, gutters or catch basins is strictly **prohibited.** Paving, street saw-cutting and sidewalk saw-cutting is prohibited during a storm event of 0.25 inches or greater. Concrete thrust blocks exist at all tees, bends, crosses and other water main fittings. Contractor shall work with caution when excavating in the vicinity of any thrust block. Contractor shall not disturb any thrust blocks. Do not disturb local depressions or concrete cross gutters unless shown on the plans. If they are disturbed, the entire structure shall be replaced. Do not disturb decorative/patterned concrete or decorative/patterned asphaltic concrete pavement without notifying the City of Long Beach Construction Inspection office for conditions prior to any removal. If disturbed, the entire decorative/patterned shall by wholly replaced by the Contractor. Any landscaping or sprinklers disturbed by the construction shall be restored by the Contractor.

E. All information regarding the Public Works Permit, in the City of Long Beach, is available at the below website:

F. http://library.municode.com/HTML/16115/level4/VO1_TIT14STSI_CH14.08EXSTIMTEOCRIWA_IIPE.html.

1.06 INSPECTIONS

A. The inspector shall have access to the work area and shall be furnished every reasonable facility for ascertaining full knowledge of the progress, material, and workmanship used to complete the work. The Contractor shall provide at least one working day advance notice of major phases of construction for purposes of inspection. All material shall be approved prior to placement and all water system work shall be visually inspected prior to backfilling.

B. The inspection of the work does not relieve the Contractor of any obligation to complete the work as prescribed by these specifications. Defective work shall be corrected, and unsuitable materials may be rejected notwithstanding the fact that such defective work and unsuitable materials may have been previously accepted by the City Engineer.

C. The County shall have the authority to suspend the work wholly, or in part, for such time as it may deem necessary due to the failure of the Contractor to perform any provisions of the plans or specifications. The work may only continue when the defective material or construction method is recognized as corrected by the City Engineer.

1.07 DIG ALERT NOTIFICATION

A. Before any excavation in or near the public right-of-way, the Contractor must contact the Underground Service Alert of Southern California (Dig Alert) at **811** for information on existing buried utilities and pipelines.

B. Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.

C. Call at least Two (2) full working days prior to digging.

D. If the members (utility companies) have facilities within the work area, they will mark them prior to the start of your excavation and if not, they will let you know there is no conflict. A different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).

E. The Law requires you to hand expose to the point of no conflict 24" (inches) on either side of the underground facility, so you know its exact location before using power equipment.

F. If caught digging without a Dig Alert ticket you can be fined as much as $50,000 per California government code 4216.

1.08 QUALITY ASSURANCE

A. The Contractor will comply with the following as a minimum requirement:

1. State of California Department of Transportation (CDT) Standard Specifications; 2010 Edition, hereinafter referred to as the "Standard Specifications", Caltrans Standard Plans 2010 Edition with 2010 Standard Plans updates.

2. The "Standard Specifications for Public Works Construction" (SSPWC) or "Greenbook Standards" and the "Standard Plans for Public Works Construction", 2012 Edition.

3. Work Area Traffic Control Handbook.

4. Grade Stakes and Field Engineering: Hire a Land Surveyor or Civil Engineer, licensed in the State of California, to set necessary grade, alignment and construction staking and field engineering in connection with the Work in this project.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall be approved for use by the Civil Engineer and LBWD and shall meet the requirements of the authorities having jurisdiction over the work.

PART 3 - EXECUTION

3.01 GENERAL

A. Perform the work in accordance with the requirements of the authorities having jurisdiction over the area.

B. Match adjoining improvements, such as construction and expansion joints, sidewalk marking patterns, and trees.

C. Foundry or other identifying stamps or markers will not be allowed on exposed portions of the work. Place in concealed locations only.

3.02 STORMWATER

A. No water or liquids, except potable water, shall be discharged onto city streets at anytime for any reason without proof of a NPDES permit approving of the discharge. The Contractor will be required to perform self-inspections to evaluate if minimum appropriate controls to reduce pollutant discharges from entering the storm drain system are being met. The Contractor shall make monthly self-inspections during the dry season and weekly self-inspections during the rainy season, October 1st through April 15th. Best Management Practices (BMP's) are made a part of this permit from the City. The discharge of liquids from concrete truck washouts into storm drains, streets, gutters or catch basins is strictly **prohibited.**

B. Paving, street saw-cutting and sidewalk saw-cutting is prohibited during a storm event of 0.25 inches or greater.

3.03 TRAFFIC CONTROL

A. A Traffic Control Plan for construction activities on City streets and sidewalks must be prepared and submitted to the City for review and approval. This Traffic Control Plan shall be prepared by the Contractor, shall be drawn to scale and shall delineate the existing curbs and traffic striping. All traffic control work for construction shall conform to the latest Caltrans Traffic Manual (Chapter 5 – Manual of Traffic Controls) and the latest Work Area Traffic Control Handbook (WATCH Manual). This Traffic Control Plan must be approved by the City prior to the issuance of a permit.

B. The Contractor shall be required to provide and maintain all barricade delineators, flashers, signs, including temporary "No Parking" signs, and other safety equipment as set forth in the latest edition of the "State of California Manual of Traffic Controls" and the "Work Area Traffic Control Handbook (W.A.T.C.H. Manual). All necessary traffic control devices shall be in place prior to the start of work.

C. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways. Hydrants under pressure, valve pit covers, valve boxes, meter boxes, fire or police call boxes, or other utility controls shall be left unobstructed and accessible during the construction period.

3.04 PROTECTION OF PROPERTY & MATERIAL

A. The Contractor shall contact each property and business owner having access along the project, at least 24 hours prior to start of construction, with a City of Long Beach approved letter (submitted to and approved by the City). Contractor shall keep area residents fully informed of the plan of operation throughout the course of this contract.

B. The Contractor shall protect the road surface and shall restore said surface to an equivalent or better condition upon completion of all work. The Contractor shall make any interim repairs or maintenance that may be requested by the Inspector during the course of work.

C. The Contractor shall replace traffic striping and pavement markings destroyed or damaged during construction with temporary striping or markings acceptable to the County. The Contractor shall install temporary striping prior to reopening streets to traffic. The Contractor shall permanently restore all traffic striping and pavement markings within seven days of final payment at the City's direction.

D. The Contractor shall protect in place or remove and replace all existing utilities and public or private improvements (whether they are specifically noted on the contract drawings or not) including but not limited to all berms, curbs, gutters, walkways, sidewalks, driveways, storm drains, landscaping materials, landscape irrigation, landscape electrical systems, walls and fences in place. The Contractor shall correct or replace any damaged utilities or improvement as part of the contract work.

E. Concrete thrust blocks exist at all tees, bends, crosses and other water main fittings. Contractor shall work with caution when excavating in the vicinity of any thrust block. Contractor shall not disturb any thrust blocks.

F. Any landscaping or sprinklers disturbed by the construction shall be restored by the Contractor.

G. The Contractor shall replace complete concrete panels or between existing concrete joints during replacement of any concrete work. The Contractor shall replace colored concrete with colored concrete to match when concrete is removed.

3.05 FIRE SERVICE

A. The contractor will install the 6-inch fire service, hot tap, & double check detector assembly in 9th Street per City of Long Beach Water Department Standard WDS-006.1 and the Construction Documents.

B. Contractor shall provide LBWD Inspection at 562-570-2322 a minimum of 48 hours notice before the start of work in the public right of way.

3.06 UTILITIES

A. Existing utility locations shown on contract drawings are based on field survey and records furnished by utility companies, the City, the County, and Owner. Where underground main conductors or conduits such as water, gas, sewer, telephone, electric power, or cable television are shown on the contract drawings, the Contractor shall assume that a service lateral from each conductor or conduit extends to every parcel or property whether or not a service lateral is shown.

B. For all permits involving excavation, it is required that Underground Service Alert (USA) be contacted a minimum of 48 hours (two working days) prior to excavation. All work shall be done in accordance with City standards.

C. The Contractor shall excavate, expose, and determine ("Pothole") the location and depth of each potential interference at least two (2) days in advance. Changes or delays caused by the Contractor's failure to perform "Potholing" and interference location work shall not be eligible for extra work, compensation, or time extension.

D. All work shall be done in accordance with City standards (which may be obtained at the Public Works counter) and in compliance with the "Green Book." It is advisable that the applicant arrange a pre-construction meeting with an Engineering inspector prior to commencing work. The inspector will be glad to review the standards and help with any

questions you may have. These meetings may be arranged by calling the phone number listed on the permit at least 48 hours in advance.

E. The Contractor shall excavate, expose, and determine ("Pothole") the location and depth of each potential interference at least two (2) days in advance. Changes or delays caused by the Contractor's failure to perform "Potholing" and interference location work shall not be eligible for extra work, compensation, or time extension.

F. The Contractor shall immediately notify the Inspector in writing, upon learning of the existence or location of any utility facility omitted from or shown incorrectly on the contract drawings, or improperly marked or otherwise indicated. The Contractor shall provide full details as to depth, location, size and function of the utility in writing to the Inspector.

G. The Contractor shall not interrupt or disturb any utility facility without authority from the utility company or order from the City. The Contractor shall furnish and place the necessary protection around the utility when protection is called for on the contract drawings, visible to the Contractor, or marked as such. The Contractor shall install the utility protection at no additional expense to the Owner.

5. CONSTRUCTION REQUIREMENTS

A. Pre-Construction Meeting

Once the construction plans have been approved by the Department, a pre-construction meeting will be held at the Department's headquarters. Five-day advance notice is required as other departments, such as the Long Beach Fire Department, may be involved.

B. Materials Submittals

Four (4) sets of materials submittals for pipe and fittings are required. These may be submitted at the pre-construction meeting. Submittals will be reviewed for compliance with Department standards. Two (2) sets will be returned to the contractor. Construction may not commence until all materials submittals have been approved.

C. Permits

The contractor shall obtain all necessary permits and pay all required fees and charges and shall meet all the requirements of said permits.

An excavation permit must be obtained from the Engineering Bureau of the City of Long Beach Public Works Department.

The Water Department does not issue permits for construction. Signed plans, approved materials submittals and a pre-construction meeting are required for construction to proceed.

D. Inspection

All work and materials on the approved construction plans are subject ot the inspection and approval of the Department's Engineer or authorized representative. *The contractor shall comply with the applicable provisions of Subsection 2-10 of the Standard Specifications.*

Requests for inspection must be provided 48-hours in advance.

E. Working Hours

Working hours are limited to 7:00 a.m. to 3:30 p.m. Monday through Friday. Inspection at other times requires prior approval from the Department. If inspection is requested outside normal working days and/or hours, an overtime rate will be charged. The following holidays are observed by the Department:

New Year's Day
Martin Luther King Day
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

F. Site and Survey Requirements

Roadway or other surface within a ten (10) foot strip above the water main must be graded to a minimum of subgrade elevations. The minimum cover from top of pipe to the subgrade surface is 30 inches for 4-, 6-, and 8-inch mains and 33 inches for 12-inch mains.

Grade sheets must be provided by the contractor prior to construction.

The following staking requirements shall be met:

WATER MAIN CONSTRUCTION

1. Hydrants shall be double-staked with cut/fill to top of flange.
2. Meter shall be double-staked with cut/fill to top of curb.
3. Tees and 90 bends in direction of offset line shall be double offset with cut/fill to bottom of pipe.
4. Bends less than 90 shall be staked on both back and ahead lines.
5. Grade breaks shall be single offset with cut/fill to bottom of pipe.
6. Each 50-foot station shall be staked with single offset with cut/fill to bottom of pipe.
7. All fittings not included above shall be single offset with cut/fill to bottom of pipe.

SEWER MAIN CONSTRUCTION

1. Cleanouts shall be double-staked with cut/fill to top of flange.
2. Lateral cleanouts shall be double-staked with cut/fill to bottom of pipe.
3. Tees and 90 bends in direction of offset line shall be double offset with cut/fill to bottom of pipe.
4. Bends less than 90 shall be staked on both back and ahead lines.
5. Grade breaks shall be single offset with cut/fill to bottom of pipe.
6. Each 25-foot station shall be staked with single offset with cut/fill to bottom of pipe.
7. All fittings not included above shall be single offset with cut/fill to bottom of pipe.

G. Notification to Customers for Shutdowns

Construction of new water and sewer facilities may impact service to existing customers. For example, tying in a new water line to an existing water line may require shutting down the existing water line and placing customers out of service. Fire protection may also be affected.

The Department will coordinate with the contractor to devise a shutdown plan with minimal interruptions to customers. The contractor must submit a detailed shutdown plan, showing the valves which must be closed and the expected duration of the shutdown. Provisions for fire protection must also be included. The Bureau of Fire Prevention of the Long Beach Fire Department must also approve the shutdown plan.

The Department requires advance notice to customers for shutdowns in the following manner:

7-DAY NOTICE

- The contractor must determine the affected customers for the proposed shutdown.
- The Department will provide a notification letter to the contractor to be delivered to the affected customers.
- The notification letter indicates the water will be turned off within the next week and further notification detailing the date and time will be provided.

48-HOUR NOTICE

- When the date and duration of the shutdown has been more precisely identified, the contractor will be required to deliver another notice to the affected customers, specifying the details of the interruption of service and providing a phone number and contact person for the contractor.

H. Hydrostatic Testing

Upon completion of the construction of the water mains and all attached service connections, the water mains and services shall be hydrostatically tested for a period of 4 hours at 188 psi. Testing against a closed valve is not acceptable.

The contractor shall furnish a testing unit, satisfactory to the Department's Engineer, capable of producing and maintaining the required test pressure. Said unit shall consist of a pump with gauges and meters necessary to accurately monitor the pressure within the pipeline and the quantity of water pumped during the test to maintain pressure.

Pipelines shall be slowly filled with water and care shall be taken to see that all air reliefs are open and that all air is permitted to escape. After a pipe has been completely filled, it shall stand under a slight pressure for a time sufficient to

allow the pipe to absorb what water it will and to allow the escape of air from all air pockets. During this period, all plugs, valves and connections shall be examined for leaks. If any leaks are found they shall be stopped, or in the case of valves in the main line, provisions shall be made for measuring the leakage during the test.

$$L = F \times D \times SR\,(P)$$

Where L = Leakage allowance in gallons per hour
F = Length of pipe tested, in feet
D = Nominal diameter of pipe, in inches
SR (P) = Square root of the average pressure during test, in psig

Regardless of the above allowable water loss, all visible leaks shall be stopped and any defective components of the installed water system repaired by the contractor at the contractor's expense.

I. Disinfection

It shall be the responsibility of the contractor to satisfactorily disinfect all mains and services and to obtain certification from the City of Long Beach Health Department that the system is free from contamination and acceptable for the transmission of potable water.

Requirements for disinfection shall comply with the requirements of AWWA C651, as amended hereunder:

Chlorine application for disinfection shall be by either the continuous-feed method or, if cleanliness of the main interior is maintained, the tablet method. No matter which method is employed, the resulting disinfectant solution shall have an available chlorine content of fifty parts per million (50 ppm) by weight.

The following table lists the quantities of available chlorine, 1% solution and chlorine tablets necessary to obtain the required 50 ppm disinfectant solution for one hundred feet (100') of pipe for various pipeline sizes:

Size & Type of Pipeline Section	100% Chlorine (Wt/100' pipe)	1% Cl solution (Vol/100' pipe)	Tablets per 100' pipe	Std.
4" DIP	0.027 lb. (12 g)	0.33 gal (0.0012 m^3)	4.70	1
6" DIP	0.061 lb. (28 g)	0.73 gal (0.0027 m^3)	10.0	2
8" DIP	0.108 lb. (49 g)	1.30 gal (0.0049 m^3)	15.0	3
12" DIP	0.240 lb. (109 g)	2.88 gal (0.0109 m^3)	35.0	6

If the tablet method is used, fire hydrant laterals shall contain not less than four (4) tablets.

To assist in the disinfection of the mains and in obtaining water samples for the City of Long Beach Health Department, the Department will furnish two-inch (2") sampling risers, as shown in LBWD Standard Drawing WDS-109 and also one-inch (1") sampling risers, as required. The contractor shall install the sampling riser, where directed by the Engineer, and remove same after the main has been certified free of contamination by the Health Department. Contractor shall also reinstall all plugs and return the risers to the Department.

J. Construction Water

The Department will install a construction meter on the nearest fire hydrant available. Water can be obtained from the Department by calling Water Services at (562) 570-2415 to make application for temporary water service. Charges for this services will be at the established standard rates of the Department.

The contractor shall not use water from any fire hydrant unless said water first passes through a meter provided for the contractor's use.

The contractor shall not, for any purpose, operate any water valve in the Department system, but shall request any necessary valve operation to be done by authorized Department personnel.

K. Cleanup and Dust Control

In addition to the provisions of Subsection 7-8.1 of the Standard Specifications, the following provisions shall apply:

If the contractor fails to carry out proper and efficient measures to obtain required dust abatement, after due notice by the Engineer, the Board may take such measures as are necessary to accomplish said abatement, and may charge the contractor with the actual cost of all labor and material required. The action of the Board in taking such measures shall not be construed as relieving the contractor from any obligations under this section, nor as an assumption by the Board of any of the contractor's obligations to provide adequate measures for dust abatement.

L. As-Built Drawings

After construction has been completed and prior to project acceptance, the contractor shall provide to the Department final as-built drawings of the water and/or sewer systems. The as-built drawings shall be dated and signed by the responsible party.

END OF SECTION

SECTION 01 42 29

REFERENCE STANDARDS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. References

1.1.2. Definitions.

1.2. DEFINITIONS

1.2.1. General: Basic Contract definitions are included in the Conditions of the Contract.

1.2.2. "Approved": The term "approved," when used in conjunction with Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

1.2.3. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.

1.2.4. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

1.2.5. "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.

1.2.6. "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

1.2.7. "Install": The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

1.2.8. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

1.2.9. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.

1.2.10. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five [5] previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.2.10.1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

1.3. INDUSTRY STANDARDS

1.3.1. Applicability of Standards: Unless the Contract Documents or applicable regulatory requirements include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

1.3.1.1. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.3.1.2. Referenced standards take precedence over standards that are not referenced but recognized in the construction industry as applicable.

1.3.1.3. Non-referenced standards are not directly applicable to the Work, except as a general requirement of whether the Work complies with recognized construction industry standards.

1.3.1.4. Non-referenced standards: Except as otherwise limited by the Contract Documents, standards not referenced but recognized in the industry as applicable will be evaluated for performance of the Work. The Architect will decide whether a code or standard is applicable, or which of several are applicable.

1.3.2. Publication Dates: Conform to reference standard by date of issue current on date of project approval by DSA and/or the authority having jurisdiction, or date specified in Product Sections.

1.3.3. 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, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1.3.3.1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Architect for a decision before proceeding.

1.3.4. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1.3.4.1. Obtain copies directly from the publication source when required by Contract Documents.

1.3.4.2. Although copies of standards needed for enforcement of requirements may be part of required submittals, the Architect reserves the right to require the Contractor to submit additional copies as necessary for use by others in the enforcement of requirements.

1.3.5. Abbreviations and Acronyms for Industry Organizations: Where abbreviations and acronyms are used in Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the United States". Contact Architect regarding any questions regarding such abbreviations and aconyms.

1.4. PROJECT MANUAL AND SPECIFICATIONS

1.4.1. Format and structure

1.4.1.1. Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 49-Division format and 2004 Masterformat numbering system.

1.4.1.2. The sections are placed in the Project Manual in numeric sequence; however, this sequence is not complete and the Table of Contents of the specifications must be consulted to determine the total listing of sections.

1.4.1.3. The section title is not intended to limit the meaning or content of the section, nor to be fully descriptive of the requirements specified within the Section.

1.4.1.4. The organization of the specifications shall not control the division of the work among subcontractors or establish the extent of work to be performed by any trade.

1.4.2. Definitions

1.4.2.1. Related Work Described Elsewhere: The caption "Related Sections" or "Related Work Described Elsewhere" identifies some Sections of the Specifications which may involve work involving coordination or general relationships to the work of the Section at hand. The omission of a Section from "Related Sections: or ""Related Work Described Elsewhere" does not limit the Contractors obligation to perform all portions of the Work with all appropriate and reasonable coordination.

1.4.2.2. Section Includes: The caption "Section Includes" or "Description" or "Summary" paragraph is intended to be a broad, general statement of the work covered by an individual section. The listing of principal items of work shall not be construed as an exhaustive or complete list.

1.4.3. Language

1.4.3.1. Specification Language and Intent: The words "the", "shall", "will", and all may be omitted in specification Sections. Where such words as "perform", "install", "erect", "test", or words of similar import are used, it shall be understood such words include the meaning of the phrase, "The Contractor Shall". The requirements indicated and specified apply to all work of the same kind, class, and type, even though the word "all" is not stated.

1.4.3.2. Specifications use certain conventions regarding style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are:

1.4.3.2.1. Language used in Specifications and other Contract. Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable to maintain the context of the Contract Document indicated.

1.4.3.2.2. Imperative and streamlined language is generally used in the Specifications. Requirements expressed in the imperative mode are to be performed by the Contractor. Subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

1.4.3.2.3. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Quality assurance and control of installation.

1.1.2. Contractor responsibility for structural tests and special inspections.

1.2. QUALITY ASSURANCE/CONTROL OF INSTALLATION

1.2.1. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

1.2.2. Comply fully with manufacturers' instructions, including each step in sequence. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

1.2.3. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.2.4. The Division of the State Architect (DSA), will provide review per Section 4-334, Part 1, Title 24, CCR. Contractor shall verify with Owner that DSA has been notified prior to start of construction in compliance with section 4-331.

1.2.5. The Owner will retain a general inspector to inspect all work performed by Contractor in compliance with Section 4-333 and 4-342 DSA, Part 1, Title 24, CCR.

1.2.5.1. The Owner will retain special inspectors for those portions of the work as shown on the drawings and specified in the respective sections in compliance with Part 2, Title 24, CCR.

1.2.6. Perform work by persons qualified to produce workmanship of specified quality.

1.2.7. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.3. CONTRACTOR RESPONSIBILITY

1.3.1. Each Contractor responsible for the construction of a main wind- or seismic-force-resisting system, designated seismic system or a wind- or seismic-resisting-component listed in the statement of special inspections shall submit a statement of responsibility to the building official and the Owner prior to commencement of work on the system or component. The Contractor's statement of responsibility shall contain the following:

1.3.1.1. Acknowledgment of awareness of the special requirements contained in the statement of special inspections;

1.3.1.2. Acknowledgment that control will be exercised to obtain conformance with the construction documents approved by the building official;

1.3.1.3. Procedures for exercising control within the Contractor's organization, the method and frequency of reporting and the distribution of the reports;

1.3.1.4. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

1.4. FIELD SAMPLES

1.4.1. Install field samples or mock-ups for review at the site as required by individual specifications Sections.

1.4.2. Acceptable samples represent a quality level for the Work.

1.4.3. Remove field sample or mock-up when specified in individual Sections.

1.5. MANUFACTURERS' FIELD SERVICES AND REPORTS

1.5.1. When specified in individual specification Sections, require material or Product suppliers or manufacturers provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start - up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.

1.5.2. Report to the Architect observations, site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

1.5.3. Submit report in duplicate within 5 days of observation.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 45 29

TESTING LABORATORY SERVICES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Selection and payment.

1.1.2. Contractor submittals.

1.1.3. Laboratory responsibilities.

1.1.4. Laboratory reports.

1.1.5. Limits on testing laboratory authority.

1.1.6. Contractor responsibilities.

1.1.7. Schedule of inspections and tests.

1.2. REFERENCES

1.2.1. Title 24, CCR.

1.2.2. ASTM D 3740 - Practice for Evaluation of Agencies in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

1.2.3. ASTM E 329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

1.3. SELECTION AND PAYMENT

1.3.1. Owner will employ and pay for services of an independent testing laboratory, approved by DSA, to perform inspection and testing as specified in this Section.

1.3.1.1. Unless specified as the Owner's responsibility, all other testing, mix design preparation and related quality control and certification requirements shall be paid by the Contractor at no additional cost to Owner.

1.3.1.2. All concrete mix designs shall be prepared at Contractor's cost and in compliance with Division 03.

1.3.1.3. All grout and mortar mix designs shall be prepared at Contractor's cost and in compliance with Division 04.

1.3.1.4. All asphalt concrete and concrete pavement mix designs shall be prepared at Contractor's cost and in compliance with Division 32

1.3.2. Only DSA, local legally constituted public authorities having jurisdiction over the Work, the Architect, and the Owner or their designated representatives shall be authorized to direct testing and inspection to determine compliance or non-compliance to the requirements of the Work.

1.3.3. The Contractor shall reimburse the Owner, through Contract adjustment, for inspection and testing costs caused by the following Contractor actions:

1.3.3.1. All testing costs incurred after initial test established non-conformance with contract requirements.

1.3.3.2. Inspection costs caused by Contractor's scheduling of work requiring inspections of less than 4 hours duration.

1.3.3.3. Inspection costs caused by Contractor's failure to complete work requiring inspection within the scheduled duration period shown on Contractor's initial construction schedule.

1.3.3.4. Inspection costs caused by Contractor's failure to order sufficient or required quantity of material.

1.3.3.5. Inspection costs of items repaired following damage caused by Contractor.

1.3.3.6. Inspection costs caused by Contractor's substitution of material, system or process, where such inspection and testing is required by the Architect, Owner or jurisdictional authority to demonstrate compliance with specified criteria.

1.3.3.7. Inspection costs caused by Contractor's use of batch plant that does not comply with criteria waiving batch plant inspection.

1.3.3.8. Inspection costs caused by Contractor's use of a supplier or subcontractor requiring inspection services to be performed at a location exceeding a 100 mile radius of project site.

1.3.3.9. Inspection costs caused by Contractor's failure to complete work within normal hours and days, requiring overtime costs.

1.4. QUALITY ASSURANCE

1.4.1. Laboratory: Authorized to operate in State in which Project is located, and currently approved by DSA under the Laboratory Evaluation and Acceptance (LEA) Program.

1.4.1.1. Laboratory facilities shall be evaluated and accepted to perform services and shall be listed on the DSA website.

1.4.2. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

1.4.3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) Standards or accepted values of natural physical constants.

1.4.4. Welding Inspectors shall be certified in accordance with AWS QC1 Standard for AWS Certification of Welding Inspectors.

1.5. LABORATORY RESPONSIBILITIES

1.5.1. Perform specified inspection, sampling, and testing of Products in accordance with specified standards.

1.5.2. Ascertain compliance of materials and mixes with requirements of Contract Documents.

1.5.3. Promptly notify Architect of observed irregularities or non - conformance of Work or Products.

1.5.4. Perform special inspections for areas of work as shown on drawings and specified in respective sections of the specifications in compliance with Section 4-333, Part 1, Title 24, CCR.

1.5.5. Perform additional inspections and tests required by Architect.

1.6. LABORATORY REPORTS

1.6.1. After each inspection and test, promptly upload laboratory reports to DSAbox to the appropriate folder as required by referenced sections and applicable regulations.

1.6.1.1. When requested, furnish copies directly to Architect, Structural Engineer, Contractor, Owner, Project Inspector and other parties.

1.6.2. Include:

1.6.2.1. Date issued.

1.6.2.2. Project title, DSA Application Number, DSA File Number and Architect's project number.

1.6.2.3. Name of inspector.

1.6.2.4. Date and time of sampling or inspection.

1.6.2.5. Method of obtaining sample.

1.6.2.6. Identification of product and Specifications section.

1.6.2.7. Location in the Project.

1.6.2.8. Type of inspection or test.

1.6.2.9. Date of test.

1.6.2.10. Results of tests.

1.6.2.11. Conformance with Contract Documents.

1.6.2.12. Indicate samples taken but not tested.

1.6.3. When requested by Architect, provide interpretation of test results.

1.6.4. Testing agency shall provide verified reports in compliance with Chapter 4, Part 1, Section 4-336 DSA, of Title 24, CCR.

1.6.4.1. Upload laboratory reports to DSAbox to the appropriate folder. Provide such reports on current DSA form.

1.6.4.2. Provide reports each time work on the project is suspended and at completion of project.

1.6.4.3. Reports shall document actions taken, tests made, and other aspects of the construction operations for the period prescribed.

1.7. LIMITS ON TESTING LABORATORY AUTHORITY

1.7.1. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

1.7.2. Laboratory may not approve or accept any portion of the Work.

1.7.3. Laboratory may not assume any duties of Contractor.

1.7.4. Laboratory has no authority to stop the Work.

1.8. CONTRACTOR RESPONSIBILITIES

1.8.1. Deliver or make available to laboratory at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.

1.8.2. Do not incorporate material or products requiring compliance with specified testing and inspection criteria without receiving documentation of compliance from approved agency.

1.8.3. Cooperate with laboratory personnel, and provide access to the Work and to manufacturer's facilities.

1.8.4. Provide incidental labor and facilities to provide access to Work to be tested, to assist testing laboratory in obtaining and handling samples, 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.

1.8.4.1. Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes.

1.8.4.2. Protect construction exposed by or for quality-control service activities, and protect repaired construction. Comply with requirements of Division 01 sections for cutting and patching / alteration project procedures for restoration of items and surfaces.

1.8.4.3. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

1.8.5. Contractor shall prepare integrated schedule for the course of construction showing all required inspection and testing. Determine the time required for the laboratory to perform testing and to issue reports and findings. Provide all required testing and inspection time within the construction schedule.

1.8.5.1. Notify Architect, Project Inspector and laboratory minimum two working days prior to expected time for operations requiring inspection and testing services.

1.8.5.2. Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1.8.6. Notify the Owner's representative a sufficient time in advance of the manufacture or material to be supplied by Owner under the Contract Documents, which must by terms of the Contract be tested, in order that the Owner may arrange for testing at the source of supply.

1.9. SCHEDULE OF INSPECTIONS AND TESTS BY OWNER'S TESTING AGENCY

1.9.1. Miscellaneous Fasteners

1.9.1.1. Anchorage test methods as shown on drawings and specified in respective sections.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Temporary Utilities: Electricity, lighting, telephone service, and sanitary facilities.

1.1.2. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and related operational requirements.

1.1.3. Construction Facilities: Access, parking, and progress cleaning.

1.2. TEMPORARY ELECTRICITY

1.2.1. Connect to existing power service. Power consumption shall not disrupt Owner's need for continuous service. Coordinate location of connection with owner.

1.2.2. Owner will pay cost of energy used. Exercise measures to conserve energy.

1.2.3. Provide all required disconnects, overcurrent protection devices, branch circuits, power cords, and outlets as required for the Work.

1.2.4. Where approved by Architect, permanent convenience outlets may be used during construction.

1.2.5. Connect to existing power service unless specified otherwise. Power consumption shall not disrupt Owner's need for continuous service. Coordinate location of connection with Owner.

1.2.6. Pay cost of all temporary electricity, including connection costs from point of connection designated by serving utility.

1.2.7. Provide all required disconnects, overcurrent protection devices, branch circuits, power cords, and outlets as required for the Work.

1.2.8. Permanent convenience receptacles within area of work may not be utilized during construction.

1.3. TEMPORARY LIGHTING

1.3.1. Utilize existing fixtures where feasible or connect temporary lighting to existing power service. Power consumption shall not disrupt Owner's need for continuous service. Coordinate location of connection with owner.

1.3.2. Owner will pay cost of energy used. Exercise measures to conserve energy.

1.3.3. Provide all required disconnects, overcurrent protection devices, branch circuits, power cords, and outlets as required for the Work.

1.3.4. Where approved by Architect, permanent convenience outlets may be used during construction.

1.3.5. Provide and maintain adequate lighting for construction operations.

1.3.6. Provide adequate lighting for security of construction operations and storage areas. .

1.3.7. Provide all lighting required for safety and security of paths and areas affected by construction, including pedestrian walkways.

1.3.8. Maintain lighting and provide routine repairs.

1.3.9. Provide and maintain, at all times, temporary lighting and exit light/path devices in corridor areas as required by applicable codes.

1.3.10. Existing permanent lighting fixtures may be utilized during construction, supplemented by temporary lighting as required.

1.4. TEMPORARY HEAT AND VENTILATION

1.4.1. Provide temporary heating, ventilating and air conditioning (HVAC) systems as necessary for the drying out of the building, the proper installation of Work and materials, and the protection of Work and materials against injury from condensation, dampness and cold. Where necessary to comply with requirements of this Section, provide ducted ventilation system.

1.4.2. Ventilate enclosed areas to prevent accumulation of dust, fumes, vapors, or gases. Where necessary to comply with requirements of this Section, provide ducted ventilation system.

1.4.2.1. Utilize equipment as required to exhaust noxious fumes directly to the outside of the building at an approved location.

1.4.2.2. Locate ventilation discharge point at an approved location, away from walkways, HVAC intakes, windows of occupied areas, and other similar locations.

1.4.2.3. No internal combustion engines will be allowed within the building or within 50 feet of the building without prior written authorization from the Owner.

1.4.3. Use of permanent equipment for temporary HVAC is prohibited without prior approval by Architect. Where prior approval is given, Contractor shall be responsible for cost of all energy used, filter replacement, and other operational criteria.

1.4.4. Maintain temperatures as required by occupational safety regulations.

1.4.5. Utilize Owner's existing heat plant, extend and supplement with temporary heat devices as required to maintain specified conditions for construction operations.

1.4.6. Owner will pay cost of energy used. Exercise measures to conserve energy.

1.5. TELEPHONE/FAX/COPY/DATA SERVICE

1.5.1. Provide, maintain and pay for cellular telephone service, available for Owners and Inspectors unlimited use while on site.

1.5.2. Telephone service shall be in place at time of project mobilization.

1.5.3. Provide, maintain and pay for telephone service and associated office equipment to field office and to Owners/Inspectors field office.

1.5.3.1. Provide two separate phone service lines, one for inspector's office and one for Owner's office, each providing private unlimited local calling service. Provide loud exterior bell, different in tone from Contractors phone service.

1.5.3.2. Provide two separate new answering machines, one for inspector's office and one for Owner's office. Answering machines shall have remote message pickup feature. Deliver answering machines to Owner at completion of project.

1.5.4. Provide portable phone, pager, or similar device for use by Superintendent when away from field office.

1.5.5. Provide, maintain and pay for FAX machine, on separate phone service, located in Contractor's field office.

1.5.5.1. Provide, maintain and pay for new FAX machine, plain paper type, on separate phone service, located in Inspector's field office. Deliver FAX machine to Owner at completion of project.

1.5.6. Provide, maintain and pay for xerographic copy machine, with 11 x 17 copy capability, able to scan up to 300 dpi to PDF format, with email export capability, located in Contractors field office.

1.5.6.1. Provide, maintain and pay for xerographic copy machine, with 11 x 17 copy capability, able to scan up to 300 dpi to PDF format, with email export capability, located in Inspectors field office.

1.5.7. Provide, maintain and pay for internet data service to Contractor's field office and to Owners/Inspectors office.

1.5.7.1. Provide separate internet service line for inspector's office. Service shall be high-speed cable. DSL is acceptable if no cable service is available.

1.5.7.2. Coordinate with Owner and Project Inspector on all required connection protocols, including security. Modify service as required to comply with Owner requests. Provide data jack type and location as required by Owner.

1.5.7.3. Data service shall be in place prior to start of construction.

1.6. TEMPORARY WATER SERVICE

1.6.1. Provide and maintain connection to existing water service.

1.6.2. Owner will pay cost of water used. Exercise measures to conserve water.

1.6.3. The Contractor shall provide, maintain, and pay for all temporary potable water piping as required to implement the work. Provide temporary potable water service in compliance with all applicable regulations. Coordinate location, including point of connection, with Architect.

1.6.4. The Contractor shall provide, maintain, and pay for suitable water source for construction operations, including cost of connection, temporary meters, distribution to point of use, and associated components. Provide temporary potable water service in compliance with all applicable regulations.

1.6.5. Provide non-potable water source for dust control and other construction operations as required by local jurisdictional authority regulations. Do not apply to any areas used by students or staff without Architects prior approval.

1.6.6. Use of on-site existing water service for potable drinking water is acceptable. Coordinate point of connection with Owner.

1.6.7. Owner has arranged for the existing on-site 10,000 gallon tank system to be made available to Contractor by Sierra Pacific at no cost to the Contractor for the first 20 months of the contract period. Contractor shall provide 2.5 inch construction meter at the point of connection to the existing water service high line connection, and pay cost of all water used.. Contractor shall maintain existing high line connections, and extend high lines to construction areas as required. Contractor shall be responsible for all damage to tank and high line.

1.7. TEMPORARY SANITARY FACILITIES

1.7.1. Provide, maintain, and pay for all temporary toilet facilities as required to implement the work in compliance with all regulations, including CAL OSHA, and as specified.

1.7.1.1. Provide two toilet facilities at site, one each for male and female employees, or as required for all Contractor and subcontractor forces on each site, whichever is greater.

1.7.1.2. In addition, provide lockable toilet facility for Architect and Inspector of Record exclusive use.

1.7.1.3. Locate toilet facilities as directed by Architect. Relocate when required by Architect.

1.7.1.4. Maintain in a clean and sanitary condition at all times, with all required supplies.

1.7.2. Use of existing toilet facilities, or toilets constructed as a part of this Contract, is prohibited.

1.8. BARRIERS AND BARRICADES

1.8.1. Exterior

1.8.1.1. Provide barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

1.8.1.1.1. When regulated by codes, such legal requirements for protection shall be considered as minimum requirements. Provide protective measures in excess of such minimum requirements as specified or required.

1.8.1.2. Provide barricades around excavations.

1.8.1.3. Provide protection for all plant life designated to remain.

1.8.1.3.1. Replace damaged plant life with approved equivalent.

1.8.1.3.2. Erect tree protection within 3 days of mobilization. Enclose trees designated to remain with 2 x 4 wood frame. Install frame minimum 6 feet from trunk diameter, all sides. Provide 4x4 post supports, minimum 3 feet high, embedded 3 feet, at 3 foot on center maximum. Wrap frame with snow type fencing, in bright iridescent color visible at night.

1.8.1.4. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.8.2. Interior

1.8.2.1. After beneficial occupancy, and where required to permit Owners on-going operations, provide barriers as specified.

1.8.2.1.1. Construct barriers as metal framed/fire-resistive gypsum board fire resistive corridor construction, with self-closing, latching door assembly. Provide temporary partition and door assembly fire resistivity rating equal to the assembly being replaced. Close joints and seal edges at intersections with existing surfaces.

1.8.2.1.2. Use of sheet plastic dust barriers in place of rated assemblies is prohibited.

1.8.2.2. Protect existing surfaces, equipment and furnishings from damage from construction operations and demolition. Where necessary, remove and store in separate area.

1.8.2.3. Where demolition or construction operations generate fine dust or air-borne particulates, provide fire retardant drop cloths, screening or other approved barriers to prevent dust intrusion into existing cabinet interiors, equipment, drawers, and similar conditions.

1.8.2.4. Provide contamination control mats at construction area access locations to prevent tracking of construction dust and dirt into Owner-occupied portion of building and elevator cars.

1.8.3. Paint surfaces exposed to view from Owner-occupied areas with approved water based paint and in color as selected by Owner.

1.9. FENCING

1.9.1. Prior to starting construction, provide chain link fence around perimeter of work under this contract, including storage areas and each individual building, at locations as directed by Architect so as to provide for complete segregation of construction and Owner operations. Submit detailed plan of fencing barriers, including gates, for review and approval by Architect and Owner. Show flow of construction traffic.

1.9.2. Erect chain link fence around entire perimeter of site [around perimeter of work areas as shown on drawings] within 3 days of mobilization. Submit detailed plan of fence, including gates, for review and approval by Architect and Owner. Show flow of construction traffic.

1.9.2.1. Provide **6 or 8** foot high fence, with top rail and bottom wire. Provide fabric with selvedge edge and line posts at maximum 9 feet on center.

1.9.2.2. Obtain Architect approval of embedment method at paving areas. Provide portable T-frame fencing panels with concrete base supports.

1.9.2.3. Provide chain link fencing fabric and supports free of sags, breaks, rust and distortion.

1.9.2.4. Following Owners beneficial occupancy of portions of project, erect chain link fence at locations as approved by Architect to provide for complete segregation of construction and Owner operations.

1.9.3. Provide gates affording access as required by fire department having jurisdictional authority.

1.9.4. Obtain and pay for required permits and inspections.

1.9.5. Remove construction fence and other related construction upon completion of Work, or sooner if so authorized or required to maintain Project progress.

1.10. WATER CONTROL

1.10.1. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

1.10.2. Protect site from puddling or running water. Provide water barriers as required to protect site and adjacent property from soil erosion and siltation.

1.10.3. Obtain all necessary permits, including preparation of engineering documentation, as required to comply with jurisdictional authority regulations regarding storm run-off and erosion control. Compliance with requirements of the federal Clean Water Act, associated State Water Resources Board and local regulations is specifically required.

1.10.3.1. Prepare and file on Owners behalf, the Notice of Intent. Owner will reimburse filing fee.

1.10.3.2. Prepare and maintain on-site "Storm Water Pollution Prevention Plan" (SWPPP), as required by regulations developed by the California Regional Water Quality Control Board with jurisdictional authority.

1.10.3.2.1. Plan shall include methods for controlling non-storm water discharge sources, such as pipe flushing, de-watering, street sweeping, clean-up, and other similar construction operations.

1.10.3.2.2. Plan shall incorporate use of Best Available Technology and Best Management Practices to prevent and/or control storm water and non-storm water discharge and run-off as required by current regulations adopted by Regional Water Quality Control Board having jurisdiction..

1.10.3.2.3. Plan shall incorporate use of testing and monitoring procedures and reporting methods as required by current regulations adopted by Regional Water Quality Control Board having jurisdiction.

1.10.3.3. Designate staff member responsible for SWPPP compliance, including monitoring, testing, and reporting procedures.

1.10.3.3.1. Inspect all SWPPP aspects before and after a storm event to maximize effective control.

1.10.3.3.2. Verify compliance with all SWPPP controls of non-storm water discharges.

1.10.3.3.3. Provide Owner with a written report of each inspection, certifying compliance or defining modifications made to achieve compliance with regulations.

1.10.3.3.4. Within 48 hours of occurrence, file written report of all SWPPP violations with Owner.

1.10.3.3.5. Submit annual certification of compliance with the SWPPP with the Owner until project completion.

1.11. PROTECTION OF INSTALLED WORK

1.11.1. Protect installed Work and provide special protection where specified in individual specification Sections.

1.11.2. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

1.11.3. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

1.11.4. Provide and maintain all required dams, screens and collection systems necessary to prevent water used in interior demolition or construction operations from damaging adjacent areas.

1.11.5. Take all means required to prevent damage to project, including interior areas, resulting from inclement weather, water, wind or other environmental impacts. Provide temporary coverings or enclosures as required for all roof and wall penetrations. Where moisture from condensation, rain or high winds is forecast or present, Contractor shall take all means to eliminate or prevent danger to the Work and to adjacent property, including covering unprotected surfaces, making all openings weather tight, removing loose materials, tools or equipment from exposed locations and removing or securing scaffolding.

1.11.6. Provide, operate, and maintain pumping equipment required to remove water from the site, roof and interior flooded areas.

1.12. PARKING AND TRAFFIC CONTROL

1.12.1. Parking Criteria

1.12.1.1. Coordinate location and number of parking spaces to be made available for Contractors forces with Owner.

1.12.1.2. Do not permit parking on adjacent public streets.

1.12.1.3. Parking for workmen employed on the work may be provided on the site, when approved by the Owner, and to the extent that space for that purpose is available without interference with activities related to performance of the Work. Additional parking spaces required by the Contractor shall be secured at Contractors own expense.

1.12.2. Traffic Control

1.12.2.1. Traffic maintenance: Prior to start of work, determine the routing of construction vehicles, and the safeguards and procedures necessary to carry out the work. Obtain the Owner's approval of the traffic routes, and for any removal, temporary relocation and reinstallation of traffic control signal. In addition:

1.12.2.1.1. Be responsible for controlling construction traffic within and adjacent to the site.

1.12.2.1.2. Provide entrances, lifts and safeguards required or necessary to the progress of the work, and effectively control such traffic to provide minimum hazard to the work and all persons.

1.12.2.1.3. Route construction equipment, trucks, and similar vehicles via existing public streets to and from the site as approved by the governing authorities.

1.12.2.1.4. Where construction traffic occurs when Owner personnel, students and staff are on site campus, provide "spotter" responsible for leading construction traffic through site campus areas.

1.12.2.1.5. Obtain and pay for permits and inspections made necessary by use of public street, sidewalks, curbs, and paving. Post guarantees and bonds that may be required, and repair and make good any damages thereto acceptable to the authorities having jurisdiction.

1.12.2.1.6. Construct and maintain temporary walks for pedestrians. Keep streets adjacent to the site open to vehicular and pedestrian traffic.

1.12.2.1.7. Maintain constant access for police, fire and ambulance service.

1.12.2.1.8. Provide and maintain for proper control of traffic and safety of all concerned. Provide all necessary barricades, suitable and sufficient lights, reflectors, and danger signals.

1.12.2.1.9. Provide warning and closure signs, directional and detour signs, and whatever additional measures are necessary.

1.12.2.1.10. Indicate on a 24-hour basis restricted and dangerous conditions existing on or adjacent to the site. Illuminate barricades, danger signals, warning signs and obstructions at night. Keep warning lights burning from sunset until sunrise.

1.13. ACCESS ROADS

1.13.1. Coordinate location of access roads with Owner.

1.13.1.1. Contractor shall maintain temporary access roads as required to implement the work under this contract, including currently developed access road.

1.13.2. Provide and maintain access to fire lanes and fire hydrants at all times, free of obstructions. Coordinate location, locking device and dimension of gates with fire department having jurisdiction.

1.13.2.1. Provide trench plates as required to resist traffic loads, including fire department vehicles.

1.13.2.2. Where trench plates occur in pedestrian paths, install with transitions as required to comply with accessibility regulations.

1.13.2.3. Obtain Fire Marshal approval of all trench plate installations.

1.13.3. Do not permit delivery trucks to block, park or wait on public streets.

1.13.4. Coordinate site access through locked access gates with Owner. Keys to such gates will not be released to Contractor.

1.14. PROGRESS CLEANING

1.14.1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

1.14.2. Use cleaning materials which do not create hazards to health or property and which will not damage surfaces. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

1.14.3. Provide for all dumpsters, haul fees and dump charges as required. Do not use Owners collection facilities at any time.

1.14.4. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

1.14.5. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

1.14.6. Remove waste materials, debris, and rubbish from interior spaces daily and deposit in approved dumpster location. Remove from site **daily/weekly/monthly**. Dispose off-site in a legal manner.

1.14.7. Broom and vacuum clean interior areas prior to start of all surface finishing, including painting, and continue cleaning on an as-needed basis until painting and surface finishes are complete.

1.14.8. Schedule operations so that dust and other contaminants resulting from cleaning procedures or construction operations will not fall on wet or newly-coated surfaces.

1.14.9. Maintain all public streets free of dust, mud, and debris as required by jurisdictional authority. Maintain parking lots, drives and walkways free of dust, mud and debris when Owner takes beneficial occupancy of a portion of project prior to final completion.

1.14.10. Provide watering, dust palliative admixture or other methods as required to minimize dust generation during work. Where required by Owner, provide dust screen netting at property line temporary fencing.

1.15. FIELD OFFICES AND SHEDS

1.15.1. Project Office: Coordinate with Owner the use and maintenance of existing interior space for field office purposes.

1.15.1.1. Provide a 3x5 foot desk and a 3x6 foot lay out table.

1.15.1.2. Provide adequate heating and cooling, including air conditioning.

1.15.1.3. Provide overhead fluorescent lighting.

1.15.1.4. In addition to desk and table, provide 2 drawer file cabinet and 2 chairs.

1.15.2. Provide and maintain a weatherproof and waterproof field office trailer, with lockable exterior access, for the Owner's, Architect's and Inspector's exclusive use, complying with the following criteria:

1.15.2.1. Provide an office area, a minimum area of 120 square feet, with sufficient dimension to accommodate furniture as specified below.

1.15.2.2. Provide adequate heating and cooling, including air conditioning.

1.15.2.3. Provide overhead fluorescent lighting.

1.15.2.4. Provide phone service for inspector's exclusive use as specified in Article 1.7 of this Section. Provide a data outlet.

1.15.2.5. Provide a 3x5 foot desk and a 3x6 foot lay out table, a 4 drawer file cabinet, and 2 office chairs. Provide plan rack suitable for 3 sets of 30 x 42 drawings in inspectors office.

1.15.3. Provide and maintain a weatherproof and waterproof field office trailer, with lockable exterior access, for the Owners, Architects and Inspectors exclusive use, complying with the following criteria:

1.15.3.1. Provide two separate office areas, each a minimum area of 120 square feet, with sufficient dimension to accommodate furniture as specified below. Offices shall access a central conference room, minimum 12 feet x 16 in dimension, through 3 foot doorways. Provide separate access to conference room area.

1.15.3.2. Provide adequate heating and cooling, including air conditioning.

1.15.3.3. Provide overhead fluorescent lighting.

1.15.3.4. Provide phone/fax/copy machine service for inspectors and Owners exclusive use as specified in Article 1.7 of this Section. Provide a data outlet.

1.15.3.5. Provide a 3x5 foot desk and a 3x6 foot lay out table, two 4 drawer file cabinets, and 2 office chairs in each office. Provide plan rack suitable for 6 sets of 30 x 42 drawings in inspectors office.

1.15.3.6. Provide 4 x 8 conference table, 6 conference chairs and 4 x 8 white markerboard at conference room.

1.15.3.7. Provide Kawasaki or equal gas powered four person cart, with windshield, as approved by Architect for Inspector of Records exclusive use. Maintain cart in operable and safe condition at all times. Provide gas, oil and service as required.

1.15.4. Provide and maintain weatherproof and waterproof field office structures for Contractors use as necessary for the proper execution of the work. Use of Inspectors office for Contractors administration of the work is not permitted.

1.15.4.1. Provide phone/fax/copy machine service for Contractor's use as specified in Article 1.7 of this Section.

1.15.5. Locate offices and sheds as directed by Architect .

1.15.6. Architect, Owner, and their representatives shall have free access to the Owners and Inspectors office at all times.

1.15.7. All field offices shall remain the property of the Contractor and shall be removed from the site upon completion of the work.

1.15.8. Furnish, install and maintain tool cribs, sheds and storage units for the Contractors use as necessary for the proper execution of the work.

1.15.8.1. Provide all necessary barricades, warning devices and enclosures required to protect and direct visitors and staff around tool and equipment located in passageways and corridors.

1.15.8.2. Return all small tools and secure in locked compartments or cribs at close of work day.

1.15.8.3. Safe-off or lock all equipment and large tools. Disable from malicious or accidental start-up and operation.

1.15.8.4. Storage facilities shall provide protection of all products from damage due to environmental conditions, abuse, or theft.

1.15.9. Requirements of regulatory agencies: Comply with requirements of regulatory agencies having jurisdiction. Obtain and apply for permits required by governing authorities.

1.15.10. Job Conditions: Locate temporary structures to avoid interference with Work. Relocate temporary structures as required by job progress.

1.16. RECORD DOCUMENTS: JOB SET

1.16.1. Contractor shall maintain, on site, one copy of the following contract documents, defined as the Record Job Set. Stamp set "RECORD JOB SET - DO NOT REMOVE". During the course of construction, use this set to record actual revisions to the Work.

1.16.1.1. Construction Drawings.

1.16.1.2. Project Manual/Specifications.

1.16.1.3. Addenda.

1.16.1.4. Change Orders and other Modifications to the Contract.

1.16.1.5. Reviewed shop drawings, product data, and samples.

1.16.2. Store Record Job Set separate from documents used for construction.

1.16.3. Transfer information concurrent with construction progress. Record Job Sets will be reviewed at each Progress Meeting.

1.16.3.1. Where Record Job Sets do not reflect actual field conditions, the Architect may delay certification of Payment Request until sets are updated to the Architects satisfaction.

1.16.3.2. Record Job Set information reflecting engineering elevations, locations and alignments shall be prepared by competent staff experienced in surveying methods a licensed Land Surveyor or Civil Engineer, licensed in California.

1.16.3.3. Cost of Record Job Set preparation shall be paid by Contractor at no additional cost to Owner.

1.16.3.4. Cost of all civil engineering and surveying associated with Record Job Set preparation shall be paid by Contractor at no additional cost to Owner. Other than the payment for services related to work of this contract, the Civil Engineer or Surveyor shall have no financial or business relationship with Contractor.

1.16.4. Specifications: Legibly mark and record at each Part 2 Product section description of actual Products installed, including the following:

1.16.4.1. Manufacturer's name and product model and number.

1.16.4.2. Product substitutions or alternates utilized.

1.16.4.3. Changes made by Addenda and Modifications.

1.16.5. Recording Data: Legibly mark each item to record actual construction including:

1.16.5.1. Measured actual horizontal and vertical locations of underground utilities, sub-drains, services and appurtenances, to a tolerance of 2 inches plus/minus, referenced to permanent surface improvements. Include elevations of all water lines, utilities, sanitary and storm drain inverts and storm drain/sub-drain/canyon drain system outfalls.

1.16.5.2. Field changes of dimension and detail, including alignments, gutter slopes, slope bank locations, drainage structures, and related site improvements.

1.16.5.3. Earthwork Engineering Record Documents, consisting of actual field elevations of grading and earthwork, to a tolerance of 0.1 feet. The actual elevation of each elevation shown on drawings shall be recorded. In addition, provide actual elevations at 50 foot intervals along all finish grade contours as shown on drawings, including all grade breaks and the top and toe of all slopes.

1.16.5.3.1. Where actual field elevations exceed specified tolerances, correct field condition and re-survey prior to preparation of final Record Set.

1.16.5.3.2. Record actual elevation in a rectangular box directly above the elevation or contour shown on drawings, using red, permanent ink.

1.16.5.4. Measured locations of internal utilities, services, and appurtenances concealed in construction, to a tolerance of 1 inch plus/minus, referenced to visible and accessible features of the Work.

1.16.5.5. Field changes of major architectural features, such as door relocation, wall furring, field changes of dimension and detail, and material transitions.

1.16.5.6. Details not on original Contract Drawings.

1.17. REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

1.17.1. Remove temporary utilities, equipment, facilities, and materials, prior to Final Application for Payment.

1.17.2. Clean and repair damage caused by installation or use of temporary work.

1.17.3. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.18. SECURITY

1.18.1. Provide security and facilities as necessary to protect work and personnel from vandalism, unauthorized entry, theft, damage, or assault.

1.18.1.1. Security Service: Contractor shall provide licensed and bonded on-site security service, approved by Owner, at all times the work is not being prosecuted, including nights, inclement weather, holidays and weekends. Such security service shall be responsible for maintaining the premises in a secure condition at all times, and shall include roaming tours and inspection of all work under construction. Owner reserves right to require replacement of service for non-performance.

1.18.2. Within a 48 hour period, replace or repair, to specified condition Architects satisfaction, all surfaces or items damaged by graffiti during course of construction.

1.18.3. Where Owner has given approval to take fire detection system off-line, return system to active status at completion of work or end of each work period.

1.18.3.1. Fire Safety During Construction: Comply with provisions of Article 87, California Fire Code, CCR, [Uniform Fire Code] including, but not limited to, access roads, fire extinguisher and fire watch regulations.

1.18.3.2. Where security or fire detection systems are disabled for any reason, including where Owner has given approval for such system shut-down, provide fire watch or security guard service as directed by Owner and at no additional cost to the Owner.

1.18.4. After beneficial occupancy by Owner, all Contractor staff, subcontractors and suppliers shall notify Owners administrative staff when on site, and sign in and out with staff as directed by Owner. Notify staff when work is completed or shut-down for that work period.

1.18.4.1. Wear badges with photo identification as directed by Owner at all times. In addition, wear orange safety vests or other approved shirt design at all times.

1.18.4.2. Do not enter patient/student or staff rooms at any time without approval of staff.

1.18.4.3. All Contractor's staff, subcontractors and suppliers shall avoid interaction, contact and communication with patients/students. Under no circumstances shall Contractors staff, subcontractors and suppliers be in contact with patients/students without Owner staff present.

1.18.4.4. All work, including work of subcontractors, shall be conducted under the observation of the Contractor's supervisory personnel complying with fingerprint regulations established by the Document: Special Conditions.

1.18.5. Remove all radio or other music generating devices operated sufficiently loud so as to be objectionable, as determined solely by the Owner, to neighbors, or Owner's operations.

1.18.6. Dogs and other pets are not permitted on site campus without prior approval by Owner.

1.18.7. No smoking or use of any tobacco products is permitted on Owner's property.

1.18.8. All Contractor staff, subcontractors and suppliers shall present a professional and civil manner to staff, visitors, neighbors and students. Use of language or behavior judged offensive, obscene or suggestive by the Owner is not permitted. Clothing that is suggestive, is marked with images that suggest or promote drug, alcohol or tobacco use, or represents behavior judged offensive, obscene or suggestive by the Owner is not permitted. Immediately remove from site campus any Contractor personnel exhibiting such behavior.

1.18.9. Persons under the influence of or engaged in the use of drugs or controlled substances, as defined by Schedules I through V of Section 202 of the Controlled Substances Act and regulations defined at 21 CFR 1308 - 1308.15, shall be immediately removed from site campus.

1.18.10. Use of alcoholic beverages is prohibited on site campus. Persons under the influence of or engaged in the use of alcoholic beverages shall be immediately removed from site campus.

1.19. PROJECT IDENTIFICATION AND SIGNAGE

1.19.1. Provide 4 x 8 sign, constructed of marine grade plywood, mounted on wood frame construction with concrete footings. Provide professional sign painter quality painted design and message as directed by Architect.

1.19.2. Message will include project identification, name of client, architect, and contractor, and miscellaneous data as shown on drawings.

1.19.3. Install sign at location directed by Architect. Remove at end of project and deliver to Owner.

1.19.4. No other signs are permitted except those required by law.

1.20. DOCUMENTATION OF EXISTING CONDITIONS

1.20.1. Prior to beginning any alterations, including grading, wall demolition or fixture removal, prepare a record of existing improvements affected by the work of this contract, including but not limited to the following:

1.20.1.1. Off-site street and frontage improvements, identifying all evidence of existing settlement, cracking, and other signs of damage, distress or failure.

1.20.1.2. Condition of adjacent properties, including fencing, retaining walls, pools, paving, and structures. Clearly identify all evidence of existing settlement, cracking, alignment and other signs of damage, distress or failure.

1.20.1.3. Condition of landscaping, including canopy overhang, shrubbery and grass/groundcover. Clearly identify all evidence of existing trunk damage, grass compaction, crushed and broken shrubs and other signs of distress or failure.

1.20.2. Format

1.20.2.1. Prepare record document using digital color video, recorded on DVD, and any other means of documentation necessary to describe existing condition.

1.20.2.2. Prepare digital color video at such scale and detail as required to document existing damage occurred prior to beginning work. If the record documents do not clearly show damage as a pre-existent condition, Contractor shall be responsible for repair or replacement of such damaged improvements.

1.20.2.3. Obtain Owners' Inspector of Record certification that documents were prepared prior to beginning construction. Deliver DVD and associated documentation to Owner prior start of construction.

2. PART 2 – PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Products.

1.1.2. Transportation and handling.

1.1.3. Storage and protection.

1.2. PRODUCTS

1.2.1. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

1.2.2. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

1.2.3. Provide interchangeable components of the same manufacturer, for similar components.

1.3. TRANSPORTATION AND HANDLING

1.3.1. Transport and handle Products in accordance with manufacturer's instructions.

1.3.2. Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and Products are undamaged.

1.3.3. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement or damage.

1.4. STORAGE AND PROTECTION

1.4.1. Store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weather-tight, climate controlled enclosures.

1.4.2. Where approved by Architect and permitted by General Conditions, provide off-site storage and protection in a bonded warehouse when site does not permit on-site storage or protection.

1.4.3. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

2. PART 2 - PRODUCTS

\\Not Used

3. PART 3 - EXECUTION

\\Not Used

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surveying requirements for the Work.

1.02 RELATED SECTIONS

A. Section 31 00 00: Earthwork

B. Section 32 12 16: Asphaltic Concrete Paving

C. Section 32 13 13: Site Concrete Work

D. Section 33 40 00: Storm Drainage

1.03 SURVEY SERVICE

A. Unless otherwise stated by the Architect or noted in the Special Provisions, the CONTRACTOR shall provide all surveying services.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 SUBMITTALS

A. CONTRACTOR shall submit the name and address of the State of California licensed surveyor to Construction Management Representative (CMR), ARCHITECT and OWNER including any changes as they may occur.

B. CONTRACTOR shall submit to OWNER copies of cut sheets, coordinate plots, data collector printouts, and other documentation as available to verify completeness and/or accuracy of field surveying work.

C. Statement of Compliance: CONTRACTOR shall submit a statement of certification signed and sealed by Surveyor, counter-signed by CONTRACTOR indicating compliance with grade elevations, slopes and tolerances.

3.02 LAYOUT OF THE WORK

A. CONTRACTOR shall employ a State of California licensed surveyor to lay out the entire Work, set grades, lines, levels, control points, vertical and horizontal control, elevations, grids and positions. Before the commencement of Work, surveyor shall, in conjunction with OWNER and Construction Management Representative (CMR) provided engineering survey of the Project site, locate all reference points and benchmarks, then lay out all lines, elevations, and measurements for the entire Work including but not limited to, buildings, grading, paving and utilities.

B. All work under this contract shall be built in accordance with the lines and grades shown on the plans. Field survey for establishing these, and for the control of construction, shall be the responsibility of the Contractor. All such survey work including construction staking shall be

done under the supervision of a California Licensed Land Surveyor or authorized Civil Engineer. Staking shall be done on all items ordinarily requiring grade and alignment, at intervals normally accepted by the agencies and trade involved.

C. The CONTRACTOR shall be responsible for any errors in the finished work, and shall notify the Engineer, in writing, within 24 hours, of any discrepancies, or design errors during the construction staking.

D. Contractor shall immediately remediate any areas found not to meet specification requirements.

3.03 PERMANENT SURVEY MARKERS

A. Prior to the start of construction, the Contractor's licensed Land Surveyor or qualified Civil Engineer shall, in conformance with Section 8771 of the California State Business and Professions Code, locate all monuments (both of record and not of record), bench marks, and centerline ties within the construction zone, i.e., within one hundred feet of the construction activity.

B. After construction and prior to final acceptance by the Owner of the construction project, the Contractor's land surveyor or qualified Civil Engineer shall re-survey all field monuments and centerline ties within the construction zone.

C. All survey monuments removed or altered as a result of construction shall be reset, Corner Records filed with the County Surveyor's Office, and approved final Corner Records filed with the City Engineer. Centerline ties removed as a result of construction shall be reset and tie sheets filed with the City Engineer.

D. The Land Surveyor shall provide a letter of certification for all monuments having four or more existing ties which are within 0.02 ft plus or minus of the original City tie sheet records. When several monuments and ties appear on one tie sheet and one of the ties has changed the Land Surveyor shall re-measure all of the ties and re-file a new tie sheet with the City as required herein.

E. County permanent and temporary bench marks within the construction zone shall be located by the surveyor, and the Contractor's Land Surveyor shall send a written notification of impending construction to the County Surveyor's Office two weeks prior to construction.

3.04 SURVEY REQUIREMENTS

A. Establish a minimum of two permanent horizontal and vertical control points on the Project site, remote from the building area, referenced to data established by the survey control points.

B. Indicate the reference points on the project record drawings with the basis of elevation being the established benchmarks.

C. Establish lines, grades, locations and dimensions by instrumentation. From time to time, verify the layout of all Work by the same methods.

D. Provide grade stakes and elevations to construct over excavation and re-compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.

E. Calculate and layout proposed finished elevations and intermediate control as required to provide smooth transitions between the spot elevations indicated in the Contract Documents.

F. Provide stakes and elevations for grading, fill, and topsoil placement.

G. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm, sewers, water mains, gas, electric and signal and provide vertical control in proportion to the slope of the line as required for accurate construction. Dry utilities will be based upon adequate horizontal and vertical control layout. Prior to trench closure, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished concrete or AC surfaces at key locations such as BC's, EC's, grade breaks, corners or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.

H. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.

I. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.

J. Submit a certification, signed by the surveyor, confirming the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01'. Building pad tolerance will be +- 0.10'.

3.05 ESTABLISHMENT OF GRADES IN HARDSCAPE AREAS

A. All work shall conform to the lines, elevations, and grades shown on the Grading Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.

B. Areas having drainage gradients of 2 percent or more shall have elevation stakes, set with instrument, at grid intervals of 25 feet. Intermediate stakes may be set by using a tightly-drawn string line over the tops of adjacent stakes. Grade stakes must be set at all grade breaks, grade changes, etc.

C. Areas having drainage gradients of less than 2 percent shall have elevation stakes, set with instrument, at 10 foot intervals. Grade stakes must be set at all grade breaks, grade changes, etc.

D. Protect and maintain stakes in place until their removal is approved by the Owner. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.

3.06 STORM DRAIN & SANITARY SEWER PIPE INSTALLATION

A. All storm drain pipelines, sanitary sewer pipelines, trench drains, catch basins, cleanouts and drain inlets shall be staked by a licensed surveyor if slope of grade is less than 2% and a complete set of cut sheets shall be supplied to the Inspector. All construction staking shall be installed and verified for grade and alignment prior to the start of construction.

3.07 RECORD DRAWINGS

A. Upon Substantial Completion, CONTRACTOR shall obtain and pay for reproducible transparencies of the as built survey drawings. Deliver to ARCHITECT, final "record" drawings of the original drawings and completed Work within specified tolerances.

B. Record drawings shall indicate locations by coordinate of all utilities onsite with top of pipe elevations at major grade and alignment changes, rim grate or top-of-curb and flow line elevations of all drainage structures and manholes.

C. Completed record drawing transparencies shall be signed and certified as correct and within specified tolerances by the licensed surveyor.

D. Attention is called to other sections of the Contract Documents requiring verification or measurements of installed Work by survey. Surveyor shall perform and certify all such surveys or verification are completed in accordance with the Contract Documents.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Environmental Issues: Project requires special Site Waste Management Program.

1.1.1.1. Waste Management Goals: A minimum 50% of total Project waste shall be diverted from landfill.

1.1.1.2. Provide documentation to show evidence that waste management, recycling, and reuse of recyclable and reusable materials have been maximized.

1.1.1.3. Effect optimum control of solid wastes.

1.1.1.4. Prevent environmental pollution and damage.

1.2. DEFINITIONS

1.2.1. Inert Fill: A permitted facility that accepts inert waste such as asphalt and concrete exclusively.

1.2.2. Class III Landfill: A landfill that accepts non-hazardous waste such as household, commercial, and industrial waste, including construction, remodeling, repair, and demolition operations.

1.2.3. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.

1.2.3.1. Rubbish: Includes both combustible and noncombustible wastes, such as paper, boxes, glass, crockery, metal and lumber scrap, tin cans, and bones.

1.2.3.2. Debris: Includes both combustible and noncombustible wastes, such as leaves and tree trimmings that result from construction or maintenance and repair work.

1.2.4. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals and inorganic wastes.

1.2.5. Sanitary Wastes:

1.2.5.1. Garbage: Refuse and scraps resulting from preparation, cooking, distribution, or consumption of food.

1.2.5.2. Sewage: Domestic sanitary sewage.

1.3. SUBMITTALS

1.3.1. Site Waste Management Program: Prior to commencement of Work, schedule and conduct meeting with Owner and Architect to discuss proposed Site Waste Management Program.

1.3.1.1. Develop mutual understanding relative to details of recycling, and rebate programs.

1.3.1.2. Prepare and submit a written and graphic Site Waste Management Program including, but not limited to, the following:

1.3.1.2.1. Indicate procedures to be implemented.

1.3.1.2.2. Estimate total Project waste to be generated, and estimated cost of disposing of Project waste in landfills.

1.3.1.2.3. Estimate total cubic yards of following waste categories to be diverted from landfill.

1.3.1.2.3.1. Clean dimensional wood, palette wood.

1.3.1.2.3.2. Plywood, oriented strand board, and medium density fiberboard.

1.3.1.2.3.3. Cardboard, paper, packaging.

1.3.1.2.3.4. Other items as directed by Owner and Architect.

1.3.1.2.4. Estimate amounts of following waste categories in appropriate units (weight, feet, square yards, gallons).

1.3.1.2.4.1. Metals.

1.3.1.2.4.2. Gypsum board.

1.3.1.2.4.3. Carpet.

1.3.1.2.4.4. Paint.

1.3.1.2.4.5. Other items as directed by Owner and Architect.

1.3.1.2.5. Submit permit or license and location of waste disposal areas.

1.3.1.2.6. Submit procedures for recycling/re-use program.

1.3.1.2.7. Submit procedures for rebate programs.

1.3.1.2.8. Revise and resubmit Site Waste Management Program as required by Owner and Architect.

1.3.1.2.9. Review of Contractor's Site Waste Management Program will not relieve Contractor of responsibility for control of pollutants and other environmental protection measures.

1.3.2. Submit summary of solid waste generated by Project with each application for progress payment, on form acceptable to Owner and Architect. Include the following information:

1.3.2.1. Name of firm accepting the recovered materials or waste materials.

1.3.2.2. Specify type of facility (e.g. recycler, processor, Class III landfill, MRF).

1.3.2.3. Location of the facility.

1.3.2.4. Type of materials.

1.3.2.5. Net weights of each type of recovered material.

1.3.2.6. Date of delivery.

1.3.2.7. Value of the materials or tipping fee paid.

1.3.3. Prepare 3-ring binder with rebate information and product documentation as required for Owner to qualify for rebate programs; submit binder with final closeout submittals.

1.4. RECYCLING PROGRAM

1.4.1. Recycling: Implement recycling program that includes separate collection of waste materials of following types as applicable to Project:

1.4.1.1. Asphalt.

1.4.1.2. Land clearing debris.

1.4.1.3. Soil.

1.4.1.4. Trees and shrubs.

1.4.1.5. Concrete and concrete blocks.

1.4.1.6. Brick and masonry materials.

1.4.1.7. Untreated lumber.

1.4.1.8. Clean dimensional wood and palette wood.

1.4.1.9. Plywood, oriented strand board, and medium density fiberboard.

1.4.1.10. Paper – bond.

1.4.1.11. Paper (e.g. newsprint).

1.4.1.12. Cardboard and paper packaging materials.

1.4.1.13. Plastics.

1.4.1.14. Rigid foam.

1.4.1.15. Insulation.

1.4.1.16. Ferrous metal.

1.4.1.17. Non-ferrous metals (e.g. copper, aluminum, etc.).

1.4.1.18. Glass.

1.4.1.19. Gypsum board (unpainted).

1.4.1.20. Carpet and pad.

1.4.1.21. Paint.

1.4.1.22. Beverage containers.

1.4.1.23. Plumbing fixtures.

1.4.1.24. Electrical fixtures and wires.

1.4.1.25. Others as appropriate.

1.4.2. Separation of Waste: Contractor and subcontractors are both required to separate recyclable materials into bins and to arrange for delivery of recyclable materials to recycling depot. Clearly label all recycling containers and list acceptable and unacceptable materials.

1.4.3. Handling: Keep materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

1.4.3.1. Clean materials that are contaminated prior to placing in collection containers.

1.4.3.2. Arrange for collection by or delivery to appropriate recycling center or transfer station that accepts construction and demolition waste for purpose of recycling.

1.4.4. Participate in Re-Use Programs: Rebates, tax credits, and other savings obtained for recycled or re-used materials shall accrue to Contractor.

2. PART 2 - PRODUCTS

Not Used

3. PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 77 19

CLOSEOUT REQUIREMENTS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Closeout Procedures.

1.1.2. Final Cleaning.

1.1.3. Adjusting.

1.1.4. Project Record Documents.

1.1.5. Operation and Maintenance Data.

1.1.6. Warranties.

1.1.7. Spare Parts and Maintenance Materials.

1.2. SUBSTANTIAL COMPLETION AND PUNCH LIST PROCEDURES

1.2.1. At such time as each Contractor believes project is substantially complete, notify Architect and Project Manager and request Punch List Inspection.

1.2.2. Architect and Architect's Consultants will conduct an inspection in order to determine acceptance of work and identify items remaining to complete. The Architect will prepare a Punch List of such items and transmit to Contractor.

1.2.3. If Architect determines that punch list items remaining are sufficiently minor, and that Owner can occupy work and use it for its intended purpose, then Architect will prepare a Notice of Substantial Completion for Owner's signature.

1.2.3.1. If work is not substantially complete, Contractor shall continue construction until such time as project status justifies subsequent inspection. Architect and Project Manager and Architect's Consultant costs incurred in such subsequent inspections will be paid by Contractor by Owner-Contractor contract adjustment.

1.2.3.2. Contractor shall complete all items on Punch List within 30 days, or as stated on Notice of Substantial Completion.

1.2.4. Provide submittals to Architect/Owner required by governing or other authorities, including all DSA required forms and approvals.

1.3. FINAL COMPLETION PROCEDURES

1.3.1. At such time as Contractor believes project is complete and following completion of Punch List items, notify Architect and request Final Inspection

1.3.1.1. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect Final inspection.

1.3.1.2. Upon receipt of request for final inspection, Architect will perform a Final Inspection and recommend actions as defined by the General Conditions.

1.3.1.3. If Architect determines work is acceptable under the Contract Documents, Contractor shall submit Final Application for Payment and close-out documents.

1.3.2. Final Application for Payment Coordinate with Section 01 20 00.

1.3.2.1. Contractor shall submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3.2.2. When requested by Architect, provide evidence of payment, lien releases and consent of surety to make final payment to Contractor.

1.3.2.3. The District's Board will take an action to accept the project and authorize the filing of a Notice of Completion.

1.3.2.4. Final Payment, including retention, will be released to the Contractor no sooner than 35 days following the filing of the Notice of Completion in compliance with County recording requirements, and subject to no filing of subcontractor stop notices or other claims against the District.

1.3.3. Contractor shall provide all close-out documents required by Contract Documents within ten days of the last day of the contract period.

1.3.3.1. Close out documents include, but are not necessarily limited to:

1.3.3.1.1. Project Job Set and Record Set.

1.3.3.1.2. Operational and maintenance manuals and data.

1.3.3.1.3. Warranties and Guarantees.

1.3.3.1.4. Keys and keying schedules.

1.3.3.1.5. Spare parts, extra stock and materials.

1.3.3.1.6. All jurisdictional approval documents, including Final Verified reports, certification of fire alarm and related documents.

1.4. FINAL CLEANING

1.4.1. Contactor shall conduct all final cleaning required to comply with requirements of this Section prior to final inspection.

1.4.2. Use cleaning materials which do not create hazards to health or property and which will not damage surfaces. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

1.4.3. Employ experienced workers or professional cleaners for final cleaning. Comply with instructions of manufacturer for surface being cleaned.

1.4.4. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner

1.4.5. Contractor shall clean all completed interior work, including but not necessarily limited to, surfaces exposed to view in final construction, all cabinet/casework interiors and surfaces, and all equipment and fixtures.

1.4.5.1. Remove temporary labels, stains and foreign substances. Where stain cannot be removed, replace item to the satisfaction of the Project Manager and Architect.

1.4.5.2. Polish transparent and glossy surfaces.

1.4.5.3. Wet wipe painted and prefinished surfaces. Do not leave residue or wipe marks.

1.4.5.4. Where HVAC system was operated during construction, clean permanent filters and replace disposable filters immediately prior to final inspection. Clean ducts, blowers and coils if units were operated without filters during construction.

1.4.5.5. Perform final cleaning of all plumbing and electrical components. Polish all glossy surfaces, wet wipe all other finished exposed surfaces and elements.

1.4.6. Clean all completed building exterior surfaces and site work, including but not necessarily limited to, surfaces exposed to view in final construction, all roof surfaces, all site paving surfaces, and all equipment and fixtures.

1.4.6.1. Remove temporary labels, stains and foreign substances from exterior surfaces.

1.4.6.2. Polish exterior signage components and similar glossy surfaces.

1.4.6.3. Remove dirt and dust from all exterior surfaces by approved means. Clean all sealant joints and similar applications.

1.4.6.4. Remove debris, construction products, fasteners, and trash from all roof surfaces.

1.4.6.5. Rake grounds that are neither paved nor planted to a smooth even-textured surface.

1.4.6.6. Clean all paving surfaces as necessary to remove construction dust and dirt, including debris from joints using approved methods. Remove all construction stains by approved means. Remove asphalt and seal coat splatter from curb faces.

1.4.7. Remove waste and surplus materials, rubbish, and construction facilities from the site and legally dispose of.

1.5. ADJUSTING

1.5.1. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.6. RECORD DOCUMENTS: RECORD SET

1.6.1. Upon completion of the Work, obtain one set of reproducible drawings made from DSA approved stamped originals from the Architect for preparation of Record Set. Cost to duplicate DSA originals will be paid by Contractor at no further cost to Owner.

1.6.1.1. Neatly and accurately transfer data from record job set prints specified in Section 01 50 00.

1.6.1.2. Graphic quality shall be equal to that of the original document. Submit sample of drafting and graphic capability and obtain Architect's approval before proceeding with transfer.

1.6.1.3. Cost of Record Set reproducibles and all preparation shall be paid by Contractor at no additional cost to Owner.

1.6.2. Sign and date Record Job Sets and Record Sets, certifying that the information and data added is accurate and complete.

1.6.3. Record drawings not complying with specified criteria shall be rejected.

1.6.4. Prior to submission for final payment, review Record Set with Architect and obtain approval of the scope of transfer. Following approval, submit Record Job Sets and Record Set to Architect with claim for final Application for Payment.

1.7. OPERATION AND MAINTENANCE DATA

1.7.1. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three ring binders with durable plastic covers.

1.7.2. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

1.7.3. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

1.7.4. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, type on 24 pound white paper.

1.7.5. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.

1.7.6. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:

1.7.6.1. Significant design criteria.

1.7.6.2. List of equipment.

1.7.6.3. Parts list for each component.

1.7.6.4. Operating instructions.

1.7.6.5. Maintenance instructions for equipment and systems.

1.7.6.6. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

1.7.7. Part 3: Project documents and certificates, including the following:

1.7.7.1. Shop drawings and product data.

1.7.7.2. Certificates.

1.7.7.3. Photocopies of warranties.

1.7.8. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with Architect comments. Revise content of documents as required prior to final submittal.

1.7.9. Submit final volumes revised, within 15 days after final inspection.

1.8. WARRANTIES

1.8.1. Provide duplicate notarized copies.

1.8.2. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.

1.8.3. Provide Table of Contents and assemble in three ring binder with durable plastic cover.

1.8.4. Submit prior to final Application for Payment.

1.8.5. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.9. SPARE PARTS AND MAINTENANCE MATERIALS

1.9.1. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

1.9.2. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

2. PART 2 - PRODUCTS

Not used

3. PART 3 - EXECUTION

Not used

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.2. REFERENCES

1.2.1. California Building Code (CBC) 2006, as adopted by Authority Having Jusrisdiction (AHJ).

1.2.2. ACI 318 - Building Code Requirements For Structural Concrete.

1.2.3. ACI SP-66 - American Concrete Institute-Detailing Manual.

1.2.4. ASTM A82 - Steel Wire, Plain, for Concrete Reinforcement.

1.2.5. ASTM A185 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

1.2.6. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

1.2.7. ASTM A706 - Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

1.2.8. CRSI - Concrete Reinforcing Steel Institute Manual of Practice.

1.2.9. CRSI - Placing Reinforcing Bars (5th ed.)

1.2.10. AWS D1.4 Structural Welding Code - Reinforcing Steel.

1.3. SUBMITTALS

1.3.1. Submit under provisions of Section 01 33 00.

1.3.2. Test Reports: Submit certified copies of mill test report of reinforcing steel analysis to testing laboratory, indicating products meet or exceed specified requirements. Include grades, physical and chemical properties.

1.3.2.1. Where welding of reinforcing steel is required, submit mill reports indicating the chemical composition and the carbon equivalent (C.E.).

1.3.3. Submit steel reinforcement shop drawings in accordance with ACI 315 for reinforcing work which deviates from structural drawings and specifications.

1.3.4. Shop Drawings

1.3.4.1. Submit steel reinforcement shop drawings in accordance with ACI 315. Include placing drawings, assembly diagrams, bending charts and slab plans. Show length and locations of splices, size and length of reinforcing steel, and stirrup spacing.

1.3.5. Product Data

1.3.5.1. Reinforcing steel couplers: Submit current ICC Evaluation Report, clearly indicating compliance with the minimum specified strength criteria.

1.4. QUALITY ASSURANCE

1.4.1. Perform Work in accordance with CRSI, ACI 315, ACI 318 and applicable Sections of Chapter 19A, Part 2, Title 24, CCR .

1.5. QUALIFICATIONS

1.5.1. Manufacturer

1.5.1.1. Manufacturer shall have produced the specified products for a period of five (5) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.5.1.2. Unless noted otherwise, reinforcing steel may be of domestic or imported origin, subject to compliance with specified criteria.

1.5.1.3. Unless noted otherwise, reinforcing steel shall be produced within the continental United States.

1.5.2. Fabricator/Erector

1.5.2.1. For fabrication and installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work on this section, and who are completely familiar with the requirements of this work.

1.5.2.2. Fabricator shall be currently licensed and approved by jurisdictional authority as an approved fabricator of reinforcing steel.

1.5.3. Detailer

1.5.3.1. For detailing of reinforcing steel shop drawings, use only personnel who are thoroughly trained and experienced in the skills required.

1.5.3.2. Detailer, or lead detailer when more than one detailer is used, shall have a minimum of five (5) years experience in the detailing of similar structures.

1.5.3.3. Submit qualifications of detailer, or lead detailer, to architect for review.

1.6. COORDINATION

1.6.1. Coordinate work under provisions of Section 01 31 13.

1.6.2. Coordinate with placement of formwork, formed openings and other Work.

1.7. PRODUCT HANDLING

1.7.1. Deliver reinforcement to the Project Site bundled, tagged and marked. Indicate on tags, bar size, lengths, and other information corresponding to markings shown on placement diagrams.

1.7.2. Store materials at the Project Site to prevent damage and accumulation of dirt and excessive rust. Store welding electrodes in accord with AWS D1.4.

2. PART 2 - PRODUCTS

2.1. REINFORCEMENT

2.1.1. Reinforcing Steel:

2.1.1.1. Non-Welded Systems: ASTM A 615, deformed billet steel bars, plain finish.

2.1.1.1.1. Bar size #4 and larger: Grade 60.

2.1.1.1.2. Bar size less than #4: Grade 40.

2.1.1.1.3. Provide reinforcing steel complying with ASTM A 706, Grade 60, where shown.

2.1.1.2. Welded Systems: ASTM A 706, Grade 60.

2.1.1.3. Deformed wire: ASTM A 496.

2.1.2. Welded Steel Wire Fabric: ASTM A 185, Plain Type; flat sheets; plain finish.

2.1.3. Dowels: Same as 2.1.1.

2.1.4. Reinforcing steel couplers: Provide mechanical couplers maintaining positive alignment and developing, in tension or compression as required, at least 125% of the specified yield strength of the bars, or of the smaller bar in transition splices.

2.2. ACCESSORY MATERIALS

2.2.1. Tie Wire: Minimum 16 gage annealed type.

2.2.2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder/retarder/barrier puncture.

2.2.3. Electrodes for welding ASTM A 615 reinforcing steel: Conform to requirements of Specifications for Low Alloy Steel Covered Arc-Welding Electrodes, AWS A5.5, E80XX Series, low hydrogen, having a minimum yield point of 80,000 psi.

2.2.4. Electrodes for welding ASTM A 706 reinforcing steel: Conform to requirements of Specifications for Low Alloy Steel Covered Arc-Welding Electrodes, AWS A5.5, E80XX Series, low hydrogen, having a minimum yield point of 80,000 psi.

2.3. FABRICATION

2.3.1. Fabricate concrete reinforcing in accordance with CRSI Manual of Standard Practice, ACI 315, and ACI 318.

2.3.2. Do NOT bend or straighten bars in manner that will weaken or injure bar. Do not re-bend bars #5 and larger.

2.3.3. Do NOT use heat to bend bars.

2.3.4. Remove and replace reinforcement with following fabrication defects.

2.3.4.1. Bar lengths, depths and bends exceeding specified fabrication tolerances.

2.3.4.2. Bends or kinks not shown on Drawings or final shop drawings.

2.3.4.3. Bars with reduced cross-section due to excessive rusting or other cause

2.3.5. Locate reinforcing splices as shown on Drawings. Obtain approval of Structural Engineer for splices not shown on drawings.

2.4. SOURCE QUALITY CONTROL AND TESTING

2.4.1. Provide for testing under the provisions of Section 01 45 29.

2.4.1.1. Reinforcing Bars: Sections 1916A.2, Chapter 19A, Part 2, Title 24, CCR.

2.4.1.2. Cost of testing for unidentified stock shall be reimbursed to the Owner by the Contractor.

2.4.2. Provide mill test certificates indicating the following information:

2.4.2.1. Steel Source and Description

2.4.2.2. Ultimate tensile strength, Bend test, Elongation percentage and Yield point.

2.4.2.3. Heat number and Chemical analysis.

2.4.3. Sample and test reinforcing for compliance with ASTM A 615 and ASTM A 706.

2.4.3.1. When materials are delivered with heat number and mill test, the Testing Laboratory shall make one series of tests (tensile and bend) for each 10.0 tons, or fraction, of each size and kind of reinforcing steel.

2.4.3.2. When materials cannot be identified by documentation acceptable to Architect, the Testing Laboratory shall make one series of tests (tensile and bend) for each 1.0 tons, or fraction, of each size and kind of reinforcing steel.

2.4.3.2.1. Payment for such testing will be borne by Contractor.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PLACEMENT

3.2.1. Place all concrete reinforcing in accordance with CRSI Placing Reinforcing Bars and Section 1907A, Chapter 19A, Part 2, Title 24, CCR .

3.2.2. Before placing, clean reinforcing of loose scale, rust, oil, dirt, and any coating adversely affecting concrete bond.

3.2.3. Place, support and secure reinforcement against displacement. Do not deviate from required position.

3.2.4. Do not displace or damage vapor retarder/retarder/barrier.

3.2.5. Accommodate placement of formed openings.

3.2.6. Maintain concrete cover around reinforcing as indicated.

3.2.7. Do NOT bend or straighten bars after placement.

3.2.8. Interrupt reinforcement at control, contraction, and expansion joints or as indicated on drawings.

3.2.9. Place reinforcement to achieve slab and curb alignment as detailed.

3.2.10. Provide dowel joints at interruptions of concrete.

3.2.11. Comply with Section 1704A, Chapter 17A, Part 2, Title 24, CCR, and AWS D1.4 at all welding of reinforcing bars.

3.3. FIELD QUALITY CONTROL

3.3.1. Field inspection will be performed under provisions of Section 01 45 00 and 01 45 29.

3.3.2. Notify Architect 48 hours minimum prior to placement of concrete.

3.3.3. Inspections and tests of welds as required by AWS D1.4 will be made by the Testing Laboratory for reinforcing bar welds, including:

3.3.3.1. Certification of welders engaged in welding of reinforcing.

3.3.3.2. Inspection of reinforcing bar welds.

3.3.3.3. Perform 2 tensile tests of sample welds of the largest size bar for each type of welding.

3.3.4. Deficient welds will require the Contractor to provide and pay for such additional tests and inspections as required. Repair or replace defective welds as acceptable.

3.3.5. Repair or replace defective welds shall be at no extra and no delay claim of construction to the owner.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Formwork and anchorage.

1.1.2. Concrete reinforcement and accessories.

1.1.3. Cast-in-place concrete.

1.2. REFERENCES

1.2.1. ACI 117 - Specification for Tolerances for Concrete Construction and Materials.

1.2.2. ACI 301 - Specification for Structural Concrete.

1.2.3. ACI 302.1R - Guide for Concrete Floor and Slab Construction.

1.2.4. ACI 305R - Hot Weather Concreting, and ACI 306.1, Cold Weather Concreting.

1.2.5. ACI 308 - Standard Practice for Curing Concrete.

1.2.6. ACI 318 - Building Code Requirements for Structural Concrete.

1.2.7. ASTM C 33 - Concrete Aggregates.

1.2.8. ASTM C 94 - Ready-Mixed Concrete.

1.2.9. ASTM C 150 - Portland Cement.

1.2.10. ASTM C 309 - Liquid Membrane-Forming Compounds for Curing Concrete.

1.2.11. ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers.

1.3. SUBMITTALS

1.3.1. Provide submittals under provisions of Section 01 33 00.

1.3.2. Product Data/Materials List: Submit data indicating product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material proposed for the work in this Section.

1.3.3. Test Reports: Submit certified copies of mill test report of reinforcing steel analysis to testing laboratory, indicating products meet or exceed specified requirements.

1.3.3.1. Steel Source and Description

1.3.3.2. Ultimate tensile strength, Bend test, Elongation percentage and Yield point.

1.3.3.3. Heat number and Chemical analysis.

1.3.4. Mix designs: Prepare mix designs for Architect's review. Include the following information in mix design data:

1.3.4.1.1. Design Method, mix number.

1.3.4.1.2. Specified compressive strength, maximum aggregate size, slump, and placement method.

1.3.4.1.3. Application and location in structure.

1.3.4.1.4. Water-Cement Ratio.

1.3.4.1.5. Cement: Type, amount, and compliance with specified criteria statement.

1.3.4.1.6. Aggregates: Source(s), gradations (individual and combined).

1.3.4.1.7. Signature and stamp of licensed civil engineer responsible for mix design.

1.4. QUALITY ASSURANCE

1.4.1. Comply with applicable portions of referenced ACI 315 and ACI 347 standards for construction of concrete work specified in this Section.

1.4.2. Comply with Chapters 7 and 12 of ACI 318 for details of reinforcement and laps at bar splices respectively.

1.5. REGULATORY REQUIREMENTS

1.5.1. Conform to applicable sections of Chapter 19A, Part 2, Title 24, CCR.

1.6. PRODUCT HANDLING

1.6.1. On delivery to Project Site, place materials in area protected from weather.

1.6.2. Store materials above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation and ventilation. Handle materials to prevent damage.

2. PART 2 - PRODUCTS

2.1. FORM MATERIALS

2.1.1. Conform to ACI 347.

2.1.2. Softwood Plywood - Vertical and horizontal surfaces.

2.1.2.1. Grade Certification: APA Grade stamped, complying with PS-1.

2.1.2.2. Type: APA Plyform, Exterior Type.

2.1.2.3. Class/Face Veneer: Class I or II, B-B Veneer.

2.1.2.4. Panel Finish: Where concrete will be exposed to view in final project, with painted and non-painted finish, provide HDO resin fiber overlay.

2.1.3. Lumber Forms: Any grade or species, S4S.

2.1.4. Form Ties:

2.1.4.1. Concealed Condition: Meadow Burke Penta-Tie or equal. Snap-off type, fixed length, cone type, 1 inch back break dimension, free of defects that could leave holes larger than one inch in concrete surface; provide flush plugs for cone holes or grout fill as specified.

2.1.4.2. Exposed Condition: Snap-off type, fixed length, cone type, 1 inch back break dimension, free of defects that could leave holes larger than one inch in concrete surface; provide semi-recessed plugs for cone holes.

2.1.5. Form Release Agent: Cresset or equal, colorless, water based material which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

2.1.5.1. Select type suitable and appropriate for achieving CCS 2 surface at exposed concrete applications.

2.1.6. Corners: Chamfered, rigid plastic or wood strip type; 3/4 x 3/4 inch size; maximum possible lengths.

2.1.7. Form Stakes: Steel bar stock, pre-drilled for nails.

2.1.8. Formwork Panel Edge: Provide foam edge stripping at exposed formwork panel edges to minimize mortar leakage.

2.2. REINFORCING STEEL

2.2.1. Reinforcing Steel:

2.2.1.1. Non-Welded Systems: ASTM A615, deformed billet steel bars, uncoated.

2.2.1.1.1. Bar size #4 and larger: Grade 60.

2.2.1.1.2. Bar size smaller than #4: Grade 40.

2.2.1.2. Provide reinforcing steel complying with ASTM A 706, Grade 60, deformed, uncoated steel, where shown.

2.2.2. Welded Steel Wire Fabric: ASTM A185,Plain Type; flat sheets; plain finish.

2.2.3. Dowels: Same as 2.2.1.

2.2.4. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder/retarder/barrier puncture.

2.2.5. Fabricate concrete reinforcing in accordance with CRSI Manual of Standard Practice, ACI 315, and ACI 318.

2.2.6. Do NOT bend or straighten bars in manner that will weaken or injure bar. Do not re-bend bars #5 and larger.

2.2.7. Do NOT use heat to bend bars.

2.2.8. Remove and replace reinforcement with following fabrication defects:

2.2.8.1. Bar lengths, depths and bends exceeding specified fabrication tolerances.

2.2.8.2. Bends or kinks not shown on drawings or final shop drawings.

2.2.8.3. Bars with reduced cross-section due to excessive rusting or other causes.

2.2.9. Locate reinforcing splices as shown on Drawings. Obtain approval of Structural Engineer for splices not shown on drawings.

2.3. CONCRETE MATERIALS

2.3.1. Cement: Conform to CBC Section 1903A, and ASTM C150; normal - Type II, low alkali, grey color.

2.3.2. Fine and Coarse Aggregates: Conform to CBC Section 1903A, ASTM C33 and the following:

2.3.2.1. Coarse Aggregate: Clean, hard, fine-grained, sound, crushed rock or washed gravel;

2.3.2.1.1. Slabs, Columns, Walls: Class Designation 5M per ASTM C 33, Table 3, with 1 inch grading.

2.3.2.1.2. Foundations: Class Designation 3M per ASTM C 33, Table 3, with 1-1/2 inch grading.

2.3.2.2. Fine Aggregate: Washed natural or manufactured sand, hard, strong, durable particles: not more than 1 percent deleterious materials.

2.3.2.3. Aggregate shall be non-reactive per ASTM C 289.

2.3.3. Water: Clean, potable, and not detrimental to concrete.

2.3.4. Concrete slab-on-grade rock base: Clean, washed crushed rock base, 3/8 inch grading, complying with ASTM C 33.

2.4. ACCESSORIES

2.4.1. Membrane Curing Blankets

2.4.1.1. Provide Whitecap or equal 483-Curelap light colored plastic faced 10 oz. burlap curing blankets complying with ASTM C 171.

2.4.2. Membrane Curing Compound and Sealers [Do not use on slabs without checking with Mike Elia or David Koons – NTD approach is to use curing blanket method instead]

2.4.2.1. Curing Compound: Atlas Quantum-Cure, or equal, zero VOC, NSF/ANSI Standard61 certified (www.atlastechproducts.com) when tested in accordance with ASTM C-156, curing compound shall have maximum moisture evaporation of 0.65 kg/ sq M, water-based, clear with fugitive dye.

2.4.2.2. Sealer: Atlas Tech-1315 at locations designated S1, complying with ASTM C 1315, Type 1 Clear Class A and B,

2.4.2.3. (for high or heavy traffic areas) Sealer: Atlas Elite-HS at locations designated S2, when tested in accordance with ASTM C-140, sealer shall provide minimum 12% increase in compressive strength over untreated surface. When tested in accordance with ASTM C-642, sealer shall have maximum 3.5% water absorption.

2.4.3. Vapor Retarder Membrane

2.4.3.1. Manufacturer: Stego Wrap, www.stegoindutries.com, or equal.

2.4.3.2. Type: Polyolefin geomembrane film.

2.4.3.3. Product Characteristics:

2.4.3.3.1. Thickness: Minimum 15 mils.

2.4.3.3.2. Perm Rating: Maximum 0.01 grains/square foot/hour per ASTM F 1249.

2.4.3.3.3. Water Vapor Transmission Rate: Maximum 0.006 grains/square foot/hour per ASTM F 1249.

2.4.3.3.4. Puncture resistance: Minimum puncture resistance of 2200 grams per ASTM D 1709.

2.4.3.3.5. Tensile Strength: Minimum tensile strength of 50 pounds per ASTM D 882. Values shall be based on ASTM E 154 Resistance to Decay test portion.

2.4.3.3.6. Low Temperature Brittleness: Pass per ASTM D 1790.

2.4.3.4. Accessories.

2.4.3.4.1. Provide all required seam tapes and mastics as supplied by manufacturer.

2.4.4. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing admixtures, capable of developing a minimum compressive strength of 8,000 psi at 28 days when tested in accordance with CRD-C-621 and ASTM C 1107.

2.4.5. Admixtures: Concrete admixtures shall be subject to prior approval by DSA/OSHPD/the jurisdictional authority and Architect. Calcium chloride or admixtures containing chloride shall not be used. Admixture(s) shall not adversely affect concrete strength or color of colored concrete, where occurs.

2.4.6. Polymer Modified Concrete: Provide Sika Armatec 110 polymer modified concrete, with 3/8 inch minus aggregate conforming to manufacturers criteria.

2.4.7. Bonding Agent: Provide SikaDur 32 Hi-Mod bonding agent/adhesive conforming to manufacturers criteria.

2.5. SCREED SYSTEMS AND JOINT FORMING MATERIALS

2.5.1. Screed Systems: Provide Grann Adjustable Quick Screed or equal chairs, available through Dayton Richmond (800-745-3700).

2.5.2. Formed Construction Joints: Meadow Burke Keyed Kold or equal, galvanized steel, tongue and groove type.

2.5.3. Isolation Joint at radiused conditions: W.R. Meadows, www.wrmeadows.com, or equal, Ceramar, 3/8 inch thick by full depth of slab.

2.5.4. Isolation Joint at perimeter conditions: W.R. Meadows or equal, Sealtight Fiber, 3/8 inch thick by full depth of slab.

2.5.5. Weakened plane/control joints: Provide Soff-Cut system or sawcutting at all slab areas. Use of cast-in-place concrete joints is not acceptable.

JOINT SEALERS

2.5.6. Provide sealants per Section 07 90 00.

2.6. CONCRETE MIX

2.6.1. Prepare concrete mix design in accordance with CBC Section 1905A.2-1905A.6.

2.6.1.1. Provide concrete mixes as necessary to attain strengths and characteristics as noted on the drawings and in the specifications.

2.6.1.2. Concrete strength: 3000 psi at 28 days, unless noted otherwise on drawings.

2.6.1.3. Interior floor slabs on grade concrete strength: 5000 psi at 28 days.

2.6.1.4. Concrete slump: Maximum slump shall not exceed 4 inches, +/-1 inch.

2.6.1.5. In addition, provide concrete mixes for all interior slab-on-grade applications with maximum water-cement ratio of 0.40.

2.6.1.6. Do not air entrain concrete mix placed for interior slabs. At concrete with exterior exposure, provide 4.5 percent air entrainment.

2.6.2. Mix concrete in accordance with ASTM C94 and CBC Section 1905A.8.

2.6.2.1. Deliver to Inspector on site, with each mixer load of concrete, certificate bearing signature of the Weighmaster and Testing Laboratory batch plant inspector stating quantities of each material contained in load and time mixer was loaded.

2.6.2.2. Delivery Requirements:

2.6.2.2.1. Licensed Weighmaster shall positively identify materials as to quantity and certify each load by ticket.

2.6.2.2.2. Ticket shall be transmitted to Project Inspector by truck driver.

2.6.2.2.3. Project Inspector shall keep daily record of pours, identify each truck, its load and time of receipt and transmit duplicate copy of record to DSA.

2.6.2.2.4. Concrete arriving at Work without Weighmaster ticket will be rejected.

2.6.2.2.5. Weighmaster shall furnish affidavit to DSA on form satisfactory to DSA, certifying concrete furnished conforms to proportions established by mix designs.

2.6.2.3. Representative of Testing Laboratory shall maintain continuous inspection of batch plant preparation of concrete, including review of aggregate and cement , loading and mixing procedures, and final quantities contained in each truck load.

2.6.2.3.1. Where batch plant is certified as conforming to quality control and equipment criteria defined by CBC Section 1704A.4.4, Chapter 17A, Part 2, Title 24, CCR, batch plant inspection may be waived, following acceptance of such certification by DSA.

2.6.2.3.2. In the absence of such certification, batch plant inspection may be waived for concrete used on single story wood framed structures when criteria defined in CBC Section 1704A.4.4, Chapter 17A, Part 2, Title 24, CCR are met. Comply with initial batch plant inspection and criteria specified in paragraph 2.5.2.3 of this Section.

2.7. SOURCE QUALITY CONTROL AND TESTS

2.7.1. Provide for testing under the provisions of Section 01 45 00.

2.7.2. Reinforcing

2.7.2.1. Reinforcing Bars: Section 1903A, Chapter 19A,Part 2, Title 24, CCRand AWS D1.4.

2.7.2.2. Cost of testing for unidentified stock shall be reimbursed to the Owner by the Contractor.

2.7.3. Cement and Aggregate

2.7.3.1. Cement: CBC Section 1903A and 1916A.1, Chapter 19A, Part 2, Title 24, CCR.

2.7.3.2. Aggregate: CBC Section 1903A, Chapter 19A, Part 2, Title 24, CCR.

2.7.3.3. Batch Plant Inspection: CBC Section 1704A.4.3, Chapter 19A, Part 2, Title 24, CCR and criteria specified in this Section.

2.8. OTHER MATERIALS

2.8.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. Verify all excavations have been inspected and approved by the Geotechnical Engineer. Verify all reinforcement and forms have been inspected and approved.

3.1.1.4. Verify concrete elevations, dimensions, and alignment with work specified in other sections.

3.1.1.5. Verify requirements for concrete cover over reinforcement.

3.1.1.6. Identify, verify, and coordinate placement of piping and conduit sleeves through concrete.

3.1.1.7. Identify, verify, and coordinate the location, dimension, and requirements of all depressions, recesses, block-outs and other provisions.

3.1.1.8. Verify anchors, seats, plates, reinforcement and other items embedded in concrete are accurately placed, positioned securely, and will permit proper concrete placement.

3.1.2. In the event of discrepancy, immediately notify the Architect.

3.1.3. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. FORMWORK AND REINFORCING

3.2.1. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 347.

3.2.2. Verify lines, levels, and measurement before proceeding with formwork.

3.2.3. Do not apply form release agent where concrete surfaces receive special finishes or applied coatings which may be affected by agent.

3.2.4. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

3.2.5. Locate and set in place items which will be cast directly into concrete.

3.2.5.1. Set all anchor bolts, hold downs and related embeds with plywood templates, anchored to formwork as required to maintain in alignment and position during concrete placement.

3.2.6. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Provide crush plates or other approved guards where stripping operation may damage concrete. Kerf wood inserts to permit easy removal.

3.2.7. Chamfer exposed corners. Seal Joints between chamfer and form panel. Miter chamfer strips at changes in direction.

3.2.8. Openings in structural members which are not indicated on Drawing are not permitted.

3.2.9. Foundation Formwork

3.2.9.1. Hand trim sides and bottom of earth forms; remove loose dirt.

3.2.9.2. Construct wood edge forms, as specified below, to extend not less than 2 inches below soil level. Do not permit stakes to extend into or through footing zone. Form all concrete without penetrating footing concrete.

3.2.9.3. Fill over-excavated footings and foundations with concrete at no additional contract cost.

3.2.9.4. Excavate as necessary to accommodate installation and removal of formwork.

3.2.9.5. Prior to pouring footings or foundations, remove all debris, loose material, and water from excavation. Where water has accumulated in excavation, obtain Architects and Geotechnical Engineers review of the suitability of sub-grade condition.

3.2.9.6. Do not place concrete on mud or saturated soils. Repair sub-grade as required by Geotechnical Engineer at no additional contract cost.

3.2.10. Wall and structure formwork

3.2.10.1. Provide bracing to ensure stability of formwork.

3.2.10.2. Align form joints.

3.2.10.3. Place plywood panels with horizontal joints level, vertical joints plumb.

3.2.10.3.1. Unless noted otherwise, place panel edge at center of surface and extend in equal dimension in each direction.

3.2.10.3.2. Set form tie so that visible cones are placed in a uniform and aligned pattern. Maintain cones level and vertically aligned.

3.2.10.4. Keep form joints to a minimum. Use maximum size panels.

3.2.10.5. Back all joints by a stud or solid blocking, and provide shaped filler where necessary for smoothness. Provide foam form edge striping to prevent grout washout.

3.2.10.6. Reused panels shall be thoroughly cleaned, damaged edges or surfaces repaired, and both sides and edges coated with specified material.

3.2.10.7. Nail plywood along edges and to intermediate supports with common wire nails spaced as necessary to maintain alignment and prevent warping.

3.2.11. Apply form release agent on formwork in accordance with manufacturer's recommendations. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

3.2.11.1. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces wet prior to placement of concrete.

3.2.12. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads, and in accordance with the following:

3.2.12.1. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

3.2.12.2. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

3.2.13. Vapor retarder/barrier membrane installation

3.2.13.1. Proof roll subgrade.

3.2.13.2. Place 4 inch crushed rock base over sub-grade.

3.2.13.3. Place vapor retarder/barrier membrane over rock base, lapping edges 12 inches. Tape and seal edges and penetrations. Extend membrane to footing face and turn down to bottom of footing.

3.2.13.4. Provide pipe "boots" at all pipe and conduit penetrations in accordance with manufactures recommendations.

3.2.13.5. Obtain inspectors approval of membrane installation before placing concrete.

3.2.13.6. Exercise care in placing reinforcing steel and concrete to avoid puncturing vapor retarder/barrier membrane. Do not drive stakes through the membrane. Use flat base screed supports.

3.2.14. Place all concrete reinforcing in accordance with CRSI Placing Reinforcing Bars and Section 1907A, Chapter 19A, Part 2, Title 24 CCR .

3.2.15. Before placing, clean reinforcing of loose scale, rust, oil, dirt, and any coating adversely affecting concrete bond.

3.2.16. Repair vapor retarder/barrier damaged during placement of concrete reinforcing. Repair with same material; lap over damaged areas minimum 6 inches and seal watertight with manufacturer's approved seam tape.

3.2.17. Place, support and secure reinforcement against displacement. Do not deviate from required position. Do not bend or straighten bars after placement.

3.2.18. Do not displace or damage vapor retarder /retarder/barrier.

3.2.19. Accommodate placement of formed openings. Maintain concrete cover around reinforcing as indicated.

3.2.20. Provide dowel joints at concrete joints as shown on drawings.

3.2.21. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions. Before concrete is deposited upon or against concrete that has taken its initial set or has hardened, mechanically roughen hardened concrete to minimum 1/4" amplitude. Remove all encrustations from forms and reinforcements .

3.2.22. Screed Placement and Leveling:

3.2.22.1. Space screeds at manufacturers recommended spacing.

3.2.22.2. Space screed for strip pours.

3.2.22.3. Level screeds by use of laser level equipment to specified slab elevation.

3.3. PLACING CONCRETE

3.3.1. Place concrete in accordance with ACI 304 and CBC Section 1905A.7.

3.3.2. Ready mix concrete shall be delivered in accordance with ASTM C94. Concrete shall be placed within 90 minutes after start of mixing.

3.3.3. Conform to ACI 305R when concreting during hot weather or when weather conditions may cause rapid evaporation of moisture. Conform to ACI 306R for concrete placement in cold weather conditions.

3.3.4. Ensure reinforcement, inserts, embedded parts, formed joint fillers, and joint devices are not disturbed during concrete placement.

3.3.5. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

3.3.6. Place concrete continuously between predetermined expansion, control, and construction joints.

3.3.6.1. Place construction joints only at locations shown on drawings or as approved by Architect.

3.3.6.2. Install construction joints in accordance with CBC Section 1906A.4,

3.3.6.3. Once concrete operation has begun, it shall be continued until the specific panel, component, or section is complete. Use of cold joints is not permitted without specific prior approval of the Architect and per Section 1906A.4 Chapter 19A, , Part 2, Title 24, CCR.

3.3.7. Thoroughly consolidate concrete during placement using mechanical vibrators. Do not allow vibrators to contact forms or reinforcing.

3.3.8. Screed floors and slabs on grade level or slope to drain as noted on drawings.

3.4. CONCRETE FINISHING

3.4.1. Slab Finish

3.4.1.1. Produce hard and impervious surfaces, free from defects and blemishes. Exposed finish floor or ground surfaces shall be slip resistant.

3.4.1.2. Provide steel troweled finish, Class 3, per ACI 302.1R. Steel troweling shall consist of three separate operations. Obtain Architect's approval of finish prior to proceeding.

3.4.1.3. At all corridors, utility areas, and similar surfaces not receiving subsequent finish, provide medium swirl texture.

3.4.1.4. Slabs receiving carpet or resilient floor finish: Provide smooth trowel finish, ACI 302.1R Class 3, free of ridges and defects.

3.4.1.5. Slabs receiving thin set ceramic tile, waterproofing membranes or traffic topping : Provide steel trowel and very light broom finish.

3.4.2. Exterior Slab Floors at service areas:

3.4.2.1. Exterior Service/Utility Concrete Slabs: Provide steel trowel and light broom finish. Broom finish shall be placed in a pattern as directed by the Architect.

3.4.3. Acid Etched Finish:

3.4.3.1. Float and steel trowel surface to required slopes and planes.

3.4.3.2. Protect surfaces not receiving acid finish.

3.4.3.3. Clean surface with bristle broom.

3.4.3.4. Apply diluted muriatic acid solution. Let stand on surface until desired texture is achieved.

3.4.3.5. Flood surface with clean water to remove solution and neutralize acid solution. Take care not to allow water to stand on areas not to receive acid finish.

3.4.3.6. Brush area with bristle broom to remove excess material and solution.

3.4.3.7. Re-treat areas as required to achieve uniform texture to match approved sample.

3.4.4. Wall/column/footing face Finish

3.4.4.1. Type 1 - Concrete receiving graffiti resistant coating, paint coating, or exposed concrete with no further finish:

3.4.4.1.1. Produce surface without honeycomb, air pockets or "bug-holes".

3.4.4.1.2. Utilize high density form with joints butt taped or with non absorbent sealant.

3.4.4.1.3. Plug tie holes, fill and grind smooth.

3.4.4.1.4. Surface shall present a consistent and even surface for application of coating. Prepare surface in accordance with paint coating manufacturers requirements and this Section.

3.4.4.2. Type 2 - Plaster Finished Concrete:

3.4.4.2.1. Provide light water or sandblast finish at all cast-in-place concrete surfaces designated as receiving plaster finish.

3.4.5. All Other Surfaces

3.4.5.1. All column, wall, and beam surfaces shall be as-cast, subject to repair of surface deficiencies as specified.

3.4.6. Surface Defects

3.4.6.1. Surface defects shall be as defined in ACI 309.2R.

3.4.6.2. Surface irregularities shall be as defined in ACI 347 for Class B surfaces for semi exposed surfaces, and Class A surfaces at all exposed to view conditions.

3.4.6.3. All surface defects shall be repaired per approved methods and as specified.

3.5. EXPANSION AND WEAKENED PLANE JOINT INSTALLATION

3.5.1. Locate and form expansion control and contraction joints. Coordinate location with joint pattern shown for finish flooring.

3.5.2. Place formed construction joints in floor slab. Set top screed to required elevations. Secure to resist movement of wet concrete.

3.5.3. Install isolation joints between slab edges and vertical structural elements.

3.5.4. Install sealants in accordance with Section 07 90 00.

3.5.5. Provide Soff-cut or equal weakened plane joints at locations shown on drawings.

3.5.5.1. Saw cut slab before random shrinkage cracks form, and as soon as slab is firm enough to not be damaged by saw blade. Complete sawcutting within 12 hours of pour.

3.6. CURING AND PROTECTION

3.6.1. Maintain concrete above 50 degrees F and in a thoroughly moist condition for at least the first 7 days after placing concrete.

3.6.2. Floor Surface Curing

3.6.2.1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.

3.6.2.2. Maintain concrete with minimal moisture loss at above 50 degrees F temperature for period necessary for hydration of cement and hardening of concrete. Dusting with dry cement to absorb excess water is prohibited.

3.6.2.3. Cure only as specified herein and in accordance with Section 1905, CBC. Membrane curing compound method not permitted for interior cast-in-place concrete slabs.

3.6.2.4. Moisture Cure: Spray water over floor slab areas and maintain wet for minimum of seven (7) days or spread polyethylene film over floor slab areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for minimum of seven (7) days. Do not permit traffic over floor slabs during the seven (7) day curing period.

3.6.2.5. Vertical Surfaces: Spray water over surfaces and maintain wet for 10 days.

3.6.2.6. Quality Control: Proper curing of concrete surfaces shall be the responsibility of the Contractor under this section.

3.7. FIELD QUALITY CONTROL

3.7.1. Field inspection and testing per CBC Section 1903A will be performed in accordance with provisions of Sections 01 45 00 and 01 45 29.

3.7.2. Provide free access to Work and cooperate with appointed firm.

3.7.3. Comply with requirements of CBC Section 1905A.6.2, regarding frequency of testing for concrete test specimens.

3.7.4. One slump test will be taken for each set of test cylinders taken.

3.7.4.1. Prepare concrete sample(s) for wach type of concrete placed each day.

3.7.4.2. Prepare one sample for each 50 cubic yards or fraction thereof.

3.7.4.3. Prepare one sample for each 2,000 square feet of slab or wall surface are placed, or a fraction thereof.

3.8. TOLERANCES

3.8.1. All tolerances shall be as defined in ACI 117 and as specified.

3.8.2. Classification shall be per General Building: Cast-in-Place, ACI 117, Section 4.0, unless noted otherwise.

3.8.3. Unless noted otherwise, depressions in slab floors between high spots shall be a maximum 3/16 inch in ten feet, using a metal straight edge placed at any location on slab, and measured within 72 hours of pour.

3.8.4. For the following applications, depressions in slab floors between high spots shall be a maximum 1/8 inch in ten feet, using a metal straight edge placed at any location on slab, and measured within 72 hours of pour.

3.8.4.1. Slabs receiving thin-set ceramic tile as specified in Section 09 30 13.

3.8.4.2. Slabs in rooms with movable or operable partitions as specified in Section 10 22 26.

3.9. PATCHING

3.9.1. Exposed formed concrete surfaces, both interior and exterior, including surfaces designated to receive painted finish, shall provide surfaces suitable for subsequent finishing, free from imperfect joints, fins, "honeycombing", air pockets or "bug" holes, or other such imperfections.

3.9.2. Remove rough spots, stains and hardened mortar or grout from intended smooth surfaces by rubbing such surfaces lightly with fine Carborundum stone. Use liberal amount of water and rub sufficiently to remove defects without changing texture of concrete.

3.9.3. Filling Snap Tie Cone Holes:

3.9.3.1. Break off tie rods at bottom of cone holes.

3.9.3.2. Concealed Applications: Flush hole with water, and allow to dry. Coat entire inner surface of cone hole with liquid bonding agent, then grout holes solid with approved cement grout and grind smooth.

3.9.3.3. Exposed Applications: Flush hole with water, and allow to dry. Coat entire inner surface of cone hole with liquid bonding agent. Insert semi-recessed plug with approved cement.

3.10. DEFECTIVE CONCRETE

3.10.1. Concrete will be considered defective if strength characteristics indicated by tests of molded cylinders and core tests fall below the minimum 28-day strengths specified or indicated. Replace or adequately strengthen such defective concrete in a manner acceptable to the Architect and Structural Engineer.

3.10.2. Concrete will be considered defective if any one of the following conditions occurs:

3.10.2.1. Any concrete work not formed as indicated or is not in conformance with specified tolerances.

3.10.2.2. Any concrete with voids or honeycomb that has been cut, resurfaced or filled, unless under the direction of the Structural Engineer.

3.10.2.3. Any concrete with sawdust, shavings, wood, or embedded debris.

3.10.2.4. Any concrete placed more than 90 minutes after batching.

3.10.2.5. Replace or repair such defective concrete to the satisfaction of the Architect at no extra cost and no delay claim of construction to the Owner.

3.11. EQUIPMENT BASES

3.11.1. Provide concrete bases and anchorage for mechanical, electrical, and other work as required and shown on the drawings and in accordance with reviewed Shop Drawings of related trades.

3.12. MISCELLANEOUS CONCRETE WORK

3.12.1. Provide areaways, cast-in-place valve boxes, pits, splash blocks, bases, and other miscellaneous concrete as shown and required to complete the Work. Conform to applicable requirements as specified in this section.

END OF SECTION

SECTION 03 35 10

POLISHED CONCRETE FINISHING

1. GENERAL

1.1. SECTION INCLUDES

1.1.1. Dyed and polished concrete slab floors.

1.2. SYSTEM DESCRIPTION

1.2.1. Performance Requirements: Provide polished flooring that has been selected, manufactured and installed to achieve the following:

1.2.1.1. Abrasion Resistance: ASTM C779, Method A, high resistance, no more than 0.008 inch (0.20 mm) wear in 30 minutes.

1.2.1.2. Reflectivity: Increase of 35% as determined by standard gloss meter.

1.2.1.3. Waterproof Properties: Rilem Test Method 11.4, 70% or greater reduction in absorption.

1.2.1.4. High Traction Rating: NFSI 101-A, non-slip properties.

1.2.2. Design Requirements:

1.2.2.1. Hardened Concrete Properties:

1.2.2.1.1. Minimum Concrete Compressive Strength: 3500 psi (24 MPa).

1.2.2.1.2. Normal Weight Concrete: No lightweight aggregate.

1.2.2.1.3. Non-air entrained.

1.2.2.2. Placement Properties:

1.2.2.2.1. Natural concrete slump of 4 1/2 inches - 5 inches (114 - 127 mm). Admixtures may be used.

1.2.2.2.2. Flatness Requirements:

1.2.2.2.2.1. Overall FF 40.

1.2.2.2.2.2. Local FF 20.

1.2.2.3. Hard-Steel Troweled (3 passes) Concrete: No burn marks. Finish to ACI 302.1R, Class 5 floor.

1.3. ACTION SUBMITTALS

1.3.1. General: Submit listed action submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.

1.3.2. Shop Drawings: Indicate information on shop drawings as follows:

1.3.2.1. Typical layout including dimensions and floor grinding schedule.

1.3.2.2. Plan view of floor and joint pattern layout.

1.3.2.3. Areas to receive colored surface treatment.

1.3.2.4. Hardener, sealer, densifier in notes.

1.3.3. Product Data: Submit product data, including manufacturer's SPEC-DATA® product sheet, for specified products.

1.3.3.1. Material Safety Data Sheets (MSDS).

1.3.3.2. Preparation and concrete grinding procedures.

1.3.3.3. Colored Concrete Surface, Dye Selection Guides.

1.4. INFORMATION SUBMITTALS

1.4.1. Quality Assurance:

1.4.1.1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties as cited in 1.03 Performance Requirements.

1.4.1.2. Certificates:

1.4.1.2.1. Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4.1.2.2. Letter of certification from the National Floor Safety Institute confirming the system has been tested and passed phase Two Level of certification when tested by Method 101-A.

1.4.1.2.3. Current contractor's certificate signed by manufacturer declaring contractor as an approved installer of polishing system.

1.4.1.2.4. Manufacturer's Instructions: Manufacturer's installation instructions.

1.5. CLOSEOUT SUBMITTALS

1.5.1. Warranty: Submit warranty documents specified.

1.5.2. Operation and Maintenance Data: Submit operation and maintenance data for installed products in accordance with Section 01 77 19 - Closeout Requirements.

1.5.2.1. Include:

1.5.2.1.1. Manufacturer's instructions on maintenance renewal of applied treatments.

1.5.2.1.2. Protocols and product specifications for joint filing, crack repair and/or surface repair.

1.6. QUALITY ASSURANCE

1.6.1. Qualifications:

1.6.1.1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

1.6.1.2. Installer trained and holding current certification for FGS PermaShine installation.

1.6.1.3. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.

1.6.2. Regulatory Requirements.

1.6.2.1. NFSI Test Method 101-A Phase Two Level High Traction Material.

1.6.3. Mock-Ups:

1.6.3.1. Construct mock-ups in accordance with Section 01 45 00 - Quality Control.

1.6.3.2. Mock-Up Size: 100 ft^2 sample panel at jobsite at location as directed under conditions similar to those which will exist during actual placement.

1.6.3.3. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, color selection and shine.

1.6.3.4. Allow 72 hours for inspection of mock-up before proceeding with work.

1.6.3.5. When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work

1.6.4. Preinstallation Meetings: Conduct a preinstallation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 31 19 - Project Meetings. Review the following:

1.6.4.1. Environmental requirements.

1.6.4.2. Scheduling and phasing of work.

1.6.4.3. Coordinating with other work and personnel.

1.6.4.4. Protection of adjacent surfaces.

1.6.4.5. Surface preparation.

1.6.4.6. Repair of defects and defective work prior to installation.

1.6.4.7. Cleaning.

1.6.4.8. Installation of polished floor finishes.

1.6.4.9. Application of liquid hardener, densifier.

1.6.4.10. Protection of finished surfaces after installation.

1.7. DELIVERY, STORAGE & HANDLING

1.7.1. General: Comply with **01 61 00 - Common Product Requirements**.

1.7.2. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

1.7.3. Delivery:

1.7.3.1. Deliver materials in manufacturer's original packaging with identification labels and seals intact.

1.7.4. Storage and Protection:

1.7.4.1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.7.4.2. Protect concrete slab.

1.7.4.2.1. Protect from petroleum stains during construction.

1.7.4.2.2. Diaper hydraulic power equipment.

1.7.4.2.3. Restrict vehicular parking.

1.7.4.2.4. Restrict use of pipe cutting machinery.

1.7.4.2.5. Restrict placement of reinforcing steel on slab.

1.7.4.2.6. Restrict use of acids or acidic detergents on slab.

1.7.4.3. Waste Management and Disposal:

1.7.4.3.1. Separate waste materials in accordance with **Section 01 74 19 - Construction Waste Management and Disposal**.

1.7.4.3.2. Remove from site and dispose of packaging materials at appropriate recycling facilities.

1.8. PROJECT AMBIENT CONDITIONS

1.8.1. Installation Location: Comply with manufacturer's written recommendations.

1.9. SEQUENCING

1.9.1. Sequence With Other Work: Comply with manufacturer's written recommendations for sequencing construction operations.

1.10. WARRANTY

1.10.1. Project Warranty: Refer to Contract Conditions for project warranty provisions.

1.10.2. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and does not limit, other rights Owner may have under Contract Documents.

1.10.3. Warranty: Commencing on date of acceptance by **Owner**.

1.11. MAINTENANCE

1.11.1. Comply with manufacturer's written instructions to maintain installed product.

1.12. EXTRA MATERIALS

1.12.1. General Contractor to provide maintenance materials in accordance with Section **01 77 19 - Closeout Requirements**.

2. PRODUCTS

2.1. MANUFACTURERS

2.1.1. Ensure manufacturer has minimum **5** years experience in manufacturing components similar to or exceeding requirements of project.

2.2. POLISHED CONCRETE FINISHING PRODUCTS

2.2.1. Manufacturer: L & M Construction Chemicals, Inc.

2.2.1.1. Contact: website: www.LMCC.com, Proprietary Products/Systems:

2.2.1.2. Hardener, Sealer, Densifier: Proprietary, water based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film.

2.2.1.2.1. Acceptable Material: L & M Construction Chemicals, Inc., FGS Hardener Plus.

2.2.1.3. Joint Filler: Semi-rigid, 2-component, self-leveling, 100% solids, rapid curing, polyurea control joint and crack filler with Shore A 80 or higher hardness.

2.2.1.3.1. Acceptable Material: L & M Construction Chemicals, Inc., Joint Tite 750.

2.2.1.4. Oil Repellent Sealer: Ready to use, silane, siloxane and fluoropolymers blended water based solution sealer, quick drying, low-odor, oil and water repellent, VOC compliant and compatible with chemically hardened floors.

2.2.1.4.1. Acceptable Material: L & M Construction Chemicals, Inc., Petrotex.

2.2.1.5. Concrete Dyes: Fast-drying dye, packaged in premeasured units ready for mixing with VOC exempt solvent; formulated for application to polished cementitious surfaces.

2.2.1.5.1. Acceptable Material: L & M Construction Chemicals, Inc., Vivid Concrete Dyes.

2.2.1.6. Cleaning Solution: Proprietary, mild, highly concentrated liquid concrete cleaner and conditioner containing wetting and emulsifying agents; biodegradable, environmentally safe and certified High Traction by National Floor Safety Institute (NFSI).

2.2.1.6.1. Acceptable Material: L & M Construction Chemicals, Inc., FGS Concrete Conditioner.

2.2.1.7. Finish: Standard High gloss finish, 1500 grit.

2.2.1.8. Color: Natural.

2.3. SOURCE QUALITY CONTROL

2.3.1. Ensure concrete finishing components and materials are from single manufacturer.

2.4. PRODUCT SUBSTITUTIONS

2.4.1. Substitutions: In accordance with Section 01 25 00 - Product Options.

3. EXECUTION

3.1. MANUFACTURERS INSTRUCTIONS

3.1.1. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions and L & M Construction Chemicals, Inc., SPEC-DATA sheets.

3.1.2. Use only L & M certified FGS/PermaShine installers.

3.2. EXAMINATION

3.2.1. Site Verification of Conditions:

3.2.1.1. Verify that concrete substrate conditions, which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete finishing materials.

3.2.2. Verify Concrete Slab Performance Requirements:

3.2.2.1. Verify concrete is cured to design strength.

3.2.2.2. Verify concrete surfaces received a hard steel-trowel finish (3 passes) during placement.

3.3. PREPARATION

3.3.1. Ensure surfaces are clean and free of dirt and other foreign matter harmful to performance of concrete finishing materials.

3.3.2. Examine surface to determine soundness of concrete for polishing.

3.3.3. General Contractor to remove surface contamination.

3.4. INSTALLATION

3.4.1. Floor Surface Polishing and Treatment:

3.4.1.1. Provide polished concrete floor treatment in entirety of slab indicated by drawings. Provide consistent finish in all contiguous areas.

3.4.1.2. Apply floor finish prior to installation of fixtures and accessories.

3.4.1.3. Diamond polish concrete floor surfaces with power disc machine recommended by floor finish manufacturer. Sequence with coarse to fine grit using dry method.

3.4.1.3.1. Comply with manufacturer's recommended polishing grits for each sequence to achieve desired finish level. Level of sheen shall match that of approved mock-up.

3.4.1.3.2. Expose aggregate in concrete surface only as determined by approved mock-up.

3.4.1.3.3. All concrete surfaces shall be as uniform in appearance as possible.

3.4.1.4. Dyed and Polished Concrete (option):

3.4.1.4.1. Locate demarcation line between dyed surfaces and other finishes.

3.4.1.4.2. Polish concrete to final finish level.

3.4.1.4.3. Apply diluted dyes to polished concrete surface.

3.4.1.4.4. Allow dye to dry.

3.4.1.4.5. Remove residue with dry buffer; reapply as necessary for desired result.

3.4.1.5. Apply FGS Hardener Plus, Hardener, Densifier As Follows:

3.4.1.5.1. First coat at 250 ft^2/gal (6.25 m^2/L).

3.4.1.5.2. Second coat at 350 ft^2/gal (8.75 m^2/L).

3.4.1.5.3. Follow manufacturer's recommendations for drying time between successive coats.

3.4.1.6. Remove defects and repolish defective areas.

3.4.1.7. Finish edges of floor finish adjoining other materials in a clean and sharp manner.

3.5. ADJUSTMENTS

3.5.1. Polish to higher gloss those areas not meeting specified gloss levels per mock-up.

3.5.2. Fill joints flush to surface.

3.6. FINAL CLEANING

3.6.1. Do cleanup in accordance with project requirements.

3.6.2. Mechanically scrub treated floors for seven days with soft to medium pads with approved cleaning solution.

3.6.3. Upon completion, General Contractor must remove surplus and excess materials, rubbish, tools and equipment.

3.7. PROTECTION

3.7.1. Protect installed product from damage during construction in accordance with Section 01 60 00.

3.7.2. Protect with EZ Cover™ by McTech Corp., or comparable product.

3.7.2.1. Contact: Phone: (866) 913-8363; website: www.ezform.net.

3.8. SCHEDULE

3.8.1. Standard Finish High Gloss, 1500 grit, all spaces.

END OF SECTION

SECTION 03 35 16

CONCRETE FLOOR FINISHING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Single application cure-seal-hardener for new concrete floors to be left exposed.

1.1.2. Precautions for avoiding staining concrete before and after application.

1.2. SUBMITTALS

1.2.1. Submit under provisions of Section 01 33 00.

1.2.2. Material requirements for concrete to which cure-seal-hardener is to be applied, including cement type, water-cement ratio, type of trowel finish, limitations on admixtures, pigments, bonding agents, and bond breakers, etc.

1.2.3. Product Data: Manufacturer's data sheets, including product specifications, test data, preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods.

1.2.4. Maintenance instructions, including precautions for avoiding staining after application

1.3. REFERENCES

1.3.1. ACI 318 - Building Code Requirements For Structural Concrete.

1.3.2. ACI SP-66 - American Concrete Institute-Detailing Manual.

1.3.3. ASTM A82 - Steel Wire, Plain, for Concrete Reinforcement.

1.3.4. ASTM A185 – Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

1.3.5. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

1.3.6. ASTM A706 - Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

1.3.7. CRSI - Concrete Reinforcing Steel Institute Manual of Practice.

1.3.8. CRSI - Placing Reinforcing Bars (5th ed.)

1.3.9. AWS D1.4 Structural Welding Code - Reinforcing Steel.

1.4. QUALITY ASSURANCE

1.4.1. Installer Qualifications: Applicator experienced with installation of product and certified by manufacturer, or applicator experienced with similar products and providing manufacturer's field technician on site to advise on application procedures; and providing adequate number of skilled workers trained and familiar with application requirements.

1.5. DELIVERY, STORAGE, AND HANDLING

1.5.1. Deliver product in factory numbered and sealed drums, with numbers recorded for Owner's records.

1.5.2. Store products in manufacturer's unopened drums until ready for installation.

1.6. PROJECT CONDITIONS

1.6.1. No satisfactory procedures are available to remove petroleum or rust stains from concrete. Prevention is therefore essential. Take precautions to prevent staining of concrete prior to application of cure-seal-hardener and for minimum of three months after application:

1.6.1.1. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid, or other liquids.

1.6.1.2. Prohibit pipe cutting using pipe cutting machinery on concrete slab.

1.6.1.3. Prohibit temporary placement and storage of steel members on concrete slab.

1.6.2. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7. WARRANTY

1.7.1. Provide manufacturer's warranty that a structurally sound concrete surface prepared and treated according to the manufacturer's directions will remain permanently dustproof, hardened and water repellent. If after the specified sealing period the treated surface does not remain dustproof, hardened and water repellent, provide, at manufacturer's expense, sufficient material to reseal defective areas.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Acceptable Manufacturer: W.R. Meadows, Inc.; P.O. Box 338, Hampshire, IL 60140. www.wrmeadows.com; or equal.

2.1.2. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00.

2.2. MATERIALS

2.2.1. Cure-Seal-Hardener: Intraguard; water-based, penetrating concrete sealing compound for exterior concrete surfaces that limits the intrusion of moisture and chlorides into concrete surfaces.

2.2.1.1. Clear, transparent, non-staining.

2.2.1.2. Complies with all current federal, state, and local maximum allowable VOC requirements, including U.S. EPA, LADCO, SCAQMD, and OTC.

2.2.1.3. Dry to touch within 1 to 2 hours (typical).

3. PART 3 – EXECUTION

3.1. EXAMINATION

3.1.1. Do not begin installation until substrates have been properly prepared and are suitable for application of product

3.1.2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2. PREPARATION

3.2.1. Clean surfaces thoroughly prior to installation.

3.2.2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3. INSTALLATION

3.3.1. Install in accordance with manufacturer's instructions.

3.3.2. If this is the applicator's first project using this product, provide the manufacturer's technical representative on-site to familiarize installers with proper procedures.

3.3.3. Prevent damage to and soiling of adjacent work.

3.3.4. New Concrete: Apply cure-seal-hardener to new concrete as soon as the concrete is firm enough to work on after troweling, except on colored concrete wait minimum of 30 days.

3.3.4.1. Spray on at rate of 200 square feet per gallon (4.8 sq m/L).

3.3.4.2. Keep surfaces wet with cure-seal-hardener for minimum soak-in period of 30 minutes, without allowing drying out or becoming slippery. In hot weather slipperiness may appear before the 30 minute time period has elapsed. If that occurs, apply more cure-seal-hardener as required to keep entire surface in a non-slippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state.

3.3.4.3. After this period, when treated surface becomes slippery lightly mist with water until slipperiness disappears.

3.3.4.4. Wait for surface to become slippery again and then flush entire surface with water removing all residue of cure-seal-hardener.

3.3.4.5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.

3.3.4.6. Wet vacuum or scrubbing machines may be used to remove residue, provided manufacturer's instructions are followed.

3.4. PROTECTION

3.4.1. Protect installed floors until chemical reaction process is complete; at least three months.

3.4.1.1. Comply with precautions listed under PROJECT CONDITIONS.

3.4.1.2. Clean floor regularly in accordance with manufacturer's recommendations because water will accelerate the sealing and scrubbing will impart a shine.

3.4.1.3. Clean up spills immediately and spot-treat stains with good degreaser or oil emulsifier.

3.4.2. Precautions and cleaning are the responsibility of the General Contractor until Substantial Completion.

END OF SECTION

SECTION 04 05 13

MASONRY MORTAR AND GROUTING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Mortar and grout for masonry.

1.2. RELATED WORK

1.2.1. Section 01 45 29 - Testing Laboratory Services.

1.2.2. Section 04 22 00 - Reinforced Unit Masonry System.

1.3. REFERENCES

1.3.1. California Building Code (CBC) 2013 edition, as adopted by Authority Having Jurisdiction (AHJ).

1.3.2. ASTM C99 - Ready-Mixed Concrete

1.3.3. ASTM C144 - Aggregate for Masonry Mortar.

1.3.4. ASTM C150 - Portland Cement.

1.3.5. ASTM C207 - Hydrated Lime for Masonry Purposes.

1.3.6. ASTM C270 - Mortar for Unit Masonry.

1.3.7. ASTM C404 - Aggregates for Masonry Grout.

1.3.8. ASTM C476 - Grout for Masonry.

1.3.9. ASTM C1019 - Sampling and Testing Grout.

1.3.10. ASTM C1586 - Standard Guide for Quality Assurance of Mortars.

1.4. DELIVERY, STORAGE, AND HANDLING

1.4.1. Deliver products to site under provisions of Section 01 60 00.

1.4.2. Store and protect products under provisions of Section 01 60 00.

1.4.3. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.5. SUBMITTALS

1.5.1. Submit under provisions of Section 01 33 00.

1.5.2. Product Data: Provide data on admixtures, including product characteristics, compatibility and limitations.

1.5.3. Provide and pay for grout mix designs, prepared by the Testing Laboratory under provisions of Section 01 45 29.

1.5.4. Mix designs: Include the following information in grout and mix design data:

1.5.4.1. Design

1.5.4.1.1. Project name, address, site location, and location of mix design usage.

1.5.4.1.2. Contractor, Sub-Contractor, Supplier and Plant Location.

1.5.4.1.3. Mix Number.

1.5.4.1.4. Specified compressive strength, maximum aggregate size, slump, and placement method.

1.5.4.1.5. Application and location in structure.

1.5.4.1.6. Signature and stamp of licensed civil engineer responsible for mix design.

1.5.4.2. Materials

1.5.4.2.1. Design Method.

1.5.4.2.2. Slump.

1.5.4.2.3. Cement: Type, amount, and compliance with specified criteria statement.

1.5.4.2.4. Aggregates: Source(s), gradations (individual and combined).

1.5.4.2.5. Admixtures: Brand, classification, dosage, addition method.

1.5.4.2.6. Water source.

1.5.4.2.7. Test Results, Batch Quantities, Yield (calculations).

1.5.4.3. All other considerations relative to placement, curing, finishing and testing.

1.6. ENVIRONMENTAL REQUIREMENTS

1.6.1. Maintain materials and surrounding air temperatures to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

2. PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Mortar Aggregate: ASTM C144 and Section 2103A.8, Part 2, Title 24, CCR with not less than 3 percent passing #100 sieve.

2.1.2. Grout Aggregate: ASTM C404 and Section 2103A.12, Part 2, Title 24, CCR.

2.1.2.1. Coarse Aggregate: 100 percent passing 3/8 inch sieve and not more than 5 percent passing #8 sieve.

2.1.2.2. Fine Aggregate: Washed, natural sand; not more than 2 percent by weight deleterious substances; 5 percent minimum passing # 100 sieve.

2.1.3. Portland Cement: ASTM C150 and Section 1903A, Chapter 19A, Part 2, Title 24, CCR, Type I or II, free alkali content 0.06 percent maximum, gray color. Use Type II where soil contact will occur.

2.1.4. Hydrated Lime: ASTM C207, Type S.

2.1.5. Water: Clean and potable.

2.1.6. Admixtures:

2.1.6.1. Grout Admixtures: Sika, Grout Aid .

2.1.6.2. Mortar: No admixtures permitted, except colorant.

2.1.7. Mortar Colorant: Approved for use in mix, 100 percent mineral oxide, two separate colors as selected by Architect from standard color range. Provide mortar colorant at applications where masonry is exposed to view in final construction.

2.2. MORTAR MIXES

2.2.1. Mortar for Reinforced Masonry: ASTM C270, Section 2103A.8, Chapter 21A, Part 2, Title 24, CCR.

2.2.1.1. Provide Type S or M as indicated on Structural Drawings, minimum compressive strength as indicated on the drawing S0.2.

2.2.2. Proportions - Type S:

2.2.2.1. 1 Part Portland Cement.

2.2.2.2. Not less than 1/4 part nor more than 1/2 part lime.

2.2.2.3. Mortar Aggregate: Not less than 2-1/4 and not more than 3 times the sum of the separate volumes of cementitious materials.

2.2.3. Proportions - Type M:

2.2.3.1. 1 Part Portland Cement.

2.2.3.2. 1/4 part lime.

2.2.3.3. Mortar Aggregate: Not less than 2-1/4 and not more than 3 times the sum of the separate volumes of cementitious materials.

2.3. MORTAR MIXING

2.3.1. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270 and Section 2103A.8, Part 2, Title 24, CCR and the following

2.3.1.1. Use mixer with capacity for batches using full sack volumes of cement.

2.3.1.2. Charge the mixer in the following sequence:

2.3.1.2.1. 1/2 quantity of sand, water, and admixture and colorant.

2.3.1.2.2. Full quantity of cement; Partial sack batches are prohibited.

2.3.1.2.3. 1/2 quantity of sand, water, and admixture and colorant.

2.3.1.2.4. Full quantity of lime.

2.3.1.2.5. Additional water as required for workable mix.

2.3.2. If water is lost by evaporation, retemper only within one hour of mixing or prior to cement reaching initial set, which ever occurs first.

2.4. GROUT MIXES

2.4.1. Engineered Masonry: Comply with ASTM C476 and Section 2103A.12, Part 2, Title 24, CCR.

2.4.1.1. Type: Coarse grout for concrete masonry units.

2.4.1.2. Slump: 8-11 inches slump at all grouting applications.

2.4.1.3. Strength: Minimum compressive strength as indicated on the Drawings.

2.4.2. Coarse grout proportions (based on loose volume):

2.4.2.1. 1 Part Portland Cement.

2.4.2.2. Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials.

2.4.2.3. Coarse Aggregate: 1 to 2 times the sum of the volumes of the cementitious materials.

2.4.2.4. 0 to 1/10 part hydrated lime or lime putty.

2.4.2.5. Grout admixture: Proportion per manufacturer's instructions and as shown on structural drawings.

2.5. GROUT MIXING

2.5.1. Mix grout concrete in accordance with ASTM C94, Section 2103A.12, Chapter 21A, Part 2, Title 24, CCR.

2.5.2. Add admixtures in accordance with manufacturer's instructions. Provide uniformity of mix.

2.5.3. Do not use anti-freeze compounds to lower the freezing point of grout.

2.6. OTHER MATERIALS

2.6.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

2.7. SOURCE QUALITY CONTROL

2.7.1. Provide for testing under the provisions of Section 01 45 29.

2.7.2. Cement: Section 1916A.1, Part 2, Title 24, CCR.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install mortar and grout to requirements of the specific masonry Sections.

3.3. FIELD QUALITY CONTROL

3.3.1. Test mortar and grout in accordance with Section 01 45 29, including Section 2105A.5,Chapter 21A, Part 2, Title 24, CCR

3.3.2. Testing of Mortar Mixes:

3.3.2.1. Mortar Test: For each type of mortar, provide mortar tests per ASTM C 1586 .

3.3.2.2. For the first three days of masonry work, prepare three test specimens for each masonry crew.

3.3.2.3. Following the first three days of grouting, prepare one masonry sample per week for each masonry crew. Prepare additional specimens when changes in job conditions or materials occur.

3.3.3. Testing of Grout Mixes:

3.3.3.1. Grout Test: For each grout strength, provide grout sample field tests per ASTM C 1019.

3.3.3.2. For the first three days of grouting, prepare three test specimens for each masonry crew.

3.3.3.3. Following the first three days of grouting, prepare one masonry sample per week for each masonry crew. Prepare additional specimens when changes in job conditions or materials occur.

END OF SECTION

SECTION 04 22 00

CONCRETE UNIT MASONRY

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Masonry units.

1.1.2. Reinforcement, anchorage, and accessories.

1.1.3. Precast concrete wall cap.

1.2. PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

1.2.1. Section 05 50 00 - Metal Fabrications: Placement of fabricated metal items built into masonry.

1.3. REFERENCES

1.3.1. California Building Code (CBC) 2013 edition, as adopted by Authority Having Jurisdiction (AHJ).

1.3.2. ACI 315 - Details and Detailing of Concrete Reinforcement.

1.3.3. ASTM A615- Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.

1.3.4. ASTM A706 - Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

1.3.5. ASTM C90 - Loadbearing Concrete Masonry Units.

1.3.6. ASTM C1314 - Compressive Strength of Masonry Prisms.

1.3.7. ASTM C90 - Hollow Load Bearing Concrete Masonry Units.

1.3.8. ASTM C 55 - Standard Specification for Concrete Brick.

1.4. QUALIFICATIONS

1.4.1. Installer: Company specializing in performing the work of this Section with minimum 5 years documented experience.

1.5. SUBMITTALS

1.5.1. Submit under provisions of Division 01.

1.5.2. Samples:

1.5.2.1. Submit two full size 6-inch square samples of each block type and color indicating surface texture and color.

1.5.3. Certification: Submit certification from block manufacturer confirming compliance with criteria established by referenced standard and this section.

1.5.4. Materials List: Submit proposed materials list for all products used.

1.5.5. Shop Drawings

1.5.5.1. Submit steel reinforcement shop drawings in accordance with ACI 315. Include placing drawings and bending charts. Show length and locations of splices, size and length of reinforcing steel, bar position dimensions and spacings.

1.5.6. Mock-up

1.5.6.1. Prior to beginning installation, prepare in-place mock-up of approximately 4 foot by 6 foot high, and obtain Architect's approval.

1.5.7. Grouting Procedures: Prior to beginning high lift grouting, provide submittal defining proposed grouting procedures. Incorporate DSA IR 21-2, as well as qualification statement of installing contractor demonstrating experience with high lift grouting techniques on Title 24 projects.

1.6. DELIVERY, STORAGE, AND HANDLING

1.6.1. Deliver products to site under provisions of Division 01.

1.7. SEQUENCING AND SCHEDULING

1.7.1. Coordinate work under provisions of Division 01.

1.8. GUARANTEE

1.8.1. Provide the Owner with a guarantee, in Architect approved form, against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

1.8.1.1. Expansion/contraction cracks.

1.9. EXTRA STOCK

1.9.1. Provide ten (10) corner units of ground face block. Store and deliver to Owner as directed.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. CONCRETE MASONRY UNITS: PRECISION

2.2.1. Type:

2.2.1.1. Block: Hollow Load Bearing Block Units per ASTM C90 and Section 2103A.1, Chapter 21A, Part 2, Title 24, CCR.

2.2.1.1.1. Minimum compressive strength of 1900 psi as a component of design f'm assembly value of 1500 psi.

2.2.2. Weight Classification All units: Medium Weight (greater than 105 pcf to less than 125 pcf).

2.2.3. Size and style

2.2.3.1. Block: Nominal 8 x 8 x 16 and 8 x 12 x 16, hollow load bearing units, one open end at vertical reinforcing, bond beam units at horizontal reinforcing. Provide additional sizes as required and as shown on drawings.

2.2.3.2. Provide pilaster units as required for conditions shown on drawings.

2.2.3.3. Provide closed end units at all outside corners and ends.

2.2.3.4. Provide cap block and sill block profiles as shown on drawings.

2.2.3.5. Provide U-lintel solid bottom units at exposed lintel conditions.

2.2.4. Finish: Manufacturer's Precision Block finish.

2.2.5. Color:

2.2.5.1. Concealed applications: Provide natural gray color.

2.2.5.2. Exposed Applications at Buildings: Provide specified RCP block colors. Color match is critical. Architect will be sole judge of color match when considering acceptability of proposed substitutions.

2.2.5.2.1. Color 1: RCP block color Terra Cotta.

2.2.5.2.2. Color 2: RCP block color El Rancho.

2.2.6. Fire Rating: Where masonry units are components in fire rated assemblies, provide written certification of compliance with Title 24, UL material listing requirements or other approved material certification methods.

2.3. CONCRETE MASONRY UNITS: GROUND FACE

2.3.1. Type:

2.3.1.1. Block: Hollow Load Bearing Block Units per ASTM C90 and Section 2103A.1, Chapter 21A, Part 2, Title 24, CCR.

2.3.1.1.1. Minimum compressive strength of 1900 psi as a component of design f'm assembly value of 1500 psi.

2.3.2. Weight Classification All units: Medium Weight (greater than 105 pcf to less than 125 pcf).

2.3.3. Size and style

2.3.3.1. Block: Nominal 8 x 8 x 16 and 8 x 12 x 16, hollow load bearing units, one open end at vertical reinforcing, bond beam units at horizontal reinforcing. Provide additional sizes as required and as shown on drawings.

2.3.3.2. Provide pilaster units as required for conditions shown on drawings.

2.3.3.3. Provide closed end units at all outside corners and ends.

2.3.3.4. Provide cap block and sill block profiles as shown on drawings.

2.3.3.5. Provide U-lintel solid bottom units at exposed lintel conditions.

2.3.4. Finish:

2.3.4.1. Provide RCP groundface finish on all sides and ends exposed to view from any point in the completed project.

2.3.4.2. Allowed defects: Permissible defects allowed by ASTM C 90 Section 7.0 are not acceptable for ground face units. Do not install groundface units with cracks or chips resulting from manufacturing, handling or installation that are visible from any point in the completed project.

2.3.5. Color:

2.3.5.1. Exposed Applications at Buildings: Provide specified RCP block colors. Color match is critical. Architect will be sole judge of color match when considering acceptability of proposed substitutions.

2.3.5.1.1. Color 1: RCP.

2.3.5.1.2. Color 2: RCP.

2.3.6. Fire Rating: Where masonry units are components in fire rated assemblies, provide written certification of compliance with Title 24, UL material listing requirements or other approved material certification methods.

2.4. CONCRETE MASONRY UNITS: SLUMPSTONE

2.4.1. Type:

2.4.1.1. Slumpstone: Hollow Load Bearing Slumped Units per ASTM C 90, and Section 2103A.1, Chapter 21A, Part 2, Title 24, CCR.

2.4.2. Weight Classification All units: Normal Weight (125 minimum pcf).

2.4.3. Size and style

2.4.3.1. Nominal 8 x 6 x16 and 12 x 6 x 16, 8 x 4 x 16 and 12 x 4 x 16, hollow load bearing units, one open end at vertical reinforcing, bond beam units at horizontal reinforcing.

2.4.3.2. Provide pilaster units as required for conditions shown on drawings.

2.4.3.3. Provide closed end units at all outside corners and ends.

2.4.3.4. Provide cap block and sill block profiles as shown on drawings.

2.4.3.5. Provide U-lintel solid bottom units at exposed lintel conditions.

2.4.4. Finish: Manufacturers standard slumped finish.

2.4.5. Color:

2.4.5.1. Concealed applications: Provide natural gray color..

2.4.5.2. Exposed Conditions - Color Type A:

2.4.6. Fire Rating: Where masonry units are components in fire rated assemblies, provide written certification of compliance with Title 24, UL material listing requirements or other approved material certification methods.

2.5. CONCRETE MASONRY UNITS: SPLIT FACE

2.5.1. Type:

2.5.1.1. Block: Hollow Load Bearing Block Units ASTM C 90, and Section 2103A.1., Chapter 21A, Part 2, Title 24, CCR..

2.5.1.1.1. Minimum compressive strength of 1900 psi as a component of design f'm assembly value of 1500 psi.

2.5.2. Weight Classification:

2.5.2.1. All units: Medium Weight (greater than 105 pcf to less than 125 pcf). Size and style

2.5.2.2. Block: Nominal 8 x 8 x 16 and 12 x 8 x 16, 8 x 4 x 16 and 12 x 4 x 16, hollow load bearing units, one open end at vertical reinforcing, bond beam units at horizontal reinforcing.

2.5.2.3. Provide pilaster units as required for conditions shown on drawings.

2.5.2.4. Provide closed end units at all outside corners and ends.

2.5.2.5. Provide cap block and sill block profiles as shown on drawings.

2.5.2.6. Provide U-lintel solid bottom units at exposed lintel conditions.

2.5.2.7. Provide U-lintel solid bottom units at exposed lintel conditions.

2.5.3. Finish

2.5.3.1. Provide split face finish as produced by RCP Block at exposed exterior surfaces and as shown on drawings.

2.5.3.2. Where outside corners, ends, and free-standing walls are provided, provide split face finish at all surfaces visible in completed construction.

2.5.3.3. Unless noted otherwise, provide precision block finish at all interior surfaces.

2.5.4. Color:

2.5.4.1. Exposed Exterior Applications at Buildings: Provide specified RCP splitface block colors. Color match is critical. Architect will be sole judge of color match when considering acceptability of proposed substitutions.

2.5.4.1.1. Color 1: RCP splitface block color Terra Cotta.

2.5.4.1.2. Color 2: RCP splitface block color El Rancho.

2.5.4.2. Exposed Applications at site walls: Provide specified RCP splitface block colors. Block shall be supplied by same manufacturer as building. Maintain color consistency between site and building applications to maximum extent possible.

2.5.4.2.1. Color 1: RCP splitface block color Terra Cotta, used on approximately 20 percent of each retaining wall, located as directed by Architect.

2.5.4.2.2. Color 2: RCP splitface block color El Rancho, used on approximately 80 percent of each retaining wall, located as directed by Architect.

2.5.5. Fire Rating: Where masonry units are components in fire rated assemblies, provide written certification of compliance with Title 24, UL material listing requirements or other approved material certification methods.

2.6. CONCRETE MASONRY UNITS: GLAZED FINISH

2.6.1. Type:

2.6.1.1. Block: Burns and Russell, SpectraGlaze II series, glazed, hollow Load Bearing Block Units per ASTM C 90 and Section 2103A.1, Chapter 21A, Part 2, Title 24, CCR.

2.6.2. Weight Classification:

2.6.2.1. All units: Medium Weight (greater than 105 pcf to less than 125 pcf).

2.7. ACCESSORIES, REINFORCEMENT AND ANCHORAGE

2.7.1. Precast concrete wall cap

2.7.1.1. Provide precast concrete wall cap, configured as shown on drawings, Type II cement, minimum 3,000 psi concrete mix design.

2.7.1.2. Provide embed as shown on drawing, coordinated with wall reinforcing layout.

2.7.1.3. Provide natural gray concrete, light sandblast finish.

2.7.1.4. Where required, provide cast corner units. Do not cast as mitered or butt joint corner units.

2.7.2. Reinforcing Steel: ASTM A 615 or ASTM A 706, in accordance with Section 2103A.13, Chapter 21A, Part 2, Title 24, CCR, and as specified in Section 03 20 00 03 30 00 of this Project Manual.

2.7.3. Where required or shown on structural drawings, provide prefabricated horizontal joint reinforcement complying with Section 2103A.13, Chapter 21A, Part 2, Title 24, CCR, hot dipped galvanized.

2.7.4. Mortar and Grout: Per Section 04 05 13.

2.8. SOURCE QUALITY CONTROL AND TESTING

2.8.1. Provide for testing under the provisions of Division 01. .

2.8.1.1. Masonry Units: Section 2105A, Chapter 21A, Part 2, Title 24, CCR.

2.9. OTHER MATERIALS

2.9.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.1.1.4. In the event of discrepancy, immediately notify the Architect.

3.1.1.5. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Direct and coordinate placement of metal anchors supplied to other Sections.

3.2.2. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.2.3. Provide templates for setting anchor bolts, maintaining clearances and embedment in compliance with Section 2104A, Chapter 21A, Title 24, Part 2, CCR.

3.3. COURSING

3.3.1. Establish lines, levels, and coursing indicated. Protect from displacement.

3.3.2. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

3.3.3. Lay masonry units in running bond. Course one unit and one mortar joint to equal 8 4 inches.

3.3.4. Joint Tooling:

3.3.4.1. Tool exterior wall joints concave.

3.3.4.2. Tool exposed interior wall joints concave.

3.3.4.3. Tool joints tight and flush at locations where waterproofing or tile finish occurs.

3.3.4.4. Where furring or framing assemblies are installed over masonry, tool joints tight and flush.

3.3.5. Surface preparation for waterproofing membranes: Provide smooth mortar parge coat at all block surfaces receiving below grade waterproofing systems, free of ridges, gaps, holes or other surface imperfections.

3.3.6. Preparation for flashing assemblies: Where roof or other flashing assemblies butt against or slope against adjoining masonry wall surface, sawcut reglet joint as required to receive flashing termination and as directed by Architect.

3.4. REINFORCEMENT AND ANCHORAGES - REINFORCED UNIT MASONRY

3.4.1. Install reinforcement at spacing indicated and to allow a minimum grout coverage of 1/2 inch or 1 bar diameter, whichever is greater.

3.4.2. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

3.4.3. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Section 03 20 00 03 30 00.

3.4.4. Splice reinforcing bars in accordance with Sections 2107A and 2108A, Chapter 21A; Part 2, Title 24, and as shown on structural drawings.

3.4.5. Embed anchors for attachment of metal fabrications.

3.5. PLACING AND BONDING

3.5.1. Lay masonry in accordance with Section 2104A, Chapter 21A; Part 2, Title 24, CCR.

3.5.2. Perform jobsite cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.5.3. Lay masonry units with full face shell bedding on bed joints and full head joints.

3.5.4. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

3.5.5. Lay masonry units with core cells grout space vertically aligned, clear of mortar, and unobstructed with a minimum cell dimension of 3 inches.

3.5.6. Interlock intersections and external corners.

3.5.7. Where expansion or control joints are shown on structural drawings, provide Type 1 sealant and backer rod as specified in Section 07 90 00 at both sides of joint.

3.5.8. Remove excess mortar as Work progresses. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

3.5.9. Grout may be placed after mortar has been set and cured. Cure time shall be adequate to prevent blow-outs in high lift grouting operations.

3.6. GROUTING

3.6.1. Wet masonry unit surfaces in contact with grout just prior to grout placement.

3.6.2. Provide coarse grout.

3.6.3. Grout masonry using specified grouting techniques.

3.6.3.1. Maintain weep joints free of grout.

3.6.4. When grouting is stopped for more than one hour, terminate grout 1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.

3.6.5. Low Lift Grouting

3.6.5.1. Conform to requirements of Section 2104A, Chapter 21A, Part 2, Title 24, CCR.

3.6.5.2. Install masonry units to a maximum height of 48 inches.

3.6.5.3. Remove all overhanging mortar and mortar droppings.

3.6.5.4. Place grout and mechanically vibrate for grout consolidation.

3.6.6. High Lift Grouting:

3.6.6.1. Conform to requirements of Section 2104A.6, Chapter 21A, Part 2, Title 24, CCR, DSA IR 21-2, and the following requirements.

3.6.6.2. Provide clean-out openings at the bottom of each grout pour.

3.6.6.3. Clean out masonry cells, reinforcing and cavities with high pressure water stream. Completely drain cavity and cell bottom of water.

3.6.6.4. Obtain Inspector's review of cleaned cells and cavities.

3.6.6.5. After review, seal opening with masonry face shell.

3.6.6.6. Pump grout into cells. Maintain water content in grout as required to achieve required slump without aggregate segregation.

3.6.6.7. Place grout in maximum 4 foot lifts. Provide initial grout consolidation by mechanical vibration.

3.6.6.8. After the grout has become plastic, but before any setting has occurred, place next grout lift. In normal weather conditions, delay placing subsequent grout lifts for 30 minutes minimum, and 60 minutes maximum. Reconsolidate the preceding grout lift by mechanical vibration, and repeat procedure.

3.7. PRECAST CONCRETE CAP INSTALLATION

3.7.1. Install in full mortar bed and with full head joints.

3.7.2. Tool all joints concave.

3.8. BUILT - IN WORK

3.8.1. As work progresses, build in anchor bolts, plates, and other items furnished by other Sections.

3.8.2. Build in items plumb and level.

3.8.3. Do not build in pipes or ducts unless specifically detailed by the Structural Engineer.

3.8.4. Do not build in organic materials subject to deterioration.

3.9. TOLERANCES

3.9.1. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

3.9.2. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

3.9.3. Maximum Variation From Plumb: 1/4 inch per story non-cumulative.

3.9.4. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.

3.9.5. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.10. CUTTING AND FITTING

3.10.1. Cut and fit for chases, pipes, conduit, sleeves, grounds, and other penetrations. Coordinate with other Sections of work to provide correct size, shape, and location.

3.10.2. Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.11. CLEANING

3.11.1. Clean work under provisions of Division 01.

3.11.2. Remove excess mortar and mortar smears.

3.11.3. Replace defective mortar. Match adjacent work.

3.11.4. Use non-metallic tools in cleaning operations.

3.11.5. Do not use acid or acid base cleaning agents.

3.12. PROTECTION OF FINISHED WORK

3.12.1. Protect finish installation under provisions of Division 01..

3.12.2. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

3.12.3. Protection of groundface units:

3.12.3.1. Without damaging completed work, provide protective covers at groundface block external corners to prevent damaged by construction activities.

3.12.3.2. Without damaging completed work, provide protective covers to prevent dirt staining on surfaces.

3.13. FIELD QUALITY ASSURANCE

3.13.1. Perform testing and inspection under the provisions of Division 01..

3.13.2. Masonry Inspection: Provide inspection per Table 1704A.5.3, Chapter 17A, Part 2, Title 24, CCR.

3.13.3. Masonry Testing: Provide testing per Section 2105A.2.2.1.4 and 2105A.4, Chapter 21A, Part 2, Title 24, CCR.

3.13.4. Masonry Prism Testing: For each different masonry compressive strength. Provide testing per Section 2105A.2.2.2, Chapter 21A, Part 2, Title 24, CCR. Prepare prisms as follows:

3.13.4.1. A set of five masonry prisms shall be built and tested in accordance with ASTM C 1314 prior to the start of construction. Materials used for the construction of the prisms shall be taken from those specified to be used in the project. Prisms shall be constructed under the observation of the special inspector or an approved agency and tested by an approved agency.

3.13.4.2. A set of three prisms shall be built and tested during construction in accordance with ASTM C1314 for each 5,000 square feet of wall area, but not less than one set of three masonry prisms for the project.

3.13.5. Masonry Core Tests: Provide masonry core tests for each different masonry compressive strength in accordance with Section 2105A.4, Chapter 21A, Part 2, Title 24, CCR.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Structural steel framing and support members.

1.1.1. Baseplates.

1.1.2. Grouting under baseplates.

1.2. REFERENCES

1.2.1. California Building Code (CBC), 2013 edition, as adopted by Authority Having Jurisdiction (AHJ).

1.2.2. ASTM A 6 - General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use.

1.2.3. ASTM A 36 - Structural Steel.

1.2.4. ASTM A 53 – Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.

1.2.5. ASTM A 123 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

1.2.6. ASTM A 307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

1.2.7. ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength.

1.2.8. ASTM A 440 – Structural Bolts, Alloy Steel, Heat Treated, 150 KSI minimum Tensile Strength.

1.2.9. ASTM A 500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

1.2.10. ASTM A 563 – Carbon and Alloy Steel Nuts.

1.2.11. ASTM A 992 – Structural Steel Shapes.

1.2.12. ASTM F 1554 – Anchor Bolts, Steel, 36, 55, and 105 ksi Strength

1.2.13. AWS A2.4 - Standard Symbols for Welding, Brazing, and Non-Destructive Examination.

1.2.14. AWS D1.1 - Structural Welding Code - Steel.

1.2.15. AWS D1.3 - Structural Welding Code - Sheet Steel.

1.2.16. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

1.2.17. AWS QC-1 – Standard for AWS Certification of Welding Inspectors

1.2.18. SSPC-Steel Structures Painting Council. – Painting Manual, Volumes 1 and 2

1.2.19. AISC 360 - Specification for Structural Steel Buildings .

1.2.20. AISC 341 – Seismic Provisions for Structural Steel Buildings.

1.2.21. AISC - Code of Standard Practice for Steel Buildings and Bridges and Commentary, modified as follows:

1.2.21.1. Notwithstanding comments in the referenced standard and Commentary to the contrary, the Contractor shall be responsible for reviewing all contract documents, including but not limited to, the structural steel drawings, as required to ascertain all structural steel requirements, including dimensions, slopes and connections.

1.2.21.2. Notwithstanding comments in the referenced standard and Commentary to the contrary, the Contractor shall be responsible for the design adequacy of all connections designed by the fabricator as a part of his preparation of the shop drawings.

1.2.21.3. Delete paragraph 3.3 as written. Replace with: "Comply with procedures established by the General Conditions."

1.2.21.4. In paragraph 4.4, delete "within 14 calendar days". Replace with: "Comply with procedures established by the General Conditions and Section 01 33 00."

1.2.22. AISC – Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts.

1.3. SUBMITTALS

1.3.1. Submit under provisions of Division 01.

1.3.2. Shop Drawings:

1.3.2.1. Shop drawings shall include complete details and procedures and diagrams. Include details of cuts, connections, camber, holes, and other pertinent data.

1.3.2.2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as work of other sections.

1.3.2.3. Indicate welds by standard AWS A2.4 symbols, and show size, length, sequence, and type of each weld. Indicate net weld lengths.

1.3.2.4. Dimensions required to locate structural steel for manufactured items such as mechanical equipment, electrical equipment, dock levelers, etc., shall be coordinated and provided by the Contractor. Contractor shall also coordinate and provide dimensions to locate structural steel for window washing supports such as davits, tie-backs, and similar components.

1.3.2.5. Shop drawings shall clearly identify, in graphic form, all deviations from contract documents. Provide complete description and rationale for deviation.

1.3.2.5.1. Where shop drawings propose deviations from contract documents, specific prior approval by Architect, Structural Engineer, and DSA/OSHPD/AHJ is required. Do not fabricate steel prior to obtaining such approval.

1.3.2.5.2. The Architect will prepare documents for submission to DSA for review documenting proposed deviations from contract documents. Cost of such preparation, all DSA plan check fees and all related charges will be paid by Contractor by deductive change order.

1.3.2.5.3. Contractor shall incorporate all delays caused by DSA review into schedule. No cost increase will be allowed by Owner for such delay.

1.3.2.6. Shop Drawings shall be originals developed by Contractor. Copying of Engineers or Architects drawings is not acceptable.

1.3.2.7. Clearly identify all changes made in re-submitted shop drawings. Incorporate changes necessary due to field conditions in re-submittal.

1.3.3. Product Data/Materials List

1.3.3.1. Submit producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications, including specified standards.

1.3.3.2. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.

1.3.3.3. Normal and high-strength bolts (each type), including nuts and washers.

1.3.3.4. Structural steel primer paint.

1.3.3.5. Non-shrink grout.

1.3.3.6. Power driven fasteners, shot pins, and related items.

1.3.4. Welders' Certificates: Submit documentation to the Testing Laboratory stating welders have been qualified and have current certification in accordance with AWS D1.1. Welders shall have been certified for not less than 24 months and have received re-certification within past 12 months.

1.3.5. Welding Procedure Specification Submittal:

1.3.5.1. Submit to Architect and Testing Laboratory written Welding Procedure Specifications (WPS) as defined by AWS D1.1. The WPS shall be prepared by the Fabricator for review and approval by the Architect and Testing Laboratory as complying with specified criteria, and shall be readily available to the welding Inspector.

1.3.5.2. The WPS shall follow the requirements of AWS D1.1 and shall specify the following:

1.3.5.2.1. Project name, and location of usage

1.3.5.2.2. Contractor, Subcontractor and or Fabricator

1.3.5.2.3. Procedure Identification

1.3.5.2.4. Base Metal Identification

1.3.5.2.5. Welding Process

1.3.5.2.6. Type of Weld

1.3.5.2.7. Position of Welding

1.3.5.2.8. Filler Metal Specification

1.3.5.2.9. Filler Metal Classification

1.3.5.2.10. Number of passes (single or multiple)

1.3.5.2.11. Welding Current

1.3.5.2.12. Welding Polarity

1.3.5.2.13. Pre-heat and Interpass Temperatures

1.3.5.2.14. Welding Parameters (electrode diameter, amperage range, voltage range, travel speed range, wire feed speed range, and electrode stickout)

1.3.5.2.15. Signature of WPS designer

1.3.5.3. The individual welding parameters shall be within the electrode manufacturer's range of operation. The fabricator shall submit a copy of the electrode manufacturer's technical information to the WPS designer.

1.3.6. Anchor Bolt Survey: Submit field survey of as-placed anchor bolt locations as specified in this Section.

1.3.7. Record Drawing: Submit record drawing of as-placed framing as specified in this Section.

1.4. QUALITY ASSURANCE

1.4.1. Codes and Standards: Comply with provisions of following, except as otherwise indicated.

1.4.1.1. American Institute of Steel Construction (AISC): AISC 360 and AISC 341, including the "Commentaries" and Supplements thereto as issued.

1.4.1.2. American Welding Society (AWS): AWS D1.1, Structural Welding Code, latest edition.

1.4.1.2.1. The minimum requirements for a qualified welding inspector shall be as those for an AWS certified welding inspector (CWI), as defined in the provision of the Fourth Edition edition of AWS, QC 1, Standard for AWS Certification of Welding Inspectors. All welding inspectors shall be approved by the DSA prior to inspection of any work.

1.5. QUALIFICATIONS

1.5.1. Manufacturer

1.5.1.1. Manufacturer shall have produced the specified products for a period of five (5) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.5.1.2. Provide structural steel manufactured within the continental United States in accordance with specified criteria.

1.5.1.3. Structural steel may be of domestic or imported origin, subject to compliance with specified criteria.

1.5.2. Fabricator/Erector

1.5.2.1. For fabrication and installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5.2.2. Fabrication of structural steel shall only be done within the continental United States in accordance with specified criteria.

1.5.2.3. Fabricator shall be currently certified by the AISC, or equivalent certification as accepted by the Architect, as a certified fabricator of structural steel, including welding of structural joints.

1.5.2.4. Fabricator shall be approved by DSA /City of Los Angeles/ jurisdictional authority as an approved fabricator of structural steel, including welding of structural joints.

1.5.2.5. Installing Foreman: Individual specializing in work of this Section, with minimum 5 years documented experience in projects of similar scale and scope.

1.6. FIELD MEASUREMENTS

1.6.1. Verify field measurements are as shown on shop drawings.

1.6.2. Contractor shall retain, at Contactors cost, a registered civil engineer or licensed land surveyor to prepare record drawings complying with Section 01 77 19 documenting the alignment, plumbness, elevation, and overall accuracy of the erected framing at appropriate stages during construction and at completion of erection. Provide record drawing, signed by engineer or surveyor, at completion of erection.

1.6.3. Column alignment shall be verified at each lift. Column shim details and procedures shall be submitted for review.

1.7. DELIVERY, STORAGE AND HANDLING

1.7.1. Deliver and store on site under the provisions of Division 01.

1.7.2. Store materials above ground, protected from dirt, grease, corrosion and other damage.

1.7.3. Store all other materials in a waterproof manner.

1.7.4. Provide original packaged welding electrodes, clearly marked as to type and rating.

1.7.5. Do not store materials on structure in a manner causing potential distortion or damage to members, surfaces, or supporting structures.

1.8. SEQUENCING AND SCHEDULING

1.8.1. Cooperate and coordinate this work with other trades for anchor bolts, and other required inserts, templates, etc. Align this work prior to installation of other materials.

2. PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Steel recycled material content

2.1.1.1. For all structural shapes, provide minimum 25 percent total recycled content, with minimum 16 percent post-consumer recycled content.

2.1.2. W shapes: ASTM A 992.

2.1.3. Channels, angles, plates, and bars: ASTM A 36.

2.1.4. Square and rectangular Hollow Structural Sections (HSS): ASTM A 500, Grade B.

2.1.5. Round Hollow Structural Sections (HSS): ASTM A 500, Grade B.

2.1.6. Pipe: ASTM A53, Grade B, Type E or S.

2.1.7. Threaded Fasteners:

2.1.7.1. Machine Bolts: Unless noted otherwise, ASTM A307, Grade A. Provide ASTM A563, Hex, Grade A Nuts and ASTM F 436 Washers.

2.1.7.2. Threaded Rods:

2.1.7.2.1. ASTM A 36, unless noted otherwise on structural drawings.

2.1.7.3. Anchor Bolts/Anchor Rods:

2.1.7.3.1. ASTM F 1554, Grade 36, where shown on structural drawings.

2.1.7.4. High Strength Bolts: ASTM A 325, with nuts complying with ASTM A563, heavy hex, Grade C. Approved load indicator washers may be used with Architect's prior approval.

2.1.7.5. Miscellaneous Fasteners: As indicated on drawings.

2.1.8. Welding Materials: AWS A5.1; E70XX electrodes, type as required for application. Use E80XX low hydrogen electrodes for welding reinforcing steel. Use E71TXX wire type for flux cored arc welding, type as required for application.

2.1.8.1. The filler metal used for the welding members in the Seismic Load Resisting System with flange thickness greater than or equal to 1-1 /2 inches, and plates with thickness greater than or equal to 2 inches , shall have a notch toughness not less than 20 ft.-lbs. at 70 F. as measured by a standard Charpy V-notch test, ASTM E 23, in accordance with the applicable filler metal specification referenced in AWS D1.1.

2.1.9. Grouts:

2.1.9.1. Plastic Grout: 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 8,000 psi at 28 days tested in accordance with CRD C 621 and ASTM C 1107.

2.1.9.2. Dry-Pack Grout: Portland cement (ASTM C150, Type I or Type II) and clean, uniformly graded, natural sand (ASTM C404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand by volume, with minimum water required for placement and hydration.

2.1.10. Touch-up Primer for Galvanized Surfaces: Galvalloy or equal.

2.1.11. Primer: Approved VOC compliant primer, suitable for subsequent finishes as specified and shown in other portions of the Contract Documents.

2.1.12. Automatic End Welded Studs: Nelson shear connector studs or approved equal, Grades C-1010 through C-1020. cold-rolled steel conforming to ASTM A108, with ferrules specifically designed for weld-through technique.

2.2. COMPONENT FABRICATION

2.2.1. General:

2.2.1.1. Conform to the approved submittals and other Reference Standards as applicable to the Work and the requirements of this Section.

2.2.1.2. Fabricate and form the Work to meet actual installation conditions as verified at the site.

2.2.1.3. Welding shall be done in strict adherence with written Welding Procedure Specifications (WPS) as defined by AWS D1.1. The Fabricator's Quality Control Inspector shall oversee the fabrication, welding and erection of roof trusses and frames. Coordinate inspection with Owners Special Inspector.

2.2.1.4. Mark weight on member of all components exceeding 4 tons in weight.

2.2.1.5. Where shown on structural drawings, fabricate components in compliance with Architecturally Exposed Structural Steel provisions of Section 10, Code of Standard Practice, AISC.

2.2.2. Cleaning and Straightening:

2.2.2.1. In accordance with SSPC-SP-2 or SP-3, thoroughly clean material of loose mill scale and rust.

2.2.2.2. Straighten by methods that will not injure the steel prior to fabrication.

2.2.2.3. Remove twists or bends after punching or working the component parts of a member before the parts are assembled.

2.2.2.4. Produce finished members free from twists, bends and open joints when erected.

2.2.3. Contact Surfaces:

2.2.3.1. Pin components parts of built-up members and rigidly maintain in close contact using clamps or temporary bolting during welding operations.

2.2.3.2. Accurately mill compression bearing surfaces of joints depending on contact bearings or saw cut square to axis or as detailed.

2.2.3.3. Cut other joints straight and true.

2.2.4. Drilling, Punching, and Reaming:

2.2.4.1. Enlarge holes only by reaming. Hole burning to make or enlarge previous holes is not allowed. Prepare required holes in structural steel members for attachment or passage of Work of other trades.

2.2.4.2. Where allowed, steel may be punched 1/16 inch larger than the nominal diameter of the bolt when thickness of the steel is equal to or less than the diameter of the bolt plus 1/8".

2.2.4.3. Where the steel is thicker than the diameter of the bolt plus 1/8 inch, the holes shall be sub-drilled or sub-punched and reamed. The diameter for sub-drilled or sub-punched holes shall be 1/16 inch smaller than the nominal diameter of bolt to be installed.

2.2.4.4. Precisely locate finished holes to ensure passage of all bolts through steel assemblies without drifting.

2.2.4.5. Punch or drill holes in base plates.

2.2.4.6. Drifting to enlarge unfair holes is not permitted.

2.2.5. Gas Cutting:

2.2.5.1. Use of a cutting torch is allowed where the metal being cut is not stressed during the operation and provided stresses are not transmitted through a flame-cut surface.

2.2.5.2. Make gas cuts with a smooth regular contour.

2.2.5.3. Deduct 1/8 inch from the width of gas cut edges to determine the effective width of members that are gas cut.

2.2.5.4. Make the radius of re-entrant gas cuts as large as possible, but 1 inch minimum.

2.3. CONNECTIONS: FABRICATION AND JOINTING CRITERIA

2.3.1. General:

2.3.1.1. Comply with requirements of referenced standards.

2.3.1.2. Unless noted otherwise, make all connections with common bolts.

2.3.1.3. Where shown on structural drawings, fabricate connections in compliance with Architecturally Exposed Structural Steel provisions of Section 10, Code of Standard Practice, AISC.

2.3.1.4. Prior to fabrication, test girder and column flanges of moment-resisting steel frame member for possible defects. Conform to non-destructive testing procedures specified under "Field Quality Control" of this section and per Section 01 45 00.

2.3.2. Welding:

2.3.2.1. Conform to AWS D1.1, as modified by referenced AISC Standards and as indicated or noted on the Drawings.

2.3.2.2. Welding shall be done in strict adherence with approved written Welding Procedure Specifications (WPS). The WPS shall be readily available to the welding Inspector.

2.3.2.3. Employ certified welders who are thoroughly trained and experienced in arc welding, produce uniformly reliable groove and fillet welds in flat, vertical and overhead positions, and make neat and consistent welds.

2.3.2.4. Weld structural steel joints by the shielded metal electric-arc method, or by the flux cord arc welding – self shielded method.

2.3.2.5. Provide inspection and testing of welds as required under Article "Field Quality Control" of this section and per Division 01.

2.3.2.6. Grind exposed welds subject to contact or visible in final construction to smooth surfaces free of holes, slag or other defects, flush with the adjoining surfaces. No finish treatment is required for permanently concealed welds and other exposed welds.

2.3.2.7. During assembling and welding, hold components of a built-up member with adequate clamps or other means to keep parts straight and in close contact. Do no welding in wind until adequate protective screening has been set up. Cut out defective welds or parts of welds with a chisel or air arc and replace.

2.3.2.8. Storage and Care of Electrodes:

2.3.2.8.1. Coatings of low-hydrogen type electrodes shall be thoroughly dry when used. After removal from container, electrodes shall be kept in heating quiver until immediately prior to use.

2.3.2.8.2. Use electrodes as taken from hermetically sealed packages within 4 hours of the time the package is opened. Electrodes not used within this 4 hour period and electrodes that have been exposed more than one hour to air having a relative humidity of 75 percent or greater shall be re-dried for at least two hours at a temperature of 500 to 800 degrees Fahrenheit before they are used or shall be reconditioned according to the manufacturer's recommendations.

2.3.2.8.3. Electrodes so dried or reconditioned not used within 4 hours after drying is completed shall be discarded.

2.3.2.8.4. Electrodes of any class that have been wet shall not be used under any conditions.

2.3.2.9. Completed welds shall be wire brushed and shall show uniform section, smoothness of welded metal, feather edges without undercuts or overlays and freedom from porosity and inclusions. Visual inspection at edges and ends of fillet welds shall show good fusion and penetration into base metal.

2.3.2.10. Prior to welding, ultrasonically test column materials greater than 1-1/2 inches in thickness for laminations within 12 inches (6 inches on each side) of a direct groove weld from column splices and girder flange connections.

2.3.2.11. Conform to the ultrasonic testing procedures specified under "Field Quality Control" of this section and per Section 01 45 00.

2.3.2.12. Welding of Primary Member of the Moment - resisting steel frames - Additional requirements.

2.3.2.12.1. All welds shall be started and ended on runoff tabs. All runoff tabs shall be removed, the affected area ground smooth and magnetic particle tested for defects.

2.3.2.12.2. Weld dams are not allowed per AWS D1.1.

2.3.2.12.3. Backer bars shall be removed from the girder flange weld, the root weld back-gouged by air arcing and the area magnetic particle tested for defects. The weld shall be repaired and reinforced with a fillet weld per AWS D1.1 requirements.

2.3.3. Shop Fabricated/Installed Automatic End Welded Stud:

2.3.3.1. Automatically end weld studs in accordance with the manufacturer's recommendations in such a manner as to provide complete fusion between the end of the stud and the plate.

2.3.3.2. There shall be no porosity or evidence of lack of fusion between the weld end of the stud and the plate.

2.3.3.3. The stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch diameter and under, and 3/16 inch for over 5/8 inch diameter.

2.3.4. High Strength Steel Bolting:

2.3.4.1. For joints connected by high-strength steel bolts, and hardened washers, the materials, method of installation and tension control, type of wrenches, and inspection shall conform to the Reference Standards and the following requirements.

2.3.4.2. High-strength bolts shall have a suitable identifying mark placed on top of the head before leaving the factory.

2.3.4.3. Tightening of nuts for slip critical joints shall be done with properly calibrated wrenches, by the turn-of-the-nut method, by installation of alternate design bolts, or by direct tension indicator tightening. Minimum bolt tension for the size of bolt used shall conform to tables listed in Reference Standards.

2.3.4.4. Calibrated wrenches shall be checked individually for accuracy at least once daily for actual conditions of application. Comply with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts.

2.3.4.5. Fully tightened bolts shall be marked with identifying symbol.

2.3.4.6. Bolts in non-slip-critical connections shall be in properly aligned holes, but need only be tightened to the snug tight condition.

2.3.4.7. Hardened washers shall be provided and installed in accordance with AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts.

2.3.4.8. Clean all contact surfaces of bolted parts and threads free of scale, slag, burrs, and pits, or dirt, paint, or other foreign material or defects which would prevent solid seating of parts.

2.3.4.8.1. For the faying surfaces of slip critical connections, paint, including any inadvertent overspray, shall be excluded from the areas closer than one bolt diameter, but not less than one inch from the edge of any hole and all areas within the bolt pattern.

2.3.4.9. Bolt lengths shall be the grip plus 1-1/4 inch.

2.3.5. Load Indicator Washers:

2.3.5.1. Washers as manufactured and licensed by either Cooper and Turner, Bethlehem Steel, or equal may be used for the field installation of slip critical high-strength bolts.

2.3.5.2. Load indicator washers may not be substituted for any required washer, but may be used in conjunction with the required washers.

2.3.5.3. Conform to tightening criteria in referenced specification.

2.3.5.4. After sufficient bolts in a joint are snugged to bring the members into close contact, tightening shall progress from the most rigid part to the free edges until the load indicators on all bolts are closed to the required gap of 0.015 inch under bolts heads or 0.010 inch under the nuts.

2.3.5.5. Do not completely close the gap to prevent over-tightening and damage to the bolts.

2.3.6. Tension Set Or Load Indicator Bolts, Nuts, And Washers:

2.3.6.1. Load indicator bolts, as manufactured by Cold Form Specialties or Bethlehem Steel, may also be used for field installation of the slip critical bolted connections.

2.3.6.2. Conform to tightening criteria in referenced specification.

2.3.6.3. In multi-bolt joints, the nuts shall be tightened in stages without breaking the spline in any until the final stage, to minimize slackening of the installed bolts.

2.4. SHOP FINISHING

2.4.1. General:

2.4.1.1. Prepare in accordance with referenced specification standards. Unless specified otherwise, shop prime all structural steel.

2.4.1.2. Do not prime areas within 4 inches of field welds..

2.4.1.3. Contact surfaces of slip critical (SC) high strength bolts.

2.4.1.4. Surfaces of steel members designated to receive steel decking.

2.4.1.5. Do not galvanize or shop prime structural steel embedded in concrete.

2.4.1.6. Do not shop prime galvanized structural steel, or steel concealed in final construction.

2.4.1.7. Do not shop prime structural steel designated as fire proofed.

2.4.2. Shop Prime Painting:

2.4.2.1. Clean steel in accordance with SSPC-SP-2 or SSPC-SP-3 criteria.

2.4.2.2. Apply shop coat per SSPC-Paint 2 criteria, minimum 1.5 mil thickness.

2.4.2.3. Work primer into joints, corners, and edges.

2.4.2.4. Block out at connections and omit shop primer.

2.4.3. Hot Dip Galvanizing:

2.4.3.1. Steel framing members and ferrous metal items, specifically shown or noted on drawings as galvanized, shall be galvanized by the hot-dip process, conforming to ASTM A 123, Grade 75.

2.4.3.1.1. Steel connection components, including bolts, washers and nuts, shall be galvanized by the hot-dip process conforming to ASTM A 153.

2.4.3.2. Appearance Criteria: Where galvanized steel is exposed to view in the final construction, take special care to produce uniform and consistent coating, including the following provisions.

2.4.3.2.1. Where designated as unpainted, provide least amount of spangle possible.

2.4.3.2.2. Where designated as unpainted, provide coating as uniform in color as possible.

2.4.3.2.3. Where designated as unpainted, provide post-galvanizing treatment as required to provide a matte dull color finish.

2.4.3.2.4. Spikes, excess coating producing irregular surfaces or edges, gross dross deposits are grounds for rejection of coating.

2.4.3.3. Where steel is designated as painted in finished project, do not water quench or apply chromate conversion coatings as a part of the galvanizing process. Contractor shall notify steel galvanizing fabricator of all steel designated as painted.

2.4.3.4. All required hot-dip galvanizing shall be done after fabrication, in the largest sections possible.

2.4.3.5. Items too large for available dip tanks shall be sprayed, by approved methods, with zinc coating thickness of 0.003 inch to 0.004 inch.

2.5. SOURCE QUALITY CONTROL

2.5.1. Structural Shapes:

2.5.1.1. Identified Structural Steel: Tests are waived for steel identified by heat number, accompanied by mill analyses and mill test reports and properly tagged with Identification Certificate so as to be readily identified for conformance with applicable ASTM standard.

2.5.1.2. Unidentified Steel: If structural steel cannot be identified or its source is questionable, not less than one tension and one bend test shall be made for each 5 tons or fractional part thereof. Additional tests may be required when deemed necessary by the Architect, Structural Engineer or Division of the State Architect. Contractor shall bear test costs.

2.5.1.3. Conform to testing requirements of Section 2203A and 2212A.1, Chapter 22A, Part 2, Title 24, CCR.

2.5.1.4. Steel shapes conforming to the following characteristics: Shapes that are part of Seismic Load Resisting System with flange thickness greater than or equal to 1-1 /2 inches; Plate elements that are part of Seismic Load Resisting System with thickness greater than or equal to 2 inches; Plate elements with a thickness greater than or equal to 2 inches in tension application; and hot rolled shapes with a flange thickness exceeding 2 inches, shall be supplied with Charpy V-Notch testing in accordance with ASTM A6, Supplementary Requirement S 30. The impact test shall meet a minimum average value of 20 ft. lbs. absorbed energy at 70 F and shall be conducted in accordance with ASTM A 673 with the following exceptions:

2.5.1.4.1. The center longitudinal axis of the specimens shall be located as near as practical to midway between the inner flange surface and the center of the flange thickness at the intersection with the web mid-thickness.

2.5.1.4.2. Test shall be conducted by the producer on material selected from a location representing the top of each ingot or part of an ingot used to produce the product represented by these tests.

2.5.2. Threaded Connections;

2.5.2.1. Random inspection of shop fabrication procedures may be performed by Owner's testing service without notification.

2.5.2.2. Common bolted assemblies: Owner's testing service will take, at random, a minimum of four (4) bolt assemblies of each type for testing to ensure compliance with ASTM standards.

2.5.3. End Welded Studs:

2.5.3.1. Comply with Section 2212A.3, Chapter 22A, Part 2, Title 24, CCR.

2.5.3.2. Inspection and tests of all shop and field welding operations for automatic end welded studs shall be made by a qualified Welding Inspector per Section 01 45 00 and Section 1704A.3, Chapter 17A, Part 2, Title 24, CCR. The type and capacity of the welding equipment shall be in accordance with the manufacturer's recommendations and shall be checked and approved by a Welding Inspector.

2.5.3.3. At the beginning of each day's work, a minimum of two test stud welds shall be made to metal which is the same as the actual work piece, with the equipment to be used. The test studs shall be subjected to a 30 degree bend test by striking them with a heavy hammer. After the above test, the weld section shall not exhibit any tearing out or cracking.

2.5.4. High-Strength bolts, nuts and washers.

2.5.4.1. Conform to testing requirements of Section 2212A.2, Chapter 22A, Part 2, Title 24, CCR.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards. Verify existing construction complies with the following tolerances:

3.1.1.2.1. Top of Anchor Bolt Tolerance: plus 1 inch, minus 3/8 inch.

3.1.1.2.2. Anchor bolt alignment/position: plus/minus 1/8 inch.

3.1.1.2.3. Elevation of concrete bearing surface: plus/minus 3/8 inch.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. ERECTION

3.2.1. Comply with requirements of reference standards as applicable to the work of this Section.

3.2.2. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

3.2.2.1. Prior to erection, prepare a graphic survey of anchor bolt locations and elevations. Submit deviations from the required position to the Structural Engineer for review. Allow five (5) working days for review.

3.2.3. Field weld components indicated on Drawings. Do NOT field cut or alter structural members without approval of Architect.

3.2.4. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.

3.2.5. Set center of base true to column center within 1/16 inch and adjust height to within tolerance of plus/minus 1/32 inch. Maintain bases in position and level during grouting.

3.2.6. Clean bearing surfaces of concrete or masonry prior to installation of base or bearing plates. Remove dust dirt, laitance, and other material which may impair bond.

3.2.7. Level base and bearing plates with double nuts on steel shims. Remove template prior to erection. Tighten anchor bolts after supported members have been positioned.

3.2.8. Cut off portions of shims which protrude beyond edges of base or bearing plates prior to grouting.

3.2.9. Grout under base plates following grout manufactures instructions. Place grout and consolidate to ensure no voids remain. Finish exposed surfaces and allow to cure.

3.2.10. After erection, touch up welds, abrasions, and surfaces of exterior galvanized members, except surfaces to be in contact with concrete. Touch up primer with approved primer paint.

3.2.11. Connections:

3.2.11.1. Maintain steel in correct position during welding and bolting and provide for dead loads, wind and all erection stresses. Drifting to enlarge unfair holes not permitted.

3.2.11.2. Do not weld or final bolt until members have been aligned and plumbed.

3.2.11.3. Field welding shall conform to requirements for shop fabrication.

3.2.11.4. Tighten and upset common bolt threads to preclude loosening or use approved self-locking nuts.

3.2.11.5. Tighten high strength bolted connections as specified for high strength bolting and according to AISC Standards, and the Referenced Standards.

3.2.11.5.1. Installation and tightening shall comply with the requirements for joint assembly and tightening of shear/bearing connections. Full pre-tensioning of connections is not required.

3.2.11.5.2. Re-use of high strength bolts is prohibited.

3.2.11.6. Field install end-weld stud connectors in accordance with approved methods and referenced AWS Standard.

3.2.11.6.1. Surfaces receiving end welded stud connectors shall be free of rust, dirt, oil, paint or other substances that might interfere with welding operations.

3.2.12. At work areas specifically shown on structural drawings, steel assembly shall comply with Architecturally Exposed Structural Steel erection provisions of Section 10, Code of Standard Practice, AISC.

3.3. ERECTION TOLERANCES

3.3.1. Tolerances shall conform to referenced AISC standards and AISC Code, including the Code of Standard Practice, and as specified. Tolerances shall be compensating, not cumulative.

3.3.1.1. All columns and beams shall be free of twists, bends, and open joints.

3.3.1.2. Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.

3.3.2. Vertical Dimensions shall be measured from top of beams at their connections at any column with variation of not more than 1/4 inches plus or minus per story or, when variations are accumulative from floor to floor, not exceeding 3/8 inches per story exclusive of column shortening due to dead load.

3.3.3. Unless specified otherwise, plumb displacement shall be measured by the center line of columns from established column line varying no more than slope ratio of 1/500 per story from established center line.

3.3.4. Place each vertical member on such grids so that its vertical center line does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.

3.3.5. The maximum displacement of the center line of columns adjacent to elevator shafts, from the established column line, shall not be more than 1 inch at any point.

3.3.6. Place all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building.

3.3.7. Floor elevation will be considered level if floor framing members on any one floor, measured from established floor elevations, do not vary more than 3/8 inch, plus or minus, excluding camber.

3.3.8. Horizontal dimension variance shall be governed by column plumb displacement tolerance.

3.3.9. At work areas specifically shown on structural drawings, steel assembly shall comply with Architecturally Exposed Structural Steel tolerance provisions of Section 10, Code of Standard Practice, AISC.

3.4. FIELD QUALITY CONTROL

3.4.1. Field inspection shall be performed under provisions of Section 01 45 00.

3.4.2. Inspection and Testing of End-Welded Stud Connectors:

3.4.2.1. Conform to testing requirements of Section 1704A.3, Chapter 17A, Part 2, Title 24, CCR.

3.4.3. Inspection of Welding:

3.4.3.1. Conform to testing and inspection requirements of Section 1704A.3.1, Chapter 17A, Part 2, Title 24, CCR.

3.4.3.2. Inspector shall be certified in accordance with AWS QC1 CW 1 program.

3.4.4. Inspection of High-Strength Bolts:

3.4.4.1. The testing service shall check bolt tightness on a minimum of 10 percent of bolts, selected at random, for each non-slip-critical strength bolted joint.

3.4.4.2. All bolts in slip-critical connections shall be inspected.

3.4.4.3. Inspection procedure shall conform to Section 1704A.3.3, Chapter 17A, Part 2, Title 24, CCR.

3.4.5. Inspection of Shop Fabrication:

3.4.5.1. Conform to testing and inspection requirements of Section 1704A.3.2.1, Chapter 17A, , Part 2, Title 24, CCR.

3.4.6. Nondestructive Testing:

3.4.6.1. As noted on Structural Drawings.

3.4.6.2. Welded connections between the primary members of moment-resisting steel frames. Conform to testing requirements of Section 1704A.3.1, Chapter 17A Part 2, Title 24, CCR, and as noted on Structural drawings.

3.4.6.3. Ultrasonic inspections of complete joint penetration welds shall be conducted from both the top and bottom sides of beam flanges, and from the back side of column flanges.

3.4.6.4. Nondestructive testing methods shall not be the sole method of welding inspection. Nondestructive testing methods shall be used as a supplement to a visual inspection.

END OF SECTION

SECTION 05 31 00

STEEL DECKING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Steel roof decking and accessories.

1.1.2. Steel floor decking and accessories.

1.1.3. Steel canopy and walkway roof decking and accessories.

1.1.4. Framing for minor openings.

1.1.5. Bearing plates and angles.

1.2. REFERENCES

1.2.1. AISI - Specification for the Design of Cold-Formed Steel Structural Members.

1.2.2. ASTM A36 - Structural Steel.

1.2.3. ASTM A 653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot-Dip Process.

1.2.4. AWS D1.1 - Structural Welding Code.

1.2.5. AWS D1.3 - Structural Welding Code - Sheet Steel.

1.3. SUBMITTALS

1.3.1. Submit under provisions of Section 01 33 00.

1.3.2. Shop Drawings: Indicate decking plan, support locations, projections, openings and reinforcement, pertinent details, and accessories. Indicate temporary shoring of decking where required.

1.3.3. Product Data: Provide deck profile characteristics and dimensions, structural properties, and finishes.

1.3.3.1. Provide current ICC ES report.

1.3.3.2. Provide certification as required by Architect of compliance with criteria as specified and as shown on drawings.

1.3.4. Certification: Provide certification that submitted deck is coordinated with fire resistant assemblies as specified and shown on drawings, including gage, span, and deck type.

1.3.5. Welder Certification: Provide documentation to Testing Laboratory certifying welders have been qualified and have current certification in accordance with AWS D1.1. Welders shall have been certified for not less than 24 months and have received re-certification within past 12 months.

1.4. QUALIFICATIONS

1.4.1. Contractor Qualifications

1.4.1.1. Installing Contractor shall have Class C-51 Structural Steel Contractor license

1.4.1.2. Installing Company: Company specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope.

1.4.1.3. Installing Foreman: Individual specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope..

1.4.1.4. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5. DELIVERY, STORAGE, AND HANDLING

1.5.1. Deliver products to site under provisions of Section 01 60 00.

1.5.2. Store and protect products under provisions of Section 01 60 00.

1.5.3. Cut plastic wrap to encourage ventilation.

1.5.4. Separate sheets and store decking on dry wood sleepers; slope for positive drainage.

1.6. FIELD MEASUREMENTS

1.6.1. Verify field measurements are as shown on Drawings.

2. PART 2 - PRODUCTS

2.1. METAL ROOF DECK

2.1.1. Manufacturer: Verco or equal.

2.1.2. Series: HSB-36/PLB-36, as indicated on drawings, with fiberglass batt insulation.

2.1.3. Characteristics:

2.1.3.1. Sheet Steel: ASTM A 653, SS, Grade 33, with a minimum yield strength of 33,000 psi.

2.1.3.2. Minimum Metal Thickness (Excluding Finish): 18 gage, or as indicated on drawings.

2.1.3.3. Nominal Height: 1-1/2 inch deep.

2.1.3.4. Formed Sheet Width: 36 inches or as indicated on drawings.

2.1.3.5. Acoustical Characteristics:

2.1.3.5.1. Noise Reduction Coefficient: 0.80 per ASTM E 795.

2.1.3.5.2. Perforations: Punched holes 5/32 inch diameter at 7 /16 inch on center staggered pattern.

2.1.3.5.3. Insulation: Fiberglass, 1.5 pound density.

2.1.4. Fire Rating:

2.1.4.1. Provide decking complying with fire rated assembly as defined on drawing.

2.1.5. Finish:

2.1.5.1. Provide G90 galvanized coating conforming to ASTM A 653, minimized spangle, extra smooth.

2.1.5.2. Where steel is designated as painted in finished project, do not water quench or apply chromate conversion coatings as a part of the galvanizing process. Contractor shall notify steel galvanizing fabricator of all steel designated as painted.

2.2. METAL ROOF DECK

2.2.1. Manufacturer: Verco or equal.

2.2.2. Series: HSB-CD-36/PLB-CD-36, as indicated on drawings, with fiberglass batt insulation.

2.2.3. Characteristics:

2.2.3.1. Sheet Steel: ASTM A 653, SS, Grade 33, with a minimum yield strength of 33,000 psi.

2.2.3.2. Minimum Metal Thickness (Excluding Finish): 18 gage, or as indicated on drawings.

2.2.3.3. Nominal Height: 1-1/2 inch deep.

2.2.3.4. Formed Sheet Width: 36 inches or as indicated on drawings.

2.2.3.5. Acoustical Characteristics:

2.2.3.5.1. Noise Reduction Coefficient: 0.80 per ASTM E 795.

2.2.3.5.2. Perforations: Punched holes 5/8 inch diameter at 7 /16 inch on center staggered pattern.

2.2.3.5.3. Insulation: Fiberglass, 1.5 pound density.

2.2.4. Fire Rating:

2.2.4.1. Provide decking complying with fire rated assembly as defined on drawing.

2.2.5. Finish:

2.2.5.1. Provide G90 galvanized coating conforming to ASTM A 653, minimized spangle, extra smooth.

2.2.5.2. Where steel is designated as painted in finished project, do not water quench or apply chromate conversion coatings as a part of the galvanizing process. Contractor shall notify steel galvanizing fabricator of all steel designated as painted.

2.3. ACCESSORIES

2.3.1. Flute Closures:

2.3.1.1. Non-Rated conditions: Metal, profiled to fit tight to decking and as specified.

2.3.1.2. Rated conditions: Coordinate with firestopping assemblies specified in Section 07 84 00.

2.3.2. Bearing Plates and Angles: ASTM A36 steel, unfinished.

2.3.3. Welding Materials: AWS D1.1 and D1.3.

2.3.4. Shear Connectors and End Welded Studs: Comply with Section 05 12 00.

2.4. FABRICATION

2.4.1. Metal Decking:

2.4.1.1. Length: Unless indicated otherwise, form deck units in lengths to span 3 or more support spacings, with flush, telescoped or nested 2 inch end laps and nesting side laps, unless otherwise indicated.

2.4.1.2. Side Joints: Fasten as indicated on drawings.

2.4.1.3. Flute deformations and perforations: Type as indicated on drawings.

2.4.1.3.1. Where waterproof membrane or roofing system is applied over concrete filled decking, provide ventilated decking with 1-1/2 % open area per square foot.

2.4.2. Roof Sump Pans: Fabricate from a single piece of 14 gage galvanized sheet steel with level bottoms and sloping sides to direct water flow to the drain unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3 inches wide. Recess pans not less than 1-1/2 inch below the roof deck surface, unless otherwise shown or required by deck configuration. Cut holes for drain in the field.

2.4.3. Metal Closure Strips: Fabricate metal closure strips of galvanized sheet steel of the same quality as the deck units; not less than nominal 0.0359 inch (20 gage) thickness before coating. Form to the configuration required to provide tight-fitting closures at open ends and sides of decking.

2.5. SOURCE QUALITY CONTROL

2.5.1. Structural Shapes

2.5.1.1. Conform to testing requirements of Section 2203A and Section 2212A.1, Chapter 22A, Part 2, Title 24, CCR.

2.5.1.2. Identified Structural Steel: Tests are waived for steel identified by heat number, accompanied by mill analyses and mill test reports and properly tagged with Identification Certificate so as to be readily identified for conformance with applicable ASTM standard, and Section 2203A, Chapter 22A, Part 2, Title 24, CCR.

2.5.1.3. Unidentified Steel: If structural steel cannot be identified or its source is questionable, then the steel shall be tested to meet the minimum chemical and mechanical properties of the ASTM Standard appropriate for the steel specified. Test is accordance with Section 2203A. Additional tests may be required when deemed necessary by the Architect, Structural Engineer or OSHPD/DSA/Jurisdictional authority. Contractor shall bear test costs.

2.6. OTHER MATERIALS

2.6.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Erect metal decking in accordance with SDI Design Manual for Composite Decks, Form Decks and Roof Decks. Install metal deck units and accessories in accordance with the drawings, manufacturer's recommendations and final shop drawings, and as specified herein.

3.2.2. Do not start placement of deck units before all supporting members are installed.

3.2.2.1. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened.

3.2.2.2. Lap ends not less than 2 inches where lap is indicated o drawings. Do not stretch or contract the side-lap interlocks

3.2.2.3. Deck units shall have a minimum of 2 inches solid bearing at all support points.

3.2.2.4. Exercise special care in holding sheets tight against structural steel when welding through double thickness of decking.

3.2.3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

3.2.4. Do not place deck units on concrete supporting structure until concrete has cured properly and is dry.

3.2.5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

3.2.6. Do not use deck units for storage or working platforms until permanently secured in position.

3.2.7. Permanently fasten deck units to steel supporting members as noted on Structural Drawings.

3.2.8. Cutting and Fitting: Cut and fit deck units and accessories around other work projecting through or adjacent to the decking. Provide neat square and trim cuts.

3.2.9. Reinforcement at Openings: Unless shown otherwise on drawings, reinforce steel deck openings from 6 to 18 inches in size with 2-1/2 x 2-1/2 x 3/16 inch steel angles. Place angles perpendicular to flutes. Extend minimum three flutes beyond each side of opening and fusion weld to deck at each flute. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.

3.2.10. Shear Stud Connectors:

3.2.10.1. Steel surfaces where shear stud connectors are to be installed shall be free of loose mill scale, heavy rust and paint. When shear studs are to be welded through metal decking, the top surface of supporting structural steel shall be unpainted and free of dirt and debris before the metal decking is installed. Remove all water in decking flutes so that it does not become entrapped between the metal decking and the structural steel. install metal decking so its bottom ribs are in continuous contact with the top of the structural steel member; flatten embossments as necessary to achieve full contact.

3.2.10.2. Shear studs welded through metal decking may replace an equivalent diameter puddle weld.

3.2.10.3. Do not permit the placement of reinforcing steel, temperature mesh and other materials which will interfere with the shear stud installation.

3.2.10.4. Do not install shear studs on steel surfaces that are wet.

3.2.10.5. Welding: Weld automatic end welded studs in accordance with manufacturer's recommendations in such a manner as to provide complete fusion between end of stud and plate. There should be no porosity or evidence of lack of fusion between welded end of stud and plate. Stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch diameter and under, and 3/16 inch for over 5/8 inch diameter. Welding shall be done only by qualified welders approved by welding inspector.

3.2.11. Weld in accordance with AWS D1.1 and D1.3.

3.2.12. Fasten weld male/female side laps at intervals indicated on the Drawings.

3.2.13. Install 6 inch minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction.

3.2.14. Roof Sump Pans: Place over opening provided in the roof decking and weld to the top decking surface. Space welds not more than 12 inches o.c. with at least one weld at each corner. Cut opening in the bottom of the roof sump to accommodate the drain size indicated.

3.2.15. Closure Strips: Provide metal closure strips at all open uncovered ends and edges of roof decking, and in the voids between decking and other construction. Weld into position to provide a complete decking installation.

3.2.16. Roof Insulation Support: Provide metal closure strips for the support of roof insulation where the rib openings in the top surface of roof decking occur adjacent to edges and opening. Weld closure strips into position.

3.2.17. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up coating. Wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

3.2.17.1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

3.2.17.2. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.

3.2.17.3. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend adjacent surfaces.

3.3. FIELD QUALITY CONTROL

3.3.1. Testing and inspection will be performed under the provisions of Section 01 45 29

3.3.1.1. Welding: Section 1704A.3.1, Part 2, Title 24, CCR.

3.3.2. Inspection and Testing: Type and capacity of welding equipment shall be checked and approved by welding inspector. Perform inspection of all shop and field welding in accordance with AWS D1.1 and D1.3, as applicable, and with following modifications:

3.3.2.1. At beginning of each day's work make minimum of two stud welds with equipment to be used, to metal which is same as actual work piece. Test studs shall be subjected to 30 degree bend test by striking them with heavy hammer.

3.3.2.2. In addition, test two studs per beam by bending 15 degree from vertical; these studs shall show no signs of weld failure.

3.3.2.3. After test, weld section shall not exhibit any tearing out or cracking.

3.3.2.4. Special Inspector shall inspect all field welded conditions by approved non-destructive test methods.

3.3.2.5. Conform to jurisdictional authority requirements for re-inspection of welds after installation.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

1. PART 1 - GENERAL

1.1. SECTION INCLUDE

1.1.1. Miscellaneous fabricated ferrous metal items, galvanized, plated, and prime painted.

1.1.2. Access ladders.

1.1.3. Miscellaneous fabricated structural connectors and clips

1.1.4. Handrails and Guardrails

1.1.5. Bollards: Galvanized steel pipe; concrete filled, crowned cap.

1.2. PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

1.2.1. Section 03 30 00 - Cast-In-Place Concrete.

1.3. REFERENCES

1.3.1. ASTM A36 - Structural Steel.

1.3.2. ASTM A53 - Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless.

1.3.3. ASTM A123 - Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.

1.3.4. ASTM A283 – Low and Intermediate Tensile Strength Carbon Steel Plates.

1.3.5. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

1.3.6. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

1.3.7. ASTM A 653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot-Dip Process.

1.3.8. AWS A2.0 - Standard Welding Symbols.

1.3.9. AWS D1.1 - Structural Welding Code.

1.3.10. SSPC - Steel Structures Painting Council.

1.4. SUBMITTALS

1.4.1. Submit under provisions of Section 01 33 00.

1.4.2. Product Data: Provide data on material, finishes and attachment.

1.4.3. Manufacturer's Installation Instructions: Submit criteria for preparation and application.

1.4.4. Samples: Accompanying materials list, submit three samples of each fence type, showing panel connection to post. Grind and seal all edges.

1.4.5. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1.4.5.1. Provide shop drawings and calculations for items subject to wind load or anchorage loads. Must be stamped and signed by California licensed structural engineer.

1.4.6. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.5. QUALITY ASSURANCE

1.5.1. Manufacturer: Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.5.2. Staff:

1.5.2.1. Use only personnel who are thoroughly trained and experienced in the skills required and have installed similar applications of the specified products within one year prior to beginning work of this section.

1.5.2.2. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5.3. Welders' Certificates: Submit under provisions of Section 01 33 00, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6. FIELD MEASUREMENTS

1.6.1. Verify that field measurements are as indicated on shop drawings.

1.7. WARRANTY AND GUARANTEE

1.7.1. Manufacturers Warranty:

1.7.1.1. Provide, in Architect approved form, the Owner with manufacturers standard warranty against coating and fence system failure.

1.7.2. Contractors Guarantee:

1.7.2.1. Provide, in Architect approved form, the Owner with a guarantee against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

1.7.2.1.1. Panel failure not resulting from anchorage and attachments.

1.7.2.1.2. Rusting and coating failure resulting from field installation.

1.7.2.1.3. Settlement and alignment resulting from footing embedment and earthwork failure.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. MATERIALS

2.2.1. Plates and Bars: ASTM A283, Grade D or approved equal.

2.2.2. Fabricated Fencing and Gate Pickets: Steel, shape as shown on drawings, solid stock, per ASTM A 322, finished in accordance with ASTM A 108 or approved equal.

2.2.3. Pipe: ASTM A53, Grade B Schedule 40, (pressure test not required), unless noted otherwise.

2.2.4. Tube: ASTM A 500, Grade B.

2.2.5. Sheet Steel: ASTM A 653, gage and profile indicated, galvanized to G90 finish in accordance with ASTM A 653.

2.2.6. Bolts, Nuts, and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components.

2.2.7. Welding Materials: AWS D1.1; type required for materials being welded.

2.2.8. Shop and Touch-Up Primer: VOC approved primer.

2.2.9. Touch-Up Primer for Galvanized Surfaces: Zinc rich Type.

2.2.10. Copper: ASTM B370, temper H00 (cold rolled) or 060 (soft), 16 ounce unless noted otherwise.

2.2.11. Solder: 50% pig lead and 50% block tin.

2.2.12. Flux: Rosin, muriatic acid neutralized with zinc or an approved soldering paste.

2.2.13. Fastening Devices for Copper: Hard copper, brass or bronze. Screws shall be round headed with lead washers.

2.3. STRUCTURAL SHAPES

2.3.1. Provide structural shapes in accordance with Section 05 12 00.

2.4. PIPE BOLLARDS

2.4.1. Provide galvanized extra strong weight steel pipe as specified in ASTM A 53. Anchor posts in concrete [and fill solidly with concrete with minimum compressive strength of 2500 psi.

2.4.2. Fixed Pipe Bollard: 6 inch diameter galvanized steel pipe, concrete filled as indicated on drawings.

2.4.3. Removable Pipe Bollard: Assembly consisting of a removable 6 inch diameter galvanized steel pipe set in pipe sleeve as indicated on drawings.

2.5. FABRICATION

2.5.1. Fit and shop assemble in each item in largest practical sections, for delivery to site.

2.5.2. Fabricate items with joints tightly fitted and secured.

2.5.3. Continuously seal joined members by continuous welds.

2.5.4. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.5.5. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

2.5.6. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.5.7. Fabricate radiused components by cold-rolled process, using equipment and techniques resulting in crimp free surfaces. Verify component wall thickness is suitable for rolling without flattening or crimping.

2.5.8. In addition to above criteria, fabricate components for exposed architectural appearance conditions.

2.5.8.1. Remove all weld splatter, grind and sand all weld joints uniformly smooth, without visible scratches, gouges, or patch marks. Conform to Finish #2 of National Ornamental and Miscellaneous Metals Association "Joint Finish Guidelines."

2.5.8.2. All visible welds shall be continuous; bead or spot welding not acceptable.

2.5.8.3. Provide tube closures at all tube and pipe components.

2.5.8.4. Grind edges of all bent and fabricated components smooth to a 1/4 inch radius.

2.6. FINISHES

2.6.1. Galvanize all exterior components, after fabrication, in accordance with ASTM A123 or A386. Provide minimum 2.00 oz/sq ft galvanized coating. Fill vent holes after galvanizing.

2.6.1.1. Where steel is designated as painted in finished project, do not water quench or apply chromate conversion coatings as a part of the galvanizing process. Contractor shall notify steel galvanizing fabricator of all steel designated as painted.

2.6.2. Prime paint interior items with one coat rust inhibitive VOC approved primer compatible with finish specified in Section 09 91 00.

2.6.2.1. Prepare surfaces to be primed in accordance with SSPC SP 2.

2.6.2.2. Do not prime surfaces in direct contact with concrete or where field welding is required.

2.7. MISCELLANEOUS METAL FABRICATIONS AND ACCESSORIES

2.7.1. Unistrut: Provide Unistrut assemblies as shown on drawings.

2.8. PRE-FABRICATED LADDERS

2.8.1. Manufacturer: O'Keefe, www.okeefe.com, or equal.

2.8.2. Exterior Application: Series 502, with standard mill finish, security door, and all required closures, fasteners and anchors.

2.8.3. Interior Application: Series 500, with standard mill finish and all required closures, fasteners and anchors.

2.9. VENT AND AREAWAY GRATING

2.9.1. Provide McNichols Co., www.mcnichols.com, Type GCM-1-100, 1 x 3/16 inch bars spaced at 7/16 inches, complete with frames, clips, and fasteners. Provide aluminum/mill finish or stainless steel. .

2.10. OTHER MATERIALS

2.10.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Clean and strip primed steel items to bare metal where site welding is required.

3.2.2. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3. INSTALLATION

3.3.1. Install items plumb and level, accurately fitted, free from distortion or defects.

3.3.2. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

3.3.3. Perform field welding in accordance with AWS D1.1.

3.3.4. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.3.4.1. Use primer as specified in above for interior steel fabrications.

3.3.4.2. Use Galvalloy galvanizing coating in accordance with manufacturer's instructions for exterior steel fabrications.

3.4. INSTALLATION OF PIPE BOLLARDS

3.4.1. Pipe guards shall be set vertically in concrete piers. Piers shall be constructed of, and the hollow cores of the pipe filled with, concrete having a compressive strength of 3000 psi.

3.5. ERECTION TOLERANCES

3.5.1. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

3.5.2. Maximum Offset From True Alignment: 1/4 inch.

3.6. SCHEDULED FABRICATION

3.6.1. The following is a list of principal items only. Refer to Drawing details for items not specifically scheduled.

3.6.2. Service ladder: Fabricate as shown on drawings, with steel mounting brackets and attachments; prime paint at interior locations; galvanized finish for exterior locations.

3.6.3. Miscellaneous Anchorages: Anchor bolts, machine bolts, eye bolts, dowels, threaded rods, plates, inters, and other fastenings to be installed in concrete or masonry; provide as detailed or indicated.

END OF SECTION

SECTION 05 70 00

DECORATIVE METAL FABRICATION

1. PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section includes:

1.1.1.1. Custom formed metal items of a decorative nature for special purposes other than roofing and flashing applications.

1.1.1.2. Supplementary accessories and detail work necessary for a complete installation whether or not such items are indicated on the Drawings or included in the Specifications.

1.2. REFEERENCES

1.2.1. Abbreviations and Acronyms:

1.2.1.1. AHJ: Authority (Authorities) Having Jurisdiction.

1.2.1.2. ANSI: American National Standards Institute.

1.2.1.3. AWS: American Welding Society.

1.2.1.4. NAAMM: National Association of Architectural Metal Fabricators.

1.2.1.5. NOMMA: National Ornamental and Miscellaneous Metals Association.

1.2.1.6. USSG: Unites States Standard Gage.

1.2.2. Definitions:

1.2.2.1. Fabricator: Means the decorative metal fabricator.

1.3. SUBMITTALS

1.3.1. Action Submittals:

1.3.1.1. Shop Drawings: Submit large-scale dimensioned drawings showing layout, geometry, materials, joints, profiles, edge conditions, attachments to other work, and finishes.

1.3.1.1.1. Label individual components with the fabricator's product name. Indicate material thickness design loads, required clearances, and methods of field installation.

1.3.1.1.2. Include elevation drawings of each surface in which decorative metal fabrications are installed. All such drawings must show the horizontal and vertical location and sizes of all decorative metal fabrications installed in each surface.

1.3.1.1.3. Include project-specific, at least 1-1/2-inch scale dimensioned detail drawings showing profiles, shapes, and dimensions, including conditions either not detailed on the product data, or that are detailed on the product data, but in a manner that is not specific to the Project. Furnish edge details where specified items abut adjacent items.

1.3.1.1.4. Indicate methods of attaching to adjacent supporting construction.

1.3.1.1.4.1. Show fasteners, brackets, clips, mounting devices, and similar attachments to other work.

1.3.1.1.4.2. Label each attachment type the fabricator's product name;

1.3.1.1.4.3. Indicate base material and finish, fastener material and finish, and material and finish of items being fastened or attached.

1.3.1.1.5. Include medium-scale pictorial oblique or axonometric projection 3-D drawings for conditions difficult to illustrate as 2-D orthographic projection drawings. Perspective projections do not meet the requirements for 3-D drawings and are returned without review.

1.3.1.2. Appearance Range Samples: Submit 12-inch samples of each type of material and finish indicated, in sets of 3, illustrating the full range of finish, color, and texture variations expected.

1.4. QUALITY ASSURANCE

1.4.1. Quality Standard Requirements: Comply with NAAMM publication "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1.4.2. Qualifications:

1.4.2.1. Fabricator: Must be a legal business entity with at least 10 consecutive years' experience fabricating decorative metal fabrications similar in material, design, complexity, and extent to this Project, and whose fabrications have resulted in applications with a record of successful in-service performance.

1.4.2.2. Welders Qualifications: Welding personnel and procedures must comply with the "Qualification" requirements of American Welding Society publication AWS D1.6, "Structural Welding Code — Stainless Steel".

1.4.2.2.1. Verify that welders designated to perform any of the work of this Section have satisfactorily passed AWS qualification tests and are current in their certification.

1.4.2.2.2. If any of those welders need re-certification, then cause the re-testing of those welders prior to performing the work of this Section.

1.5. HANDLING

1.5.1. Packaging Requirements: Provide strippable film or other standard form of temporary protection for during fabrication, delivery, storage, handling and installation.

1.5.2. Delivery and Acceptance Requirements:

1.5.2.1. Inspect for damage all items delivered to the Project site.

1.5.2.2. Reject the delivery of items that show damage or have damaged containers.

1.5.2.3. With a minimum of handling, unload and store only undamaged items.

1.5.3. Storage and Handling Requirements:

1.5.3.1. Store items as shipped, upright in their original shipping containers, and in conformance with the fabricator's requirements, recommendations, or instructions for storage.

1.5.3.2. Store items off the floor or ground on pallets, and protect against weather, precipitation, and other forms of moisture with breathable covers. Un-vented polyethylene tarpaulins may not be used.

1.5.3.2.1. Incline stored items to provide maximum drainage of accumulated moisture.

1.5.3.2.2. Provide spacers to separate stored items and allow air to circulate around all surfaces.

1.5.3.2.3. Protect stored items to prevent contact with the ground, to prevent staining, and to prevent cracking, distortion, warping, and other physical damage.

1.5.3.2.4. Do not leave items uncovered where they may be exposed to rain, mist, high relative humidity, condensation, frost, or other sources of moisture, or to ultraviolet radiation in excess of the fabricator's recommended exposure limits.

1.5.3.2.5. Store materials and place equipment in a manner to avoid permanent deflection of floor or roof decks.

1.5.4. Damaged Item Replacement Requirements: Promptly remove, dispose of, and replace, or arrange and pay costs for the removal, disposal, and replacement of items that become deteriorated, contaminated, or otherwise damaged.

1.5.4.1. Remove and dispose of damaged items at a disposal location away from the Project site.

1.5.4.2. Replace removed items with undamaged new items.

1.5.5. Packaging Waste Management:

1.5.5.1. Remove and dispose of construction waste at a disposal location away from the Project site.

1.5.5.2. Do not bury any type of wood, or wood-based or agrifiber products at the Project site.

2. PART 2 - PRODUCTS

2.1. STAINLESS STEEL TRIM AND ACCESSORIES

2.1.1. Description: Decorative metal angles, channel reveals and similar trim pieces fabricated from non-magnetic austenitic stainless steel sheet.

2.1.1.1. Provide sheet metal selected for its surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit.

2.1.1.2. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled metal sheet, stains, discoloration or other imperfections.

2.1.2. Materials:

2.1.2.1. Stainless Steel Sheet, Strip, Plate, and Flat Bar: ASTM A 240 (annealed), Type 304 No. 4 finish, passivated in conformance with ASTM A 967, and tension-leveled to a flatness of not more than S I-units.

2.1.2.2. Stainless Steel Bars and Shapes: ASTM A 276 Condition A (annealed), Type 304.

2.1.2.3. Stainless Steel Tubing: ASTM A 554, Grade MT (tubing), Type 304.

2.1.2.4. Stainless Steel Pipe: ASTM A 312, Grade TP (pipe), Type 304.

2.2. FABRICATION

2.2.1. Fabricate items in largest sections practicable in order to minimize field jointing.

2.2.2. Form exposed work straight, true to line, true to size, and true to shape; within allowable tolerances; and having accurate angles, accurate surfaces, and crisp straight edges.

2.2.2.1. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

2.2.2.2. Form exposed connections with flush hairline joints having edges and corners square and true.

2.2.3. Cut, reinforce, drill punch, thread, and tap fabrications as necessary to receive other assemblies, fabrications, components, accessories, hardware and similar items, and as required to securely anchor stair assemblies to supporting construction.

2.2.4. Provide supplementary parts, components and accessories required for complete fabrication and installation whether or not such items are indicated on the Drawings or included within the Specifications.

2.3. FINISHES

2.3.1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Protect mechanical finishes by applying a strippable, temporary protective covering before shipping.

2.3.2. Stainless Steel Finishes: Stainless steel, satin brushed finish 304 alloy, #4 finish.

3. PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Examine supporting construction and conditions for conformance to the specified requirements for installation tolerances, true and level bearing surfaces, and other, conditions affecting appearance or performance.

3.1.2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.1.3. Do not install decorative metal fabrications until supporting construction is complete.

3.2. PREPARATION

3.2.1. A. Clean substrate prior to the start of installation in order to remove dust, debris and loose particles

3.3. INSTALLATION

3.3.1. Set items accurately in location, alignment, and elevation. Fit exposed connections accurately together to form tight, hairline joints.

3.3.2. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

3.3.3. Remove strippable, temporary protective covering only when there is no possibility of damage from other work.

3.4. REPAIRS

3.4.1. Repairs are permitted when appearance is not impaired.

3.4.2. Replace any unit that exhibits damage to surfaces, finish, corners or edges that exceed allowable defects and are exposed to view after installation, or that is broken or cracked due to shrinkage, transportation, handling, or installation.

3.4.3. Acceptance of repaired units by the Architect is contingent upon repairs being done skillfully so as to be sound, permanent, flush with adjacent surfaces and of color and texture matching adjoining surfaces and showing no apparent line of demarcation between original and repaired work. The Architect's decision is final with respect to acceptance or rejection of repaired units.

3.5. CLEANING

3.5.1. Clean surfaces of decorative metal fabrications units exposed to view.

3.5.2. Clean exposed surfaces of decorative metal fabrications after installation and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

3.5.3. Perform cleaning procedures, if necessary, in conformance with the fabricator's recommendations.

3.5.3.1. Clean soiled surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water.

3.5.3.2. Protect other work from staining or damage due to cleaning operations.

3.5.3.3. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

3.5.4. Waste Management: After completing the work of this Section, leave work areas around the project site free from debris, materials, equipment, and related items.

3.6. PROTECTION

3.6.1. Protect installed decorative metal fabrications systems from damage until Substantial Completion.

3.6.2. Do not store anything adjacent to or against the installed decorative metal fabrications systems unless the decorative metal fabrications systems are adequately protected from damage and staining, determined by the fabricator's field representative and the Architect.

3.6.3. Remove protection when it's no longer needed and before Substantial Completion.

END OF SECTION

SECTION 06 10 00

MISCELLANEOUS ROUGH CARPENTRY

1. PART 1 - GENERAL

1.1. WORK INCLUDED

1.1.1. Roof nailers.

1.2. REFERENCES

1.2.1. APA - American Plywood Association.

1.2.2. AWPA - American Wood Preservers Association: Treating Practices.

1.2.3. RIS - Redwood Inspection Service: Standard Specifications for Grades of California Redwood Lumber.

1.2.4. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.

1.2.5. WWPA - Western Wood Products Association.

1.3. SUBMITTALS

1.3.1. Submit certificate based on actual moisture content readings performed in accordance with this Section, indicating moisture content of all lumber was 19 percent or less at time of installation.

1.4. QUALITY ASSURANCE

1.4.1. Lumber Grading Agency: Certified by specified agency and approved by Division of State Architect.

1.4.2. Plywood Grading Agency: Certified by specified agency.

1.4.3. Provide Certificate of Inspection or grade mark by an approved inspection agency on each piece of lumber and plywood, indicating compliance with applicable standards or grading rules specified in the referenced standards and this Section.

1.4.4. Provide quality mark by an approved inspection agency on each piece of preservative-treated lumber and plywood, indicating compliance with applicable standards or grading rules specified in the referenced standards and this Section.

1.5. DELIVERY, STORAGE AND HANDLING

1.5.1. Store materials on site in a area protected from potential damage. Provide loose opaque covers or other protection from sun and rain.

1.5.2. Store on skids or other elevated supports.

2. PART 2 - PRODUCTS

2.1. LUMBER MATERIALS

2.1.1. Lumber Grading Rules: APA, NFoPA, RIS, WCLIB, and WWPA.

2.1.1.1. Lumber Materials: Comply with Chapter 23, Part 2, Title 24.

2.1.2. Wood blocking: Provide Douglas Fir No.2 grade for use as blocking, nailers, and similar applications.

2.1.2.1. Use pressure treated wood at all roof applications.

2.2. ACCESSORIES

2.2.1. Fasteners:

2.2.1.1. Common nails complying with Chapter 23, Part 2, Title 24, CCR, size as required to suit condition, as specified.

2.2.1.2. Screws: Stainless steel, minimum # 10 screw, length and type as required for fastening.

2.2.1.3. Provide hot dip galvanized steel fasteners at the following applications:

2.2.1.3.1. Exterior framing exposed to weather.

2.2.1.3.2. Framing of preservative treated lumber.

2.2.1.4. Box nails or "sinkers" are not permitted.

2.2.2. Framing Connectors:

2.2.2.1. Connector references, unless noted otherwise, are based on products as defined in the latest edition of the Simpson Strong-Tie catalog.

2.2.2.2. Use only fasteners as approved for listed connector. Where more than one type of fastener in the referenced series is scheduled, provide fastener with greatest capacity.

2.2.3. Bolts:

2.2.3.1. Bolts: A 307, machine bolts, size and type as indicated, with washers under head and nut. Provide hot dipped galvanized at all conditions defined above for nail fasteners.

2.2.3.2. Lag Bolts: A 307, cut thread, size and type as indicated, with washers under head. Provide hot dipped galvanized at all conditions defined above for nail fasteners.

2.3. PRESERVATIVE TREATMENT

2.3.1. Wood Preservative (Site Application): Water based material system as recommended by AWPA for repair of treated surfaces.

2.3.2. Wood Preservative (Pressure Treatment):

2.3.2.1. Wood shall bear WWPA or WCLIB grading stamp and the AWPA Quality mark. AWPA mark shall designate treatment method, retention value and KDAT (kiln dried after treatment).

2.3.2.2. Comply with Section 2304.11.2, Chapter 23, Part 2, Title 24, CCR.

2.3.2.3. AWPA Treatment U-1, Commodity Specification A using water borne preservative.

2.3.2.4. Moisture Content: Kiln Dry all materials after treatment to 19 percent maximum moisture content.

2.4. OTHER MATERIALS

2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. SITE APPLIED WOOD TREATMENT

3.2.1. Brush apply two coats of specified wood treatment to cut ends, holes, daps, notches, and similar field cuts of treated wood in accordance with AWPA standards.

3.2.2. Allow preservative to cure prior to erecting members.

3.3. FRAMING

3.3.1. Lumber Selection:

3.3.1.1. Select individual pieces so that knots and obvious minor defects will not interfere with connection. Install all members with crown and tight knots in the upper position.

3.3.1.2. Do not use lumber with end splits or checks greater than the following:

3.3.1.2.1. 2 x joists: Split length shall be less than or equal to one half the wide face of the member.

3.3.1.2.2. Beams or headers: Split length shall be less than or equal to the thickness of the member.

3.3.2. Erect wood framing members level and plumb. Place horizontal members laid flat, crown side-up.

3.3.3. Construct framing members full length without splices.

3.3.4. Predrill holes for nails when necessary to prevent splitting, maximum hole size not more than 0.90 times nail diameter.

3.3.5. Drill holes for threaded fasteners as follows:

3.3.5.1. Wood Screws larger than # 14: Drill lead holes for shank and threaded portion to 7/8 times shank and thread root diameter, respectively.

3.3.5.2. Lag screws: Drill lead hole same diameter and depth as shank; drill hole for threaded portion to 0.7 times shank diameter.

3.3.5.3. Bolts: Oversize hole by not more than 1/16 inch.

3.3.6. Re-tighten all threaded fasteners before covering-up.

3.3.7. Cutting:

3.3.7.1. Provide all cutting of framing members to accommodate structural members, piping, conduit, ducts, and building system equipment and fixtures.

3.3.8. Framing for Connectors

3.3.8.1. Where roofing, plaster or other finish occurs, all straps, seats, bolts, and nuts which occur on the exposed exterior face of beams or posts shall be "let-in," dapped or countersunk to be flush with the face of the member.

3.3.8.2. Verify amount and method with Architect prior to proceeding.

3.3.8.3. Install wood stripping or blocking where indicated on the drawings or required at right angles to supported members and securely nail into place. Space as indicated. Align and level stripping by shimming where necessary. Provide stripping or blocking to conceal all plumbing, conduit, and other items shown installed in framing, whether such stripping is shown or not.

3.4. TOLERANCES

3.4.1. Location: 1/4 inch maximum from true position.

END OF SECTION

SECTION 06 41 00

ARCHITECTURAL WOOD CASEWORK

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Custom fabricated cabinet units.

1.1.2. Cabinet preparation for utilities.

1.2. REFERENCES

1.2.1. AWS – Architectural Woodwork Standards, 1st Edition, 2009.

1.2.2. National Particleboard Association, NPA 9-87, Voluntary Standard for Formaldehyde Emission from Medium Density Fiberboard.

1.2.3. National Particleboard Association, ANSI/A 208.1, current edition, Wood Particleboard.

1.2.4. National Particleboard Association, ANSI/A 208.2, current edition, Medium Density Fiberboard for Interior Use.

1.2.5. ASTM E 84- Surface Burning Characteristics of Building Materials.

1.2.6. National Electrical Manufacturers Association (NEMA) LD.3 High Pressure Decorative Laminates.

1.3. SUBMITTALS

1.3.1. Provide submittals under provisions of Section 01 33 00.

1.3.2. Product and Material Data

1.3.2.1. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes. Include seaming plan of all countertop materials.

1.3.2.2. Provide written certification of current approval of fabrication and anchorage method where deviation from contract documents is proposed.

1.3.2.3. Submit written certification of compliance with specified particleboard or fiberboard product criteria.

1.3.3. Provide Woodwork Institute (AWS) Certified Compliance documents as specified.

1.3.3.1. Provide AWS Certified Compliance label on shop drawings.

1.3.3.2. Provide AWS Certified Compliance Certificate prior to delivery to job site.

1.3.3.3. Provide AWS Certified Compliance Label on all casework and countertops.

1.3.4. After completion, issue written certification, on Contractors letterhead, and signed by Contractor and casework subcontractor, that all that casework materials, fabrication and installation fully meet all the requirements of the AWS Grade specified.

1.3.5. Samples:

1.3.5.1. Prior to fabricating mock-up, provide complete color chip/sample ring of laminated plastic, PVC edging and prefinished panel colors for Architects color selection.

1.3.5.2. Prior to fabricating mock-up, provide hinge, handle and lock samples for Architects review.

1.3.5.3. Incorporate all selections in mock-up.

1.4. QUALITY ASSURANCE

1.4.1. The Owner reserves the right to obtain a AWS inspection of completed casework installation.

1.4.1.1. Where such inspection determines the installed casework is not in compliance with specified standards, correct or replace as directed by Architect at no additional cost to Owner.

1.4.1.2. In the event the installed casework is not in compliance with specified standards, payment for inspection cost will be backcharged to the Contractor.

1.4.2. After completion, issue written certification, on Contractors letterhead, and signed by Contractor and casework subcontractor, that all that casework materials, fabrication and installation fully meet all the requirements of the AWS Grade specified.

1.4.3. Perform work in accordance with AWS Architectural Woodwork Standards (AWS), Section 10 Casework, Section 11 Countertops, and as required by this Section.

1.4.3.1. Where more restrictive than referenced standards, comply with requirements of this Section.

1.4.4. Issue a AWS Certified Compliance Certificate prior to delivery certifying that products fully meet all the requirements of the AWS Grade specified.

1.4.5. After completion, issue a AWS Certified Compliance Certificate for Installation certifying that products fully meet all the requirements of the AWS Grade specified.

1.5. REGULATORY REQUIREMENTS

1.5.1. Comply with seismic attachment requirements, Chapter 16A, Part 2, Title 24, CCR.

1.6. MOCKUP

1.6.1. Prepare mockup under provisions of Section 01 45 00.

1.6.2. Provide full size base cabinet, upper cabinet, and each counter type indicated, in specified finish with hardware installed.

1.6.3. Units will be examined to ascertain quality and conformity to AWS standards.

1.6.4. Units will establish a minimum standard of quality for this work.

1.6.5. Approved units may be used as part of the Work.

1.7. DELIVERY, STORAGE, AND HANDLING

1.7.1. Deliver work in this section only at such time as the work is ready and suitable for installation.

1.7.2. Comply with requirements of AWS Section 2 requirements for care and storage of millwork.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. PLASTIC COVERED CASEWORK

2.2.1. Type: Flush Overlay, Style A Frameless

2.2.1.1. Provide casework conforming to AWS Premium grade, modified as specified in this Section, and in accordance with approved fabrication methods.

2.2.2. Construction Type: Type I

2.2.3. Construction:

2.2.3.1. Casework Cores: Provide SierraPine Medite II or equal, phone (503)-773-2522, Medium Density Fiberboard (MDF), Type MD, per ANSI A 208.2, latest edition and NEMA LD3-85.

2.2.3.2. Cabinet Door Cores: Provide SierraPine Medite II or equal, phone (503)-773-2522, Medium Density Fiberboard (MDF), Type MD, per ANSI A 208.2, latest edition and NEMA LD3-85.

2.2.3.3. Drawer bottoms, sides, backs, and sub - fronts: MDF as specified in this Section.

2.2.3.4. Casework Cores: Particleboard, Grade 1-M-2 per ANSI A 208.1.

2.2.3.4.1. Comply with formaldehyde emission limit of 0.3 ppm at 0.13 SF/CF loading ratio per NPA 9-87.

2.2.3.5. Casework Core Visible Edges: Unless noted otherwise, high pressure laminate, minimum 0.028 inches thickness, color to match laminated plastic.

2.2.3.6. Shelving: Provide MDF core as specified in this Section, 3/4 inch thick minimum, thickness as required for 50 pound per square foot loading per AWS Section 10 and AWS Appendix B.

2.2.3.6.1. Provide 1 inch thick shelving at all spans in excess of 36 inches.

2.2.3.7. Hardboard: ANSI/AHA A135.4-82, oil tempered both sides.

2.2.3.8. Solid Surface sub-base and Countertop Cores: Provide SierraPine Medex or equal, phone (503)-773-2522, Medium Density Fiberboard (MDF), Type MD - Exterior, per ANSI A 208.2, latest edition and NEMA LD3-85, 3/4 inch thick minimum, formed as shown on drawings for specific edge.

2.2.3.9. Casework core air quality regulation compliance: Comply with CARB ATCM Rule 93120, Phase I and Phase II emission levels limiting formaldehyde emissions from all MDF composite cores.

2.2.4. Surface Finish Criteria:

2.2.4.1. Exposed portions: Finish exposed portions with high pressure laminate as specified in this Section. For purposes of this specification, definition of exposed portions requiring high pressure laminate includes:

2.2.4.1.1. Interior surfaces of knee space or recesses provided for movable equipment.

2.2.4.1.2. Tops of cabinets with more than 18 inches clear between ceiling and cabinet.

2.2.4.1.3. Bottoms of all wall hung cabinets

2.2.4.1.4. All cabinet door surfaces, including edges.

2.2.4.1.5. Exposed exterior surface of all cabinet backs.

2.2.4.1.6. All fixed and adjustable shelving surfaces, including all 4 edges.

2.2.4.2. Semi-exposed Portions - As specified in this section.

2.2.4.3. Concealed Portions: As defined in AWS Section 10, as modified in this section.

2.2.4.4. Filler panels: Provide filler panels as required to accommodate door and drawer function and allow for scribing cabinet to adjoining surfaces. Unless noted otherwise, provide 2 inch dimension at wall conditions, and 4 inch dimension at inside, cabinet to cabinet corner conditions.

2.2.4.5. Glass Panels and Doors: Clear tempered glass per Section 08 81 00, with eased edges at sliding panels.

2.3. PLASTIC LAMINATE AND FINISH MATERIALS

2.3.1. High Pressure Laminated Plastic:

2.3.1.1. Manufacturer: Provide manufacturer as specified for color. If alternate manufacturer is proposed, Architect shall be sole judge if color and finish are acceptable.

2.3.1.2. Manufacturer: Provide WilsonArt or equal.

2.3.1.3. High Pressure Laminated Plastic Series/Type: Provide grades as follows:

2.3.1.3.1. Provide Type HGS per NEMA LD-3, 0.048 inches, at vertical surfaces designated to receive high pressure laminated plastic.

2.3.1.3.2. Provide Type VGS per NEMA LD-3, 0.028 inches, at vertical surfaces designated to receive high pressure laminated plastic.

2.3.1.3.3. Provide Type HGS per NEMA LD-3, 0.048 inches, at horizontal surfaces designated to receive high pressure laminated plastic, including shelving.

2.3.1.4. High Pressure Laminated Plastic Countertop:

2.3.1.4.1. Abrasion Resistant Countertop: Provide Type HGS at all laminated plastic countertop and splash assemblies, unless otherwise specified. Provide Type HGP at postformed designs.

2.3.2. Low Pressure Finishes for semi-exposed surfaces:

2.3.2.1. Unless specified otherwise, provide AWS listed low pressure thermosetting coating.

2.3.3. Backing Sheet: AWS Listed material.

2.3.4. Color/Finish:

2.3.4.1. As selected by Architect from full color and finish line for specified product applications.

2.3.4.2. A maximum of two separate colors and finishes will be selected by Architect for each material for casework, doors, shelves and drawers.

2.3.4.3. A maximum of one color will be selected by Architect from full color and finish line for casework countertops and splashes.

2.3.4.4. A maximum of one color will be selected by Architect from full color and finish line for semi-exposed surfaces with low pressure finish.

2.4. ACCESSORIES

2.4.1. Adhesive: Water based type recommended by laminate manufacturer to suit application. Solvent based contact and urea resin adhesives are not permitted.

2.4.2. Grommets and guides:

2.4.2.1. Wire Grommets: ITW Plastiglide P3RDBL, 3 inch diameter, black color.

2.4.2.2. Trash receptacle grommet: Stainless steel, 8 inch diameter, self rimming, as approved by Architect.

2.4.3. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; stainless steel or cadmium plated steel.

2.4.4. Sleepers and toe kicks: Douglas fir, pressure treated when in direct contact with concrete slab-on-grade.

2.4.5. Uses not otherwise specified: Hardwood or softwood; grade in accordance with Section 3 and 4, AWS as required for use.

2.5. HARDWARE

2.5.1. Provide in accordance with Resource Guide Appendix to AWS except as noted below.

2.5.2. Shelf Support System: Provide KV 345/346 or equal metal shelf support clips, with Phillips PHWS at each clip.

2.5.3. Provide Hettich HT 1- 005-767 shelf support and lateral restraint pin, with HT1 – 005 – 082 vertical securing stud.

2.5.4. Drawer and Door Pulls: Trimco or equal, loop handle, 4 inch center to center, No. 562-4 inches x US 26D.

2.5.5. Hinges: Unless noted otherwise, provide RPC or equal, 850 or 370 series, 0.095-inch thickness Heavy duty wrap around, Hospital Tips, 2-3/4 inch height minimum, width configuration as required for application, color as selected by Architect from complete line, including powder coating.

2.5.6. Drawer Guides: Unless noted otherwise, provide Accuride Full Extension Model 4034 at drawers less than 24 inches wide, Model 4032 at drawers 24 inches and wider.

2.5.6.1. Bottom Drawers: Provide Accuride Full Extension Model 3640 at all bottom drawers.

2.5.6.2. File Drawers: Provide Pendaflex G-6110-04(WH) file railing system at all drawers marked "file".

2.5.7. Locks:

2.5.7.1. Manufacturer: CompX/National, www.compx.com or equal.

2.5.7.2. Type: Provide specified design, with front loaded removable cylinder permitting rekeying without total lock disassembly.

2.5.7.2.1. Drawer and door Lock Series: C 8178 series, deadbolt pin tumbler design, suitable for Owners standard cabinet keyway, with bar strike. Comply with ANSI A156.11 Grade 1 cycle testing criteria.

2.5.7.2.2. Cam Lock Series: C 8102 series, with retainer staple.

2.5.7.2.3. Sliding Door Lock Series: C 8142 series, pin tumbler design, plunger lock .

2.5.7.2.4. Sliding Glass Door Lock Series: C 8140, pin tumbler design, ratchet type .

2.5.7.3. Finish: US 26D.

2.5.7.4. Keying: Key to Owners standard cabinet keyway . Key alike all locks within each room, and key each room differently.

2.5.7.5. Accessory: Provide Ives IV2A or equal elbow catch at inactive cabinet door leaf.

2.5.8. Magnetic catches: Provide magnetic catches at all cabinet doors, with maximum 5 pounds holding power.

2.5.9. Coat Closet Pole Assembly: KV 770, with KV 766/764 tube supports, chrome finish.

2.6. FABRICATION

2.6.1. Construct casework conforming to AWS Premium grade, modified as specified in this Section, and in accordance with DSA approved fabrication methods.

2.6.1.1. Provide white bumpers.

2.6.1.2. Provide white anchor screw covers/caps.

2.6.1.3. Provide corbels matching countertop material as necessary to support counter screens.

2.6.1.4. Fabricate all drawers full depth of cabinet. Provide minimum 30 inch deep drawers at flat file drawers.

2.6.1.5. Fabricate all TV Monitor shelving with 1 inch thick MDF core, with 3 /4 x 1-1/2 inch maple/oak front edge.

2.6.1.10. Provide cabinet locks at the following locations:

2.6.1.10.1. At all workrooms, office areas, administrative areas, conference rooms, food service areas and janitorial areas.

2.6.2. Construct countertops conforming to AWS Premium grade.

2.6.2.1. Provide waterfall splash top edge, coved back splash and rolled front edge. Where end splash are required, butt waterfall splash portion into end splash.

2.6.2.2. Provide AWS listed backer sheet.

2.6.2.3. Coordinate with countertop types as specified in Section 12 35 53//06 61 16.

2.6.3. Shop assemble casework for delivery to site. Do not glue any materials on site without prior approval.

2.6.4. Fit shelves, doors, drawer fronts, and other exposed edges with matching materials. Use full length pieces only. Provide edging at all edges of adjustable shelves.

2.6.4.1. Where laminated plastic is used with a pattern or design, such as wood grains, vertically match and align pattern across face of door and drawer fronts..

2.6.5. Plough drawer bottoms into sides, fronts, or sub fronts, and backs. Surface attachment of bottoms is not acceptable.

2.6.6. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings. Verify locations of cutouts from on - site dimensions. Prime paint or seal contact surfaces of cut edges.

2.6.7. Install wire grommet at each countertop, located as directed by Architect. Allow for one grommet per 3'-0" section of countertop.

2.6.8. Install door and drawer handle horizontally, spaced as shown on drawings. Do not center drawer handles in drawer face. Space same distance from top edge of drawer as at doors.

2.7. OTHER MATERIALS

2.7.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify adequacy of backing and support framing.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Set and secure casework in accordance with AWS Premium Grade and Title 24, Chapter 16A, CCR. Provide AWS Certified Compliance Certificate for Installation.

3.2.2. Install separate anchor strips behind cabinet back. Cabinet back shall not be used for anchorage.

3.2.2.1. Unless shown otherwise on drawings, provide one anchor strip top and bottom for wall hung cabinets and base cabinets less than four feet high. Provide three strips for base cabinets over four feet high.

3.2.2.2. Secure anchor strips in compliance with load resistance criteria defined in this Section.

3.2.2.3. Provide design and detailing for seismic attachment/bracing of all free - standing library shelving units, including specifying and coordinating all required embedded shields necessary to comply with DSA requirements.

3.2.3. Scribe cabinets in accordance with AWS standards, Premium Grade, except that use of cellulose sponge is not acceptable.

3.3. ADJUSTING AND CLEANING

3.3.1. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.

3.3.1.1. Adjust doors with mechanical and magnetic catches to limit opening force to maximum 5 pounds force.

3.3.2. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION

SECTION 07 19 00

WATER-REPELLENTS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Water repellent coating to exterior concrete masonry unit surfaces.

1.1.2. Water repellent coating to exterior portland cement plaster surfaces.

1.1.3. Water repellent coating to exterior exposed aggregate concrete planter surfaces.

1.1.4. Water repellent coating to exterior portland cement precast stadium plank surfaces.

1.1.5. Water repellent coating to exterior thin brick veneer surfaces.

1.2. SUBMITTALS

1.2.1. Submit product data under provisions of Section 01 33 00.

1.2.2. Include details of product description, tests performed, limitations to coating, cautionary procedures required during application, and chemical properties, including percentage of solids.

1.2.3. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.3. QUALITY ASSURANCE

1.3.1. Coating Systems Manufacturer: Company specializing in VOC approved water repellent systems with three years minimum experience.

1.3.2. Applicator: Company specializing in application of specified water repellent coating, with 3 years minimum documented experience and approved by manufacturer.

1.4. ENVIRONMENTAL REQUIREMENTS

1.4.1. Do not apply coating when ambient air and surface temperature is lower than 45 degrees F or higher than 100 degrees F.

1.5. WARRANTY

1.5.1. Contractor's Guarantee:

1.5.1.1. Provide Owner with written Guarantee per Section 00 65 36 on Contractor's letterhead, and signed by General Contractor and water repellent coating system subcontractor.

1.5.1.2. Provide guarantee for a time period of five years, commencing from the date of final acceptance of the project.

1.5.1.3. Make inspections and emergency repairs to defects or leaks in the roof system within twenty-four (24) hours of receipt of notice from the Owner.

1.5.1.4. Restore the affected areas to the standard of the original specifications as soon as weather permits.

1.5.2. Manufacturers Guarantee:

1.5.2.1. Provide Owner with manufacturers written guarantee complying with the following criteria:

1.5.2.1.1. Type: Unlimited dollar amount of recovery for material necessary to maintain surfaces system in a watertight condition.

1.5.2.1.2. Term: Ten (10) years minimum.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. WATER REPELLANT COATING – CONCRETE MASONRY

2.2.1. Manufacturer: Prosoco, Inc. www.prosoco.com, or approved equal.

2.2.2. Series: Sure Klean WeatherSeal Siloxane WB Concentrate.

2.2.3. Characteristics:

2.2.3.1. Composition: Blended Silane/siloxane in VOC compliant water based system.

2.2.3.2. Water Repellency: 94% minimum per ASTM C 67.

2.2.3.3. Accelerated Weathering: No Change.

2.2.4. Finish/Color: No sheen or change in substrate.

2.3. WATER REPELLANT COATING: THIN BRICK TILE VENEER

2.3.1. Manufacturer: BASF Building Systems www.buildingsystems.basf.com,, or approved equal.

2.3.2. Series: Enviroseal Double 7 for Brick.

2.3.3. Characteristics:

2.3.3.1. Composition: Blended Silane in VOC compliant water based system.

2.3.3.2. Solids content: 12% approximately by weight.

2.3.3.3. Moisture Vapor Transmission: 49.8 grams/cf/24 hours at 77 degrees F per ASTM D 1653-72.

2.3.3.4. Water Repellency: 90% minimum per ASTM C 67.

2.3.3.5. Accelerated Weathering: No Change after 1500 hours QUV lamp exposure per ASTM G 154.

2.3.3.6. Efflorescence: Excellent per NBS 883.

2.3.4. Finish/Color:

2.3.4.1. Finish: No sheen or change in substrate.

2.3.4.2. Color: Clear

2.4. WATER REPELLANT COATING: PLASTER SURFACES

2.4.1. Manufacturer: BASF Building Systems www.buildingsystems.basf.com, Hydrozo Coatings, , or approved equal.

2.4.2. Series: Enviroseal Double 7 for Brick.

2.4.3. Characteristics:

2.4.3.1. Composition: Blended Silane in VOC compliant water based system.

2.4.3.2. Solids content: 12% approximately by weight.

2.4.3.3. Moisture Vapor Transmission: 49.8 grams/cf/24 hours at 77 degrees F per ASTM D 1653-72.

2.4.3.4. Water Repellency: 90% minimum per ASTM C 67.

2.4.3.5. Accelerated Weathering: No Change after 1500 hours QUV lamp exposure per ASTM G 154.

2.4.3.6. Efflorescence: Excellent per NBS 883.

2.4.4. Finish/Color:

2.4.4.1. Finish: No sheen or change in substrate.

2.4.4.2. Color: Clear

2.5. WATER REPELLANT COATING: CONCRETE BLOCK SURFACES

2.5.1. Manufacturer:

2.5.1.1. BASF Building Systems, Hydrozo Coatings, www.buildingsystems.basf.com or approved equal.

2.5.2. Series: Hydrozo Clear Double 7 VOC.

2.5.3. Characteristics:

2.5.3.1. Composition: Blended Silane in VOC compliant water based system.

2.5.3.2. Solids content: 12% approximately by weight

2.5.3.3. Moisture Vapor Transmission: 47.5 grams/sf/24 hours at 77 degrees F per ASTM D 1653-72.

2.5.3.4. Water Permeance of Masonry: 99.8% reduction per ASTM E 514-86.

2.5.3.5. Water Repellency: 96% per ASTM C 67.

2.5.3.6. Accelerated Weathering: No Change after 2500 hours QUV lamp exposure per ASTM G 154.

2.5.3.7. Efflorescence: Highly resistant per NBS 883.

2.5.4. Finish/Color:

2.5.4.1. Finish: No sheen or change in substrate.

2.5.4.2. Color: Clear.

2.6. OTHER MATERIALS

2.6.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Remove loose particles and foreign matter.

3.2.2. Remove oil or foreign substance with a chemical solvent which will not affect coating.

3.2.3. Scrub and rinse surfaces with water and let dry.

3.2.4. Protect adjacent surfaces not scheduled to receive coating.

3.2.5. If applied on unscheduled surfaces, remove immediately, by approved method.

3.3. APPLICATION

3.3.1. Allow masonry mortar joints to cure a minimum of 20 days prior to coating application.

3.3.1.1. Install all precast plank sealants prior to applying coating. Allow sealant joints to cure a minimum of 7 days prior to coating application.

3.3.2. Apply coating in accordance with manufacturer's instructions, as modified for each substrate and site conditions

3.3.3. Apply coating at all portions of concrete block surfaces exposed to weather.

3.3.3.1. Coordinate application with roofing system application for limits and sequence.

3.3.3.2. Apply coating at all portions of precast plank surfaces exposed to weather.

3.3.4. Apply number of coats necessary to achieve water repellent characteristics.

END OF SECTION

SECTION 07 21 00

THERMAL AND ACOUSTICAL INSULATION

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Batt acoustical insulation for interior wall and ceiling construction.

1.1.2. Batt thermal insulation for exterior wall, floor and ceiling construction.

1.1.3. Acoustical insulation for interior wall and ceiling construction at theater areas.

1.1.4. Semi - rigid board acoustical insulation above interior partitions.

1.1.5. Theater acoustical insulation system.

1.1.6. Perimeter foundation thermal insulation.

1.2. REFERENCES

1.2.1. ASTM C 177 - Standard Test Method For Steady-State Heat Flux Measurements And Thermal Transmission Properties By Means Of The Guarded-Hot-Plate Apparatus

1.2.2. ASTM C 518 - Standard Test Method For Steady-State Thermal Transmission Properties By Means Of The Heat Flow Meter Apparatus

1.2.3. ASTM C 578 - Standard Specification For Rigid, Cellular Polystyrene Thermal Insulation

1.2.4. ASTM C 612 - Standard Specification For Mineral Fiber Block And Board Thermal Insulation.

1.2.5. ASTM C 665 - Standard Specification For Mineral-Fiber Blanket Thermal Insulation For Light Frame Construction And Manufactured Housing.

1.2.6. ASTM E 84 - Standard Test Method For Surface Burning Characteristics Of Building Materials

1.3. SUBMITTALS

1.3.1. Materials List:

1.3.1.1. Submit materials list in accordance with Section 01 33 00.

1.3.1.2. Prepare complete materials list identifying specific insulation types and applications.

1.3.1.3. Provide agency approval documentation, including ICBO ES reports, State Fire Marshal Listing, or other approvals.

1.4. REGULATORY REQUIREMENTS

1.4.1. Comply with Title 24, Part 2, Chapter 7, fire resistivity ratings.

1.5. DELIVERY, STORAGE, AND HANDLING

1.5.1. Protection:

1.5.1.1. Deliver, store and handle all products in a manner to prevent damage and deterioration.

1.5.1.2. Use all means necessary to protect the installed work and materials of all other trades.

1.5.1.3. Deliver all materials in unopened bundles, labeled with date of manufacturer and testing agency approval.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. ACOUSTICAL INSULATION: BATT

2.2.1. Manufacturer: Manville, www.jm.com, or equal.

2.2.2. Type: Glass fiber batt, friction fit, unfaced.

2.2.3. Construction:

2.2.3.1. Blanket: Glass Fiber, Type 1 per ASTM C 665

2.2.3.1.1. Provide formaldehyde free insulation with acrylic binder.

2.2.3.1.2. Provide minimum 25 percent total recycled content, with minimum 18 percent post-consumer recycled content.

2.2.3.2. Facing: None.

2.2.3.3. Thickness: 4 inch.

2.2.4. 2.1.4 Fire/Habitability Criteria:

2.2.4.1. Flame Spread Classification: Maximum 25 per ASTM E 84

2.2.4.2. Smoke Developed Classification: Maximum of 50 per ASTM E 84

2.2.4.3. Thermal Resistance: Minimum R-11 per ASTM C 177 or C 518.

2.3. THERMAL INSULATION: EXTERIOR WALL

2.3.1. Manufacturer: Manville, www.jm.com, or equal.

2.3.2. Type: Glass fiber batt, staple flange, faced.

2.3.3. Construction:

2.3.3.1. Blanket: Glass Fiber per ASTM C 665.

2.3.3.2. Exposed Facer: Provide reinforced foil facing, with stapling flange, with maximum 25 flame spread classification and maximum 450 smoke contributed classification where facer is not in substantial contact with the unexposed surface of the ceiling finish.

2.3.3.3. Concealed Facer: Provide kraft paper faced insulation without fire and smoke rating where facer is in substantial direct contact with unexposed surface of wall finish.

2.3.4. Fire/Habitability Criteria

2.3.4.1. Flame Spread Classification: Maximum 25 per ASTM E 84

2.3.4.2. Smoke Developed Classification: Maximum of 50 per ASTM E 84

2.3.4.3. Thermal Resistance: R-11 **[R-19]** value, per ASTM C 177 or C 518.

2.3.4.4. Perm Rating (Foil facer): Maximum 0.02 grains/hr/sf/in Hg per ASTM C 665.

2.3.4.5. Perm Rating (Kraft facer): Maximum 1.0 grains/hr/sf/in Hg per ASTM C 665.

2.4. THERMAL INSULATION: FLOOR AND ROOF ASSEMBLY

2.4.1. Manufacturer: Manville, www.jm.com, or equal.

2.4.2. Type: Glass fiber batt, faced.

2.4.3. Construction:

2.4.3.1. Blanket: Glass Fiber per ASTM C 665.

2.4.3.1.1. Provide formaldehyde free insulation with acrylic binder.

2.4.3.1.2. Provide minimum 25 percent total recycled content, with minimum 18 percent post-consumer recycled content.

2.4.3.2. Exposed Facer: Provide reinforced foil facing, with stapling flange, with maximum 25 flame spread classification and maximum 450 smoke contributed classification where facer is not in substantial contact with the unexposed surface of the ceiling finish.

2.4.3.3. Concealed Facer: Provide kraft paper faced insulation without fire and smoke rating where facer is in substantial direct contact with unexposed surface of ceiling or floor finish.

2.4.4. Fire/Habitability Criteria:

2.4.4.1. Flame Spread Classification (Batt): Maximum 25 per ASTM E 84

2.4.4.2. Smoke Developed Classification (Batt): Maximum of 50 per ASTM E 84

2.4.4.3. Thermal Resistance: R-19 **[R-30]** value per ASTM C 177 or C 518.

2.4.4.4. Perm Rating (Foil facer): Maximum 0.02 grains/hr/sf/in Hg per ASTM C 665.

2.4.4.5. Perm Rating (Kraft facer): Maximum 1.0 grains/hr/sf/in Hg per ASTM C 665.

2.4.5. Accessory Products:

2.4.5.1. Wire Lacing: 18 gage prestretched steel wire, with approved anchor system.

2.4.5.2. Insulation Tape: As recommended by manufacturer, maximum flame spread value of 25.

2.5. THEATER ACOUSTICAL INSULATION SYSTEM

2.5.1. Manufacturer: Provide Johns-Manville or equal.

2.5.2. Type: Glass fibers, bonded with thermosetting resin, coated throughout.

2.5.3. Series: Insul-Shield Coated Black.

2.5.4. Product Characteristics:

2.5.4.1. Thickness: 2 inch.

2.5.4.2. Size: 48 inch width x 50 foot rolls.

2.5.4.3. Material: acrylic-coated surface, Black Mat Boards and Coated Black Rolls, ASTM C 612, Type IA, Category 1.

2.5.5. Fire/Habitability Criteria:

2.5.5.1. Flame Spread Classification: Maximum 25 per ASTM E 84.

2.5.5.2. Smoke Developed Classification: Maximum of 50 per ASTM E 84.

2.5.5.3. Fungi Resistance: Does not promote growth per ASTM C 665.

2.5.5.4. Noise Attenuation Characteristics:

2.5.5.4.1. NRC Value: 1.00

2.5.5.4.2. R-Value: 8.0

2.6. INSULATION STICK PINS

2.6.1. Provide Midwest or equal stick pin type insulation hangers of proper length to accommodate insulation thickness, with 2 inch diameter insulation washers with dome cap finish

2.6.2. Adhesive: Provide manufacturers recommended epoxy adhesive. Self adhesive pins are not acceptable.

2.7. CURTAIN WALL SAFING ASSEMBLY

2.7.1. Acceptable Manufacturer: USG, www.gypsumsolutions.com.

2.7.2. Type: Friction fit safing material, with clip supports and sealant fill.

2.7.3. Product Characteristics: Safing.

2.7.3.1. Series: USG Thermafiber FSP Safing.

2.7.3.2. Type: Mineral fiber safing insulation.

2.7.3.3. Thickness: 4 inch.

2.7.3.4. Density: Nominal 4.0 PCF.

2.7.3.5. Facing: FSP Foil facing.

2.7.4. Accessory Products:

2.7.4.1. Support Clips: USG Safing Impaling Clip, 0.040 inches thick, galvanized, with cap washer.

2.7.4.2. Sealant: USG Thermafiber SmokeSeal Compound.

2.7.4.3. Insulation Tape: As recommended by manufacturer, maximum flame spread value of 25.

2.7.5. Fire/Habitability Criteria:

2.7.5.1. Flame Spread Classification (Safing): Maximum 25 per ASTM E 84.

2.7.5.2. Smoke Developed Classification (Safing): Maximum of 5 per ASTM E 84.

2.7.5.3. Flame Spread Classification (Sealant): Maximum 5 per ASTM E 84.

2.7.5.4. Smoke Developed Classification (Sealant): Maximum of 0 per ASTM E 84.

2.7.5.5. Glass Curtain Wall Fire Containment: Rating of 3 hour per CEG-4-2-81.

2.8. CURTAIN WALL INSULATION ASSEMBLY

2.8.1. Acceptable Manufacturer: USG.

2.8.2. Type: Mineral fiber insulation material, with curtain wall pins and clip system.

2.8.3. Product Characteristics: Insulation.

2.8.3.1. Series: USG Thermafiber CW 80 Curtainwall Wall Insulation, Dark color.

2.8.3.2. Type: Mineral fiber insulation.

2.8.3.3. Thickness: 3 inch.

2.8.3.4. Density: Nominal 8.0 PCF.

2.8.3.5. Facing: FSP Foil facing.

2.8.4. Accessory Products:

2.8.4.1. Support Pin and Clip System: Provide USG Clinch Shields size as required to fit pins, over 12 gage galvanized steel impaling pins, with cap washer.

2.8.4.2. Sealant: USG SmokeSeal Compound.

2.8.4.3. Backing/Reinforcement at safing insulation: Provide minimum 4 inch wide, 20 gage galvanized steel, extending between mullions.

2.8.4.4. Mullion Protection: USG Thermafiber, CW-90, minimum 6 inches wide, 1 inch thick.

2.8.4.5. Insulation Tape: As recommended by manufacturer, maximum flame spread value of 25.

2.8.5. Fire/Habitability Criteria:

2.8.5.1. Flame Spread Classification: Maximum 25 per ASTM E 84.

2.8.5.2. Smoke Developed Classification: Maximum of 5 per ASTM E 84.

2.8.5.3. Glass Curtain Wall Fire Containment: Rating of 3 hour per CEG-4-2-81.

2.9. SEMI-RIGID BOARD INSULATION ASSEMBLY

2.9.1. Acceptable Manufacturer: USG.

2.9.2. Type: Mineral fiber insulation material.

2.9.3. Product Characteristics: Insulation.

Series: USG Thermafiber CW 80 Curtainwall Wall Insulation.

2.9.3.1. Type: Mineral fiber insulation.

2.9.3.2. Thickness: 3 inch.

2.9.3.3. Density: Nominal 8.0 PCF.

2.9.3.4. Facing: FSP Foil facing.

2.9.4. Fire/Habitability Criteria:

2.9.4.1. Flame Spread Classification: Maximum 25 per ASTM E 84.

2.9.4.2. Smoke Developed Classification: Maximum of 5 per ASTM E 84.

2.10. RIGID BOARD FOUNDATION INSULATION

2.10.1. Acceptable Manufacturer: Dow, or equal; www.dow.com/styrofoam/na/pro-us/products .

2.10.2. Type: High Density extruded polystyrene, per ASTM C 578, Type IV.

2.10.3. Product Characteristics:

2.10.3.1. Series: Dow Styrofoam Scoreboard Foundation Wall Insulation.

2.10.3.2. Thickness: 2-1/2 inch.

2.10.3.3. Compressive Strength: 25 psi at 10 percent deformation.

2.10.3.4. R value: 5.0 per inch at 75 degrees F per ASTM C 518.

2.10.4. Fire/Habitability Criteria:

2.10.4.1. Flame Spread Classification: Maximum 5 per ASTM E 84.

2.10.4.2. Smoke Developed Classification: Maximum of 165 per ASTM E 84.

2.11. OTHER MATERIALS

2.11.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install insulation in accordance with insulation manufacturer's instructions and as specified.

3.2.2. Install faced insulation with facing to occupied room side. Install non-rated facing in contact with unexposed surface of finish materials.

3.2.2.1. At floors over unconditioned crawl space, install insulation with facing towards crawl space.

3.2.3. Do not install insulation over recessed light fixtures.

3.2.4. Trim insulation neatly to fit spaces. Fit insulation into crevices, spaces at outlet boxes and similar penetrations.

3.2.5. Maintain continuous foil faced vapor barrier. Provide fire resistive tape at all edges or penetrations of foil faced insulation, including batt ends.

3.2.6. Where wall insulation cavity exceeds 8 feet high, provide blocking or other approved support at 8 feet on center.

3.2.7. Wire Lacing Support Method:

3.2.7.1. Provide wire lacing method at floor and roof insulation where spacing of framing members exceeds batt width.

3.2.7.2. Provide wire lacing diagonally at bottom of joist cavity, fastened 16 inches on center, staggered, and fastened to each joist in an approved manner.

3.2.7.3. Adjust lacing as necessary to provide taut and consistent support for insulation batts.

3.2.7.4. Install insulation on lacing supports. Provide additional wire lacing at unsupported ends of batts.

3.2.7.5. Tape all batt ends and penetrations.

3.2.8. Staple Flange Application:

3.2.8.1. Staple batt through flange at wood framing.

3.2.8.2. Keep facer taut and without buckles.

3.2.8.3. Tape all batt ends and penetrations.

3.2.9. Stick Pin Application:

3.2.9.1. Install insulation in accordance with insulation manufacturer's instructions and as specified.

3.2.9.2. Space stick pins at 12 inches on center each way with approved adhesive.

3.2.9.3. Install curtain wall insulation over stick pins. Cover all areas. Install with foil facing to occupied room side. Install washer at all clips.

3.2.9.4. Tape all insulation batt joints with specified foil backed tape.

3.2.10. Stick Pin Application At Theater Areas:

3.2.10.1. Install insulation in accordance with insulation manufacturer's instructions and as specified.

3.2.10.2. Space stick pins at 12 inches on center each way with approved adhesive. Clean wall and metal deck surfaces with approved process as required to achieve complete bond.

3.2.10.3. Install batt insulation and theater acoustical insulation over stick pins. Cover all areas as shown on drawings. Install with theater insulation on room side. Install washer at all stickpins. Touch up coating as required to maintain uniform black color at entire surface.

3.2.10.4. Coordinate with installation of acoustical wall panels.

3.3. INSTALLATION: CURTAINWALL/SAFING

3.3.1. Install insulation and safing in accordance with insulation manufacturer's instructions and as specified.

3.3.2. Install curtain wall insulation over impaling clips and on support angle. Cover all areas. Install with foil facing to occupied room side.

3.3.2.1. Space impaling clips at 12 inches on center each way.

3.3.2.2. Unless curtainwall insulation extends across all mullion surfaces, protect curtainwall mullions behind spandrels with impaling clips at 12 inches on center along mullion. Install mullion insulation with shields.

3.3.2.3. Tape all joints with specified foil backed tape.

3.3.3. Install safing in accordance with UL and referenced standards between curtainwall insulation and slab edges.

3.3.3.1. Install backing reinforcement within 4 inches of safing insulation at floor slab, attached mechanically to each mullion behind curtainwall insulation.

3.3.3.2. Where gaps between slab edge and curtainwall insulation is less than 2 inches, cut safing minimum 1/2 inch wider than joint and compress into void between edge of slab and curtain wall insulation.

3.3.3.3. Where gap exceeds 2 inches, attach Z-clip to slab edge with approved fastener at maximum 24 inches on center. Cut safing minimum 1/2 inch wider than joint and impale safing on clip with foil facing upward.

3.3.4. Provide minimum 3/8 inch bead of specified sealant at safing joints and at safing intersection with floor slab and curtainwall insulation.

3.4. RIGID BOARD INSTALLATION

3.4.1. Install insulation in accordance with insulation manufacturer's instructions and as specified.

3.4.2. Provide fire resistive tape at all edges or penetrations of exposed faced insulation.

3.4.3. Trim insulation neatly to fit space between roof sheathing and top of partition. Staple or otherwise fasten to solid blocking or joist. In addition, provide wire lacing as backing for boards.

3.4.4. Wire Lacing Support Method:

3.4.4.1. Provide wire lacing diagonally from joist/solid blocking to top of plate at 16 inches on center, fastened in an approved manner. Provide additional wire lacing at unsupported ends of board.

3.4.4.2. Adjust lacing as necessary to provide taut and consistent support for insulation batts.

3.4.4.3. Wire insulation to lacing at midpoint of board.

3.4.4.4. Tape all board ends.

3.5. RIGID BOARD INSTALLATION

3.5.1. Install insulation in accordance with insulation manufacturer's instructions and as specified.

3.5.2. Tape all board ends.

END OF SECTION

SECTION 07 42 13

METAL WALL PANELS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Composite metal panels.

1.1.2. Supplementary components and accessories necessary for a complete installation, whether or not such items are indicated on the Drawings or included in the Specifications.

1.2. REFERENCES

1.2.1. Abbreviations and Acronymns:

1.2.1.1. AA: Aluminum Association.

1.2.1.2. AAMA: American Architectural Manufacturers Association.

1.2.1.3. ACM: Aluminum-Faced Composite Material.

1.2.1.4. AHJ: Authority (Authorities) Having Jurisdiction.

1.2.1.5. AL: Air Leakage.

1.2.1.6. DFT: Dry Film Thickness.

1.2.1.7. HDG: Hot Dip Galvanized.

1.2.1.8. NAAMM: National Association of Architectural Metal Manufacturers.

1.3. ADMINISTRATIVE REQUIREMENTS

1.3.1. Coordination:

1.3.1.1. General Coordination: Coordinate panel installation of with the work of related trades for necessary rough-in work, backings, supports, and anchorage. Deliver backing and embedments, templates, and installation instructions to related trades before affected work begins.

1.3.1.2. Sustainability Coordination: Provide written notification to the Architect of any non-specified items used in the work of this Section that contain or include

1.3.1.2.1. Liquid chemicals, adhesives, sealants, paints, coatings, or tapes containing VOC's or other toxins;

1.3.1.2.2. Composite wood or agrifiber that may contain urea formaldehyde binders;

1.3.1.2.3. FSC-certified wood;

1.3.1.2.4. Rapidly renewable material content;

1.3.1.2.5. Recycled content; or

1.3.1.2.6. Local materials manufactured or harvested within 500 miles of the job site.

1.3.2. Performance Requirements: Panel assemblies must conform to the performance and testing requirements of Section 01 45 29 and the following.

1.3.2.1. Perpendicular Deflection (Convexity and Concavity): Limit deflection under maximum design pressure to L/180, and not more than L/60 for any individual panel, without failure, structural distress of supporting framing members, or other detrimental effects, when measured in a direction normal to the assembly plane.

1.3.2.2. Parallel Deflection (Sagging): Limit deflection under maximum design load to to L/180, and not more than L/60 for any individual panel, without failure, structural distress of supporting framing members, or other detrimental effects, when measured in line with the assembly plane.

1.3.2.3. Permanent Deformation: No permanent deformation exceeding 0.2 percent of clear span of any framing member or panel, when tested in compliance with ASTM E 330 (uniform static pressure test).

1.3.2.3.1. Test Load at Corner and Parapet Conditions: At least 30 psf.

1.3.2.3.2. Test Load Elsewhere: At least 20 psf.

1.3.2.4. Air Leakage (AL): Maximum permanent AL rating of not more than 0.06 CFM per square foot, when tested in compliance with ASTM E 283 at a minimum differential static air pressure across the assembly of 1.57 psf.

1.3.2.5. Water Leakage: No water leakage through the assembly, joints, or frame areas, when tested in compliance with the ASTM E 331 (uniform static air pressure test) at 0.20 times the specified design pressure, but not less than 12 psf.

1.4. SUBMITTALS

1.4.1. Action Submittals: Combine all product data specified below together and submit as one coordinated submittal

1.4.1.1. Product Data:

1.4.1.1.1. Submit a comprehensive list of all proposed panel assembly components and accessories necessary for complete installation, along with their manufacturer's product data, typical installation details and other data necessary to demonstrate compliance with specified requirements for each item listed.

1.4.1.1.2. Along with the other required submittals for items furnished under this Section, combine copies of manufacturer's product data for items furnished under other Sections together with the product data required for the work installed under this Section.

1.4.1.1.3. Submit sample copies of specified warranties with terms, conditions, exclusions, limitations and time periods for each warranty clearly defined and expressed.

1.4.1.2. Shop Drawings: Submit large-scale dimensioned drawings showing panel layout, geometriey, materials, joints, profiles, edge conditions, attachments to other work, and finishes.

1.4.1.2.1. Label individual components with the manufacturer's product name. Indicate material thickness design loads, required clearances, and methods of field installation.

1.4.1.2.1.1. Indicate method of field assembly, components, and location and size of each field connection.

1.4.1.2.1.2. Distinguish between factory- and field-assembled work.

1.4.1.2.2. Include elevation drawings of each vertical surface in which panels are installed. All such drawings must show the horizontal and vertical location and sizes of all components, accessories, and trim, including joint locations, openings, penetrations, and items installed in each surface.

1.4.1.2.3. Include project-specific, at least 1-1/2-inch scale dimensioned detail drawings showing profiles, shapes, joints, seams, and dimensions, including terminations, penetrations, miters, interior corner conditions, and exterior corner conditions either not detailed on the product data, or that are detailed on the product data, but in a manner that is not specific to the Project. Furnish edge details where specified items abut adjacent items.

1.4.1.2.4. Indicate method of attaching to adjacent supporting construction.

1.4.1.2.4.1. Show fasteners, brackets, clips, mounting devices, and similar attachments to other work.

1.4.1.2.4.2. Label each attachment type the manufacturer's product name.

1.4.1.2.4.3. Indicate base material and finish, fastener material and finish, and material and finish of items being fastened or attached.

1.4.1.2.5. Include medium-scale 3-D pictorial oblique or axonometric projection drawings for conditions too difficult to illustrate as two-dimensional multi-view orthographic projection drawings. Perspective projections do not meet the requirements for 3-D drawings and are returned without review.

1.4.1.3. Samples:

1.4.1.3.1. Panels: Submit a 12-inch long sample of each panel type in the same material and finish specified for the Work.

1.4.1.3.1.1. Trim and Closures: Submit minimum 12-inch long samples of each accessory type in the specified color and finish. Include fasteners and other exposed accessories

1.4.2. Informational Submittals:

1.4.2.1. Test and. Evaluation Reports: Submit evidence showing that proposed panels have been tested or listed by a qualified national testing organization, conform to the specified reference standards, and either meet or exceed the specified performance requirements, based on comprehensive testing of the manufacturer's current manufactured units.

1.4.2.2. Installation Instructions:

1.4.2.2.1. Submit manufacturer-prepared instructions for the proper installation of each panel assembly.

1.4.2.2.2. If the manufacturer's instructions are either unavailable or do not specifically apply to project conditions, then consult the manufacturer's field representative and obtain manufacturer-prepared installation requirements, recommendations, or instructions in writing and promptly distribute copies to the Architect for feedback before proceeding with the work.

1.5. QUALITY ASSURANCE

1.5.1. Source Limitations: Obtain each type of panel and accessories through one source from a single manufacturer.

1.5.2. Manufacturer: Company with a minimum of 10 consecutive years' experience in the regular manufacture and production of specified panel assemblies required for this Project, whose panel assemblies installed on projects similar in material, design, complexity and extent to this project have resulted in applications with a record of successful in-service performance.

1.5.3. Mockups: Before starting the Work of this Section, assemble an integrated mockup in order to review installation techniques, to coordinate the Work of multiple sections, to train the trades involved in the Work, and to demonstrate aesthetic effects, quality of materials, and fabrication and installation (workmanship).

1.5.3.1. Mockup size, configuration and features will be selected by the Architect.

1.5.3.2. Submit shop drawings of proposed mockup for information.

1.5.3.3. After Architect's review of mockup shop drawings by the Architect, assemble Type B mockup (part of the building, aesthetic, and erected after Architect's review of product submittals) in compliance with Architect's review comments. Demonstrate materials and techniques proposed for repair of surface blemishes to match adjacent undamaged surfaces where directed by Architect.

1.5.3.4. Architect will review mockup to determine if the Work falls within acceptable ranges for the following.

1.5.3.4.1. Visual appearance.

1.5.3.4.2. Mottling, sheen, color and texture variation, and evenness of finish.

1.5.3.4.3. Integration of the Work of different trades.

1.5.3.4.4. Tolerances.

1.5.3.4.5. Quality and fabrication and installation (workmanship).

1.5.3.4.6. Compliance with specified performance requirements.

1.5.3.5. Make corrections requested by Architect or remove and replace mockup when corrective work is not acceptable. Repeat mockup until Architect's approval is obtained.

1.5.3.6. Protect approved mockup, which will be used as an example of the acceptable standard for remaining work, until removal is authorized in writing by Architect.

1.5.3.7. When authorized in writing by Architect, and after being properly identified for future reference, the mockup may remain part of the Work.

1.6. DELIVERY, STORAGE, AND HANDLING

1.6.1. Packing, Shipping, Handling and Unloading:

1.6.1.1. Aluminum: Comply with applicable requirements of ASTM B 660 for packaging and packing of aluminum.

1.6.1.2. Protection: Provide either strippable film or manufacturer's other standard form of temporary protection for metal finishes during fabrication, delivery, storage, handling and installation.

1.6.2. Delivery:

1.6.2.1. Transport panels in a manner consistent with their shape and design, and in a position to prevent damage, or excessive stresses that could cause damage.

1.6.2.2. Provide adequate dunnage and bracing during transport.

1.6.2.3. Support units on non-staining, shock-absorbing material.

1.6.3. Acceptance at the Site:

1.6.3.1. Inspect panels, components, and accessories delivered to the site for damage.

1.6.3.2. With a minimum of handling, unload and store only undamaged items.

1.6.4. Storage: Store panel units outdoors, off the ground on pallets, and protected from weather and precipitation or other forms of moisture with breathing-type covers. Unvented polyethylene tarpaulins are not permitted.

1.6.4.1. Incline stored items to provide maximum drainage or accumulated moisture.

1.6.4.2. Provide spacers in order to separate stored items and to provide for air circulation around all surfaces.

1.6.4.3. Protect stored items to prevent contact with the ground or soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

1.6.5. Handling: Handle panel units in a manner that will prevent bending, warping, twisting or other physical damage.

1.7. PROJECT CONDITIONS

1.7.1. Existing Conditions:

1.7.1.1. Field-verify measurements before preparing panel submittals and indicate those field measurements on the shop drawings.

1.7.1.2. If field measurements cannot be made without delaying the Work, establish working dimensions that accommodate installation tolerances, as well as related tolerances specified for the Work of other sections, and indicate those working dimensions on the shop drawings.

1.7.1.3. Coordinate the installation of adjacent work to ensure the actual dimensions accommodate the previously established working dimensions.

1.8. GUARANTEE AND WARRANTY

1.8.1. Manufacturer's Warranty:

1.8.1.1. Panel Assembly Warranty: All metal panel assemblies must be covered by a warranty that protects the Owner for at least 20 years after Substantial Completion against

1.8.1.1.1. Water leakage;

1.8.1.1.2. Defective products, materials, manufactured units, components, accessories;

1.8.1.1.3. Patent or latent defects; and

1.8.1.1.4. Incipient or catastrophic failure.

1.8.1.2. Panel Finish Warranty:

1.8.1.2.1. Provide specific protection against deterioration of factory-applied finishes for at least 20 years after Substantial Completion. Deterioration includes the following.

1.8.1.2.1.1. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

1.8.1.2.1.2. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

1.8.1.2.1.3. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

1.8.2. Installer's Warranty: All metal panel assemblies must be covered by a written warranty that protects the Owner for at least 5 years after Substantial Completion against

1.8.2.1. Defective assemblies and installation;

1.8.2.2. Patent or latent defects; and

1.8.2.3. Incipient or catastrophic failure.

1.8.3. Remedy: At no cost to the Owner, replace or repair defective or deteriorated work that occurs during the specified warranty periods.

2. PART 2 – PRODUCTS

2.1. COMPOSITE PANELS

2.1.1. Description: Pre-finished aluminum composite material (ACM) exterior wall panels.

2.1.2. Comply with ICC-ES Evaluation Report ESR-3704.

2.1.3. Fabricators: Provide complete composite wall panel system fabricated by Mitsubishi Plastics Composites America, INC, ALPOLIC AP and AT Aluminum Composite Exterior and Interior Wall Panels. PE ACM (757) 382-5750, www.alpolic.com , or approved equal.

2.1.4. Items must conform with the following:

2.1.4.1. Panel Size: As indicated.

2.1.4.2. Panel Thickness: 0.16-inch (4 mm) Alpolic AP wall panels: 76 psf (3.6kPa) positive, and 55 psf (2.6 kPa) negative.

2.1.4.3. Panel Texture: Smooth.

2.1.4.4. Attachment Method: Wet seal methods as indicated.

2.1.5. Fabrication: Factory form panels in a continuous process with no glues or adhesives between dissimilar materials.

2.1.5.1. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.

2.1.5.2. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.

2.1.5.3. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.

2.1.5.4. Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural silicone sealant or bond tape.

2.1.5.5. Fabrication Tolerances:

2.1.5.5.1. Panel Bow: 0.8 percent maximum of panel length or width.

2.1.5.5.2. Squareness: 0.25 inch maximum.

2.1.6. Accessories:

2.1.6.1. Support Framing Members: Hot- or cold-rolled steel members of required size and shape, conforming to the following.

2.1.6.1.1. Steel Plates: ASTM A 283, Grade C.

2.1.6.1.2. Structural Steel Shapes: ASTM A 36.

2.1.6.1.3. Stud and Joist Framing Members: As specified in Section 05 41 00.

2.1.6.1.4. Aluminum Extrusion Panel Retention Members, Clips, Angles and Panel Hangers: Provide alloy, temper and shape required to meet or exceed performance criteria specified.

2.1.6.2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

2.1.6.3. Closures: Provide closures fabricated of same material as the panels.

2.1.6.4. Edge Members: Extruded aluminum, not less than 0.063-inch wall thickness.

2.1.6.5. Mitered Corners: Provide trimless structurally-bonded corner to match exterior profile panel in shape, material and finish with no exposed fasteners.

2.1.6.6. Clips, Pins and Fasteners: Concealed, non-corrosive, non-deteriorating clips pins and fasteners of quantity and type recommended by panel manufacturer that are compatible with panel face.

2.1.6.6.1. Secure clips in the manufacturer's facility to the greatest degree possible.

2.1.6.6.2. Pop rivet attachment of clips and accessories will not be accepted.

2.1.6.6.3. Do not overdrive fasteners.

2.1.6.7. Fasteners: At least 0.242-inch shank diameter (No. 14 UTS) hex washer-head austenitic stainless-steel self-drilling tapping screws complying with ASTM A 276 Type 304, coated to match exposed panel surface color, with At least 5/8-inch diameter bonded polychloroprene (Neoprene) and stainless steel washers.

2.1.6.8. Flashing and Trim: At least 0.0239-inch base metal thickness (MSG 24) HDG metallic-coated (galvanized) steel sheet or aluminum-zinc alloy-coated prepainted steel sheet.

2.1.6.8.1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers.

2.1.6.8.2. Finish flashing and trim with same finish system as adjacent metal wall panels.

2.1.6.9. Gaskets and Sealants used in Panel Assembly: As specified in Section 07 90 00 and as recommended by the panel manufacturer to meet or exceed performance criteria. Color to be selected by Architect from manufacturer's standard palette.

2.1.6.10. Other Accessories: Install or apply other accessories and similar secondary items supplied, required, recommended, approved, or accepted by the panel manufacturer.

2.2. FINISHES

2.2.1. Shop Priming:

2.2.1.1. Prime steel parts of anchors, inserts, mullion reinforcement, and supports.

2.2.1.2. Coat concealed aluminum surfaces in contact with masonry, concrete or steel with bituminous paint specified in Section 05 50 00.

2.2.2. Shop Finishing:

2.2.2.1. Top Side Finish: Provide fluoropolymer finish.

2.2.2.2. Bottom Side Finish: Apply manufacturer's standard pretreatment and white or light-colored acrylic or polyester backer finish consisting of both a prime coat and wash coat for a total dry film thickness of at least 0.5-mil.

3. PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Verification of Conditions: Examine site conditions and field-verify measurements affecting the work of this Section.

3.1.1.1. Examine supporting and adjacent construction and other conditions under which panels are installed.

3.1.1.2. Verify that

3.1.1.2.1. Substrates provide sound anchoring supports;

3.1.1.2.2. Openings have been framed or formed within allowable tolerances; are square plumb, level, and true to line;

3.1.1.2.3. Weather resistive barriers and flashings that are concealed by the installed panels are installed;

3.1.1.2.4. Spaces behind panels have been thoroughly cleaned of debris; and

3.1.1.2.5. Work performed as part of the work of other Sections conforms to the panel manufacturer's installation tolerance requirements; provides true, flat, and level bearing surfaces; and satisfies all other conditions relating to the quality of panel installation, durability, appearance, and performance.

3.1.2. Evaluation and Assessment:

3.1.2.1. Reject work that does not conform to the panel manufacturer's installation requirements. The Contractor shall either perform or arrange and pay costs for all remedial work necessary to correct or improve deficient conditions and to conform to the panel manufacturer's installation requirements.

3.1.2.2. Proceeding with installation stipulates the installer's acceptance of existing conditions. After starting work, the installer shall perform remedial work necessary to correct or improve deficient conditions and to conform to the panel manufacturer's installation requirements.

3.2. PREPARATION

3.2.1. Clean substrates of substances harmful to panels. Removing projections that may interfere with attachment. Shim or otherwise plumb supporting substrates.

3.2.2. Install flashings and other sheet metal in conformance with the requirements specified in Section 07 60 00.

3.2.3. Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage in conformance with ASTM C 754 and the metal wall panel manufacturer's installation instructions.

3.3. INSTALLATION

3.3.1. General:

3.3.1.1. Use materials and methods required, recommended, approved, or accepted by the panel manufacturer, along with manufacturer-recommended accessories and techniques.

3.3.1.2. Install panels perpendicular to girts and subgirts unless otherwise indicated. Securely fasten panels and other components in place with provisions for thermal and structural movement. Use concealed fasteners and anchorages where possible. Provide washer head fasteners with bonded sealing washers where required to protect metal surfaces and to make a weathertight connection.

3.3.1.3. Set units true to line, to required levels and lines, plumb, level, square, and fitted without warp or rack of frames and panels; with flush well-fitted joints; and in alignment with adjacent construction

3.3.1.4. Scribe and cope the Work of this Section as necessary for an accurate fit. Perform required cutting, drilling, and fitting for a complete installation.

3.3.1.5. Form closely-fitted joints with exposed connections accurately located and secured.

3.3.1.6. Flash and seal panels with weather closures at perimeter of openings. Install flashing and trim as metal plate wall panel work proceeds.

3.3.1.7. Where weathertight panel joints are required, install concealed gaskets, flashings, joint fillers, and insulation as panel installation progresses. Comply with the requirements of Section 07 92 00 for installing sealants during panel installation.

3.3.1.8. Securely attach panel assemblies in place, and provide measures necessary to accommodate, resist, distribute, or transfer, as applicable, the At least specified in-service loads and thermal, seismic, wind sway, or other types of movement without incipient or catastrophic failure.

3.3.2. Special Techniques:

3.3.2.1. Provide manufacturer's standard pressure-equalized, rainscreen-principle system with vertical channel that provides support and complete secondary drainage system, draining at base of wall.

3.3.2.2. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer.

3.3.2.3. Attach wall panels by engaging horizontal support_pins into notches in vertical channels and into flanges of wall panels.

3.3.2.4. Leave horizontal and vertical joints uniform-width with open reveals.

3.3.2.5. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.

3.3.2.6. Do not apply sealants to joints unless otherwise indicated on Drawings.

3.3.2.7. Repair damaged finishes. Restore finishes so that no evidence remains of corrective work. Return to the factory those items that either cannot be refinished in the field, or that contain components that cannot be refinished in the field; make required alterations; and either refinish the entire item or provide a new item.

3.3.3. Correction:

3.3.3.1. Correct deficiencies that do not conform to the Drawings or specified appearance criteria and other requirements, as determined by the panel manufacturer's field representative and the Architect. Correct items that

3.3.3.1.1. Have damaged, loose, chipped, broken, stained, or corroded components, accessories, and similar items; or

3.3.3.1.2. Do not match the appearance of specified finishes, as determined by the Architect.

3.3.3.2. Arrange and pay costs for either removing and re-installing, or replacing items that cannot be satisfactorily corrected, as determined by the panel manufacturer's field representative and the Architect.

3.4. CLEANING

3.4.1. Cleaning Installed Work:

3.4.1.1. Remove protective materials after installation.

3.4.1.2. Clean surfaces of panel assemblies using cleaning agents, equipment, tools, and procedures furnished, required, recommended, approved, or accepted by the panel manufacturer. Remove from exposed metal surfaces anything that might interfere with uniform oxidation or weathering.

3.4.1.3. Replace items that cannot be satisfactorily cleaned, as determined by the panel manufacturer's field representative and the Architect.

3.4.2. Waste Management: After completing the work of this Section, leave work areas around the project site free from debris, materials, equipment, and related items.

3.5. PROTECTION

3.5.1. Protect installed panel assemblies from corrosion, deterioration, staining, or other damage until Substantial Completion.

3.5.2. Do not store anything adjacent to or against the installed panel assemblies unless the panels are adequately protected from damage and staining, as determined by the manufacturer's field representative and the Architect.

3.5.3. Remove protection when it's no longer needed and before Substantial Completion.

END OF SECTION

SECTION 07 54 19

PVC ROOFING - ADHERED

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Single Ply Adhered PVC thermoplastic roofing membrane system with fiberglass reinforcements.

1.1.2. Single Ply PVC fiberglass reinforced roof flashing membrane, flashing metal, termination bar, fasteners, prefabricated inside and outside corners, vent pipe boots, and joint cover-strips and other components to comprise a complete roof system.

1.1.3. Rigid Roof Insulation, Crickets and Overlayment Board.

1.2. REFERENCES

1.2.1. ASTM D 4434 - Polyvinyl Chloride Sheet Roofing.

1.2.2. Part 2, Title 24, California Code of Regulations, including Chapter 15.

1.2.3. Part 6, Title 24, California Code of Regulations.

1.2.4. NRCA - Roofing and Waterproofing Manual.

1.2.5. FM - Roof Assembly Classifications.

1.2.6. UL - Roofing Materials and Systems Directory.

1.2.7. UL - Fire Resistance Directory.

1.3. SYSTEM DESCRIPTION

1.3.1. Provide an adhered thermoplastic (PVC) roof membrane including, but not limited to, flashings and other components to comprise a weathertight roofing system. The system assembly from the top down is as follows: Adhered 80 Mil PVC Roof Membrane, ¼" Overlayment Board, R-30 Rigid Insulation over sloped metal deck.

1.3.2. Roofing System Wind Design: Provide system successfully tested by a qualified testing and inspecting agency, including FMG or UL, to resist uplift pressure calculated according to ASCE 7 as modified by Chapter 16A, Part 2, Title 24, CCR.

1.3.3. Use of EPDM or TPO single ply membrane systems is prohibited.

1.4. SUBMITTALS

1.4.1. Provide submittals under provisions of Section 01 33 00.

1.4.2. Product Data:

1.4.2.1. Submit product data sheet for the membrane, overlayment board, insulation materials, base flashing materials, adhesive and accessories. Include certification of compliance with specified polymer and membrane material thicknesses as defined in Sections 2.2.4.2.2 and 2.2.4.2.4.

1.4.2.2. Provide total system breakdown, by layer, in weight and composition.

1.4.2.3. Provide letter of certification, signed by roofing manufacturer, that all products used in completed roof assembly are asbestos free.

1.4.2.4. Submit manufacturer's installation instructions to include fastener spacing requirement.

1.4.2.5. Provide shop drawing details where proposed installation method varies from contract documents.

1.4.2.6. Provide letter demonstrating compliance with specified energy conservation criteria.

1.4.2.7. Submit manufacturer's certificate that products are physically and chemically compatible with each other and meet listed ASTM or Federal Specifications.

1.4.2.8. Submit manufacturer's certificate that products comply with current safety and environmental regulations, including hazardous materials labeling and air quality/VOC regulations. Provide MSDS for all roof system components.

1.4.2.9. Provide sample copy of the manufacturer's and contractor's warranty.

1.4.2.10. Provide tapered plan layout for use of tapered insulation to include crickets, saddles, etc. along with fastener density per board.

1.4.2.11. Letter from the proposed manufacturer confirming the number of years it has DIRECTLY manufactured the proposed roof system under the trade names and/or trademarks as proposed.

1.4.3. Installation:

1.4.3.1. Installers Certification: Submit written certification from manufacturer that installer has been trained and is approved to install specified systems under the specified warranty.

1.4.3.2. Manufacturers Certification: Submit written certification from manufacturer that roof deck and details comply with manufacturer's recommendations and are suitable for application, climate zone, slope, and code constraints.

1.4.4. Samples:

1.4.4.1. Submit two 8 1/2 x 11 inch factory samples of sheet roofing materials.

1.5. QUALITY ASSURANCE

1.5.1. Manufacturer:

1.5.1.1. Membrane manufacturer shall have produced or have been responsible for the manufacture of single ply roofing systems using the same membrane formulation for a period of (twenty) 20 years prior to beginning work of this Section, as certified by the manufacturer. Manufacturer shall have the capability to provide the specified products in compliance with the delivery and quantity criteria for the Project.

1.5.1.2. Manufacturer shall provide evidence of a minimum of (five) 5 roof installations within 500 miles of the project site, similar in scope of the specified roofing with a minimum of 10 years of successful performance.

1.5.1.3. Manufacturer shall provide factory trained technical field inspectors for initial, interim and final inspections. Sales staff may not be used to provide site inspections.

1.5.1.4. There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Owner, the Owner's Representative and the Manufacturer.

1.5.2. Installer:

1.5.2.1. Installing company shall have minimum of 5 years' experience in roofing work similar in scope of the specified roofing, and has installed a minimum of 5 projects similar in material system, scope and scale.

1.5.2.2. Installer shall have been trained and is be currently approved (or certified) by membrane manufacturer.

1.5.2.3. For installation of work, use only personnel who are thoroughly trained and experienced in the skills required, and who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5.2.4. Install roofing system under the direction of a full-time supervisor/foreman on Project site during time roofing work is in progress. Supervisor shall have a minimum of 5 years' experience in roofing work similar to nature and scope of specified roofing, has been trained within one year by the manufacturer, and has installed similar applications of the specified products within one year prior to beginning work of this Section.

1.5.3. Roof Inspection and Quality Assurance Procedures:

1.5.3.1. Owner may elect to have the entire roofing system application reviewed during application by an inspection service knowledgeable regarding the application of this type of roofing system, and make written report to Architect of all variance from Specifications and established roofing practices as outlined in referenced standards.

1.6. REGULATORY REQUIREMENTS

1.6.1. Fire Hazard Classification: Provide UL Class A systems.

1.6.2. Provide materials clearly marked with UL labels, CRRC ratings, ASTM standards and hazardous materials designations.

1.6.3. Comply with all safety and regulations and manufacturers recommendations, including those associated with cold adhesive product systems.

1.6.4. Wind Resistance:

1.6.4.1. Provide wind resistant roof system in compliance with methods defined by Section 1609A.6 and 1504.3, Part 2, Title 24, CCR for minimum basic wind speeds of 60 MPH.

1.7. PRE-INSTALLATION CONFERENCE

1.7.1. Convene a pre-installation conference no less than two weeks prior to commencing work of this Section. Provide minimum two weeks advance notice to the Owner and Architect of scheduled date. Comply with provisions of Section 01 31 13. Attendance by material manufacturer's representative is mandatory.

1.7.2. Review installation procedures and coordination required with related work.

1.8. DELIVERY, STORAGE, AND HANDLING

1.8.1. Protection:

1.8.1.1. Deliver, store and handle all products in a manner to prevent damage and deterioration. Store membrane rolls lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not acceptable.

1.8.1.2. Provide packaging as recommended by manufacturer. Do not expose to elements prior to installation.

1.8.1.3. Use all means necessary to protect the installed work and materials of other trades. Store all adhesives at temperatures between 40 degrees F and 80 degrees F.

1.8.1.4. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the General Contractor shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over Felt or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.

1.8.2. Provide materials clearly marked with UL labels, ASTM standards and hazardous materials designations. All products delivered to the job site are to be in the original unopened containers or wrappings bearing all seals and approvals.

1.8.3. Comply with all safety and regulations and manufacturers recommendations, including those associated with adhesive product systems.

1.8.4. Replacements:

1.8.4.1. In the event of damage, immediately make all repairs and replacements necessary to the approval of Architect without additional cost to Owner.

1.9. ENVIRONMENTAL REQUIREMENTS

1.9.1. Do not apply roofing membrane during inclement weather, or when rain is anticipated during work period.

1.9.2. Do not apply roofing membrane to damp, wet or frozen deck surface, including dew/condensate.

1.9.3. Do not apply roofing membrane components designated to remain above freezing when ambient temperature is below 40 degrees F, or anticipated to fall below 40 degrees F during work period.

1.9.4. Maintain all roll products above 40 degrees F for 24 hours prior to installation.

1.10. WARRANTY/GUARANTEE

1.10.1. Manufacturer's Warranty:

1.10.1.1. Provide Owner with roofing system manufacturer's warranty complying with the following:

1.10.1.1.1. Type: Non-prorated, unlimited dollar amount of recovery for labor and material necessary to maintain roof system in a watertight condition, equal to Sika Sarnafil 20 Year Full System Warranty.

1.10.1.1.2. Term: 20 years, including all supplied membrane and roof assembly components, accessories, overlayment board, insulation, fasteners, transition flashing, drain and curb flashing, adhesives, and expansion joint components.

1.10.1.1.3. Warranty shall have no exclusions of any kind for standing or ponding water or foot traffic on the roof system during the warranty period. The warranty shall not obligate the owner to a maintenance schedule or requirements of any kind as a condition of the warranty.

1.10.1.4. Warranty shall provide for 60 mph wind speed protection.

1.10.2. Contractor's Guarantee:

1.10.2.1. Provide Owner with written Performance Agreement on Contractor's letterhead, signed by Contractor and roofing system installer.

1.10.2.2. Include the following requirements in Performance Agreement:

1.10.2.2.1. "For a period of 5 years commencing from date of final acceptance of the Project, we agree to make inspections and repairs to defects or leaks in the roof system within 24 hours of receipt of notice from Owner, and restore affected areas to the standard of the original Specifications as soon as weather permits."

1.10.2.2.2. "Inspections and repairs will be made without additional cost to Owner, unless it is determined that leaks or defects were caused by abuse to the roof by others or by failure of work installed by others not included in this Contract."

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. ROOFING MEMBRANE

2.2.1. Manufacturer: Sika Sarnafil or pre-approved equal, http://www.sarnafilus.com/, subject to compliance with all specification requirements herein so stated. KEE and other like-type, non-conforming membrane products submitted will not be approved as equal.

2.2.2. Adhered single ply PVC thermoplastic roof membrane, over overlayment board over rigid insulation assembly over sloped metal deck.

2.2.3. Series: Sika Sarnafil G410

2.2.4. Membrane Characteristics:

2.2.4.1. Type: Fiberglass reinforced polyvinyl chloride (PVC), complying with ASTM D 4434, Classification Type II, Grade I.

2.2.4.2. Thickness:

2.2.4.2.1. Total Thickness: 80 mils (2.0 mm).

2.2.4.2.2. Membrane thickness above reinforcement: Minimum 36 mils polymer thickness above reinforcement, tested per ASTM D 4434.

2.2.4.2.3. Provide independent test data documenting required thickness.

2.2.4.2.4. Membrane shall be certified by the manufacturer to be the exact specified membrane thickness as stated in this section; ASTM tolerance does not apply.

2.2.4.3. Sheet Width: As necessary to minimize field seams.

2.2.5. Membrane Performance Characteristics:

2.2.5.1. Breaking Strength: Minimum 200 lbf/inch per ASTM D 751.

2.2.5.2. Elongation at Break: Minimum 20 percent per ASTM D 751.

2.2.5.3. Seam Strength: Minimum 75 percent of breaking strength per ASTM D 751.

2.2.5.4. Tearing Strength: Minimum 45 lbf per ASTM D 1004.

2.2.5.5. Linear Dimensional Change: Less than 0.5 percent per ASTM D 1204.

2.2.5.6. Low Temperature Bend: Pass at – 40 degrees F per ASTM D 2136.

2.2.5.7. Accelerated Weathering Test after 10,000 hours, tested per ASTM G 53 and ASTM D 2565:

2.2.5.7.1. Cracking (7 x magnification): none.

2.2.5.7.2. Discoloration (by observation): negligible.

2.2.5.7.3. Crazing (7 x magnification): none.

2.2.5.8. Retention of Properties after Heat Aging of Membrane after 168 hours at 194 degrees F per ASTM D 3045:

2.2.5.8.1. Breaking Strength: (D 751): Minimum 90 percent of original.

2.2.5.8.2. Elongation (D 751): Minimum 90 percent of original.

2.2.5.9. Weight Change after water immersion: Maximum 3 percent per ASTM D 570.

2.2.5.10. Static Puncture resistance: Pass at 33 lbs per ASTM 5602.

2.2.5.11. Dynamic Puncture resistance: Pass at 20 lbs per ASTM 5635.

2.2.6. Membrane Fire/Safety/Habitability Characteristics:

2.2.6.1. Wind Classification: Minimum Factory Mutual, Class I, I-90 (Attachment Criteria) Classification or as required to comply with specified wind loads.

2.2.6.2. Fire Hazard Classification: UL Class A.

2.2.6.3. Energy Conservation Criteria for main roof membrane and flashings:

2.2.6.3.1. Color: Energy Smart White

2.2.6.3.2. Listing: Provide Cool Roof Rating Council listing.

2.2.6.3.3. Reflectivity (aged): Minimum value of 0.70, certified per Section 118 and 143, Part 6, Title 24, CCR.

2.2.6.3.4. Emissivity (aged): 0.75, certified per Section 118 and 143, Part 6, Title 24, CCR.

2.3. ROOF INSULATION

2.3.1. Manufacturer/Supplier: Sika Sarnafil, Inc.

2.3.2. Series/Type: Sarnatherm, Tapered/ Rigid Polyisocyanurate insulation board with approved facers or Expanded Polystyrene (EPS).

2.3.2.1. Minimum insulation assembly thickness: 2 inches.

2.3.2.2. Provide rigid insulation as required to achieve specified R-30 value and roof slopes, consisting of layers made up of maximum board thickness as established by insulation manufacturer.

2.3.2.3. Provide insulation tapered (crickets) at ½" inch per foot slope minimum, tapered as shown on drawings.

2.3.3. Characteristics:

2.3.3.1. R-Value: Minimum 6.0 based on one inch thickness, conditioned per ASTM C 518 and Ric/TIMA Bulletin 281-1.

2.3.3.2. Density: Minimum 2.0 pounds/cubic foot (pcf) per ASTM D 1622

2.3.3.3. Fire Rating: UL Listed and Classified as a part of a Class A listed Roof Assembly.

2.4. OVERLAYMENT BOARD

2.4.1. Provide Georgia Pacific, Dens-Deck Prime or equal, glass mat faced gypsum panel, minimum ¼" inch thick for application over the insulation.

2.4.2. Provide Georgia Pacific, Dens-Deck Prime or equal, glass mat faced gypsum panel, minimum 5/8" inch thick for application over the metal deck at the canopy.

2.5. ATTACHMENT COMPONENTS

2.5.1. Insulation/overlayment board fastener: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, heavy duty, designed for resistance to back-out, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength to achieve specified wind resistance, and provided by the roofing system manufacturer.

2.5.2. Termination Stop: Extruded aluminum, 6063-T-6, 1/8" inch thickness.

2.5.3. Miscellaneous fasteners, termination bars, anchors, nails, straps, bars:

2.5.3.1. Provide corrosion resistant hot dip galvanized steel, aluminum or stainless steel.

2.5.3.2. Provide non-reactive separators to galvanic corrosion.

2.5.3.3. Metal to masonry/concrete fasteners: Provide expansion type fasteners with stainless steel pins, with minimum embedment of 1-1/4 inch and approved for such use by the fastener manufacturer.

2.6. FLASHING MEMBRANES

2.6.1. Provide PVC membrane systems compatible with specified system and as recommended by roofing system manufacturer.

2.6.2. Provide reinforced flashing membranes unless non-reinforced flashing materials are specifically approved by Architect.

2.6.3. Where required by application, provide PVC-coated, heat-weldable sheet metal: 25 gauge, G90 galvanized metal sheet with a 20 mil unsupported PVC membrane laminated on one side, white color.

2.6.4. Provide prefabricated inside and outside corners, pipe boots, and related components, minimum 0.060 inch thick.

2.7. WALKWAY PROTECTION

2.7.1. Sarnafil Crossgrip Walkway: A rolled-out walkway protection mat used to protect roofing membrane from mechanical abuse. Crossgrip Walkway is 9/16 inch (14 mm) thick flexible PVC with a heavily textured surface. Crossgrip Walkway is loose laid on top of completed roof assemblies. Where design windspeeds exceed 94 mph (150 km/h) the walkway must be secured with loops of membrane welded to the field sheet.

2.8. ADHESIVES AND SEALANTS

2.8.1. Provide water based adhesives, sealants, sealers, cleaners and related system components as recommended by roof membrane manufacturer for adhered membrane application, compliant with local VOC criteria, and subject to Architect's approval.

2.8.2. Provide two-component, urethane-based, low-rise foam adhesive for application of insulation and overlayment board to acceptable substrates.

2.8.3. Provide solvent-based adhesive for membrane flashing applications as approved by membrane manufacturer.

2.9. Nailers

2.9.1. Provide pressure treated Douglas Fir per Section 06 10 53 for all nailers and blocking.

2.9.2. Treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on Project Drawings. Thickness of nailers must match the insulation thickness to achieve a smooth transition. Wood nailers shall be treated for fire and rot resistance (wolmanized or osmose treated) and be #2 quality or better lumber. Creosote or asphalt-treated wood is not acceptable. Wood nailers shall conform to Factory Mutual Loss Prevention Data Sheet 1-49. All wood shall have a maximum moisture content of 19% by weight on a dry-weight basis.

2.10 OTHER PRODUCTS

2.10.1 Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify that deck is supported and secured.

3.1.1.2.2. Verify that deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys or eaves.

3.1.1.2.3. Verify all roof drainage systems are functioning.

3.1.1.2.4. Verify that surface substrate is properly prepared and dry.

3.1.1.2.5. Verify that roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and blocking and cant strips are in place.

3.1.1.2.6. Verify that PVC membrane will not be in contact with heavy oils, asphalt, bitumen residue, or other contaminants.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Install wood nailers at perimeter of openings.

3.2.2. Conduct fastener pullout tests in accordance with the latest revision of the SPRI/ANSI Fastener Pullout Standard to verify condition of deck/substrate and to confirm expected pullout values. Report discrepancies and results to Architect and membrane manufacturer before proceeding.

3.2.3. Provide approved UL approved fire extinguishers readily accessible at areas of roofing work. Strictly comply with all state, local, and federal fire and safety regulations.

3.2.4. Cover roof drains to prevent debris entry. Remove cover at end of each day's work.

3.2.5. Verify crickets and transitions are constructed in compliance with roof deck criteria. Fill all voids, splits and holes.

3.2.6. Verify roof drainage provides minimum 1/4 inch per foot fall at all areas, including cricket valleys.

3.2.7. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. Provide protection path consisting of plywood over polyester felt or insulation board for all new and existing roof areas which receive rooftop traffic during construction.

3.3. BOARD INSULATION AND OVERLAYMENT APPLICATION

3.3.1. Install insulation and overlayment in accordance with manufacturer's instructions and as specified.

3.3.2. On metal decks, place boards parallel to deck flutes with edges bearing on flutes. Stagger all joints 12 inches minimum in each direction.

3.3.3. Lay boards in moderate contact without forcing. Cut to fit neatly to perimeter blocking and around penetrations in roof.

3.3.4. Install all insulation in a minimum of 2 layers, fastening as specified.

3.3.5. Mechanically fasten first 2" layer to the metal deck per FM and manufacturer's attachment requirements (One fastener for every two square feet of board). For subsequent layers, apply using a four bead applicator or by hand with a dual component manual applicator over properly installed and prepared substrates in bands 12 in. o.c. Bands are 1/4-1/2 in. wide before foaming. Adhesive will quickly, within 30-45 seconds at 60-80°F, transform from a liquid into low rise foam. Immediately set insulation boards into wet adhesive. Walk insulation boards into place to ensure full embedment. Within 5-12 minutes the boards are securely attached to the substrate. In warmer weather this process is a little quicker. In colder weather the process is a little slower. On roof slopes greater than 1/2 inch in 12 inches, begin adhering insulation at low point and work upward to avoid slippage. One person should be designated to walk in, trim/slit and if necessary add additional weight for proper securement. Only areas that can be made completely watertight in the same day's operations shall be installed.

3.3.6. Where insulation is designated as tapered, install as required to provide continuous smooth drainage flow. Shape all joints to avoid edges and gaps.

3.3.7. Do not apply more insulation and overlayment board than can be covered with membrane in same day.

3.3.8. Protect roof material surfaces against damage from roofing work.

3.4. FIELD MEMBRANE INSTALLATION

3.4.1. General:

3.4.1.1. Install single ply roofing system per manufacturer's specification and as described in this Section.

3.4.1.2. Shingle membrane overlaps with the flow of water where possible.

3.4.1.3. Tack welding of PVC membrane full or half-width rolls for purposes of temporary restraint during installation on windy days is not permitted.

3.4.1.4. Install only when temperature is a minimum of 40 degrees F., and rising.

3.4.1.5. Observe all safety, ventilation, and fire hazard requirements.

3.4.2. Membrane Installation:

3.4.2.1. Unroll membrane roofing and position without stretching membrane and allow membrane to relax.

3.4.2.2. Over the properly installed and prepared substrate, approved water based adhesive shall be poured out of the pail and spread using notched ¼ inch x ¼ inch x ¼ inch (6 mm x 6 mm x 6 mm) rubber squeegees. The 2121 adhesive shall be applied at a rate according to the manufacturer's requirements. No adhesive is applied to the back of the G410 membrane. Do not allow adhesive to skin-over or surface-dry prior to installation of G410 membrane.

3.4.2.3. The G410 roof membrane is unrolled immediately into the wet 2121 adhesive. Adjacent rolls overlap previous rolls by 3 inches (75 mm). This process is repeated throughout the roof area. Immediately after application into adhesive, each roll shall be pressed firmly into place with a water-filled, foam-covered lawn roller by frequent rolling in two directions. Do not allow adhesive to skin-over or surface-dry prior to installation of G410 membrane.

3.4.2.4. Install membrane parallel with the perimeter edge.

3.4.2.5. The number of adjacent half-rolls shall be in accordance with Factory Mutual requirements.

3.4.2.6. In corner areas where perimeter half-rolls intersect, add rows of fasteners and plates over the top of the half-rolls and weld a PVC coverstrip above them for water tightness

3.4.2.7. Remove creased or damaged sections of membrane.

3.4.2.8. Provide minimum six inches wide seam overlaps, except for hand-welding of certain details and flashings.

3.4.2.9. Install fasteners around all perimeters, at the base curbs, vent pipes, and all other roof penetrations according to perimeter rate of attachment and in accordance with manufacturer's instructions.

3.4.3. Welding of Overlaps:

3.4.3.1. Use hot air welding equipment as approved by membrane manufacturer.

3.4.3.2. Weld only clean and dry membrane.

3.4.3.3. Use only automatic welding machines for hot-air welding of field seams. Use of hand-held welding tools to perform field seaming is prohibited.

3.4.3.3.1. Comply with manufacturer's instructions and local codes for electric supply, grounding and over current protection observed.

3.4.3.3.2. Provide dedicated circuit for welding machines. Do not operate other equipment off dedicated circuit.

3.4.3.3.3. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

3.4.3.4. Use hand-held welding tools for detail/flashing applications only.

3.5. FLASHING SYSTEM INSTALLATION:

3.5.1. PVC Membrane Flashings:

3.5.1.1. Install membrane flashings concurrently with roof membrane as work progresses.

3.5.1.2. Use of handheld hot air equipment is acceptable. Hot air weld all seams in two stage process as recommended by membrane manufacturer.

3.5.1.3. Extend flashings a minimum of 8 inches above roofing level.

3.5.1.4. Extend PVC membrane flashings 2-1/2 inches past the discs and hot-air weld to the field membrane.

3.5.1.5. Cut and hot-air weld all interior and exterior corners and miters into place. Ensure there is no bitumen contact with the PVC membrane.

3.5.1.6. Mechanically fasten all flashing membranes along the counter-flashed top edge with anchor bar at 6-8 inches on center.

3.5.1.7. Terminate membrane flashing in accordance with membrane manufacturer's standard details.

3.5.2. PVC Clad Metal:

3.5.2.1. Form and install PVC clad metal flashings per roof membrane manufacturer's requirements.

3.5.2.2. Fasten all metal flashings with two rows of post galvanized flat head annular ring nails, 4 inches on center staggered. Penetrate nailer minimum of 1 inch with fasteners.

3.5.2.3. Install metal to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

3.5.2.4. Space adjacent sheets of clad metal ¼" inch apart. Cover each joint with 2 inch wide aluminum tape and hot-air weld a 4 inch minimum wide strip of PVC flashing membrane over the joint. For clad coping or edge metal, a "Facia Plate" is required and is to be applied over the 4 inch wide membrane flashing strip in accordance with manufacturer's requirements.

3.5.2.5. Make metal joints watertight, stagger over nailer joints to prevent joints in nailers and joints in metal from lining up.

3.5.2.6. Securely fasten metal flashings and terminations in the plane of roof deck with fasteners recommended by membrane manufacturer.

3.5.2.7. Fabricate metal to form hemmed edges to prevent sharp metal edges from cutting the membrane.

3.5.3. Metal Counter Flashing:

3.5.3.1. Install metal flashing in accordance with membrane manufacturer's detail drawings and per Section 07 60 00.

3.5.3.2. Complete all metal work concurrently with roofing and flashings so a watertight condition exists daily.

3.6. WATERSTOPS:

3.6.1. Install temporary cutoffs around incomplete edges of roofing assembly at end of each day's work and when work must be postponed due to inclement weather.

3.6.2. Seal membrane roofing to deck using manufacturer's approved method. Remove temporary seals completely when work resumes, cutting out the contaminated membrane, sealant, and insulation fillers from the work area and properly dispose off-site.

3.7. WALKWAY INSTALLATION

3.7.1. Provide walkways as shown on drawings and in areas where routine rooftop maintenance occurs and in areas where regular rooftop traffic is expected.

3.7.2. Crossgrip Walkway is installed loose laid on top of completed roof assemblies. Where design wind speeds exceed 94 mph (150 km/h) the walkway must be secured with loops of membrane welded to the field sheet. Unroll and position Crossgrip Walkway within specified areas and cut to desired length. Do not install Crossgrip Walkway directly over Bars. Connecting clips are available for butting two ends together. **Important:** Check all existing deck membrane seams that are to be covered and re-weld any inconsistencies before installation.

3.8. MANUFACTURER'S FIELD SERVICES

3.8.1. Provide manufacturer's field services under provisions of Section 01 45 00 and as specified.

3.8.2. Technical representative shall provide field inspection of roof substrate prior to beginning membrane installation, at outset of installation, and at completion of membrane work.

3.8.3. Technical representative shall provide the contractor with written reports regarding observations of each inspection. Contractor shall provide to the Architect these inspection reports upon request.

3.9. FIELD QUALITY CONTROL

3.9.1. Testing:

3.9.1.1. Certification: Contractor shall provide written certification that all products were installed in accordance with manufacturer's recommendations and specifications.

3.9.2. Quality Control of Seams:

3.9.2.1. Check all welded seams for continuity using a rounded screwdriver.

3.9.2.2. Field test cuts of welded seams shall be made daily by the Contractor to locations as directed by the Owner's Representative. Take one inch wide cross-section samples of welded seams at least three times a day. Test to ensure that membrane shears prior to weld separation.

3.9.2.2.1. Patch each test cut by the Contractor at no extra cost to the Owner.

3.9.2.3. If any one test cut fails, Architect will prepare additional test protocols. Contractor shall perform all testing and make all repairs at no additional cost to Owner.

3.10. CLEANING

3.10.1. Remove all adhesive, spills, scrap materials, and other debris from Project site.

END OF SECTION

SECTION 07 60 00

FLASHING AND SHEET METAL

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Coping, parapet, and cap flashings.

1.1.2. Reglets and counter-flashings over bituminous base flashings.

1.1.3. Counter-flashings.

1.1.4. Sheet metal gutters and downspouts.

1.1.5. Steel pipe downspouts.

1.2. REFERENCES

1.2.1. ANSI/ASTM B 32 - Solder Metal.

1.2.2. ASTM A 53 - Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless.

1.2.3. ASTM A 240/A 240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2002a.

1.2.4. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2001a.

1.2.5. ASTM A 924 - General Requirements for Steel Sheet, Zinc Coated by the Hot Dip Process.

1.2.6. ASTM D 4586 - Asphalt Roof Cement, Asbestos-Free.

1.2.7. FS O-F-506 - Flux, Soldering, Paste and Liquid.

1.2.8. FS QQ-Z-100 - Zinc Alloy.

1.2.9. NRCA (National Roofing Contractors Association)-Roofing Manual.

1.2.10. SMACNA - Architectural Sheet Metal Manual, 1993 edition.

1.3. SUBMITTALS

1.3.1. Submit shop drawings and product data under provisions of Section 01 33 00.

1.3.2. Describe material profile, jointing pattern, jointing details, fastening methods, and installation details.

1.3.3. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.4. QUALITY ASSURANCE

1.4.1. Fabricator: Company specializing in sheet metal flashing work with 5 years minimum experience.

1.5. DELIVERY, STORAGE, AND HANDLING

1.5.1. Store products under provisions of Section 01 60 00.

1.5.2. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation.

1.5.3. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.6. GUARANTEE

1.6.1. Contractor's Guarantee:

1.6.1.1. Provide Owner with written Guarantee on Contractor's letterhead, and signed by General Contractor and flashing system subcontractor.

1.6.1.2. Provide guarantee against the following defects for a time period of three years, commencing from the date of final acceptance of the project.

1.6.1.2.1. Flashing blow-off or permanent deformation from wind.

1.6.1.2.2. Water intrusion through flashing joints into building interior.

1.6.1.3. Make inspections and emergency repairs to defects or leaks in the roof system within twenty-four (24) hours of receipt of notice from the Owner.

1.6.1.4. Restore the affected areas to the standard of the original specifications as soon as weather permits.

2. PART 2 - PRODUCTS

2.1. SHEET MATERIALS

2.1.1. Galvanized Steel:

2.1.1.1. Classification: Per ASTM A 653 and A 924.

2.1.1.2. Finish: Hot Dip galvanized, G90 coating. Provide Paint-Grip finish over galvanizing at all painted flashings.

2.1.1.3. Gage: As specified and shown on drawings. If not shown on drawings, provide minimum 24ga.

2.1.2. Prefinished Flashing: Provide factory prefinished flashing to match panel material specified in Section 07 41 13 at locations where field fabricated flashings are located adjacent to panels.

2.1.3. Downspouts: Steel pipe, ASTM A 53, Grade B, Schedule 40, galvanized, unless otherwise shown or specified.

2.2. ACCESSORIES

2.2.1. Fasteners: Galvanized steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.

2.2.2. Sealant: Type specified in Section 07 90 00.

2.2.3. Flashing Cement: As specified in Section 07 52 10.

2.2.4. Solder: ANSI/ASTM B 32; type with less than 0.2% lead.

2.2.5. Flux: FS O-F-506.

2.2.6. Provide water resistant underlayment per Section 09 20 00.

2.2.7. Provide elastomeric flashing per Section 07 13 00.

2.3. PREFABRICATED COMPONENTS

2.3.1. Prefabricated Reglet Assembly:

2.3.1.1. Manufacturer and Series: Fry, www.fryreglet.com , or equal, Type as required for condition shown on drawings.

2.3.1.1.1. For purpose of establishing required level of quality, characteristics of products manufactured by Fry are specified.

2.3.1.2. Counter-Flashing: Galvanized Steel, with windlocks at 32 inches on center and at each corner. Provide prefinished counter-flashing where adjacent to prefinished metal roofing or siding

2.3.1.3. Corners: Provide factory prefabricated corner assemblies.

2.4. FABRICATION

2.4.1. Provide sheet metal work as shown on Drawings and not specified under other Sections. Fabricate as indicated. Where specific details are not shown, fabricate according to applicable SMACNA "Architectural Sheet Metal Manual" criteria.

2.4.2. Form sections true to shape, accurate in size, square, and free from distortion or defects. Match profiles at connections. Provide ribs, cleats, and reinforcement necessary to make sections rigid and substantial. Allow for expansion and contraction.

2.4.3. Unless noted otherwise, fabricate cleats and starter strips of same material as sheet, minimum 2 inches wide, interlocked with fabrication.

2.4.4. Form pieces in longest practical lengths. Locate joints of fascias, roof edges, and other sheet metal work exposed to view with respect to panel joints or other architectural features as indicated on Drawings, or as directed by Architect.

2.4.5. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip and cleat interlock.

2.4.6. Generally, provide shop joints single locked and soldered, or lapped, riveted and soldered. Provide field joints designed to permit expansion, with joint covers or lapped joints with "S" clips. Do not solder.

2.4.6.1. Provide lapped, riveted and soldered joints at gutter conditions.

2.4.6.2. Provide all concealed stiffeners and bracing at roof edge trim, fascia and gutter cover as required by Architect.

2.4.6.3. Provide 10 gage x 1-1/2 inch wide gutter bracket support, wrapping completely around gutter, located at 32 inches on center and fastened to solid blocking with 2 No. 12 wood screws. Provide 16 gage x 1-1/2 inch gutter strap at 32 inches on center, extending minimum 6 inches under roofing system.

2.4.6.4. Provide gutter flashing in compliance with SMACNA Chapter 1, including "rectangular Gutter Design criteria" page 1.8, 5th edition. Provide fully welded two, three and four way gutter intersections, with expansion joints fabricated and located per Figure 1-5 and 1-6.

2.4.7. Form material with flat lock seams unless noted otherwise. Overlap seams in direction of flow with finished width of lock seams and soldered lap seams not less than 1 inches, and finished width of unsoldered lap seams not less than 3 inches.

2.4.8. Where specified, solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Provide smooth even surface on exposed soldering on finished surfaces.

2.4.9. Provide shop formed transition and corner pieces with locked and soldered corners. Locate field joints not less than one foot nor more than three feet from actual corner. Shortest length dimension of any corner piece leg shall not be less than one foot.

2.4.10. Locate parapet coping expansion joints 20 feet on center maximum, and as otherwise required to permit expansion and contraction.

2.4.11. Fabricate flashing assemblies as specified in this Section and as shown on Drawings.

2.5. FINISH

2.5.1. Paint flashing applications as specified below in off-site shop location.

2.6. OTHER MATERIALS

2.6.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

3.1.1.2.2. Verify roof membrane, elastomeric flashing, waterproof underlayment and base flashings are in place, sealed, and secure.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Field measure site conditions prior to fabricating work.

3.2.2. Install starter and edge strips, and cleats before starting installation.

3.2.3. Except at prefinished material specified in Section 07 41 13, pre-paint all copings, gutters, expansion joint flashings, counter-flashings and related flashing assemblies when visible from any location in final project. Pre-paint in off-site shop location, complying with paint system specified in Section 09 91 00. Touch up after installation.

3.3. INSTALLATION

3.3.1. Support all flashings with firm and stable attachments, anchored into solid backing as required.

3.3.2. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

3.3.3. Where required by installation, solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

3.3.4. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.

3.3.5. Insert flashings into reglets to form tight fit. Secure in place in accordance with the manufacturer's instructions.

3.3.6. Coping Installation:

3.3.6.1. Install coping with cleats and clips as specified and as shown on drawings. Provide continuous cleat at exterior surface. Provide approved fasteners at inside (roof) surface at 24 inches on center.

3.3.6.2. Install coping intermediate joints per Schedule, Article 3.4 of this Section. Locate as shoe.

3.3.6.3. Provide waterproof underlayment over wall framing and under coping flashing. Provide elastomeric flashing at all coping joints, extending 12 inches each side of joint. Coordinate with plaster underlayment installation.

3.3.7. Gutter, Scupper, and Downspout Installation:

3.3.7.1. Secure gutters and covers and downspouts in place as detailed.

3.3.7.2. Coordinate with waterproof membrane underlayment installation as specified in Section 07 13 00.

3.3.7.3. Connect downspouts to downspout boots and seal connection.

3.3.8. Roof Membrane Flashing:

3.3.8.1. Provide and install in coordination with roofing work, all flashing, counter-flashing, sleeves, and related components as required to provide a watertight installation.

3.3.8.2. Set sheet metal installed on or adjoining roofing in continuous bed of approved roofing cement.

3.3.9. Aluminum Components Installation:

3.3.9.1. Provide di-electric separation at all components, including fasteners.

3.3.9.2. Provide expansion sleeves at end of radiused components. Do not splice at mid-point of radius.

3.3.9.3. Attach coping with welded connections, mechanical fasteners, clips, and brackets. Do not solder.

3.4. FABRICATION SCHEDULE

3.4.1. Coping:

3.4.1.1. Material and Gage: Galvanized Steel:

3.4.1.1.1. Flashing with an exposed vertical face of 8" or less: 24 gage.

3.4.1.1.2. Flashing with an exposed vertical face of 8" to 10": 22 gage.

3.4.1.1.3. Flashing with an exposed vertical face of 10" to 15": 20 gage.

3.4.1.2. Finish: As specified in this Section, painted, including factory prefinished where adjacent to material specified in Section 07 41 13.

3.4.1.3. SMACNA Reference: Table 3-1, with J9 drive cleat, flat lock seam joint design, C1 corner, and E1 edge.

3.4.2. Prefabricated and Fabricated Reglet Counterflashing:

3.4.2.1. Material and Gage: Galvanized steel, 22 gage, painted.

3.4.2.2. Finish: As specified in this Section, painted, including factory prefinished where adjacent to material specified in Section 07 41 13.

3.4.3. Miscellaneous flashing, roof flashing, metal flashing assemblies and counterflashing:

3.4.3.1. Material and Gage: Galvanized Steel:

3.4.3.1.1. Flashing with an exposed vertical face of 8" or less: 24 gage.

3.4.3.1.2. Flashing with an exposed vertical face of 8" to 10": 22 gage.

3.4.3.1.3. Flashing with an exposed vertical face of 10" to 15": 20 gage.

3.4.3.2. Finish: As specified in this Section, painted, including factory prefinished where adjacent to material specified in Section 07 41 13.

3.4.4. Gutters:

3.4.4.1. Material and Gage: Galvanized steel, 22 gage.

3.4.4.2. Finish: As specified in this Section, painted, including factory prefinished where adjacent to material specified in Section 07 41 13.

3.4.4.3. SMACNA Reference: Hanging Gutter Installations-Sloped Roofs, Figure 1-19B, with minimum 4 inch flashing flange beneath roof flashing system.

3.4.4.4. SMACNA Reference: Hanging Gutter Installations-Sloped Roofs, Figure 1-19A, with minimum 4 inch flashing flange beneath roof flashing system.

3.4.4.5. SMACNA Reference: Concealed Hanging Gutters, Figure 1-15C, with minimum 4 inch flashing flange beneath roof flashing system.

3.4.4.6. Provide downspout connection per SMACNA Figure 1-33, with basket strainer.

3.4.5. Through-Parapet Overflow Scuppers:

3.4.5.1. Material and Gage: Galvanized steel, 22 gage.

3.4.5.2. Finish: Painted.

3.4.5.3. SMACNA Reference: Figure 1-30, with minimum 4 inch flashing flange beneath parapet wall finish.

3.4.6. Fabricated Sheet Metal Downspouts - Round:

3.4.6.1. Material and Gage: Galvanized steel, 22 gage.

3.4.6.2. Finish: Painted.

3.4.6.3. SMACNA Reference: Figure 1-32A smooth, round, with hangers per Figure 1-35D.

3.4.7. Fabricated Sheet Metal Downspouts - Rectangular:

3.4.7.1. Material and Gage: Galvanized steel, 22 gage.

3.4.7.2. Finish: Painted.

3.4.7.3. SMACNA Reference: Figure 1-32B smooth, rectangular, with hangers per Figure 1-35B.

3.4.8. Conductor Heads:

3.4.8.1. Material and Gage: Galvanized steel, 22 gage.

3.4.8.2. Finish: Painted.

3.4.8.3. SMACNA Reference: Figure 1-25C .

3.4.9. Steel Pipe Downspout:

3.4.9.1. Material and Gage: ASTM A 53, Grade B, Schedule 40, galvanized, unless otherwise shown or specified.

3.4.9.2. Finish: Painted per Section 09 91 00, Painting..

3.4.10. Transition at plaster finished wall intersecting adjacent plaster wall: Provide 22 gage fully soldered fabricated transition. Fabricate transition to extend beneath plaster finish at all surfaces 4 inches. Coordinate transition with coping and underlayment as directed by Architect.

END OF SECTION

SECTION 07 72 00

ROOF ACCESSORIES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Prefabricated roof penetration flashings.

1.1.2. Prefabricated duct support flashings.

1.1.3. Prefabricated pipe support flashings.

1.1.4. Prefabricated mechanical equipment support curbs.

1.1.5. Prefabricated roof hatches with hardware and counterflashing.

1.1.6. Prefabricated roof smoke vents, with hardware and counterflashing.

1.1.7. Fixed Safety Handrail.

1.2. REFERENCES

1.2.1. ASTM A 240/A 240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2002a.

1.2.2. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2001a.

1.2.3. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2002.

1.2.4. ASTM D 3574 - Standard Test Methods for Flexible Cellular Materials?Slab, Bonded, and Molded Urethane Foams; 2001.

1.3. SUBMITTALS

1.3.1. Provide submittals under provisions of Section 01 33 00.

1.3.2. Provide shop drawings of each installation application. Include general construction, configurations, jointing methods and locations when applicable, and fastening methods. Show field based dimensions accommodating existing roof slope and insulation.

1.3.3. Coordinate with type and dimension of equipment, duct and building system piping/conduit component shown on drawings.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. ROOF PENETRATION FLASHING ASSEMBLIES

2.2.1. Manufacturer: S.B.C. Industries or equal (no known equal), phone 1-800-228-2580. http://www.sbcflashings.com/

2.2.1.1. Field fabricated flashing assemblies matching configuration of specified product are approved.

2.2.2. Application: Conduit, Pipe and Plumbing Vent Penetration:

2.2.2.1. Unless otherwise shown on drawings, including mechanical and plumbing documents, provide specified flashing assembly at all penetrations through built up roofing.

2.2.2.2. Type: Stainless steel factory fabricated assembly, presoldered seam at stack to base flashing. Adjust stack to base angle to reflect roof slope. Provide separate counterflashing collar.

2.2.2.3. Series: As recommended by manufacturer, with sealant cover.

2.2.2.4. Size: Fabricate with counterflashing collar minimum 5 inches above roof membrane, and with minimum 3-1/2 inch flashing flange.

2.2.2.5. Application: Duct Support Structural Members:

2.2.2.6. Type: Stainless steel factory fabricated assembly, presoldered seam at stack to base flashing, configured for field soldering of base flashing.

2.2.2.7. Series: ER Series, type as required for application. Provide sealant cover at each type. Minimum 12 inches adjustable horizontal and vertical.

2.2.2.8. Size: Fabricate with flashing collar minimum 8 inches above roof membrane, and with minimum 3-1/2 inch flashing flange.

2.3. PIPE AND CONDUIT PENETRATION CURBS

2.3.1. Manufacturer: RPS Corporation, www.rpscurbs.com, or equal.

2.3.2. Application: Multiple and Single Pipe/Conduit Penetration:

2.3.2.1. Series: Pipe Portal System, with RC-2A curb complying with specified dimensional criteria. Provide curb length as required for single or multiple pipe penetrations as shown on drawings.

2.3.2.2. Curb Height: Minimum 11 inches, fabricated to accommodate roof slope and provide level curb elevation.

2.3.2.3. Curb Flange: Minimum 3 inches, sized as required to accommodate anchor as shown on drawings.

2.3.2.4. Gage: 18 gage shell, base plate, and counter flashing.

2.3.2.5. Cover: ABS plastic, acrylic coated, with anchor flange.

2.3.2.6. Rubber Cap: EPDM rubber, style as required for number of penetrating items, with stainless steel swivel clamp. Maximum number of penetrations per cap limited to two.

2.3.2.7. Insulation Fill: Provide fiber glass insulation, 1.5 PCF density, at insulated pipe penetrations, installed as shown on drawings.

2.4. ROOF ACCESS HATCH

2.4.1. Manufacturer: Bilco www.bilco.com or equal.

2.4.2. Series: Type S-20.

2.4.3. Size : 30 inch x 36 inch.

2.4.4. Construction:

2.4.4.1. Curb: 14 gage galvanized prime painted steel; integral cap flashing to receive roof flashing system; extended flange for mounting.

2.4.4.2. Cover: 14 gage galvanized prime painted steel; fiber insulation retained by 22 gage steel. Continuous neoprene vinyl gasket to provide weatherproof seal. Cover shall be designed to resist 40 pound per square foot live load without failure or permanent set.

2.4.4.3. Curb Insulation: Provide rigid insulation at all sides of curb suitable for roof system flashing membrane termination.

2.4.5. Hardware:

2.4.5.1. Operator: manually operated type with compression spring operators, positive snap latch with turn handles inside and out; automatic hold-open arm with vinyl covered grip handle for easy release.

2.4.5.2. Provide padlock eye for regular roof hatches.

2.4.5.3. Hinges: Manufacturer's recommended type. Heavy duty, galvanized steel.

2.4.6. Finish:

2.4.6.1. Provide zinc plated and chromate sealed hardware.

2.4.6.2. Provide galvanized and primed finish at roof hatch.

2.4.7. Ladder Safety Post: Bilco, or equal.

2.4.7.1. Model and Finish: Model No. LU-4 Aluminum, mill finish.

2.4.7.2. Performance Characteristics:

2.4.7.2.1. Tubular post shall lock automatically when fully extended.

2.4.7.2.2. Safety post shall have controlled upward and downward movement.

2.4.7.2.3. Release lever shall disengage the post to allow it to be returned to its lowered position.

2.4.7.2.4. Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14" on center and clamp brackets to accommodate ladder rungs up to 1-3/4" in diameter.

2.4.7.3. Post: Shall be manufactured of high strength square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.

2.4.7.4. Balancing spring: A stainless steel spring balancing mechanism shall be provided to provide smooth, easy, controlled operation when raising and lowering the safety post.

2.4.7.5. Hardware: All mounting hardware shall be Type 316 stainless steel.

2.4.8. Fixed Safety Handrail:

2.4.8.1. Manufacturer: The BILCO Company, or equal.

2.4.8.2. Model: Bil-Guard Hatch Railing System Fixed railing system meeting OSHA fall protection regulations (29 FR 1910.23).

2.4.8.3. Size: As selected from manufacturer's standard railing systems and as required to fit specified model of roof hatch.

2.4.8.4. Performance characteristics:

2.4.8.4.1. Color: High visibility safety yellow color shall be molded in.

2.4.8.4.2. Installation: Hatch rail system shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.

2.4.8.4.3. Regulatory Requirements: Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two.

2.4.8.4.4. Fabrication and Warranty: UV and corrosion resistant construction with a twenty-five year warranty.

2.4.8.4.5. Gate: Self-closing gate shall be provided with hatch rail system.

2.4.8.4.6. Posts and Rails: Shall be round pultruded reinforced fire retardant yellow fiberglass treated with a UV inhibitor.

2.4.8.4.7. Hardware: Mounting brackets shall be 1/4 inch thick hot dip galvanized steel. Hinges and post guides shall be 6063T5 aluminum. Fasteners shall be Type 316 stainless steel.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. ROOF EQUIPMENT SUPPORT AND PENETRATION INSTALLATION

3.2.1. Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.

3.2.2. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.

3.2.3. Roof Mounted Equipment Supports:

3.2.3.1. Fasten to roof deck with corrosion resistant fasteners, type and size as shown on drawings and as specified.

3.2.3.2. Anchorage: Provide fasteners at each side of accessory/shell, 6 inches from each end and at 18 inches maximum on center, minimum of 2 per side.

3.2.4. Pipe And Conduit Penetration Curbs:

3.2.4.1. Fasten to roof deck with corrosion resistant fasteners, type and size as shown on drawings and as specified.

3.2.4.2. Anchorage: Provide fasteners at each side of accessory/shell, 6 inches from each end and at 18 inches maximum on center, minimum of 1 per side.

3.2.4.3. Carefully cut cap, properly selected for penetration diameter. When cut, cap shall fit tight against penetration, fastened with specified adjustable clamp without puckers or gaps.

3.2.4.4. Where insulated pipe occur, fill cap cavity with specified insulation supported as shown on drawings.

3.2.5. Roof Penetration Flashing Assemblies:

3.2.5.1. Install roof penetration flashings coordinated with roof membrane installation.

3.2.5.2. Where required, field solder base to form watertight seam.

3.2.5.3. Install complete with sealant, neoprene tape, and sealant cover.

3.3. ROOF HATCH/SMOKE VENT INSTALLATION

3.3.1. Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.

3.3.1.1. Fasten to roof deck with corrosion resistant fasteners, type and size as shown on drawings and as specified.

3.3.1.2. Anchorage: Provide fasteners at each side of accessory/shell, 6 inches from each end and at 18 inches maximum on center, minimum of 2 per side.

3.3.2. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.

3.3.3. Install smoke vent in accordance with approval requirements.

3.3.3.1. Extend manual release cable and handle to location as directed by Architect.

3.3.4. Test vent for operation, including fusible link test.

3.3.5. After test, replace fusible link, and provide additional link for Owners future use.

END OF SECTION

SECTION 07 84 13

FIRESTOPPING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Firestopping materials and accessories for the following applications:

1.1.1.1. Duct, cable, conduit, and piping penetrations through fire-resistive ceiling, floor and wall assemblies.

1.1.1.2. Openings between fire-resistive floor assemblies and non-load bearing walls.

1.1.1.3. Penetrations of fire resistive vertical service shafts, including annular space at duct penetrations.

1.1.1.4. Gaps, separations, and openings resulting from construction and penetrations in fire-resistive ceiling, floor and wall assemblies, including the intersection of such components.

1.1.1.5. Additional locations where specifically shown on the Drawings or where specified in other Sections of the Project Manual.

1.2. REFERENCES

1.2.1. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.

1.2.2. American Society for Testing and Materials (ASTM).

1.2.2.1. E 84 Test Method for Surface Burning Characteristics of Building Materials

1.2.2.2. E 119 Test Method for Fire Tests of Building Construction and Materials

1.2.2.3. E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750F

1.2.2.4. E 814 Fire Tests of Through-Penetration Fire Stops

1.2.2.5. E 1399 Cyclic Movement and Measuring Minimum and Maximum Joint Widths

1.2.2.6. E 1966 Test Method for Resistance of Building Joint

1.2.2.7. E 2174 Standard Practice for On-Site Inspection of Installed Fire Stops

1.2.2.8. E 2393 Standard Practice for On-Site Inspection of Installed Fire Stop Joint Systems.

1.2.2.9. E 2307 Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA)

1.2.3. Factory Mutual (FM) Research: FM Approval Standard of Firestop Contractors – Class 4991

1.2.4. Firestop Contractors International Association (FCIA): M.O.P. Manual of Practice

1.2.5. International Firestop Council (IFC):

1.2.5.1. Reference 1: Recommended IFC Guidelines for Evaluating Firestop Engineering Judgments (April 2001)

1.2.5.2. Reference 2: Inspectors Field Pocket Guide

1.2.6. National Fire Protection Association (NFPA):

1.2.6.1. NFPA 70 - National Electric Code

1.2.6.2. NFPA 101 - Life Safety Code

1.2.6.3. NFPA 221 - Fire Walls and Fire Barriers (preliminary to be released)

1.2.6.4. NFPA 251 - Fire Tests of Building Construction and Materials

1.2.7. Underwriters Laboratories, Inc. (UL):

1.2.7.1. UL Qualified Firestop Contractor Program

1.2.7.2. UL 263 Fire Tests of Building Construction and Materials

1.2.7.3. UL 723 Surface Burning Characteristics of Building Materials

1.2.7.4. UL 1479 Fire-Tests of Through-Penetration Fire Stops

1.2.7.5. UL 2079 Tests for Fire Resistance of Building Joint Systems

1.3. PERFORMANCE REQUIREMENTS

1.3.1. Provide system materials and installation for through membrane penetration of rated assemblies with a fire resistance rating equal to that of the assembly penetrated, based on referenced testing methods, and in compliance with referenced regulations. Provide firestopping systems designed to resist the spread of fire, and the passage of smoke and other gases according to requirements indicated, including but not limited to the following:

1.3.1.1. Use of exceptions based on size of penetrating items as defined by ICC Chapter 7 is not acceptable. Firestop all penetrations, regardless of size, with material complying with specified criteria.

1.3.1.2. Firestop all penetrations passing through fire resistance rated wall and floor assemblies and other locations as indicated on the drawings.

1.3.1.3. Provide and install complete penetration firestopping systems that have been tested and approved by third party testing agency.

1.3.1.4. F - Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than one hour or the fire-resistance rating of the construction being penetrated.

1.3.1.5. T - Rated Through-Penetration Firestop Systems: Provide firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated by Code.

1.3.1.6. L – Rated Through-Penetration Firestop Systems: Provide firestop systems with L ratings, in addition to F and T ratings, as determined per UL 1479, where indicated by Code.

1.3.2. Perimeter Fire Containment Systems: Provide interior perimeter joint systems with fire-resistance ratings indicated, as determined per ASTM E 2307, but not less than the fire-resistance rating of the floor construction.

1.3.3. Fire-Resistive Joints: Provide joint systems with fire-resistance ratings indicated, as determined per UL 2079, but not less than the fire-resistance rating of the construction in which the joint occurs.

1.3.4. For firestopping exposed to view, traffic, moisture, and physical damage, provide appropriate firestop systems for these conditions.

1.3.5. Where there is no specific third party tested and classified firestop system available for a particular firestop configuration, the firestopping contractor shall obtain from the firestop manufacturer, an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFFRA) for submittal.

1.3.6. System shall comply with performance criteria and characteristics as specified in this Section.

1.4. QUALIFICATIONS

1.4.1. Manufacturer:

1.4.1.1. Produced the specified or equivalent products for a period of five (5) years prior to beginning work of this Section.

1.4.1.2. Has successfully used firestopping products on a minimum of 10 projects of similar scale and application within one (1) year prior to beginning work of this Section.

1.4.1.3. Has capability to produce the specified products to the delivery and quantity criteria of the project.

1.4.1.4. Provide local distributor or manufacturers representative completely familiar with products selected and available on-site within 4 hours.

1.4.1.5. Provide capability to provide manufacturers technical engineering support available on-site within 48 hours.

1.4.2. Installer Qualifications:

1.4.2.1. Approved by the firestopping system manufacturer.

1.4.2.2. Thoroughly trained and experienced in the skills required

1.4.2.3. FM Approved in accordance with FM Standard 4991 – Approval of Firestop Contractors.

1.4.2.4. UL Qualified Firestop Contractor

1.4.2.5. Installed a minimum of 5 similar applications of the specified products within one year prior to beginning work of this Section.

1.4.2.6. Completely familiar with the manufacturers' recommended methods of installation applicable to the requirements of this work.

1.5. ENVIRONMENTAL REQUIREMENTS

1.5.1. Conform to requirements of the manufacturer.

1.5.2. Provide ventilation in areas of work in conformance with manufacturers recommendations.

1.5.3. Provide control of noxious or objectionable odors as specified in Section 01 50 00.

1.6. SUBMITTALS

1.6.1. Firestop Schedule

1.6.1.1. Review firestopping conditions and applications required by work.

1.6.1.2. Prepare written firestop schedule identifying specific types of penetrating items, wall/ceiling assembly, and proposed system firestopping system, incorporating systems as shown on drawings, schedule as specified in this Section and all other conditions not identified. Coordinate with conditions shown on mechanical and electrical drawings.

1.6.1.3. Where specific application is not covered by current test results, submit all necessary engineering documentation required to establish equivalent fire-resistance values and obtain approval.

1.6.1.4. Provide agency approval documentation, including ICC ES reports, State Fire Marshal Listing, or other approvals.

1.6.1.5. Submit in accordance with Section 01 33 00.

1.6.2. Shop Drawings/Details:

1.6.2.1. Accompanying Firestopping Schedule, submit Shop Drawings/Details illustrating proposed firestopping assemblies. Include dimensions, damming material requirements, and related assembly data.

1.6.3. Certification and Approval

1.6.3.1. Submit written certification that all assemblies comply with listing and rating requirements.

1.6.3.2. Obtain local jurisdictional authority review and approval of schedule and shop drawings prior to submittal to Architect.

1.7. DELIVERY, STORAGE AND HANDLING

1.7.1. Protection

1.7.1.1. Deliver, store and handle all products in a manner to prevent damage and deterioration.

1.7.1.2. Use all means necessary to protect the installed work and materials of all other trades.

1.7.1.3. Deliver all materials in unopened containers, labeled with date of manufacturer and testing agency approval.

2. PART 2 - PRODUCTS

2.1. FIRESTOPPING SYSTEMS

2.1.1. Manufacturer

2.1.1.1. All firestopping products for any one type of assembly shall be supplied by one manufacturer.

2.1.1.2. Firestopping assemblies shall represent an integrated series of materials, coordinated to provide required ratings for project specific conditions.

2.1.1.3. Manufacturers complying with qualifications criteria and additional specified requirements are acceptable.

2.1.2. Standards and Regulatory Criteria

2.1.2.1. Provide systems listed under UL Fire Resistance Directory categories as shown on drawings, current edition or approved equivalent.

2.1.2.2. Test Standards: Provide firestopping systems in accordance with the following:

2.1.2.2.1. F - Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than one hour or the fire-resistance rating of the construction being penetrated.

2.1.2.2.2. T - Rated Through-Penetration Firestop Systems: Provide firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated by Code.

2.1.2.2.3. L – Rated Through-Penetration Firestop Systems: Provide firestop systems with L ratings, in addition to F and T ratings, as determined per UL 1479, where indicated by Code.

2.1.3. Performance Characteristics

2.1.3.1. Cold Smoke Barrier: Provide system with sealant component capable of preventing cold smoke penetration through firestopping.

2.1.3.2. Assembly Construction: In non-symmetrical wall assemblies, select system based on least fire-resistive side.

2.1.3.3. Movement capability:

2.1.3.3.1. Provide system with sufficient resiliency and elastomeric properties to accommodate anticipated thermal movements of penetrating item without compromising firestopping function.

2.1.3.3.2. Provide system with sufficient resiliency and elastomeric properties to accommodate anticipated vibration and cyclic movement of penetrating item without compromising firestopping function.

2.1.3.4. Habitability

2.1.3.4.1. For applications within or adjacent to occupied spaces, provide system complying with current air quality VOC regulations, and without objectionable odor or harmful fumes. Comply with Section 01 50 00.

2.1.3.4.2. Do not utilize systems generating explosive or flammable gas, including hydrogen, during installation or curing.

2.1.3.4.3. Provide systems without asbestos containing materials, including safing and damming materials.

2.1.3.4.4. Provide material with flow characteristics resulting in smooth, non-sag joints.

2.1.3.4.5. Provide permanent protection of floor joints against damage when firestopping is unprotected.

2.1.3.5. Compatibility:

2.1.3.5.1. Verify compatibility of selected system with substrate and penetrating item.

2.1.3.5.2. Do not use systems with materials that stain or bleed into substrate or deposit films on surface of firestopping.

2.1.3.5.3. At insulated piping applications, select systems that do not require removal of insulation materials.

2.1.3.6. Fire Safety

2.1.3.6.1. Flame Spread: Maximum value of 25 per ASTM E 84.

2.1.3.6.2. Smoke Contributed: Maximum value of 50 per ASTM E 84.

2.1.3.6.3. Damming Materials: Provide non-combustible damming materials for permanent installation conditions.

2.1.3.6.4. Where T ratings are required in corridor and floor conditions, select system providing maximum flexibility for type and size of penetrating item.

2.2. OTHER MATERIALS

2.2.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Clean substrate surfaces of dirt, dust, grease, oil, and loose material, or other matter which may effect bond of firestopping material.

3.2.2. Remove incompatible materials which affect bond.

3.2.3. Provide curing and ventilation environment as required for system installation.

3.3. INSTALLATION

3.3.1. Install selected systems in accordance with listing requirements and the manufacturers recommendations.

3.3.2. Provide firestopping at annular space around duct penetrations and damper frames. Do not provide at fire dampers unless damper includes firestopping in listing application.

3.3.3. Where large openings are created for duct, cable tray, bus duct, and other similar penetrations, close unused portions with firestopping tested for large opening conditions.

3.3.4. Where wall framing meets uneven surface, such as fluted metal deck, irregular masonry block finish, and similar materials, select system suitable for closing gap and openings.

3.3.5. Tool sealant to give surface a smooth concave appearance.

3.4. CLEANING

3.4.1. Clean Work under provisions of Section 01 77 00.

3.4.2. Clean adjacent surfaces of firestopping materials.

3.5. FIELD QUALITY CONTROL

3.5.1. Manufacturer's representative shall inspect initial installation of each type of firestop system to verify installation procedures.

3.5.2. At completion of work, inspect all firestopping applications to verify compliance with listing requirements.

3.5.3. Provide written certification that all firestopping systems were installed in accordance with listing requirements and approved schedule.

3.6. PROTECTION OF FINISHED WORK

3.6.1. Protect finished Work under provisions of Section 01 50 00.

3.6.2. Protect adjacent surfaces from damage by material installation.

3.7. FIRESTOPPING SCHEDULE

3.7.1. Provide Firestopping Schedule in the following or similar format. Include firestopping assemblies as shown on drawings and all firestopping selections as required to comply with applicable regulations.

FIRESTOPPING SCHEDULE

	Walls			Floor
Penetration Material	**Concrete CMU Wall**	**Gypsum Steel Stud 1 Hour**	**Gypsum Steel Stud 2 Hour**	**Concrete Fill Metal Deck**
Metal Pipe/ Conduit				
Membrane				
Through				
Metal DWV				
Membrane				
Through				
Copper				
Membrane				
Through				
Insulated Pipe				
Membrane				
Through				
Combined Penetrations				
Membrane				
Through				

Ductwork
10 inch diameter
without fire
dampers

Ductwork
32x14 inch
without fire
dampers

Ductwork
36x30 inch
without fire
dampers

END OF SECTION

SECTION 07 90 00

JOINT PROTECTION

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Sealants and joint treatment necessary to provide a positive barrier against passage of moisture and air.

1.1.2. Sealants at material joints necessary to provide closure for ease of cleaning and maintenance.

1.1.3. Sealants at all penetrations of sound rated walls and floors.

1.2. SUBMITTALS

1.2.1. Materials List/Product Data: Submit complete materials list, including catalogue data, of all materials, equipment, and products.

1.2.2. Samples: Accompanying Materials List, submit two (2) samples of each type of specified sealant, including color range available.

1.2.3. Test Data:

1.2.3.1. Staining: Provide test data, performed on concrete, demonstrating no staining or discoloration of adjacent substrate from sealant or primer.

1.2.4. Certifications: As a condition of acceptance, submit certification stating that sealants and joint treatments are installed per submittal and are complete and ready for intended function.

1.3. QUALITY ASSURANCE

1.3.1. Qualifications: Provide adequate numbers of skilled staff, thoroughly trained and experienced in the necessary craft and installation methods associated with the specified products.

1.4. COORDINATION

1.4.1. Coordination: Sequence all work to assure an orderly progress in the project, without removal of previously installed work, and so as to prevent damage to finishes and products.

1.5. DELIVERY, STORAGE, AND HANDLING

1.5.1. Protection: Use all means necessary to protect work in this Section before, during and after installation and to protect the installed work and materials of all other trades.

1.5.2. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.5.3. Product Storage: Do not retain on site any material which has exceeded the shelf life recommended by the manufacturer.

1.6. GUARANTEE

1.6.1. Contractor's Guarantee:

1.6.1.1. Provide Owner with written Guarantee per Section 00 65 36 on Contractor's letterhead, and signed by General Contractor and sealant system subcontractor.

1.6.1.2. Provide guarantee for a time period of five years, commencing from the date of final acceptance of the project, against the following defects:

1.6.1.2.1. Adhesive or cohesive sealant joint failure.

1.6.1.2.2. Pin holes or blistering of sealant joint.

1.6.1.2.3. Staining of adjacent substrate or surrounding material.

1.6.1.2.4. Chalking or color change exceeding manufacturers published data.

1.6.1.3. Make inspections and emergency repairs to defects or leaks in the sealant system within twenty-four (24) hours of receipt of notice from the Owner.

1.6.1.4. Restore the affected areas to the standard of the original specifications as soon as weather permits.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. SEALANTS

2.2.1. General:

2.2.1.1. All sealants for any one Type shall be the product of a single manufacturer, suitable for the intended use, and per the following product characteristics.

2.2.1.2. Unless noted otherwise, use sealants in application as defined below.

2.2.1.3. For other applications provide products especially formulated for the proposed use and approved in advance by the Architect.

2.2.2. Product Characteristics:

2.2.2.1. Type 1: Unless noted otherwise, at exterior openings, joints, material transitions, bedding, and other conditions where anticipated joint movement will be plus/minus 25% or less.

2.2.2.1.1. Products: Dow Corning 795, Pecora 895, Tremco Tremsil 600, or equal.

2.2.2.2. Type 2: At all exposed metal to metal wall and roof flashing conditions, all exposed prefinished metal roofing and flashing conditions; storefront perimeter conditions, and all other conditions where anticipated joint movement will be plus/minus 25 - 50%.

2.2.2.2.1. Products: Dow Corning 795, GE Silicones Silglaze II, Tremco Spectrum 2, or equal.

2.2.2.3. Type 3: At horizontal concrete paving joints exposed to pedestrian and vehicular traffic, and all joints subject to immersion:

2.2.2.3.1. Products: Pecora DynaTred, Tremco Vulkem 45SSL, Sonneborn NP2, or equal.

2.2.2.4. Type 4: Exterior application in conjunction with wood products:

2.2.2.4.1. Tremco Vulkem 116, Sika Sikaflex-1a, Sonneborn NP1, or equal.

2.2.2.5. Type 5: Pipes and conduits penetrating underground walls:

2.2.2.5.1. Sealant compatible with waterproofing system.

2.2.2.6. Type 6: Interior applications in conjunction with sanitary conditions (non-food use):

2.2.2.6.1. Products: General Electric Silicone Sanitary Sealant 1702, Dow Corning 786, Pecora 898 Sanitary Silicone Sealant, or equal.

2.2.2.7. Type 7: Interior sound control applications.

2.2.2.7.1. Products: USG Sheetrock Acoustical Sealant, Pecora AC-20 FTR, Tremco Acoustical Sealant, or equal.

2.2.2.8. Type 8: Unless noted otherwise, at interior openings, joints, material transitions and bedding, at locations shown on drawings, and other conditions where anticipated joint movement will be 25% or less.

2.2.2.8.1. Products: Pecora 864, Dow Corning 795, Sonneborn Omniseal, or equal.

2.2.2.9. Type 9: At all concealed prefinished metal roofing and flashing conditions, provide butyl sealant as recommended by metal roofing manufacturer.

2.2.2.10. Type 10: At all metal flashing and gutter joints subject to periodic or continuous water immersion:

2.2.2.10.1. Products: Dow Corning 799, Pecora 863, or equal.

2.2.2.11. Type 11: At joints in acoustical laminated glass:

2.2.2.11.1. Products: Dow Corning 795, Pecora 895, Tremco Tremsil 600, or equal.

2.2.2.12. For other applications provide products especially formulated for the proposed use and approved in advance by the Architect.

2.2.3. Colors:

2.2.3.1. Colors for each sealant application will be selected by the Architect from standard colors normally available from the manufacturers complete line of running line colors, including premium and special color lines for each specified product.

2.2.3.2. Should such standard color not be available from the approved manufacturer except at additional charge, provide such colors at no additional cost to the Owner.

2.2.3.3. In concealed installations, and in partially or fully exposed installations where approved by the Architect, use standard gray or black sealant.

2.3. WALL TO STOREFRONT MULLION CLOSURE

2.3.1. Pre-compressed Joint Filler: Provide Willseal 600 or equal, precompressed joint filler material, full width of wall, thickness sized for 20% compression.

2.3.2. Closure Filler: Provide high density neoprene backer, 1/4 inch thickness, both sides with adhesive backing.

2.4. ACCESSORIES

2.4.1. Pre-compressed Joint Filler: Provide Willseal 600 or equal, precompressed joint filler material, full width of wall, thickness sized for 20% compression.

2.4.2. Primers: Provide primer as specifically recommended for this installation by the manufacturer of the sealant used and have been tested for staining, adhesion and durability on all applicable surfaces.

2.4.3. Back-Up Materials: Use only those backup materials which are specifically recommended for this installation by the sealant manufacturer, non-absorbent and non-staining.

2.4.4. Masking Tape: For masking around joints, provide an appropriate masking tape which will effectively prevent application of sealant on surfaces not scheduled to receive it, and which is removable without damage to substrate.

2.5. OTHER MATERIALS

2.5.1. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Concrete and Masonry Surfaces:

3.2.1.1. Install only on surfaces which are dry, sound, and well brushed, wiping free from dust.

3.2.1.2. At open joints, remove dust by mechanically blown compressed air if so required.

3.2.1.3. To remove oil and grease, use sandblasting or wire brushing.

3.2.1.4. Where surfaces have been treated, remove the surface treatment by sandblasting or wire brushing.

3.2.1.5. Remove laitance and mortar from joint cavities.

3.2.2. Steel Surfaces:

3.2.2.1. Unprimed or unfinished steel surfaces in contact with sealant:

3.2.2.2. Sandblast as required to achieve acceptable surface for bond.

3.2.2.3. If sandblasting is not practical, or would damage adjacent finish, scrape the metal or wire brush to remove mill scale and rust.

3.2.2.4. Use solvent to remove oil and grease, wiping the surfaces with clean white rags only.

3.2.2.5. Remove protective coatings on steel by sandblasting or by using a solvent which leaves no residue.

3.3. INSTALLATION OF ACCESSORY MATERIALS

3.3.1. When using backup of tube or rod stock, avoid lengthwise stretching of material. Do not twist or braid hose or rod backup stock.

3.3.2. Prime joints in accordance with manufacturers recommendations.

3.3.3. Provide an approved bond-breaker where recommended by sealant manufacturer.

3.4. INSTALLATION OF SEALANTS

3.4.1. Prior to start of installation in each joint, verify the joint type according to details on the drawings, or as otherwise directed by the Architect, and verify that the required proportion of width of joint to depth of joint has been secured.

3.4.2. Equipment:

3.4.2.1. Apply sealant under pressure with power-actuated hand gun or manually-operated hand gun, or by other appropriate means.

3.4.2.2. Use guns with nozzle of proper size, and providing sufficient pressure to completely fill the joints as designed.

3.4.2.3. Do not use pourable sealant installation method at hardscape paving joints.

3.4.3. Thoroughly and completely mask joints where the appearance of primer or sealant on adjacent surfaces would be objectionable.

3.4.4. Install the sealant in strict accordance with the manufacturer's recommendations, thoroughly filling joints to the recommended depth.

3.4.4.1. Use of sealant dams contained within the hardscape joint is not permitted. Install sealant without interruption from end to end of joint.

3.4.5. Tool joints to the profile shown on the Drawings, or as otherwise required if such profiles are not shown on the Drawings.

3.4.5.1. Tool joints to a smooth and consistent transition. Do not leave ripples, strings, or surface tooling marks in sealant.

3.4.6. Unless otherwise specified, at all sound rated wall and floor assemblies, seal penetrations and recessed items through the floors and walls with Type 7 sealant. Seal all penetrations such as electrical device cover plates, pipes, fire extinguisher cabinets and similar penetrations in room surfaces.

3.5. CLEANING

3.5.1. Remove masking tape immediately after joints have been tooled.

3.5.2. Clean adjacent surfaces free from sealant as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.

3.5.3. Upon completion of the work of this Section, promptly remove from the job site all debris, containers, and surplus material derived from this portion of the Work.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Hollow metal rolled steel doors, non-rated and rated for fire resistance.

1.1.2. Hollow metal rolled steel door frames, non-rated and rated for fire resistance.

1.1.3. Hollow metal rolled steel borrowed lite and window frames, non-rated and rated for fire resistance.

1.2. QUALITY ASSURANCE

1.2.1. Certification of Labeled Construction: After notifying Architect of oversize requirements, furnish inspection certificate certifying component construction conforms to UL rating requirements.

1.2.2. Hollow metal supplier shall be a qualified direct distributor of specified products.

1.2.2.1. Distributor shall employ a an A.H.C./C.D.C. or person of equivalent experience who will be available at reasonable times to consult with the architect and owner regarding all matters affecting work of this Section.

1.2.3. Hollow metal supplier shall be a member of the Steel Door Institute or Hollow Metal Manufacturers Association Division of NAAMM.

1.2.4. Perform work in accordance with standards of the Steel Door Institute and as required by this Section.

1.2.4.1. Where more restrictive than referenced standards, comply with requirements of this Section.

1.2.5. Provide written certification all doors conform to Level 'A' criteria of ANSI-A-250.4 , including testing to 2,000,000 operating cycles.

1.2.6. Provide written certification all door frames conform to Level 'A' criteria of ANSI-A-250.5 , including testing to 1,000,000 operating cycles.

1.2.7. Where exterior window wall frames and mullions occur, design for wind load resistance in accordance with Chapter 16A, Title 24, CCR.

1.2.7.1. Provide engineering based on Wind Speed of 70 miles per hour, Exposure C condition.

1.3. REGULATORY REQUIREMENTS

1.3.1. Conform to Chapters 7 and 10, Part 2, Title 24, CCR for fire rated frames and doors.

1.3.2. Construct fire rated door panel and frame construction in conformance with NFPA 252.

1.3.3. Install fire rated frame and door assemblies in conformance with NFPA 80, UL/WH approval listing and manufacturers instructions.

1.4. SUBMITTALS

1.4.1. Submit shop drawings and product data under provisions of Division 01.

1.4.1.1. Provide shop drawings illustrating system and component dimensions, components within assembly, framed opening requirements and tolerances, anchorage and fasteners; glass and infills; and affected related work.

1.4.1.2. Provide, where required, shown or specified, custom modifications to manufacturers or referenced standard, including material gage, anchorage, dimension and fabrication criteria.

1.4.1.3. Provide manufacturer's installation instructions and listing requirements.

1.4.2. Samples:

1.4.2.1. Provide one 12 inch square sample of each type of door, cut at corner, showing edge treatment and core material. Indicate compliance with specified requirements.

1.5. DELIVERY, STORAGE AND PROTECTION

1.5.1. Deliver doors and frames cardboard wrapped, crated, palletized or otherwise protected during transit and site storage.

1.5.2. Inspect doors and frames upon delivery for damage. Minor damage may be repaired provided refinished items are equal in all respects to new work and accepted by the Architect; otherwise remove and replace damaged items.

1.5.3. Store doors and frames at the building site in a dry secure place.

1.5.3.1. Place units on minimum 4 inch high wood blocking.

1.5.3.2. Store in vented shelters.

1.5.3.3. If cardboard wrapper on door becomes wet, remove carton immediately.

1.5.3.4. Provide 1/4 inch spaces between stacked doors to promote air circulation.

1.6. SEQUENCING AND SCHEDULING

1.6.1. Order and deliver all doors and frames so as not to delay progress of work of other Sections.

2. PART 2 - PRODUCTS

2.1. STEEL DOORS -- HOLLOW METAL

2.1.1. Manufacturer: Characteristics of specific products manufactured by Curries Company www.curries.com are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Division 01.

2.1.2. Type/Series:

2.1.2.1. Type: Flush, Hollow metal, with core material and vertical steel channel stiffeners as indicated herein.

2.1.2.2. Series:

2.1.2.2.1. Interior: 707T except doors #XXX and #XXX shall be 747T.

2.1.2.2.2. Exterior: 747T .

2.1.2.3. Style: As shown on drawings.

2.1.3. Construction:

2.1.3.1. Grade:

2.1.3.1.1. Interior Doors: Level 2 per ANSI 250.8.

2.1.3.1.2. Exterior Doors: Level 3 per ANSI 250.8.

2.1.3.2. Material: Cold Rolled Steel per ASTM A 653, CS grade, A 60 galvanized at interior doors, G 90 galvanized at exterior doors, extra smooth.

2.1.3.3. Thickness: 1-3/4 inch.

2.1.3.4. Face Sheet Gauge

2.1.3.4.1. Exterior Doors: 16 gage.

2.1.3.4.2. Interior Doors: 16 gage.

2.1.3.5. Edge Seams: Continuously welded and ground smooth. Filler not acceptable.

2.1.3.6. Core:

2.1.3.6.1. Exterior Doors: Provide fiberglass between stiffeners, minimum .75 pcf density.

2.1.3.6.2. Interior Doors: Provide foamed in place polyurethane core, minimum 1.0 pcf density, R value of 12.5.

2.1.3.6.3. Fire Rated Doors: Provide core as required to comply with rating shown on drawings.

2.1.3.7. Vision Glass Frame: Anemostat Series FGS-75, www.anemostat.com, or equal, factory primed and finish painted per Section 09900. Refer to Section 08800 for glazing.

2.1.3.8. Louvers: As specified in this Section.

2.1.3.9. Transom (where shown): Same construction and finish as door.

2.1.4. Electric Through-wired Doors:

2.1.4.1. Where indicated on schedule, doors to be prepped for electrified hardware: Provide doors in these openings with through-wires in a factory prepared, concealed channel within the door.

2.1.4.1.1. Manufacturer shall engineer concealed channel (drilled core) to travel from locking device to center hinge[s] of opening system.

2.1.4.1.2. Through-wires to be UL Listed, and factory installed in door before shipped to jobsite.

2.1.4.2. Coordinate wire runs with electrified locking devices.

2.1.4.2.1. Match number of wires for each electrified device per opening condition. Accommodate up to twelve wires.

2.1.4.2.2. Each end of wires to be directly connected to the electrified hardware and the electric hinge.

2.1.5. Finish:

2.1.5.1. At exterior doors, provide Hot Dip Galvanized finish per ASTM A 653, A 90 classification, extra smooth.

2.1.5.2. Provide spray applied primer at all interior doors per ANSI A250.10.

2.1.6. Fire Criteria:

2.1.6.1. Provide rated doors per referenced standards and as scheduled on drawings.

2.2. STEEL DOOR AND WINDOW FRAMES – HOLLOW METAL

2.2.1. Manufacturer: Characteristics of specific products manufactured by Curries Company, are indicated to establish required level of quality, appearance, and performance. The Architect will consider comparable products by alternate manufacturers listed in this Section, and requests for substitutions, under the provisions of Division 01.

2.2.2. Type: Unless noted otherwise, wrap around, double rabbet, flush frames, fully welded as specified.

2.2.3. Construction:

2.2.3.1. Material: Cold Rolled Steel per ASTM A 653, CS Grade, A 60 galvanized, extra smooth.

2.2.3.2. Face Dimension: 2 inches, unless otherwise shown on drawings.

2.2.3.3. Gage

2.2.3.3.1. Exterior: 14 gage.

2.2.3.3.2. Interior: 16 gage.

2.2.3.4. Gasketing/Weatherseal: As specified in this Section.

2.2.3.5. Glazing: Per Section 08 81 00.

2.2.4. Finish:

2.2.4.1. At exterior frames, provide Hot Dip Galvanized finish per ASTM A 653, G 90 classification, extra smooth.

2.2.4.2. Provide spray applied primer at all interior frames per ANSI A224.1.

2.2.4.3. Provide bituminous paint coating at interior surface of grout filled frames.

2.2.5. Anchors:

2.2.5.1. Provide minimum 18 gage head and jamb anchors suitable for wall condition and in configuration for welded in place installation.

2.2.6. Glass Stops:

2.2.6.1. Manufacturer's standard glass stop, minimum 5/8 inch high for glass area under 500 square inches and minimum 3/4 inch high for glass area over 500 square inches.

2.2.6.2. Glass stop shall be attached with countersunk Phillips head screws. .

2.2.6.3. Adjust glass stop size as required to accommodate listing requirements for fire rated glazing specified in Section 08 81 00.

2.2.7. Fire Criteria:

2.2.7.1. Provide rated frames per referenced standards and as scheduled on drawings.

2.3. FABRICATION

2.3.1. General

2.3.1.1. Fabricate all doors and frames in accordance with ANSI 250.8 except where more stringent requirements are specified.

2.3.1.2. Supply only doors and frames manufactured by a single manufacturer.

2.3.2. Door Construction

2.3.2.1. Unless otherwise required by hardware specified in other Sections, bevel vertical lock edges 1/8 inch in 2 inches.

2.3.2.2. Door lock edge reinforcing: one-piece, full height 14 gage channel.

2.3.2.3. Closer reinforcing: one-piece, minimum 12 gage plate.

2.3.2.4. Door hinge edge reinforcing: one-piece, full height 12 gage channel, formed and tapped for hinges, with additional 7 gage reinforcement at each hinge.

2.3.2.5. Weld both hinge and lock channels to each door face sheet.

2.3.2.6. Provide minimum 16 gage top and bottom channels, flush or inverted, and welded to face sheets.

2.3.2.6.1. Close tops of outswinging exterior doors flush by the addition of steel top channel filler.

2.3.3. Frame Construction

2.3.3.1. Fully weld all frame intersections . Weld face trim, tabs and frame soffit with continuous fillet weld. Grind all welds smooth. Repair specified finish.

2.3.3.2. At all openings provide continuous welds at all horizontal to vertical sections, including stop sections and rabbets on exterior side. Weld face trim, tabs, rabbets, and frame soffit with continuous fillet weld.

2.3.3.3. Provide temporary shipping bars for protection from damage during transit and handling.

2.3.3.4. Remove temporary spreaders before setting frames.

2.3.3.5. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

2.3.3.6. Prepare door frame for silencers. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.

2.3.3.7. Where required by listing, attach fire rated label to each frame unit requiring such rating.

2.3.3.8. Supply welded in mortar guards at all hardware cutouts in frames built into masonry or grouted.

2.3.3.9. Fabricate window frames for glass thickness as shown on drawings or specified. Provide roll formed integral stop portion of frame on interior side of frame.

2.3.3.10. Provide loose glass stops, located on exterior of exterior window frame. Fasten using Phillips/spanner head screws, located as necessary to assure compression of glass against weatherseal.

2.3.4. Frame Anchors

2.3.4.1. Wall anchors for drywall/frame partitions:

2.3.4.1.1. Provide steel or wood stud anchors sized to accommodate frame jamb depth and face dimension on all welded frames.

2.3.4.2. Provide frame jamb anchors at 30 inches on center (or fractional portion) on each jamb.

2.3.4.3. Floor anchors:

2.3.4.3.1. Where access to back of frame is possible, provide angle clip type, 16 gage minimum, welded to the bottom of each jamb.

2.3.4.3.2. Where stud framed wall occurs at concrete curb, provide additional jamb anchor at each jamb, installed at approximately 7 inches above finish floor.

2.3.5. Hardware Preparation

2.3.5.1. Reinforcement: reinforce components for hardware installation in accord with ANSI A 250.8 and A250.6 and the following criteria.

2.3.5.1.1. Provide 'box' type lock reinforcing, minimum 16 gage.

2.3.5.1.2. Provide minimum 7 gage hinge reinforcing, welded to minimum 12-gage full height channel.

2.3.5.1.3. Provide minimum 12 gage closer reinforcement.

2.3.5.1.4. Provide minimum 12 gage reinforcement at other hardware locations.

2.3.5.2. Locate factory prepared hardware locations in compliance with "Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames", as adopted by The Steel Door Institute.

2.4. GASKET AND WEATHERSEAL

2.4.1. Type 1: Provide wet seal at exterior window assemblies, using Type 1 sealant per Section 07 90 00 silicone sealant at exterior, and approved glazing tape at interior, color as selected by Architect. Alternate weatherseal methods may be approved by Architect.

2.4.2. Type 2: Provide dry seal installation at Interior window assemblies, using glazing tape, thickness as necessary for installation, in accord with fire rating requirements.

2.4.3. Accessories: Provide neoprene setting blocks, edge blocks and other accessories as necessary for complete installation in accordance with referenced standards.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Set all frames in accord with SDI 105 and as specified.

3.2.1.1. Use of wire tie method is not acceptable.

3.2.2. Set welded frames in position prior to beginning partition work. Brace frames until permanent anchors are set.

3.2.2.1. Use of KD frames not permitted.

3.2.3. Set anchors for frames as work progresses. Install anchors at hinge and strike levels.

3.2.3.1. Where frame is accessible from back, install sill/floor anchors to slab or floor assembly.

3.2.3.2. Where wall framing is installed on concrete curb, install jamb anchor at approximately 7 inches above floor level.

3.2.3.3. Install two head anchors per frame with width exceeding 3 feet and less than 6 feet wide. Install three anchors, equally spaced, at wider frames.

3.2.4. Use temporary setting spreaders at all locations. Use intermediate spreaders to assure proper door clearances and header braces for grouted frames.

3.2.5. Install all fire rated frames in accord with NFPA-80 requirements, UL listing and manufacturers installation requirements.

3.2.6. Fill all voids in door and window frames at exterior framed walls with R-11 unfaced insulation as specified in Section 07 21 00 and detailed on drawings.

3.2.7. Where hollow metal window frames are shown at exterior conditions, install stops at glass with wet seal method at exterior:

3.2.7.1. Provide heel sealant bead at joint between glass and integral frame stop.

3.2.7.2. Provide sealant cap bead at joint between glass and loose stop, tooled neatly per Section 07 90 00.

3.2.8. Provide preformed gasket or tapes at interior window assemblies.

3.3. DOOR INSTALLATION

3.3.1. Install hollow metal doors in frames using specified hardware.

3.3.2. Clearance at edge of doors:

3.3.2.1. Between door and frame at head and jambs: 1/8 inch.

3.3.2.2. Meeting edges of doors and mullions: 1/8 inch.

3.3.2.3. Transom panels, without transom bars: 1/8 inch.

3.3.2.4. Sills without thresholds: 5/8 inch maximum above finish floors.

3.3.2.5. Sills with thresholds: 1/8 inch above threshold.

3.4. ADJUSTMENT AND CLEANING

3.4.1. Remove dirt and excess sealants, mortar, or glazing compounds from exposed surfaces.

3.4.2. Adjust moving parts for smooth operation. Use shims if necessary to allow for proper closing.

3.4.3. Where approved by Architect, fill all dents, holes, and similar defects with epoxy metal filler. Where required by Architect, fill all dents, holes and similar defects with weld material. After filling, grind smooth and flush with adjacent surface. Provide approved zinc rich primer at all galvanized products.

3.4.4. Touch up abrasions with primer.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Access doors and frames.

1.2. REGULATORY REQUIREMENTS

1.2.1. Manufacture fire rated access doors and frames to conform to UL 10B, and Title 24, CCR, Part 2.

1.2.2. Provide labels indicating rating.

1.3. SUBMITTALS

1.3.1. Submit product data under provisions of Section 01 33 00.

1.3.2. Submit schedule indicating location of access panels per Article 2.1 below. Provide shop drawings defining clearances and alignment with other finish materials and components, including light fixtures, mechanical air registers, and related items.

2. PART 2 - PRODUCTS

2.1. ACCESS DOOR UNITS

2.1.1. Manufacturer: Characteristics of specific products manufactured by Karp, Inc. are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00. Milcor is an acceptable manufacturer.

2.1.2. Applications and Series

2.1.2.1. Non-Rated Wall/Ceiling – Exposed face: Style DSC-214M.

2.1.2.2. Non-Rated Gypsum board ceiling – KSTDW sesame drywall ceiling hatch, or equal.

2.1.3. Size and Location:

2.1.3.1. Provide at all locations necessary to access all electrical components, valves, controls, damper resetting mechanisms, and other components requiring maintenance, inspection, adjustment, or reset.

2.1.3.2. Provide panels of such size as necessary to remove largest single component requiring maintenance or replacement. Unless noted otherwise on drawings, provide minimum 24 x 24 inch square panel size at all operating and surgical procedure rooms, and 18 x 18 inches square panel size at all other applications.

2.1.4. Hinge and Locking Mechanism:

2.1.4.1. Provide continuous piano hinge with stainless steel pin.

2.1.4.2. At areas accessible to public, provide cylinder lock with latch.

2.1.4.3. Provide flush latch release ring at all fire rated access doors in non-public areas.

2.1.4.4. Provide flush cam lock configured for screwdriver operation at all non-rated access doors in non-public areas.

2.1.4.5. Provide three keys for each lock configuration. Coordinate with keying criteria defined by Owner.

2.1.4.6. Provide release latch accessible from push side of access panel.

2.1.5. Fire Resistivity:

2.1.5.1. Fire Rating: UL Labeled 1-1/2 hour B fire rating at panels installed in rated assemblies.

2.1.5.2. Temperature Rating: Temperature rise limited to 250 degrees F maximum at 30 minutes.

2.1.6. Finish:

2.1.6.1. Provide stainless steel, Type 304, Number 4 finish at the following areas:

2.1.6.1.1. All exterior surfaces.

2.1.6.1.2. All janitor and laundry areas.

2.1.6.1.3. All shower/toilet rooms.

2.1.6.2. Provide prime coat paint finish at all other applications.

2.1.7. Options

2.1.7.1. Provide continuous 1/16 inch x 3/8 inch neoprene gaskets at all non-fire rated access panels.

2.2. OTHER MATERIALS

2.2.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. ACCESS PANEL LOCATIONS

3.2.1. Review all portions of the work, including electrical, mechanical, plumbing, and fire protection systems.

3.2.2. Based on such review, provide all access panels necessary, whether shown on drawings or not, required to comply with product characteristics defined in this Section.

3.2.3. Coordinate location and alignment of access panels with finish materials and other construction. Verify all alignment issues with Architect.

3.3. INSTALLATION

3.3.1. Install frame plumb and level in wall and ceiling openings. Locate in proper position and alignment, providing convenient access to concealed components.

3.3.2. Secure rigidly in place in accordance with manufacturer's instructions.

3.3.3. Prior to closing of work, obtain Districts inspector approval of panel size and location selection by an actual reach and removal test. Relocate or replace panels not providing acceptable access or service capability.

3.3.4. Paint all exposed fasteners, frames and hardware to match adjacent construction.

END OF SECTION

SECTION 08 35 14

ACOUSTICAL GLASS PANELS

1. PART 1 - GENERAL

1.1. DESCRIPTION

1.1.1. General

1.1.1.1. Furnish and install operable partitions and suspension system. Provide all labor, materials, tools, equipment, and services for operable walls in accordance with provisions of contract documents.

1.2. RELATED WORK BY OTHERS

1.2.1. Preparation of opening will be by General Contractor. Any deviation of site conditions contrary to approved shop drawings must be called to the attention of the architect.

1.2.2. All header, blocking, support structures, jambs, track enclosures, surrounding insulation, and sound baffles as required in 1.4 Quality Assurance.

1.2.3. Pre-punching of support structure in accordance with approved shop drawings.

1.2.4. Paint or otherwise finishing all trim and other materials adjoining head and jamb of operable partitions.

1.3. SUBMITTALS

1.3.1. Complete shop drawings are to be provided prior to fabrication indicating construction and installation details. Shop drawings must be submitted within 60 days after receipt of signed contract.

1.4. QUALITY ASSURANCE

1.4.1. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.

1.4.2. The partition STC (Sound Transmission Classification) shall be achieved per the standard test method ASTM E90-99 and E413-87. Test run under ASTM procedures prior to E90-99 shall not be permitted. All tests must be from an independent, currently operating, NIST-accredited Laboratory available to verify results.

1.5. PRODUCT DELIVERY, STORAGE, AND HANDLING

1.5.1. Proper storage of partitions before installation, and continued protection during and after installation will be the responsibility of the General Contractor.

1.6. WARRANTY

1.6.1. Partition Panels shall be guaranteed for a period of two years with all mechanical parts including track and carriers guaranteed for a period of five years. This guarantee is against defects in material or workmanship of manufacturer's product.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Manufacturers: Subject to compliance with requirements, provide products by the following:

2.1.1.1. Moderco Inc. – as distributed by L2 Specialties, Inc – 714.979.5507

2.2. MATERIALS

2.2.1. Product to be top supported Crystal Acoustical Glass panels as manufactured by Moderco Inc., or equal.

2.2.1.1. Panels shall be nominally 4" [102mm] thick, in manufacturer's standard widths up to 60" [1525mm].

2.2.1.2. For glass panels refer to drawings and Section 08 81 00 Glass and Glazing for glass type.

2.2.1.3. Frames shall be a composite of steel and aluminum alloys, formed to protect the edges of the glass.

2.2.1.4. Interlocking vertical seals between the panels shall consist of tongue and groove aluminum and vinyl astragals creating a shock-absorbing, deep nesting, impact resistant acoustical interlock between panels.

2.2.1.5. Horizontal top seals shall be continuous contact multi-fingered vinyl.

2.2.1.6. Horizontal bottom seals shall be automatically setting and retracting, providing 2" [50mm] nominal clearance, and exert downward force when extended.

2.2.2. Weight of the panels shall be 13 lbs./sq. ft. plus or minus 1 lb. [63 kg/sq.m] based on options selected.

2.2.3. Suspension system:

2.2.3.1. Track shall be clear anodized tempered aluminum with soffit trim of clear anodized aluminum providing a transition to the ceiling. Track shall include support brackets and hanger rods, spaced to manufacturer's standards.

2.2.3.1.1. Each panel shall be supported by two dual horizontal wheel trolley assemblies made of glass-reinforced, self lubricating nylon with steel precision ground bearings. Carrier design shall use a counter rotating concept to move panels along the track and through 90 degree "L", "T", & "X" intersections. Carriers using friction discs shall not be permitted.

2.2.4. Finishes:

2.2.4.1. For glass finish refer to drawings and Section 08 81 00 Glass and Glazing.

2.2.4.2. Frame color shall be clear anodized aluminum

2.2.4.3. Aluminum track and soffit shall be clear anodized.

2.2.5. Accessories/Options:

2.2.5.1. Full-height passdoor (pivot panel).

2.3. OPERATION

2.3.1. Panels shall be manually operated, top supported, moved individually from the storage area, positioned in the opening, and seals set.

2.3.2. Retractable Bottom Seals

2.3.2.1. Bottom seals shall automatically activate as panels are deployed / positioned without the use of any handle or action by the operator and shall automatically retract when panels are moved to be stored. or

2.3.3. Final partition closure to be by:

2.3.3.1. Pivot Closure Panel permanently positioned at the back end of the partition. Panel permits access between adjacent rooms and shall be of the same finish as basic panels. Top and bottom seals shall be continuous contact multi-ply vinyl.

2.4. ACOUSTICAL PERFORMANCE

2.4.1. Acoustical performance shall be tested at an independent laboratory in accordance with ASTM E90-99 Test Standards. Standard panel construction shall have obtained an STC rating of 44.

2.4.1.1. Copies of the written test report are to be made available upon request.

3. PART 3 - EXECUTION

3.1. INSTALLATION.

3.1.1. The complete installation of the operable wall system shall be by an authorized factory-trained installer and be in strict accordance with the approved shop drawings and manufacturer's standard printed specifications, instructions, and recommendations.

3.2. CLEANING

3.2.1. All track and panel surfaces shall be wiped clean and free of handprints, grease, and soil.

3.2.2. Packing and other installation debris shall be removed from the job site.

3.3. TRAINING

3.3.1. Installer shall demonstrate proper operation and maintenance procedures to owner's representative.

3.3.2. Operating handle and owner's manuals shall be provided to owner's representative.

END OF SECTION

SECTION 08 41 00

ALUMINUM STOREFRONTS, ENTRANCES AND WINDOWS

1. PART 1 - GENERAL

1.1. WORK INCLUDED

1.1.1. Aluminum storefront, entrances and entrance frames.

1.1.2. Aluminum windows, fixed and operable.

1.1.3. Anchors, brackets, and attachments.

1.1.4. Perimeter sealant.

1.2. WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

1.2.1. Section 08 71 00 - Door Hardware.

1.3. REFERENCES

1.3.1. ANSI/ASTM A 36 - Structural Steel.

1.3.2. ASTM A 167 - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

1.3.3. ASTM A 653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.

1.3.4. ANSI/ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bar, Rod, Wire, Profiles, and Tube.

1.3.5. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.

1.3.6. ASTM E 283 – Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences Across the Specimen

1.3.7. ASTM E 330 – Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference

1.3.8. ASTM E 331 – Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference

1.3.9. FS TT-P-645 - Primer, Paint, Zinc Chromate, Alkyd Type.

1.4. QUALITY ASSURANCE

1.4.1. Manufacturer

1.4.1.1. Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.4.2. Staff

1.4.2.1. Use only personnel who are thoroughly trained and experienced in the skills required and have installed similar applications of the specified products within one year prior to beginning work of this section.

1.4.2.2. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5. SUBMITTALS

1.5.1. Submit shop drawings and product data under provisions of Section 01 33 00.

1.5.2. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.

1.5.3. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.5.4. Submit samples under provisions of Section 01 33 00.

1.5.5. Submit four samples, 3 x 5 inches in size, illustrating prefinished aluminum surface.

1.6. DELIVERY, STORAGE, AND HANDLING

1.6.1. Deliver and handle system components under provisions of Section 01 60 00.

1.6.2. Store and protect system components under provisions of Section 01 60 00.

1.6.3. Provide wrapping to protect prefinished aluminum surfaces.

1.7. WARRANTY

1.7.1. Warranty

1.7.1.1. Provide, in Architect approved form, the Owner with a guarantee against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

1.7.1.1.1. Broken, cracked or otherwise damaged glass not resulting from vandalism or glass failure.

1.7.1.1.2. Water intrusion through storefront system.

1.7.1.1.3. Sealant failure.

2. PART 2 - PRODUCTS

2.1. ALUMINUM STOREFRONT SYSTEM

2.1.1. Basis of Design: Characteristics of specific products manufactured by Kawneer Company are indicated to establish required level of quality, appearance, and performance. The Architect will consider comparable products by alternate manufacturers listed in this Section, and requests for substitutions, under the provisions of Section 01610.

2.1.1.1. Acceptable Alternate Manufacturers: EFCO Corp., Traco, or equal.

2.1.1.2. Drawings and specifications indicate sizes, profiles, and dimensional requirements, and are based upon the specific products indicated in this Section. Do not modify intended aesthetic effect, as judged solely by the Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Submit comprehensive explanatory data to Architect for review where modifications are proposed.

2.1.2. Type: Centerset, flush glazed storefront system, glass captured on four sides, with aluminum entrance frames and doors.

2.1.3. Storefront Framing System:

2.1.3.1. Series: TriFab VG 451.

2.1.3.2. Size: Nominal 2 x 4-1/2 inch profile.

2.1.3.2.1. Provide flush glazing pocket and fillers as required for infill material.

2.1.3.2.2. Provide applied glazing stops and weatherstripping stops as shown on drawings.

2.1.3.2.3. Provide all framing components required for a complete system.

2.1.3.3. Performance:

2.1.3.3.1. Base design load on 85 MPH wind speed, (3 second gust) Exposure C, and per Chap. 16A, Part 2, Title 24, CCR.

2.1.3.3.2. Deflection: Assembly limited to 1/175 at 20 PSF static air load per ASTM E 330.

2.1.3.3.3. Breakage: At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2 percent of their clear spans shall occur.

2.1.3.3.4. Air Infiltration: Assembly limited to 0.06 CFM per square foot at 6.24 PSF in accordance with ASTM E 283.

2.1.3.3.5. Water Resistance: No water penetration of assembly at 8.00 PSF in accordance with ASTM E 331 and AAMA 501.

2.1.3.3.6. Thermal Movement: No damage to system or components resulting from expansion and contraction within system components caused by a cycling temperature range of 170 F degrees.

2.1.3.3.7. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.

2.1.3.4. Accessories

2.1.3.4.1. Sill aprons and other aluminum finish pieces shall be brake formed or extruded, prefinished to match storefront, and attached with concealed fasteners.

2.1.3.4.2. Provide continuous aluminum sill flashing at all storefront sill conditions. Extend sill flange up wall 2 inches at wall terminations.

2.1.3.4.3. Provide all reinforcing and stiffeners, including concealed steel fabrications, required to comply with specified loading criteria and within profiles and design as shown on drawings.

2.1.3.4.4. Provide continuous steel insert at all entrance door jambs, with cathodic separation.

2.1.4. Finishes:

2.1.4.1. Exposed Aluminum Surfaces:

2.1.4.1.1. Finish Type: PVDF coating, complying with AAMA 605.2-92, consisting of 70% Kynar 500/Hylar 5000 fluorpolymer resin.

2.1.4.1.2. Manufacturer: PPG or equal.

2.1.4.1.3. Finish Type: Clear anodized coating, AA-A41 designation.

2.1.4.2. Concealed Steel Items: Prime with VOC compliant primer.

2.1.4.3. Protection of Contact Surfaces: Coat contact surfaces of aluminum surfaces in contact with dissimilar metals or with incompatible materials such as concrete, masonry or plaster with alkali-resistant bituminous paint coating before installation, or isolate with approved tape or gaskets.

2.1.4.4. When all components prefinished in a single color or finish can not be completed in the same day, label and bundle separately all such components so as to maintain maximum color match.

2.1.5. Entrance Door System

2.1.5.1. Series: Series 350 Tuffline, modified as specified below.

2.1.5.2. Mounting: Off-set, single acting outward.

2.1.5.3. Head rail Dimension: 6 inches high, and as necessary to accommodate specified closer.

2.1.5.4. Bottom rail Dimension: 10 inches high.

2.1.5.5. Glass stops: Square.

2.1.5.6. Finish: Prefinished to match storefront system.

2.1.5.7. Mounting: Off-set, single acting outward.

2.1.5.8. Head rail Dimension: 6 inches high, and as necessary to accommodate specified closer.

2.1.5.9. Bottom rail Dimension: 10 inches high.

2.1.5.10. Glass stops: Square.

2.1.5.11. Finish: Prefinished to match storefront system.

2.1.6. Entrance Door Hardware

2.1.6.1. Weatherstripping: Polyurethane or silicone inserts in locations as shown on drawings.

2.1.6.2. Balance of hardware as specified in Section 08710.

2.2. GLASS

2.2.1. Per Section 08 81 00.

2.3. SEALANTS

2.3.1. Per Section 07 90 00.

2.4. FABRICATION

2.4.1. Fabricate doors and frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.

2.4.2. Accurately miter and fit all members to hairline joints. Make joints and connections flush, hairline, and weatherproof.

2.4.3. Rigidly fit and secure joints and corners with screw and spline internal reinforcement. Weld or mechanically fasten along entire line of contact on the unexposed side. No discoloration on face will be permitted after aluminum finishing.

2.4.4. Develop drainage holes with moisture pattern to exterior.

2.4.5. Prepare components to receive anchor devices. Fabricate anchorage items.

2.4.6. Arrange fasteners, attachments, and jointing to ensure concealment from view.

2.4.7. Prepare components with internal reinforcement for all door and window hardware.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. General

3.2.1.1. Install doors, frames, glazing and hardware in accordance with manufacturer's instructions.

3.2.1.2. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

3.2.1.3. Install all members with adequate provision for settlement, expansion, and contraction to occur without breaking glass.

3.2.1.4. Protection of Contact Surfaces: Aluminum surfaces in contact with dissimilar metals or with incompatible materials such as concrete, masonry, and plaster, shall be painted on contact surfaces with a protective coating of alkali-resistant bituminous paint before installation or, isolated in an approved manner with nonabsorbative tape or gaskets.

3.2.1.5. Expansion and Contraction: Construct and install all aluminum work so as to avoid distortion and/or stress of parts and fastenings resulting from thermal expansion and contraction.

3.2.2. Fitting and anchorage

3.2.2.1. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

3.2.2.2. Provide aluminum or non-magnetic stainless steel screws, bolts, nuts, and other fastening devices. Use manufacturers approved anchorage devices to securely attach frame assembly to structure.

3.2.2.3. Furnish all necessary accessories, including closures, flashings, and backing as indicated and required for a complete installation.

3.2.3. Sealant

3.2.3.1. Thoroughly apply sealant and other waterproofing materials to all joints as required to maintain specified air and water performance values.

3.2.3.2. Install perimeter sealant and backing materials in accordance with Section 07 90 00.

3.2.4. Hardware Installation

3.2.4.1. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.

3.2.4.2. Provide required cutouts, recesses, mortising or milling operations for hardware. Reinforce with backing plates as required to ensure adequate strength of connection.

3.2.4.3. Adjust operating hardware.

3.2.5. Glass Installation

3.2.5.1. Install glass and infill panels in accordance with Section 08 81 00, using manufacturers approved methods.

3.3. TOLERANCES

3.3.1. Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet, whichever is less.

3.3.2. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.4. CLEANING

3.4.1. Remove protective material from prefinished aluminum surfaces.

3.4.2. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.4.3. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08 58 00

ALUMINUM BULLET RESISTANT TRANSACTION WINDOW

1. PART 1 - GENERAL

1.1. SUMMARY

1.1.1. This section includes:

1.1.1.1. Aluminum bullet resistant transaction windows as indicated in drawings and in sections.

1.1.2. The publication below forms a part of this specification:

1.1.2.1. UNDERWRITERS LABORATORY UL 752 9th Edition, Standard for Bullet Resisting Equipment dated Jan. 27, 1995.

1.2. SUBMITTALS

1.2.1. Product Data: Submit Manufacturer's technical product data substantiating that products comply.

1.2.2. Shop drawings: Submit for fabrication and installation of windows. Include details, elevations and installation requirement of finish hardware and cleaning.

1.2.3. Certification: Provide printed data in sufficient detail to indicate compliance with the contract documents.

1.3. DELIVERY, STORAGE, AND HANDLING

1.3.1. Deliver windows crated to provide protection during transit and job storage

1.3.2. Inspect windows upon delivery for damage. Unless minor defects can be made to meet the Architect's specifications and satisfaction, damaged parts should be removed and replaced.

1.3.3. Store windows at building site under cover in dry location.

1.4. PROJECT CONDITIONS

1.4.1. Field measurements: Check opening by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

1.5. WARRANTY

1.5.1. All material and workmanship shall be warranted against defects for a period of one (1) year from the original date of purchase.

2. PART 2 - PRODUCTS

2.1. ACCEPTABLE MANUFACTURER'S

2.1.1. Basis of design: Design is based on aluminum bullet resistant transaction windows, manufactured by **C.R. Laurence Co., Inc. (800) 421-6144**

2.2. MATERIALS

2.2.1. Frames: Aluminum bullet resistant frame modules shall be to the standards established by U.L. 752 Protection Level _____(specify level 1,2,or3). Frames are to be constructed of 6063-T5 extruded aluminum lined with U.L. listed bullet resistant fiberglass for levels 2 and 3. Replacement of glazing shall be from the secure side of the window or wall unit and does not require the removal of the frame from the opening. Shapes and sizes are to be in accordance with the contract drawings. FRAMES MUST UTILIZE TESTING RECOGNIZED UNDER THE STANDARDS ESTABLISHED BY U.L. 752 FOR BULLET RESISTANT COMPONENTS.

2.2.2. Finish: All aluminum to be clear anodized, duranodic bronze, powder or Kynar painted (specify color).

2.2.3. Glazing: The glazing must be in accordance with U.L. 752 testing standards

2.2.4. Level ____ (specify level 1, 2, or 3). Laminated glass, polycarbonate, or acrylic (specify type of glazing material desired).

2.2.5. Shelf: Provide a shelf not less than 2" thick with recessed deal tray. The shelf is to be the full width of the window and a minimum of 12" deep centered under the glazing. (Options include: 18" deep shelf, 16 ga. stainless steel #4 finish or high pressure laminate shelf, drain holes, and weatherflap.)

2.2.6. Voice Transmission: Communication permitted by one of the following as selected by architect. (Options include: #N666 round 6"stainless steel speak thru, "Surround Sound" for interior windows only which provides for natural voice communication permitted by the design of the vertical and top frames and glazing technique, or electronic thru glass communicator # TTU1, with optional headset.)

3. PART 3 – EXECUTION

3.1. INSTALLATION

3.1.1. Install frames and glazing in accordance with manufacturer's printed instructions and recommendations. Repair damaged units as directed (if approved by the manufacturer and the architect) or replace with new units.

3.2. CLEANING

3.2.1. Clean frame and glazing surfaces after installation, complying with requirements contained in the manufacturer's instructions. Remove excess glazing sealant compounds, dirt or other substances.

3.3. PROTECTION

3.3.1. Institute protective measures required throughout the remainder of the construction period to ensure that all the windows do not incur any damage or deterioration, other than normal weathering, at the time of acceptance.

END OF SECTION

SECTION 08 62 01

TUBULAR SKYLIGHTS

1. PART 1 – GENERAL

1.1. SECTION INCLUDES

1.1.1. Tubular Skylight system, suspended ceiling application.

1.2. REFERENCES

1.2.1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.

1.2.2. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.

1.2.3. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.

1.2.4. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.

1.2.5. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.

1.2.6. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.

1.2.7. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.

1.2.8. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position; 2006.

1.2.9. ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).

1.2.10. UL 790 - Standard for Tests for Fire Resistance of Roof Covering Materials; 2004.

1.2.11. ICBO/ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

1.3. QUALITY ASSURANCE

1.3.1. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 10 years experience in materials of like design and application.

1.3.2. Installer:

1.3.2.1. Installer: Company specializing in applying specified system with minimum 5 years documented experience.

1.3.2.2. Installer: Company approved by materials manufacturer for specified guarantee work.

1.3.2.3. Installing Foreman: Individual specializing in applying specified system with minimum 5 years documented experience.

1.4. SUBMITTALS

1.4.1. Provide submittals under provisions of Section 01 33 00.

1.4.2. Product Data: Manufacturer's data sheets on each product to be used, including:

1.4.2.1. Preparation instructions and recommendations.

1.4.2.2. Storage and handling requirements and recommendations.

1.4.2.3. Installation methods.

1.4.3. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.

1.4.4. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.5. WARRANTY

1.5.1. Contractor shall provide written guarantee, in Architect approved form, guaranteeing system free from the following defects or failures, for a period of five years from Date of Notice of Substantial Completion.

1.5.1.1. Water intrusion, in any form, through skylight system.

1.5.1.2. Broken, cracked or otherwise damaged glazing material not resulting from vandalism or misuse.

1.5.1.3. Joint separation in frame or permanent deformation in excess of specified tolerances.

1.5.1.4. Sealant failure, including adhesive or cohesive failure.

1.5.1.5. Prefinished coating failure, including chalking and fading in excess of referenced standard.

2. PART 2 - PRODUCTS

2.1. PREFABRICATED SKYLIGHT – TYPE 1

2.1.1. Manufacturer: Characteristics of specific products manufactured by Solatube www.solatube.com, are indicated to establish required level of quality, appearance, and performance. The Architect will consider comparable products by alternate manufacturers listed in this Section, and requests for substitutions, under the provisions of Section 01 25 00.

2.1.2. Series: SolaMaster Solatube 330 DS-C penetrating ceiling series.

2.1.2.1. Configuration: Domed skylight with tubular light shaft, as shown on drawings.

2.1.3. Product Characteristics: Skylight Dome Assembly.

2.1.3.1. Nominal Size: 21 inch diameter.

2.1.3.2. Skylight Dome: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.

2.1.3.2.1. Glazing: Type DA, 0.143 inch minimum thickness injection molded acrylic, classified as CC2 material; UV inhibiting, impact modified acrylic blend.

2.1.3.2.2. LightTracker Reflector: aluminum sheet, thickness 0.015 inch with Spectralight Infinity.

2.1.3.3. Roof Flashing Base: Type F08, Self mounted, 8 inches high. one piece, seamless, leak-proof flashing functioning as base support for dome and top of tube, sheet steel, corrosion resistant conforming to ASTM A 653 or ASTM A 463, 0.028 inch thick. Provide manufacturer's standard extensions, insulations and gaskets as required for application.

2.1.3.4. Dome Seal: Adhesive backed weatherstrip 0.63 inch tall by 0.28 inch.

2.1.3.5. Provide Dome Edge Protection Band: Type PB, galvanized steel, Nominal thickness 0.039 inches.

2.1.3.6. Tube Ring: Attached to top of base section; 0.090 inch nominal thickness injection molded high impact PVC.

2.1.4. Product Characteristics: Reflective Tube Assembly.

2.1.4.1. Tubular shaft and light transmitting device: Spectralight Infinity high reflectance specular finish on exposed reflective surface. aluminum sheet, thickness 0.018 inch, tubular shaft. Provide all required fasteners and transitions, including Type 1 transition box to sealed ceiling diffuser.

2.1.4.1.1. Interior Finish: Specular reflectance for visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum reflectance (400 nm to 2500 nm) less than 93 percent.

2.1.4.1.2. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.

2.1.5. Product Characteristics: Ceiling Diffuser Assembly.

2.1.5.1. Sealed Ceiling Diffuser: Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube, with compression seal to minimize condensation and bug or dirt infiltration; 23.8 inches by 23.8 inches square frame to fit standard suspended ceiling grids or hard ceilings.

2.1.5.1.1. Round to square transition box made of opaque polymeric material, classified as CC2, Class C, 0.110 inch thick.

2.1.5.1.2. Natural Effect Lens made of acrylic, classified as CC2, Class C, 0.060 inch thick, with open cell foam seal to minimize condensation and bug, dirt, and air-infiltration per ASTM E 283.

2.1.5.1.3. Lens: Type L1 OptiView Fresnel lens design to maximize light output and diffusion with extruded aluminum frame. Visible Light Transmission shall be greater than 90 percent at 0.022 inch thick.

2.1.5.1.4. Lens: Type L2 Prismatic lens design to maximize light output and diffusion with extruded aluminum frame. Visible Light Transmission shall be greater than 90 percent at 0.100 inches thick.

2.1.5.1.5. Secondary Diffuser: Type SS, Acrylic, 0.100 inches thick.

2.1.5.2.

2.1.6. Fire/Life Safety/Habitability Criteria.

2.1.6.1. Dome Light Transmission: Minimum 0.91 visual light transmission.

2.1.6.2. Air Infiltration Test: Maximum Air infiltration 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.

2.1.6.3. Water Resistance Test: No uncontrolled water leakage at 10.5 psf pressure differential with water rate of 5 gallons/hour/sf when tested in accordance with ASTM E 547.

2.1.6.4. Uniform Load Test:

2.1.6.4.1. No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf or Negative Load of 70 psf.

2.1.6.4.2. All units shall be tested with a safety factor of 3 times for positive pressure and 2 times for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.

2.1.6.5. Fire Testing:

2.1.6.5.1. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the 2006 International Building Code.

2.1.6.5.2. Self-Ignition Temperature - Greater than 650 degrees F Per: U.B.C. Standard 26-6. See ASTM D-1929.

2.1.6.5.3. Smoke Density - Rating no greater than 450 Per U.B.C. 8-1 (See ASTM Standard E 84) in way intended for use. Classification C.

2.1.6.5.4. Rate of Burn and/or Extent - Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2: U.B.C. Standard 26-7. See ASTM D 635.

2.1.6.5.5. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1: U.B.C. Standard 26-7. See ASTM D 635.

2.1.7. Accessories

2.1.7.1. Security Bars: Type B Security Bars 0.375 inch (95 mm) stainless steel bar across flashing diameter opening.

2.1.7.2. Security Kit: Type SK Dome Security Kit, rivets with nylon spacers to replace dome screws.

2.1.7.3. Wire Suspension Kit: Type E, Use the wire suspension kit when additional bracing to the structure is required.

2.1.7.4. Local Dimmer Control: Provided with dimmer switch and cable.

2.1.7.4.1. Daylight Dimmer: Type D Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; Maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4 conductor, 22 gauge cable; providing daylight output between 2 and 100 percent.

2.1.7.4.2. Switch: Type SW, Manufacturer-specific low voltage DC DP/DT switch (white) required to operate Daylight Dimmer. Note: A maximum of 10 units can be connected to one switch.

2.1.7.4.3. Cable: Type CA, Two conductor, 22 gauge, low voltage cable (500 ft.) for multiple unit DC connection.

2.1.8. Finish:

2.1.8.1. Aluminum Frame: manufacturers standard.

2.1.8.2. Thermal Break Frame: White.

2.2. OTHER MATERIALS

2.2.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify that deck is supported and secured.

3.1.1.2.2. Verify that deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys or eaves.

3.1.1.2.3. Verify that surface substrate is properly prepared and dry.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.

3.2.2. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.

3.2.3. Fasten to support members with corrosion resistant fasteners.

3.3. FIELD QUALITY CONTROL

3.3.1. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owners representative.

3.3.2. Correct identified defects or irregularities.

3.4. CLEANING

3.4.1. Remove markings from finished surfaces.

3.4.2. In areas where finished surfaces are soiled by adhesive or any other source of soiling caused by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

3.4.3. Repair or replace defaced or disfigured finishes caused by work of this Section.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

1. PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Mechanical door hardware.

1.1.1.2. Electrified door hardware.

1.1.1.3. Electronic access control system components.

1.1.2. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:

1.1.2.1. Windows.

1.1.2.2. Cabinets.

1.1.2.3. Signage.

1.1.2.4. Toilet accessories.

1.1.2.5. Conduit, junction boxes & wiring.

1.1.2.6. Operable partitions.

1.1.2.7. Sliding aluminum doors.

1.1.2.8. Overhead doors.

1.1.2.9. Gates.

1.2. REFERENCES

1.2.1. Use date of standard in effect as of Bid date.

1.2.1.1. American National Standards Institute

1.2.1.1.1. ANSI 156.18 – Materials and Finishes.

1.2.1.2. BHMA – Builders Hardware Manufacturers Association

1.2.1.3. 2013 California Building Code

1.2.1.3.1. Chapter 11B – Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing

1.2.1.4. DHI – Door and Hardware Institute

1.2.1.5. NFPA – National Fire Protection Association

1.2.1.5.1. NFPA 80 – Standard for Fire Doors and Other Opening Protectives.

1.2.1.5.2. NFPA 105 – Smoke and Draft Control Door Assemblies

1.2.1.5.3. NFPA 252 – Fire Tests of Door Assemblies

1.2.1.6. UL – Underwriters Laboratories

1.2.1.6.1. UL10C – Positive Pressure Fire Tests of Door Assemblies.

1.2.1.6.2. UL 305 – Panic Hardware

1.2.1.7. WHI – Warnock Hersey Incorporated

1.2.1.8. SDI – Steel Door Institute

1.2.1.9. WI – Woodwork Institute

1.2.1.10. AWI – Architectural Woodwork Institute

1.2.1.11. NAAMM – National Association of Architectural Metal Manufacturers

1.2.1.12. Local Applicable Codes

1.3. SUBMITTALS

1.3.1. Submit product data including manufacturers' technical product data for each item of door hardware.

1.3.2. After final approval of hardware schedule, submit details of electrified door hardware including riser and wiring diagrams.

1.3.3. Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by DHI. Indicate complete designations of each item required for each door or opening, including:

1.3.3.1. Door number, heading number, and Architects hardware set number.

1.3.3.2. Locking device and function for each opening.

1.3.3.3. Type, style, function, size, and finish of each hardware item.

1.3.3.4. Name and manufacturer of each item.

1.3.3.5. Fastenings and other pertinent information.

1.3.3.6. Mounting locations for hardware.

1.3.3.7. Door and frame sizes and materials.

1.3.3.8. Name and phone number for local manufacturer's representative for each product.

1.3.3.9. Operational Description of openings with any electrified hardware. Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.

1.3.4. Provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.

1.3.4.1. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.

1.3.4.2. Provide complete bitting list of key cuts and key system schematic illustrating system usage and expansion.

1.3.4.3. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.

1.3.5. Provide operations and maintenance data including:

1.3.5.1. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.

1.3.5.2. Catalog pages for each product.

1.3.5.3. Name, address, and phone number of local representative for each manufacturer.

1.3.5.4. Parts list for each product.

1.3.5.5. Final approved hardware schedule, edited to reflect conditions as-installed.

1.3.5.6. Final keying schedule.

1.3.5.7. Copies of floor plans with keying nomenclature

1.3.5.8. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

1.3.5.9. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.4. QUALITY ASSURANCE

1.4.1. Product Substitutions:

1.4.1.1. Where specific manufacturer's product is named and accompanied by "District Standard," provide product specified.

1.4.1.2. Where products indicate "acceptable manufacturers," products have been approved as acceptable alternates to the specified product, subject to compliance with specified requirements stated herein.

1.4.2. Supplier Qualifications:

1.4.2.1. Direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for hardware consultation to Owner, Architect and Contractor.

1.4.2.2. 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.

1.4.3. Installer Qualifications:

1.4.3.1. Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.

1.4.4. Hardware:

1.4.4.1. Free of defects, blemishes and excessive play.

1.4.4.2. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

1.4.4.3. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.

1.4.5. Pre-Installation Meetings:

1.4.5.1. Initiate and conduct with supplier, installer and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation.

1.4.5.2. Include manufacturers' representatives of locks, panic hardware and door closers in the meetings. Convene prior to commencement of related work.

1.4.6. Keying Conference:

1.4.6.1. Attendees: Owner, Contractor, Architect, Installer, Owner's security consultant, and Supplier's Architectural Hardware Consultant.

1.4.6.2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:

1.4.6.2.1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.

1.4.6.2.2. Preliminary key system schematic diagram.

1.4.6.2.3. Requirements for key control system.

1.4.6.2.4. Requirements for access control.

1.4.6.2.5. Address for delivery of keys.

1.4.6.2.6. Requirements for final installation of permanent cylinders/cores.

1.5. DELIVERY, STORAGE AND HANDLING

1.5.1. Delivery: coordinate delivery to appropriate locations (shop or field).

1.5.1.1. Permanent keys and cores: secured delivery direct to Owner's representative.

1.5.2. 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.

1.5.3. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6. COORDINATION

1.6.1. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.6.2. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.6.3. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.6.4. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.6.5. Direct shipments not permitted, unless approved by Contractor.

1.7. WARRANTY

1.7.1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1.7.1.1. Warranty Period: From date of Substantial Completion, for duration indicated:

1.7.1.1.1. Locksets and Exit Devices (mechanical): Three years.

1.7.1.1.2. Locksets and Exit Devices (electrified): One year.

1.7.1.1.3. Door Closers: 30 years.

1.7.1.1.4. Architectural Hinges: One year.

1.7.1.1.5. Continuous Hinges: Lifetime.

1.7.1.1.6. Key Blanks: Lifetime.

1.8. COMMISSIONING

1.8.1. Conduct these tests prior to request for certificate of substantial completion:

1.8.1.1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.

1.8.1.2. With installer, access control contractor and electrical contractor present, test electronic hardware systems for satisfactory operation.

1.8.1.3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Approval of products from manufacturers indicated in "Acceptable Manufacturer" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

ITEM:	SCHEDULED MFR:	ACCEPTABLE ALTERNATE:
Hinges	(IVE) Ives	District Standard
Continuous Hinges	(IVE) Ives	District Standard
Key System	(SAR) Sargent	District Standard
Locks	(SCH) Schlage	District Standard
Exit Devices:	(VON) Von Duprin	District Standard
Closers:	(LCN) LCN	District Standard
Thresholds:	(NGP) National Guard Product	Zero, Pemko
Seals & Door Bottoms:	(ZER) Zero International	Pemko, Reese
Floor Stops:	(IVE) Ives	District Standard
Power Supplies:	(VON) Von Duprin	District Standard
Auto Operators:	(LCN) LCN	District Standard

2.2. HINGES

2.2.1. 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 manufacturer's standard size and notify Architect of deviation from scheduled hardware.

2.2.2. Use wide-throw hinges where necessary to allow door to swing 180 degrees.

2.2.3. Conventional Hinges: Steel or stainless steel pins and approved bearings. Use minimum hinge width necessary to permit maximum door swing.

2.2.4. Continuous Hinges: Provide continuous hinges conforming to ANSI/BHMA A156.26, Grade 2.

2.3. ELECTRIC POWER TRANSFER

2.3.1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.

2.4. FLUSH BOLTS

2.4.1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch steel or brass rods at doors up to 90 inches in height. For doors over 90 inches in height increase top rods by 6 inches for each additional 6 inches of door height. Provide dust-proof strikes at each bottom flush bolt.

2.5. COORDINATORS

2.5.1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.

2.5.2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

2.6. MORTISE LOCKS

2.6.1. Scheduled Manufacturer and Product: Schlage (SCH) L9000 series

2.6.2. Requirements:

2.6.2.1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.

2.6.2.2. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.

2.6.2.3. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide a request to exit (RX) switch that is actuated with rotation of inside lever.

2.6.2.4. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

2.6.2.4.1. Lever Design: 06A.

2.6.2.5. Force to retract latchbolt and deadbolt: 5 lbs or less per CBC 2013.

2.7. EXIT DEVICES

2.7.1. Scheduled Manufacturer and Product: Von Duprin (VON) 98/99 or 33/35 series

2.7.2. Requirements:

2.7.2.1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to "KEYING" article, herein.

2.7.2.2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.

2.7.2.3. Touchpad: Extend minimum of one half of door width. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. No plastic inserts are allowed in touchpads.

2.7.2.4. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.

2.7.2.5. Provide flush end caps for exit devices.

2.7.2.6. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.

2.7.2.7. Provide cylinder dogging at non-fire-rated exit devices, .

2.7.2.8. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.

2.7.2.9. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.

2.7.2.9.1. Lever Style: Match lever style of locksets.

2.7.2.10. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.

2.7.2.11. Provide electrified options as scheduled.

2.7.2.12. Provide "AX" feature, where touchpad directly retracts the latchbolt with 5 lb or less of force.

2.8. POWER SUPPLIES

2.8.1. Scheduled Manufacturer and Product: Schlage (SCE) or Von Duprin (VON) PS900 series

2.8.2. Requirements:

2.8.2.1. Provide power supplies, recommended and approved by manufacturer of electrified locking component, for operation of electrified locks, electrified exit devices, magnetic locks, electric strikes, and other components requiring power supply.

2.8.2.2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.

2.8.2.3. Provide regulated and filtered 24 VDC power supply , and UL class 2 listed.

2.8.2.4. Provide power supply in an enclosure, complete, and requiring 120VAC to fused input.

2.8.2.5. Provide power supply with emergency release terminals, where specified, that allow release of all devices upon activation of fire alarm system complete with fire alarm input for initiating "no delay" exiting mode.

2.9. KEY SYSTEM

2.9.1. Assa V-10 system, interchangeable core. Contact Campus Locksmith to determine system structure. Furnish temporary construction-keyed and permanent cylinders. Contractor to demonstrate to the Campus Locksmith that temporary keys no longer operate the locking cylinders at the end of the project.

2.10. DOOR CLOSERS

2.10.1. Scheduled Manufacturer and Product: LCN 4040XP series.

2.10.2. Requirements:

2.10.2.1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.

2.10.2.2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.

2.10.2.3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 3/4 inch (19 mm) diameter double heat-treated pinion journal.

2.10.2.4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.

2.10.2.5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.

2.10.2.6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.

2.10.2.7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.

2.10.2.8. Pressure Relief Valve (PRV) Technology: Not permitted.

2.10.2.9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).

2.10.2.10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.11. ELECTRO-MECHANICAL AUTOMATIC OPERATORS

2.11.1. Scheduled Manufacturer and Product: LCN Senior Swing

2.11.2. Requirements:

2.11.2.1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.

2.11.2.1.1. Opening: Powered by DC motor working through reduction gears.

2.11.2.1.2. Closing: Spring force.

2.11.2.1.3. Manual, hydraulic, or chain drive closers: Not permitted.

2.11.2.1.4. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.

2.11.2.1.5. Cover: Aluminum.

2.11.2.2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.

2.11.2.3. Provide drop plates, brackets, or adapters for arms as required to suit details.

2.11.2.4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.

2.11.2.5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.

2.11.2.6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.

2.11.2.7. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.12. DOOR TRIM

2.12.1. Scheduled Manufacturer: Ives (IVE)

2.12.2. Requirements:

2.12.2.1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.

2.12.2.2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.

2.12.2.3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.

2.12.2.4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.

2.12.2.5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.

2.12.2.6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.

2.12.2.7. Provide wire pulls of solid bar stock, diameter and length as scheduled.

2.12.2.8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.13. PROTECTION PLATES

2.13.1. Scheduled Manufacturer: Ives (IVE)

2.13.2. Requirements:

2.13.2.1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick as scheduled. Furnish with sheet metal or wood screws, finished to match plates.

2.13.2.2. Sizes of plates:

2.13.2.2.1. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.13.2.2.2. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.13.2.2.3. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.14. DOOR STOPS AND HOLDERS

2.14.1. Scheduled Manufacturer: Ives (IVE)

2.14.2. Provide door stops at each door leaf:

2.14.2.1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.

2.14.2.2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.

2.14.2.3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.15. SEALS, DOOR SWEEPS, AND GASKETING

2.15.1. Scheduled Manufacturer: Zero International (ZER)

2.15.2. Requirements:

2.15.2.1. Provide weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.

2.15.2.2. Provide door sweeps, seals, and astragals only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.16. THRESHOLDS

2.16.1. Scheduled Manufacturer: Zero International (ZER)

2.16.2. Requirements:

2.16.2.1. Saddle thresholds: 0.125 inches minimum thickness.

2.16.2.2. Exterior: Seal perimeter to exclude water and vermin.

2.16.2.3. Provide noncombustible sill or threshold where combustible floor covering extends through door opening.

2.16.2.4. Fire rated openings: Where scheduled, thresholds to extend at least the depth of the door frame.

2.16.2.5. Acoustic openings: Set units in full bed of Division-7-compliant sealants, leave no air space between threshold and substrate.

2.16.2.6. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.

2.16.2.7. 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. Plastic plugs with wood or sheet metal screws are not an acceptable fastening method.

2.17. SILENCERS

2.17.1. Scheduled Manufacturer: Ives (IVE)

2.17.2. Requirements:

2.17.2.1. Provide "push-in" type silencers for hollow metal or wood frames.

2.17.2.2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.

2.17.2.3. Omit where gasketing is specified.

2.18. FINISHES

2.18.1. Provide finishes to match BHMA 626 Satin Chrome where specified.

3. PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

3.1.2. Existing Door and Frame Compatibility: Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

3.1.3. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

3.1.4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

3.2.1. Where on-site modification of doors and frames is required:

3.2.1.1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.

3.2.1.2. Field modify and prepare existing door and frame for new hardware being installed.

3.2.1.3. When modifications are exposed to view, use concealed fasteners, when possible.

3.2.1.4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:

3.2.1.4.1. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.2.1.4.2. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.2.1.4.3. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3. INSTALLATION

3.3.1. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

3.3.1.1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

3.3.1.2. Custom Steel Doors and Frames: HMMA 831.

3.3.1.3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3.3.2. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

3.3.3. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

3.3.4. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

3.3.5. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

3.3.6. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

3.3.7. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

3.3.8. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

3.3.9. Lock Cylinders: Install construction cores to secure building and areas during construction period.

3.3.9.1. Replace construction cores with permanent cores as indicated in keying section.

3.3.10. Lead Protection: Lead wrap hardware penetrating lead-lined doors. Levers and roses to be lead lined. Apply kick and armor plates on lead-lined doors with adhesive as recommended by manufacturer.

3.3.11. Wiring: Coordinate with Division 26, ELECTRICAL sections for:

3.3.11.1. Conduit, junction boxes and wire pulls.

3.3.11.2. Connections to and from power supplies to electrified hardware.

3.3.11.3. Connections to fire/smoke alarm system and smoke evacuation system.

3.3.11.4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.

3.3.11.5. Testing and labeling wires with Architect's opening number.

3.3.12. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

3.3.13. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.

3.3.14. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

3.3.15. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

3.3.15.1. Configuration: Provide [one power supply for each door opening][least number of power supplies required to adequately serve doors] with electrified door hardware.

3.3.16. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

3.3.17. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

3.3.18. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

3.3.19. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

3.3.20. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4. FIELD QUALITY CONTROL

3.4.1. Architectural Hardware Consultant: Engage qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

3.4.1.1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5. ADJUSTING

3.5.1. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.5.1.1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.

3.5.1.2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

3.5.1.3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.5.2. Occupancy Adjustment: Approximately three[six] <Insert number> months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6. CLEANING AND PROTECTION

3.6.1. Clean adjacent surfaces soiled by door hardware installation.

3.6.2. Clean operating items as necessary to restore proper function and finish.

3.6.3. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.7. DEMONSTRATION

3.7.1. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.8. DOOR HARDWARE SCHEDULE

3.8.1. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

3.8.2. Hardware Sets:

01 - MEETING ROOM

HARDWARE PART OF DOOR SYSTEM.

02 - OFFICE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050L 06A L583-363	626	SCH
1	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
1	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE

COORDINATE: WIDE-STILE DOORS REQUIRED AT FULL-VISION DOORS WHERE MORTISE LOCKS ARE SPECIFIED.

03 - ELECTRICAL

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	700	630	IVE
1	EA	STOREROOM LOCK	L9080L LLL 06A L283-150	626	SCH
1	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
1	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	DOOR PULL	VR900	630	IVE
1	EA	SURFACE CLOSER	4040XP HEDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	GASKETING	188S-BK	S-BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER

04 - DISPATCH

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU MORTISE LOCK	L9092LEU 06A RX	626	SCH
1	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
1	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE
1	EA	POWER SUPPLY	PS906 900-4R-FA	LGR	SCE

COORDINATE: CREDENTIAL READER, WIRING, CONDUIT, POWER.

05 - ALL GLASS AUTO OPERATOR ENTRY PAIR

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	TOP PIVOT	H340	626	RIX
1	EA	FLOOR CLOSER	PH-H28-N-105	626	RIX
1	EA	EXIT DEVICE	PA-100-D EXIT ONLY	630	CRL
1	EA	EXIT DEVICE	PA-100-D KEY ACCESS	630	CRL
1	EA	IC MORTISE CYLINDER	ASSA V-10 TWIN	626	SAR
1	EA	PERMANENT CORE	ASSA V-10 TWIN	626	SAR
1	EA	ELECTRIC STRIKE PR	ESP2BS	630	CRL
1	EA	AUTO OPERATOR	2811 CP POS	ANCLR	LCN
1	EA	FLOOR MTD CLOSER ARM	CRL9040CB		CRL
2	EA	FULL LENGTH ACTUATOR	8310-836T	630	LCN
1	EA	IN-GROUND CONVERTER	OPCON - LCN		OPC
1	EA	THRESHOLD	430E - OPCON PREP	AL	NGP

COORDINATE: CREDENTIAL READER, POWER SUPPLY, WIRING, CONDUIT, POWER.
COORDINATE: DOOR RAILS BY GLASS DOOR MANUFACTURER.

06 - OPEN OFFICE, BREAK, GUN CLEANING, CORRIDOR

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	L9071L 06A	626	SCH
2	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
2	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE

07 - SECURE EVIDENCE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP1/2 AS REQ'D	626	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
1	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	4040XP	689	LCN
2	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
2	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE

08 - DRUG STORAGE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
1	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE

09 - STORAGE, CUSTODIAL, IDF

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
1	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE

10 - TOILET

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY W/DEADBOLT	L9440 06A L583-363	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE

11 - ARMORY

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM W/DEADBOLT	L9480L 06A L583-363	626	SCH
1	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
1	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE

12 - INTERVIEW ROOM

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EL MORTISE LOCK	L9092LEL 06A RX	626	SCH
1	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
1	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE
1	EA	POWER SUPPLY	PS906 900-4R-FA	LGR	SCE

COORDINATE: CREDENTIAL READER, WIRING, CONDUIT, POWER.
VALID CREDENTIAL OR KEY REQUIRED TO EXIT INTERVIEW ROOM.
FREE ENTRY INTO INTERVIEW ROOM.
DOOR UNLOCKS UPON LOSS OF POWER.

13 - LOCKER

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64/65 AS REQ'D	GRY	IVE

14 - EXT ACCESS CONTROL

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	700 EPT	630	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU MORTISE LOCK	L9092LEU 06A RX	626	SCH
1	EA	ASSA V-10-TWIN	IC MORTISE CYLINDER	626	SAR
1	EA	ASSA V-10-TWIN	PERMANENT CORE	626	SAR
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	GASKETING	188S-BK	S-BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	POWER SUPPLY	PS906 900-4R-FA	LGR	SCE

COORDINATE: CREDENTIAL READER, WIRING, CONDUIT, POWER.

END OF SECTION

Door/Hardware Index

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SECTION 08 81 00

GLASS AND GLAZING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Glass and glazing for windows and doors.

1.2. REFERENCES

1.2.1. ASTM C-1036 - Standard Specification for Flat Glass.

1.2.2. ASTM C- 1048 - Standard Specification for Heat-Treated Flat Glass - Kind FT Coated and Uncoated Glass.

1.2.3. Glass Association of North America (GANA) (formerly FGMA) - Glazing Manual.

1.2.4. Title 24, Part 2, Chapter 24, current edition.

1.3. QUALITY ASSURANCE

1.3.1. Conform to GANA Glazing Manual for glazing installation methods.

1.3.2. Manufacturer: Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.3.3. Staff:

1.3.3.1. Use only personnel who are thoroughly trained and experienced in the skills required and have installed similar applications of the specified products within one year prior to beginning work of this section.

1.3.3.2. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.4. SUBMITTALS

1.4.1. Submit in accordance with the provisions of Section 01 33 00.

1.4.2. Materials List: Provide complete list of all proposed materials and accessories, including product data on performance criteria.

1.4.3. Samples: Accompanying materials list, submit three 12 inch square samples of each glass type. Grind and seal all edges.

1.4.4. Shop Drawings: Provide complete shop drawings indicating glass type, installation method, and materials used.

1.5. DELIVERY, STORAGE, AND PROTECTION

1.5.1. Deliver products to site under provisions of the General Conditions.

1.5.2. Store and protect products under provisions of the General Conditions.

1.6. WARRANTY

1.6.1. Warranty:

1.6.1.1. Provide, in Architect approved form, the Owner with a guarantee against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

1.6.1.1.1. Broken, cracked or otherwise damaged glass not resulting from vandalism.

1.6.1.1.2. Water intrusion through sealant/glass joint.

1.6.1.1.3. Sealant failure.

1.6.1.1.4. Fogging or delamination at laminated glass.

1.6.2. Insulating Glass Warranty:

1.6.2.1. Provide, in Architect approved form, the Owner with manufacturers warranty against the following specific defects or failures for a period of ten (10) years after Notice of Substantial Completion:

1.6.2.1.1. No material obstruction of vision through glass caused by accumulation of dust, moisture or film on the internal surface of glass caused by insulating seal failure.

1.6.2.1.2. Water intrusion through sealant/glass joint.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. INTERIOR BULLET RESISTANT GLASS – GL-1

2.2.1. Fabricator: C.R. Laurence Co., www.crlaurence.com, or equal.

2.2.2. Type: 1-1/4" Level 3 Lexgard, or equal, by transaction window manufacturer per Section 08 58 00.

2.2.3. Characteristics:

2.2.3.1. Thickness: 1-1/4 inch minimum, by transaction window manuf.

2.4. INSULATING GLASS UNIT, FULLY TEMPERED – GL-2

2.4.1. Fabricator: Fabricator: Oldcastle Glass, www.OldcastleGlass.com, or equal.

2.4.2. Series/Type: Dual glazed glass units, fully tempered,

2.4.2.1. Exterior Lite: 1/4-inch PPG Caribia with Solarban 70XL on Surface 2.

2.4.2.2. Interior Lite: 1 / 4 inch PPG Solargray.

2.4.3. Total Thickness: One inch, and as required by code, with 1/2 inch air space.

2.4.4. Characteristics:

2.4.4.1. Strength: Each lite fully Tempered (Kind FT) per ASTM C 1048 and ASTM C 1036. Permanently label all tempered glass.

2.4.4.2. SHGC: 0.22.

2.4.4.3. Visible Light Transmission: 24 percent.

2.4.4.4. Shading Coefficient: 0.25.

2.4.4.5. U-value -- Summer Daytime: 0.26.

2.4.4.6. U-value – Winter Night: 0.28.

2.4.4.7. Safety Standards: Comply with CBC Chapter 24, safety glazing requirements.

2.4.4.8. Seal Classification: Class CBA per ASTM E 773/774, with third party validation required.

2.4.5. Accessories:

2.4.5.1. Capillary Tubes: Provide capillary tubes at units as recommended by manufacturer for installed altitude conditions.

2.5. VISION LAMINATED GLASS, CLEAR - GL-3

2.5.1. Manufacturer: PPG, //www.ppgglass.com/, or equal.

2.5.2. Series/Type:

2.5.2.1. Clear, single lite, two ply, laminated clear float glass.

2.5.2.2. Laminated Interlayer: Solutia or approved equal.

2.5.3. Characteristics:

2.5.3.1. Total Thickness: 9/16 inch minimum, and as required by code. 1/2 inch at door vision lite, or as required by code.

2.5.3.2. Glass Characteristics:

2.5.3.2.1. Outer Ply: Heat Strengthened Kind HT, 1/4 inch float glass per ASTM C 1036 and C 1048.

2.5.3.2.2. Inner Ply: Heat Strengthened, Kind HT, 1/4 inch float glass, per ASTM C 1036 and C 1048.

2.5.3.2.3. Type: Condition A - uncoated, Type 1 - transparent, Class 1 - clear, q3 quality - glazing select, float glass.

2.5.3.3. Interlayer Characteristics:

2.5.3.3.1. Material: PVB

2.5.3.3.2. Series: Solutia Saflex

2.5.3.3.3. Thickness: 0.030 inches

2.5.3.3.4. Color: Clear

2.5.3.4. Safety/Habitability Characteristics:

2.5.3.4.1. Light Transmission: 89% visible light approximately.

2.5.3.4.2. Sound Reduction Rating: STC 40 per ASTM E 90.

2.5.3.4.3. Safety Standards: Comply with Chapter 24, Part 2, Title 24, CCR safety glazing requirements.

2.6. LAMINATED GLASS, OPAQUE - GL-4

2.6.1. Glass panels by door manufacturer under Section 08 35 14 as part of door system.

2.6.2. Characteristics:

2.6.2.1. Panels shall be nominally 4 inches thick (102 mm) in manufacturer's standard widths up to 60 inches (1525 mm).

2.6.2.2. Panel faces shall be ¼ inch thick (6 mm) tempered glass, clear.

2.6.2.3. Provide manufacturer's standard opaque or frosted coating, full height or partial height, size and color as selected by Architect.

2.7. LAMINATED SECURITY GLASS – GL-5

2.7.1. Refer to Specification Section 08 58 00 for glass, similar.

2.8. GLASS DESIGN CRITERIA

2.8.1. Provide glass thickness, edge support, "bite," and other engineering criteria per referenced standards and Chapter 24, Title 24, Part 2, CCR.

2.8.2. Provide glass that has been produced, fabricated, and installed to withstand normal thermal movement and wind loading, without failure, including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.

2.8.2.1. Normal thermal movement is defined as that resulting from a consequent temperature range of +10 degrees F to +180 degrees F within glass and glass framing members.

2.8.3. Provide glass thickness in minimum thickness specified and as required by Chapter 16A, Title 24, Part 2, CCR and the following criteria:

2.8.3.1. Wind Speed: 85 MPH wind speed, (3 second gust)

2.8.3.2. Exposure: Exposure C.

2.8.4. Provide safety glazing complying with at all locations as required by Chapter 24, Part 2, Title 24.

2.8.4.1. Provide permanent etched or ceramic fired label on all safety glazing, visible after installation.

2.9. GLAZING ACCESSORIES

2.9.1. Setting Blocks: Neoprene or EPDM with a Shore A Durometer value of 85 +_ 5.

2.9.2. Spacer Shims: Neoprene with a Shore A Durometer value of 50.

2.9.3. Foam Glazing Tapes / Beads: Provide manufacturers recommended system, UV Stabilized, black color.

2.10. OTHER MATERIALS

2.10.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify surfaces of glazing channels or recesses are clean and free of obstructions.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. GLASS INSTALLATION

3.2.1. General

3.2.1.1. Install all glass at proper ambient temperatures.

3.2.1.2. Do not glaze assemblies when damp or wet due to rain, dew, condensation, or other moisture sources.

3.2.1.3. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners.

3.2.1.4. Do not impact glass with metal framing.

3.2.1.5. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar.

3.2.1.6. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening.

3.2.1.7. Remove from project and dispose of glass units with edge damage or other imperfections of the type that, when installed, weaken glass and impair performance and appearance.

3.2.1.8. Install all glass within ambient temperature limits established by glass manufacturer.

3.2.1.9. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.

3.2.2. Install all glass products in accordance with referenced codes, standards, and approved submittals. Install per recommendations of manufacturer, and as specified in related sections.

3.2.3. Install in accordance with Listing and labeling requirements.

3.2.3.1. Install wire glass with mesh pattern aligned vertically and horizontally.

3.2.4. Rest glass on setting blocks per referenced standard.

3.2.4.1. Install neoprene or EPDM setting blocks. No lead setting blocks permitted.

3.2.4.2. Provide minimum 4 inch long setting block, and as required by glass manufacturer. Install at quarter points unless otherwise approved.

3.2.4.3. Provide setting block width 1/16 to 1/8 inch less than the width of the glazing pocket, and a minimum of 1/8 inch wider than glass thickness.

3.2.4.4. Provide edge blocking at all jamb conditions of captured pocket glazing.

3.2.5. Repair of existing glazing system.

3.2.5.1. Where shown on drawings, repair existing glazing assemblies.

3.2.5.2. Remove all existing putty or sealant by approved means, providing satisfactory surface for sealant installation.

3.2.5.3. Install glass on approved setting blocks with specified sealant. Install in accordance with sealant manufacturers recommendations.

3.3. PROTECTION AND CLEANING

3.3.1. Protect glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply tape or marking of any kind to glass surface. Remove non-code required and non-permanent labels.

3.3.2. Remove tape after work is completed.

3.3.3. 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.

3.3.4. Examine glass surfaces adjacent to or below exterior plaster, 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. Remove tape after work is completed.

3.3.5. Do not store materials or any kind against interior or exterior surfaces of glass or glass frame. Remove tape after work is completed.

3.3.6. Immediately prior to completion of the Work, clean all glass using manufacturers approved methods.

3.4. REPLACEMENT

3.4.1. Immediately remove all glass delivered to site with manufacturing or fabrication defects.

3.4.2. Remove and replace all glass broken, cracked, abraded or damaged in any other way during construction period due to construction, vandalism, natural occurrences or other causes.

3.4.3. Remove and replace all glass broken, cracked, abraded or damaged in any other way during construction period due to construction, vandalism, natural occurrences or other causes.

3.4.3.1. Comply with scratch tolerances specified below for all glass.

3.4.4. Immediately remove all glass delivered to site with manufacturing or fabrication defects defined as follows:

3.4.4.1. Based on inspection from a distance of 6 feet, pinholes exceeding 1/16 inch in diameter are not acceptable.

3.4.4.2. Based on inspection from a distance of 6 feet, clusters of pinholes less than 1/16 inch in diameter shall not occur in the central 80 percent of the glass.

3.4.4.3. Based on inspection from a distance of 10 feet, scratches exceeding 2 inches are not acceptable, except scratches up to 3 inches in length will be acceptable if located a maximum of 3 inches of glass edge.

3.4.4.4. Concentrated scratched or abraded areas are not acceptable at any part of glass panel.

END OF SECTION

SECTION 09 20 00

PORTLAND CEMENT PLASTER

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Metal lath.

1.1.2. Portland cement plaster system, exterior.

1.1.3. Portland cement plaster system, interior

1.1.4. Metal suspension system for plaster ceilings.

1.1.5. Plaster accessories.

1.2. REFERENCES

1.2.1. ASTM C144 - Aggregate for Masonry Mortars.

1.2.2. ASTM C150 - Portland Cement.

1.2.3. ASTM C 206 - Finishing Hydrated Lime.

1.2.4. ASTM C 926 – Application of Portland Cement Plaster

1.2.5. ASTM C 1063 – Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement Based Plaster

1.2.6. ASTM E119 - Fire Test of Building Construction and Materials.

1.2.7. California Building Code, Part 2, Title 24, CCR.

1.2.8. Tech Bulletins and References as Published by Technical Services Information Bureau (TSIB), www.tsib.org.

1.2.9. Portland Cement Plaster Stucco Resource Manual by Northwest Walls and Ceilings Bureau **www.nwcb.org**

1.3. QUALITY ASSURANCE

1.3.1. Applicator: Company specializing in cement plaster work with 10 years documented experience in non-residential projects of similar scope.

1.3.2. Supervision: Plaster assembly shall be installed under the full time supervision of a foreman with 10 years documented experience in non-residential projects of similar scope .

1.3.3. Integrated Installation: Plaster assembly shall be installed under a single contract, responsible for all underlayment, lathing and plastering operations.

1.3.4. Manufacturer: Where provided, company specializing in manufacturing premixed and engineered plaster products **for a minimum of 10 years.**

1.4. SUBMITTALS

1.4.1. Provide submittals under provisions of Section 01 33 00.

1.4.2. Provide product data on plaster, lathing, and furring materials, characteristics and limitations of products specified.

1.4.3. Provide complete mix design for each application.

1.4.4. Prior to beginning plaster operations, construct on-site a movable 4 foot x 8 foot high mock-up to enable the Architect to review and adjust the plaster texture, color and pattern. Include fog coat in mock-up.

1.4.4.1. Based on initial review of mock-up, modify texture, color and pattern as directed by Architect. All subsequent plaster mix designs and installation shall reflect approved mock-up.

1.4.5. Prior to beginning plaster operations, construct on-site a movable 4 foot x 8 foot high mock-up to demonstrate to DSA Inspector lathing procedures provide adequate keying of plaster.

1.4.5.1. Maintain mock-up during plaster operations. Dispose of mock-up after substantial completion.

1.4.5.2. Prior to beginning plaster operations, obtain Architect and DSA approval of lathing mockup.

1.5. SPECIAL INSPECTION PROCEDURES

1.5.1. Provide continuous special inspection of all underlayment, lath and scratch coat plaster work at no additional cost to the Owner.

1.5.2. Inspector shall be approved by DSA and Architect, and may be a member of a plastering trade organization, a plastering consultant, or Contractors staff dedicated to this role.

1.5.3. Inspector shall prepare daily reports of work performed on each building, by area or portion, and include check-off statements of compliance with specified criteria for underlayment installation, lath fastening and clearance, and mix control. Notify inspector a minimum of 2 working days prior to beginning work covered by this requirement.

1.5.4. Contractor shall provide weekly certification to Architect, countersigned by IOR and applicator, certifying all work specified in this Section was completed in compliance with contract documents.

1.5.4.1. Contractor shall submit daily reports and a final report to the Inspector of Record and the Architect, certifying compliance with the contract documents, and describing all direction given to Contractor during review period.

1.5.4.2. See this Section, Part 3 for field test criteria.

1.6. ENVIRONMENTAL REQUIREMENTS

1.6.1. Apply plaster materials when substrate or ambient air temperature is within manufacturers temperature ranges.

1.6.2. Maintain manufacturers minimum recommended ambient temperature during and after installation of plaster. Provide barriers, heaters and all other temporary facilities as required.

1.6.3. Take all precautions required to protect plaster from drying winds and other environmental impacts.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. FIELD MIX PLASTER MATERIALS

2.2.1. Cement: ASTM C150, Type II Portland Cement, low alkali.

2.2.1.1. Use of plastic cement is not permitted.

2.2.2. Lime: ANSI/ASTM C206, Type S.

2.2.3. Aggregate: Clean sharp plastering sand, complying with ASTM C144 and ASTM C897.

2.2.4. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.

2.2.5. Glass Fiber Reinforcing: Fibermesh Harbourite, AR type, complying with ASTM C 1116, with glass fiber, length, proportion and density per manufacturer's recommendations.

2.2.6. Admixture: Larsen Acrylic Ad-Mix 101 or equal, bonding agent admixture at masonry/concrete plaster mix applications.

2.2.7. Plaster Bonding Agent: Larsen Weld-Crete or equal, surface application bonding agent.

2.2.8. Fog Coat: La Habra or equal, cement fog coat finish paint, color to match integral color.

2.3. PREMIXED PLASTER ALTERNATIVE

2.3.1. Premixed Basecoat Plaster: As a field mix alternate, provide LaHabra Basic926 sanded, BMI 690, or equal, with integral fiber reinforcing, complying with ASTM C 926 and IBC Chapter 25.

2.3.2. Premixed Finishing Coat: La Habra or equal, Exterior Stucco Color Coat, 20/30 mesh silica sand, premixed integral color finish coat.

2.3.2.1. Provide number pf integral color to match number of different paint colors for exterior plaster as provided in Section 09 91 00.

2.3.2.2. Provide premixed integral color to match existing building plaster color.

2.3.3. Finish Coat: Expo Shower Finish, or approved equal, complying with ASTM C 150, Type I Portland Cement, white color, low alkali, with hydrated lime admixture.

2.4. LATH

2.4.1. Self Furred Metal Lath: Cemco or equal, Cem-Lath, 3.4 lb/sq. yd, G40 galvanized finish, self-furring.

2.4.1.1. Combination lath and underlayment may be used with Architects prior approval.

2.4.2. Lath at plaster soffit: Cemco, Cem-Lath D, 3.4 lb/sq yd, expanded metal lath, non-furring style at spaced framing, G40 galvanized finish, with Grade D paper backing.

2.4.3. Lath at plaster soffit: Cem-Lath D 3.4 lb/sq yd, expanded metal lath, non-furring style, G40 galvanized finish, with Grade D paper backing.

2.2.3 Use of rib lath is not permitted.

2.5. UNDERLAYMENT

2.5.1. Underlayment: Fortiber or equal, Super Jumbo Tex, exceeding FS-UU-B-790, type I, Grade D as specified:

2.5.1.1. Water vapor transmission: minimum 11 perms per ASTM E 96, method A

2.5.1.2. Water Resistance: Minimum 60 minutes per ASTM D 779.

2.5.1.3. Tensile Strength: Minimum 70 lb/inch MD/60 lb/inch CD.

2.6. ACCESSORIES

2.6.1. Corner Reinforcing Lath: 2.7 lb/sq yd expanded metal lath, G40 galvanized, or approved equivalent at all openings.

2.6.2. Expansion and edge accessories:

2.6.2.1. Manufacturer: Provide manufacturer as indicated or approved equal.

2.6.2.1.1. Aluminum Accessories: Provide products manufactured by Fry Reglet Corporation, www.fryreglet.com, or equal.

2.6.2.1.2. Steel brake Metal Accessories: Unless noted otherwise, provide products manufactured by Stockton Products, http://www.stocktonproducts.com, or equal.

2.6.2.2. Outside Lath/Corner Bead: Cemco 1-A series.

2.6.2.3. Interior corners (where shown): Cemco #30, galvanized, ground as required for plaster thickness.

2.6.2.4. Control Joint/Reveal - Type 1: Cemco # XJ-15.

2.6.2.5. Casing Bead/Edge Termination - Type #:

2.6.2.5.1. Stockton, SFC with expanded lath, 26 gage, galvanized, at lath application, ground dimension as required for plaster thickness.

2.6.2.5.2. Stockton SFC, 26 gage, galvanized, at masonry/concrete surfaces, ground dimension as required for plaster thickness.

2.6.2.6. Casing Bead/Edge Termination:

2.6.2.6.1. Fry JPM-75, prime paint/clear anodized/prefinished white, with protective insert.

2.6.2.7. Soffit/Fascia Transition and Soffit Vent Screed - Type # **X**: Stockton STM Series, 3-1/2 inch reveal, galvanized, ground as required for plaster thickness.

2.6.2.8. Soffit/Fascia Transition and Soffit Vent Screed - Type # **X**: Stockton STM Series, 3-1/2 inch reveal, Vented, galvanized, ground as required for plaster thickness.

2.6.2.9. Soffit Vent Screed - Type # **X**: Stockton SVR Series, 3 inch, Vented, galvanized, ground as required for plaster thickness.

2.6.2.10. Soffit Vent Screed - Type # **X**: Fry, PCS-75-V-300, prime paint/clear anodized/prefinished white, with protective insert.

2.6.2.11. Weep Screeds:

2.6.2.11.1. Stockton #7 sill screed, 26 gage, with weep holes, galvanized, with 5-1/2 inch leg, ground as required for plaster thickness.

2.6.2.11.2. Stockton J-B sill screed, 26 gage, with weep holes, galvanized, with 5-1/2 inch leg, ground as required for plaster thickness.

2.6.2.12. Control Joint/Reveal - Type # **X**: Fry PCS-75-75, prime paint/clear anodized/prefinished white, with protective insert. Provide connector clip, end cap and compatible sealant bedding.

2.6.2.13. Wall/Fascia Transition - Type # **X**: Fry F Series, 3/4 inch exposed reveal, prime paint/clear anodized/prefinished white, with protective insert.

2.6.2.14. Radiused edge trim - Type # **X**: Fry, profile as necessary for condition, aluminum, factory stretch formed, prime paint/clear anodized/prefinished white, with protective insert

2.6.2.15. Outside Corner - Type # **X**: Fry PCM-75-75, prime paint finish.

2.6.3. Wire Ties: Soft annealed steel, galvanized; 18 gage.

2.6.4. Anchorage: Nails, staples, or other metal supports conforming to requirements of referenced standards, galvanized, of type and size to suit application and conforming to requirements of CBC Chapter 25 for conditions as required to rigidly secure lath, underlayment and associated accessories in place.

2.7. CEMENT PLASTER MIXES

2.7.1. Field Mix: Mix and proportion cement plaster in accordance with ASTM C 926, Table 3, for type C portland cement plaster. Do not add plasticizers of any kind. Incorporate specified fiber reinforcing in mix design.

2.7.2. Mix only as much plaster as can be used in one hour.

2.7.3. Protect mixtures from frost, contamination, and evaporation.

2.7.4. Do not retemper mixes after initial set has occurred.

2.8. METAL SUSPENSION SYSTEM

2.8.1. Type: Runner and furring channel grid system.

2.8.2. Components

2.8.2.1. Main Runner: Provide hot rolled channels, size as shown on drawings, minimum 1-1/2 inch deep, minimum 1.12 pounds per linear foot minimum, hot dip galvanized.

2.8.2.2. Cross-Furring: Provide hot rolled channels, size as shown on drawings, minimum 1 inch deep, minimum 0.410 pounds per linear foot, hot dip galvanized.

2.8.2.3. Vertical Hanger Wire: Prestretched steel wire, Number 8, galvanized.

2.8.2.4. Saddle Tie Wire: Prestretched steel wire, Number 16, galvanized.

2.9. ELASTOMERIC FLASHING

2.9.1. Manufacturer: Fortifiber, www.fortifiber.com, or equal.

2.9.2. Type: SBS Modified Asphalt membrane, with polyethylene film facer.

2.9.3. Series: Fortiflash .

2.9.4. Characteristics:

2.9.4.1. Thickness: 0.040 inches (40 mils) nominal.

2.9.4.2. Width: as required to achieve specified laps and as recommended by manufacturer.

2.9.4.3. Facing Color: White

2.10. OTHER MATERIALS

2.10.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Grounds and Blocking: Verify items within walls for other Sections of work have been installed.

3.1.1.2.2. Mechanical and Electrical: Verify services within walls have been tested and approved.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Protect surfaces near the work of this Section from damage or disfiguration.

3.2.1.1. Install line wire backing at framing without sheathing.

3.2.1.2. Comply with special inspection criteria specified in this Section.

3.2.2. Underlayment at framed wall applications:

3.2.2.1. Unless specified otherwise, install Grade D underlayment.

3.2.2.1.1. Coordinate underlayment placement with Section 09 30 13.

3.2.2.2. Install first course of underlayment shingle fashion, perpendicular to studs, attaching to studs with approved fasteners. Lap edges and ends 6 inches. Do not tear. Seal vertical edges with tape.

3.2.2.3. Install second course of underlayment per 3.2.2.2, shingle fashion, with joints offset 6 inches from first course.

3.2.2.4. Install two layers of waterproof underlayment over top of framed walls. Do not fasten through top of wall. Shingle lap over wall underlayment.

3.2.2.5. Weather lap underlayment and elastomeric flashing with sheet metal flashing conditions.

3.2.2.6. Install self adhesive elastomeric flashing as sill, head and jamb flashing at openings and at sloped plaster surfaces in compliance with manufacturers recommendations, weather lapping each course. Lap elastomeric flashing at opening; lap over head and jamb flashing and under sill flashing.

3.2.2.6.1. Do not anchor through horizontal or sloped surface. Extend up vertical surfaces of opening and beneath sills a minimum of 6 inches.

3.2.2.7. Coordinate underlayment placement with installation of elastomeric flashing conditions.

3.2.2.8. Install approved sealant over tears, holes and all fasteners not located at framing members.

3.2.2.9. Coordinate underlayment placement with installation of waterproof membrane specified in Section 0713007 13 00/0714007 14 00.

3.2.3. Provide water-resistant underlayment as specified at plaster accessory installation.

3.2.4. Concrete/Masonry wall applications:

3.2.4.1. Provide surface treatment of masonry and concrete surfaces as required to achieve proper bond and adhesion.

3.2.4.2. Remove all surface coatings, dirt, glossy or smooth finishes limiting plaster adhesion.

3.2.4.3. Where necessary, sandblast concrete surfaces to remove surface paste film.

3.2.5. Metal suspension system:

3.2.5.1. Install in accordance with CBC Chapter 7A and as required by DSA.

3.3. LATH INSTALLATION AT VERTICAL AND SLOPED FRAMING

3.3.1. Apply specified metal lath over underlayment.

3.3.1.1. Install with metal lath in contact with metal lath. Ensure paper selvage edges are properly lapped. Do not permit lath to be sandwiched or covered by underlayment.

3.3.2. Apply metal lath taut, with long dimension perpendicular to supports. Install lath a minimum of 1/4 inch from backing with approved fasteners, anchored through sheathing into framing or blocking only. Do not fasten lath to sheathing.

3.3.3. Lap metal lath edges minimum 1-1/2 inches, lapped as recommended by manufacturer and secure with tie wire at 6 inches on center.

3.3.4. Attach metal lath to supports in conformance with CBC Chapter 25 and ASTM C 1063.

3.3.4.1. Install approved sealant over tears, holes and all fasteners not located at framing members.

3.3.4.2. Install lath using approved drilled in mechanical fasteners where lath is shown extending over masonry or concrete, including wall curbs.

3.3.5. Continuously reinforce internal angles with specified corner expansion screeds. Fasten at perimeter edges only.

3.3.6. Install specified outside corner reinforcing. Fasten only at flange or outer edges.

3.3.7. Place 4 x 12 inch strip of corner reinforcing lath diagonally at corners of openings. Secure rigidly in place.

3.3.8. Place 4 inch wide strips of corner reinforcing lath centered over junctions of dissimilar backing materials. Secure rigidly in place.

3.4. LATH INSTALLATION AT HORIZONTAL SOFFITS

3.4.1. Apply paper backed metal lath taut, with long dimension perpendicular to supports in accordance with CBC Chapter 25, including Section 2507.3.

3.4.1.1. Ensure paper selvage edges are properly lapped. Do not permit lath to be sandwiched or covered by underlayment.

3.4.2. Lap ends and sides of metal lath minimum 1-1/2 inches. Secure laps with tie wire where they occur between supports.

3.4.3. In addition to fastening methods required by CBC Chapter 25, provide 9 gage ring shank hook staple over 10d nail, at 27 inches on-center along joist support, and located not more than 3 inches from edge of lath.

3.4.4. Place 4 x 12 inch strip of corner reinforcement lath diagonally at corners of openings and recessed light fixture frames. Secure rigidly in place.

3.5. PLASTER ACCESSORIES AND CONTROL JOINTS

3.5.1. Place specified plaster accessories at terminations of plaster finish per ASTM C 1063.

3.5.1.1. Neatly miter or cope, corners and intersections of accessories to fit exposed edges.

3.5.1.2. Caulk drip screeds and other exterior accessories at joints and intersections

3.5.1.3. Secure in place by wire tying to lath. Do not anchor to plywood sheathing or supports without Architects prior approval.

3.5.1.4. Where available from manufacturer, provide manufacturer's recommended connector clip and sealant bedding at all accessory intersections and joints.

3.5.1.5. Where available from manufacturer, provide manufacturer's end cap at locations where accessories terminate against door frames, wall surfaces and similar conditions.

3.5.2. Install specified weep screed at bottom edge of plaster. Fasten to backing or sill with fully seated screws at 16 inches on center. .

3.5.3. Install accessories to proper lines and levels. Provide 1/8 inch spacing at joints. Align intersections.

3.5.4. Establish control and expansion joints with specified joint devices. Do NOT allow lath to continue behind or through expansion joint.

3.5.5. Coordinate joint placement with naturally occurring joints of other related work. Do not extend lath across expansion or control joints in substrate.

3.5.6. Lath and Underlayment Installation at Accessories

3.5.6.1. Provide additional layer of water-resistant underlayment behind all accessories, 12 inches wide, centered on accessory. Apply over lower layer of wall underlayment.

3.5.6.2. In horizontal applications at wall conditions, install lath and underlayment over upper flange of accessory. Install lath over lower flange of accessory. Extend wall underlayment a minimum of 6 inches above upper flange.

3.5.6.3. In vertical applications at wall conditions and soffit conditions, install lath over flange of accessory. Maintain wall underlayment behind accessory.

3.5.7. Provide joints as shown on drawings. Where joints not shown, provide as directed by Architect in compliance with the following criteria:

3.5.7.1. Extend screeds and accessories into niches and recesses, around interior and exterior wall corners, and around all sides of columns and similar building elements. Continue control joint patterns and molding alignments on walls of arcades, passages and all similar locations to match or extend those shown on exterior elevations, whether or not individual conditions are specifically shown, noted or elevated.

3.5.7.2. Provide wall control joint at edge of door and window frames, extended from drip screed to continuous horizontal control joint.

3.5.7.3. Provide vertical wall control joints as necessary to limit plaster area to approximately 140 square feet, with maximum joint spacing dimension of 18 feet, and with maximum 2-1/2 to 1 aspect ratio. Coordinate area limit with horizontal joint location. Final location as directed by Architect.

3.5.7.4. Provide horizontal wall control joint in coordination with vertical joint spacing as necessary to limit plaster area as defined for vertical joints. Final location as directed by Architect.

3.5.7.5. In plastered ceilings and soffits, provide control joints as necessary to limit plaster area to approximately 75 square feet. Final location as directed by Architect.

3.5.8. Coordinate joint placement with coursing and layout for thin brick tile specified in Section 09 31 34. Place joints at brick module. Joints placed in such a location as to require cutting of thin brick tile at non-module locations will result in plaster substrate rejection. .

3.6. PLASTERING

3.6.1. Apply plaster in accordance with referenced TSIB Tech Bulletins, CBC Chapter 25 and ASTM C 926.

3.6.2. Framed wall application:

3.6.2.1. Apply three-coat plaster assembly, resulting in minimum 7/8 inch nominal thickness.

3.6.2.2. Apply scratch coat to a nominal thickness of 3/8 inch.

3.6.2.3. Apply brown coat to a nominal thickness of 3/8 inch. Texture as required to comply with specified texture.

3.6.2.4. Rod surface of brown coat with a 10 foot straight edge to produce a true plane. Texture as required to comply with specified texture.

3.6.2.5. Apply finish coat to a nominal thickness of 1/8 inch.

3.6.3. Concrete and Masonry wall application:

3.6.3.1. Apply two- coat plaster to concrete and masonry wall surfaces, resulting in 5/8 inch nominal thickness.

3.6.3.2. Apply specified bonding agent and dash coat as necessary for proper adhesion.

3.6.3.3. Apply brown coat to a thickness of 1/2 inch. Texture as required to comply with specified texture.

3.6.3.4. Apply finish coat to a thickness of 1/8 inch, texture as specified.

3.6.4. Thin Brick Tile Veneer Application:

3.6.4.1. Apply plaster coats as necessary to provide properly prepared substrate for thin brick tile veneer specified in Section 09 31 34.

3.6.4.2. Apply over framing or masonry structural substrate as shown on drawings and as specified.

3.6.4.3. Do not apply finish coat.

3.6.4.4. See Article 3.7 for required tolerances.

3.6.5. At soffits and ceilings, provide a combined thickness of 7/8 inch thickness at scratch and brown coats prior to application of finish coat.

3.6.6. Curing:

3.6.6.1. Moist cure scratch coat a minimum of 5 days prior to application of brown coat.

3.6.6.2. Dampen surface of scratch coat prior to application of brown coat.

3.6.6.3. Moist cure brown coat a minimum of 5 days, and cure for a total of 10 days prior to application of finish coat.

3.6.6.4. Moist cure finish coat for minimum period of 72 hours.

3.6.7. Finish Coat:

3.6.7.1. After brown coat curing time has elapsed, apply finish coat. Dampen base coat prior to applying finish coat.

3.6.7.2. Exterior Surfaces:

3.6.7.2.1. Apply finish coat in medium dash finish as illustrated in "Plaster Textures" published by TSIB and matching approved sample.

3.6.7.2.2. Exterior Surfaces: Apply finish coat in texture matching existing plaster finish, and matching approved sample.

3.6.7.3. Interior Surfaces: Apply finish coat in two- coat process. Use wood float to a smooth and consistent fine sand float finish, as illustrated in "Plaster Textures" published by TSIB and matching approved sample.

3.6.8. Fog Coat Application:

After finish coat has completely cured, and no sooner than 28 days after installation of finish coat, apply fog coat finish to all plaster surfaces as recommended by manufacturer.

3.7. TOLERANCES

3.7.1. Exposed finish plaster: Maximum variation from true plane limited to 1/4 inch plus or minus, in 10 feet, non-cumulative.

3.7.2. Interior Plaster/Thin brick tile substrate: Maximum variation from true plane limited to 1/8 inch plus or minus, in 10 feet, non-cumulative.

3.8. CLEANING AND PROTECTION

3.8.1. Protect all aluminum frames, accessories, glass and thresholds from plaster application with complete waterproof protective sheeting or tape.

3.8.1.1. Verify tape compatibility with all prefinished coatings.

3.8.1.2. Do not allow tape or protection sheeting to contact glass.

3.8.1.3. Remove all covering and tape within two weeks of plaster completion in any one area.

3.8.2. During plaster operations, provide plywood or other approved protection at all roofing, walkways, and concrete paving.

3.8.2.1. Lap and tape edges as necessary to prevent water infiltration to unprotected plywood sheathing below.

3.8.3. Remove all traces of spilled or splashed plaster from surfaces and landscaping. Do not discharge plaster wash-off into planter areas.

3.9. FIELD QUALITY CONTROL

3.9.1. The Owner reserves the right, prior to applying finish coat, to direct Contractor to remove 2 plaster assembly samples taken from in-place plaster at random locations as selected by Architect.

3.9.1.1. Remove plaster by saw-cutting through underlayment. Do not cut sheathing.

3.9.1.2. Samples shall be 24 inches square, and selected at locations to include lath and underlayment joint.

3.9.1.3. Repair plaster at sample area to match adjacent plaster, including providing additional underlayment shingle lapped with remaining underlayment.

3.9.2. Take all samples in the presence of the Architect.

3.9.3. The Architect will take possession of samples for inspection and testing, including plaster mix content and lath placement.

3.9.4. Cost of sample removal and repair will be paid by Owner if plaster complies with specification. Contractor shall pay for sample removal, repair, and all remedial work made necessary by non-compliance with the specification.

END OF SECTION

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Gypsum board.

1.1.2. Joint treatment and surface finishes.

1.1.3. Metal support and furring systems.

1.1.4. Cementitious backer board for ceramic tile.

1.1.5. Rated shaft wall assemblies.

1.1.6. Metal suspension system for drywall ceiling assemblies.

1.2. WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

1.2.1. Section 08 31 13 - Access Doors and Frames.

1.3. REFERENCES

1.3.1. ASTM C 36 - Gypsum Wallboard.

1.3.2. ASTM C 442 - Specification for Gypsum Backing Board and Coreboard.

1.3.3. ASTM C 630 - Water Resistant Gypsum Backing Board.

1.3.4. ASTM C 645 – Nonstructural Steel Framing Members

1.3.5. ASTM C 1002 - Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.

1.3.6. ASTM C 1177 – Glass Mat Gypsum Substrate for Use as Sheathing.

1.3.7. ASTM D 3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

1.3.8. ASTM E 119 - Fire Tests of Building Construction and Materials.

1.3.9. Gypsum Association, "Levels of Gypsum Board Finish"

1.3.10. ASTM C 28 - Gypsum Plasters.

1.3.11. ASTM C 36 - Gypsum Wallboard.

1.3.12. ASTM C 37 - Gypsum Lath.

1.3.13. ASTM C 588 and C 587 - Gypsum Base for Veneer Plaster and Gypsum Veneer Plaster.

1.4. REGULATORY REQUIREMENTS

1.4.1. Conform to IBC Chapter 7 / CBC Chapter 7A, Part 2, Title 24, CCR for fire rated assemblies.

1.4.2. Conform to IBC Chapter 25 / CBC Chapter 25A, Part 2, Title 24, CCR for finish materials installation.

1.4.3. Conform to DSA Interpretation of Regulations document IR M-4 IR 25-5 (supercedes IR M-4 under CBC 2007) for gypsum board ceiling suspension.

1.5. SUBMITTALS

1.5.1. Provide submittals under provisions of Division 01.

1.5.2. Submit product data indicating materials, joint toppings and finish materials, and accessories.

1.5.3. Submit manufacturer's installation instructions.

1.6. QUALITY ASSURANCE

1.6.1. Manufacturer: Provide company who has produced the specified products for a period of 5 years prior to beginning work of this Section and maintains the capability to provide the specified products in compliance with the delivery and quantity criteria for the Project.

1.6.2. Installer: For installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this Section, and who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. GYPSUM BOARD

2.2.1. Manufacturer: United States Gypsum (USG), www.usg.com, Georgia-Pacific (G-P) www.gpgypsum.com or equal.

2.2.2. Board Type:

2.2.2.1. Non-Rated: USG Regular per ASTM C36.

2.2.2.1.1. Edge: SW Tapered.

2.2.2.1.2. Thickness: 5/8 inch.

2.2.2.2. Fire Rated: USG FireCode Core (Type X) per ASTM C36.

2.2.2.2.1. Edge: SW Tapered.

2.2.2.2.2. Thickness: 5/8 inch.

2.2.2.3. Water Resistant: USG Mold Tough FireCode Core, Type X, per ASTM C1396.

2.2.2.3.1. Edge: Tapered.

2.2.2.3.2. Thickness: 5/8 inch.

2.2.2.4. Abuse-Resistant: USG Abuse-Resistant FireCode Core (Type X) per ASTM C36.

2.2.2.4.1. Edge: SW Tapered.

2.2.2.4.2. Thickness: 5/8 inch.

2.2.2.5. Exterior Sheathing: Georgia-Pacific DensGlass Exterior Sheathing Fireguard Type X or USG Securock Glass-Mat Sheathing Firecode Core per ASTM C1177 and ASTM D3273

2.2.2.5.1. Edge: Square.

2.2.2.5.2. Thickness: 5/8 inch.

2.2.2.5.3. Moisture and mold resistant treated core and coated fiberglass mat on face, back and long edges with 12-month warranty against in-place weather exposure damage.

2.2.2.5.4. When tested for mold growth per ASTM D3273, product shall score the highest possible rating: 10.

2.2.2.6. Shaftwall Board: USG Gypsum Liner Panel, per ASTM C442.

2.2.2.6.1. Edge: Beveled.

2.2.2.6.2. Thickness: 1 inch.

2.2.2.7. Shaftwall Face Board: USG Gypsum UltraCode Core Panel, per ASTM C36.

2.2.2.7.1. Edge: Tapered.

2.2.2.7.2. Thickness: 3/4 inch.

2.2.2.8. Acoustical Gypsum Board at Acoustical Rated Wall and Ceiling Assemblies: per ASTM C36.

2.2.2.8.1. Manufacturer: Suppress Products, or equal.

2.2.2.8.2. Series: Sound-Engineered Drywall, 1/2 inch SED1248.

2.2.2.8.3. Edge: Square.

2.2.2.8.4. Thickness 1/2 inch.

2.2.2.8.5. Performance characteristics: For acoustical assembles of STC 50 for single stud walls; STC 55 staggered stud walls; STC 61 double stud walls; in accordance with ASTM E90.

2.3. ACCESSORIES

2.3.1. Acoustical Sealant: USG, Non-hardening, non-skinning, conforming to ASTM C557 and C919, for use in conjunction with non-rated gypsum board assemblies.

2.3.2. Drywall Joint and Edge Accessories:

2.3.2.1. Corner Bead: USG or approved alternate, paper faced metal.

2.3.2.2. Edge Trim: USG or approved alternate, paper faced metal.

2.3.2.3. Expansion Joint: USG 093 or approved alternate, metal.

2.3.2.4. Drywall Reveal: Fry, DRM Series, reveal dimension as shown on drawings.

2.3.2.4.1. "F" Reveal, DRMF-625-50/DRMF-625-V-50

2.3.2.4.2. "Z" Reveal, DRMZ-625-25

2.3.2.4.3. Contemporary Reveal, CDRM-625-100

2.3.2.4.4. Reveal Base, DRMB-625-400

2.3.3. Joint and Finishing Systems:

2.3.3.1. Provide systems produced by same manufacturer as boards.

2.3.3.2. Joint Systems: USG Ready Mixed Compounds, complying with ASTM C475, vinyl based, certified asbestos free.

2.3.3.3. Finishing System Materials: USG Multi-Purpose or approved alternate, complying with ASTM C475, non-aggregate, vinyl based, certified asbestos free.

2.3.3.4. Primer: Manufacturer's approved primer, compatible with finishes specified in other Sections.

2.3.4. Fasteners:

2.3.4.1. Gypsum board screws: type and length as required by installation and UL Listing criteria.

2.3.4.2. Gypsum board nails: type and length as required by installation and UL Listing criteria. Nails not permitted at interior gypsum board applications.

2.3.4.3. Cementitious Backer Unit screws: corrosion resistant, type and length as required by manufacturer, installation and UL Listing criteria. Nails not permitted.

2.3.5. Adhesive: Manufacturer's approved adhesive for attachment to concrete surfaces.

2.3.6. Underlayment Membrane: Membrane complying with ANSI A 108.2-3.8.

2.3.7. Metal Furring Components:

2.3.7.1. Resilient Channels: USG, Series RC-1, 1/2 inch depth.

2.3.7.2. Wall Furring Channels: Provide USG Metal Furring Channel, 20 gage, corrosion resistant steel.

2.3.8. Shaftwall Stud Systems:

2.3.8.1. Series: USG Shaftwall System C-H.

2.3.8.2. Size: As shown on drawings.

2.3.8.3. Gage: 20 gage.

2.3.8.4. Finish: Galvanized per ASTM A 653.

2.3.8.5. Accessories: Provide clips, runner and track as required for installation and assembly rating.

2.3.9. Fire Rated Ceiling Components:

2.3.9.1. Sawn Timber Members: Resilient furring channel as required for compliance with UL Design L513 Method

2.3.9.2. Truss Members: Furring clip, strap and channel as required for compliance with UL Design L530 Method

2.3.9.3. Fire Rated Assembly Insulation: Provide 1 inch thick insulation as required by UL Design L530.

2.3.10. Fire-Resistive Head of Wall Joint Components: Provide fire-resistive joint sealants, fire safing insulation, and similar materials as part of head-of-wall joint system specified in Section 09 51 00 and required by UL Design system designations shown on drawings.

2.4. CEMENTITIOUS BACKER UNIT (CBU)

2.4.1. Manufacturer: USG or equal.

2.4.2. Series: USG Durock Cement Board.

2.4.2.1. Characteristics:

2.4.2.1.1. Edge: Smooth wrapped edge.

2.4.2.1.2. Thickness: 5/8 inch or as indicated.

2.4.2.1.3. Indentation Resistance: 2300 psi, 1 inch disc at 0.02 inch indentation per ASTM D2394.

2.4.2.1.4. Water Absorption: 10 percent maximum at 24 hours per ASTM C473.

2.4.2.1.5. Flexural Strength: 750 psi per ASTM C947.

2.4.2.2. Fire and Life Safety Criteria:

2.4.2.2.1. Surface Burning/Smoke contributed: Maximum values of 5/0 per ASTM E84.

2.4.2.2.2. Listing: UL Listed as a component in rated wall and floor assemblies per ASTM E119.

2.5. METAL SUSPENSION SYSTEM FOR DRYWALL CEILING ASSEMBLIES

2.5.1. Manufacturer: USG or equal.

2.5.2. Type: Runner and furring channel grid system.

2.5.3. Components:

2.5.3.1. Main Runner: Provide hot rolled channels , complying with CBC, Chapter 25, Part 2, Title 24, CCR, including Section 1614A, galvanized.

2.5.3.2. Cross-Furring: Provide galvanized hat channels, , complying with CBC, Chapter 25, Part 2, Title 24, CCR, including Section 1614A.

2.5.3.3. Vertical Hanger Wire: Prestretched steel wire, Number 8, galvanized.

2.6. WEATHER BARRIER

2.6.1. Synthetic Fiber Wrap: Synthetic vapor permeable weather barrier at all exterior gypsum sheathing, ASTM E1677, Dupont Tyvek CommercialWrap or equal.

2.6.2. Nonperforated #15 asphalt saturated felt complying with ASTM D 226, Type 1.

2.6.3. Air and water-resistive barrier systems such as fluid applied or self adhering air or water barrier shall be _____.

2.7. OTHER MATERIALS

2.7.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify framing members are properly installed and will comply with specified tolerances.

3.1.1.2.2. Verify that openings, curbs, pipes, sleeves, ducts, and vents are solidly set, and blocking and backing is in place.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Insulation Coordination:

3.2.1.1. Verify insulation is fitted tightly within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and to items passing through partitions.

3.2.1.2. Install insulation specified in this Section as a component in rated floor/ceiling and roof/ceiling systems.

3.2.2. Metal Suspension System:

3.2.2.1. Install metal suspension system for drywall ceiling surfaces in accordance with USG AC 3152 and CBC Chapter 25.

3.3. GYPSUM BOARD INSTALLATION

3.3.1. Install gypsum board in accordance with manufacturer's instructions and designated system number for fire rated assemblies.

3.3.1.1. Unless noted otherwise, utilize water resistant type for wall surfaces within four feet of the outermost edge of any plumbing fixture or moisture generating equipment. Extend water resistant gypsum board full height.

3.3.1.2. Do not use water resistant gypsum board on ceiling applications.

3.3.2. Where gypsum board extends across concrete curbs, install with specified adhesive, consisting of vertical beads placed at 4 inches on center full height. Bond to curb with rollers exerting sufficient pressure to assure full contact and surface alignment with board at framing above.

3.3.3. Use screws of proper length when fastening gypsum board to framing, spaced at 8 inches on center maximum at each support.

3.3.4. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.

3.3.5. Double Layer Applications: Place second layer parallel to first layer. Offset joints of second layer from joints of first layer a minimum of one stud spacing, and as required by referenced test standard.

3.3.6. Edge and Trim Installation:

3.3.6.1. Install corner beads at all external corners. Use longest practical length.

3.3.6.2. Install corner beads at all conditions where gypsum board abuts dissimilar materials.

3.3.6.3. Install angle reinforcement at interior corners.

3.3.6.4. Tape and finish joint reinforcement as specified.

3.3.7. Install acoustical sealant at wall edge perimeter, including floor edge, and at all penetrations where fire stopping is not required.

3.3.8. Cementitious Backer Unit Installation:

3.3.8.1. Install backer board in accordance with manufacturer's recommendations, including USG Systems Folder SA-934.

3.3.8.2. Apply specified underlayment membrane to framing with approved adhesive or tape. Lap membrane 4 inches in shingle fashion at all joints.

3.3.8.3. Install backer board with joints over supports. Space ends and edges 1/8 inch apart.

3.3.8.4. Install backer board using screws at maximum 8 inches on center at each support.

3.3.8.5. Prefill all joints with approved latex fortified mortar meeting ANSI 118.4. Tape all joints and level.

3.3.9. Exterior Gypsum Sheathing Installation:

3.3.9.1. Install gypsum sheathing in accordance with manufacturer's recommendations. Install boards with correct side to exterior.

3.3.9.2. Install board with joints over supports. Space ends and edges 1/8 inch apart.

3.3.9.3. Install board using approved fasteners at maximum 8 inches on center at each support.

3.3.9.4. Apply approved sealant at sheathing edges and penetrations. Coordinate all joint treatments with specified air and or water barrier.

3.3.9.5. Entire face of gypsum sheathing shall be covered with weather barrier.

3.3.10. Exterior Gypsum Sheathing Installation at EIFS Application:

3.3.10.1. Install gypsum sheathing in accordance with manufacturer's recommendations, including EIFS manufacturer's requirements. Install boards with correct side to exterior.

3.3.10.2. Install approved weather barrier over framing members per manufacturer's recommendations.

3.3.10.3. Install board with joints over supports. Space ends and edges 1/8 inch apart.

3.3.10.4. Install board using approved fasteners at maximum 8 inches on center at each support.

3.3.10.5. Apply approved sealant at sheathing edges and penetrations. Coordinate joint treatment with specified air and or water barrier.

3.3.10.6. Entire face of gypsum sheathing shall be covered with synthetic fiber wrap weather barrier.

3.3.11. Gypsum Shaft Wall Installation:

3.3.11.1. Install gypsum shaft wall assemblies in accordance with manufacturer's recommendations, including USG Systems Folder SA-926.

3.3.11.2. Install required clips at steel framing assemblies.

3.3.11.3. Install steel runners at maximum 24 inches on center, or as shown on drawings. Install studs and liner panels in sequence.

3.3.12. Gypsum Veneer Plaster Installation :

3.3.12.2. Install gypsum base in accordance with manufacturer's recommendations.

3.3.12.3. Install tape and beads as required. Apply finish plaster in accordance with manufacturer's recommendations.

3.3.12.4. Provide smooth/sand texture.

3.3.13. Gypsum Plaster Installation:

3.3.13.1. Provide framing or blocking/backing as required to support lath in compliance with CBC.

3.3.13.2. Install metal lath in accordance with manufacturer's recommendations.

3.3.13.3. Apply gypsum scratch and brown coats with finish plaster in accordance with manufacturer's recommendations.

3.3.13.4. Provide texture as selected by Architect.

3.4. GYPSUM BOARD FINISH AND JOINT TREATMENT

3.4.1. Comply with descriptions and Finish Levels as specified and in accordance with referenced standard.

3.4.2. LEVEL 2 Finish: Gypsum board located above ceiling areas, plenums, and similar surfaces not visible in completed construction:

3.4.2.1. Embed tape at all joints and interior angles in joint compound.

3.4.2.2. Apply one separate coat of joint compound over all joints, angles, fastener heads, and accessories.

3.4.2.3. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

3.4.3. LEVEL 3 Finish: Gypsum board designated to receive rigid FRP or solid paneling.

3.4.3.1. Embed tape at all joints and interior angles in joint compound.

3.4.3.2. Apply two separate coats of joint compound over all joints, angles, fastener heads, and accessories.

3.4.3.3. All joint compound shall be smooth and free of tool marks and ridges.

3.4.3.4. Apply uniform coat of approved primer over entire surface with roller.

3.4.4. LEVEL 4 Finish: Gypsum board designated to receive vinyl wallcovering – verify Level 5 not required by VWC manufacturer.

3.4.4.1. Embed tape at all joints and interior angles in joint compound.

3.4.4.2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories.

3.4.4.3. Surface shall be smooth and free of tool marks and ridges.

3.4.4.4. Apply uniform coat of approved primer over entire surface with roller.

3.4.5. LEVEL 4 Finish - Knock-Down Finish: Gypsum board designated to receive flat paint finish.

3.4.5.1. Embed tape at all joints and interior angles in joint compound.

3.4.5.2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories. Apply uniform coat of approved primer over entire surface with roller.

3.4.5.3. Apply texture coating over entire surface. Finish in "Knock-Down" texture as illustrated in USG Construction Handbook. Surface shall be smooth and free of tool marks and ridges.

3.4.5.4. Apply uniform coat of approved primer over entire surface with roller.

3.4.6. LEVEL 5 Finish - Orange Peel: Gypsum board surfaces receiving eggshell, semi-gloss or gloss paint finish.

3.4.6.1. Embed tape at all joints and interior angles in joint compound.

3.4.6.2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories. Apply uniform coat of approved primer over entire surface with roller.

3.4.6.3. Apply texture coating over entire surface. Finish in "Orange Peel" texture as illustrated in USG Construction Handbook. Surface shall be smooth and free of tool marks and ridges.

3.4.6.4. Apply uniform coat of approved primer over entire surface with roller.

3.4.7. LEVEL 5 Finish - Smooth: Gypsum board surfaces receiving eggshell, semi-gloss or gloss paint finish.

3.4.7.1. Embed tape at all joints and interior angles in joint compound.

3.4.7.2. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories. Apply uniform coat of approved primer over entire surface with roller.

3.4.7.3. Apply thin skim coat of joint compound over entire surface. Sand as necessary. Surface shall be smooth and free of tool marks and ridges.

3.4.7.4. Apply uniform coat of approved primer over entire surface with roller.

3.5. TOLERANCES

3.5.1. Comply with the following tolerances for level, plumb and flat. Where substrate framing will not comply with specified tolerances, correct deficiencies as required.

3.5.1.1. Level and Plumb: Plus or minus 1/4 inch in 10 feet, non-cumulative.

3.5.1.2. Flatness: No gaps exceeding 1/8 inch at any point under a 10 foot straight edge placed on surface in any orientation.

END OF SECTION

SECTION 09 22 16

NON-STRUCTURAL METAL STUD FRAMING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Steel non-structural light gage wall and horizontal framing for interior non-structural applications.

1.1.2. Steel furring systems.

1.1.3. Framing accessories.

1.2. REFERENCES

1.2.1. ASTM A 653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot-Dip Process.

1.2.2. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

1.2.3. C 954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

1.2.4. 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

1.2.5. ASTM C 1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories..

1.2.6. ASTM A 1011 - Structural Steel, Sheet and Strip, Carbon, Hot-Rolled.

1.2.7. ASTM E 119 – Standard Test Methods for Fire Tests of Building Construction Materials.

1.2.8. E 1966 – Standard Test Method for Fire-Resistive Joint Systems.

1.2.9. AISI NASPEC/NAS-01 - North American Specification For the Design of Cold-Formed Steel Structural Members, 2001 Edition and 2004 Supplement.

1.3. QUALITY ASSURANCE

1.3.1. Provide full time quality control over fabrication and erection complying with applicable codes, ordinances, rules and regulations of government agencies having jurisdiction

1.3.2. Provide fire-resistance-rated assemblies with materials and construction approved in assembly as tested by ASTM E 119 by an independent testing agency. Products used in the assembly shall carry a classification label from a testing laboratory acceptable to authority having jurisdiction.

1.3.3. Provide sound rated assemblies with materials and construction approved in assembly as tested by ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.4. QUALIFICATIONS

1.4.1. Manufacturer:

1.4.1.1. Manufacturer with a demonstrated history of producing the specified products for a period of five (5) years prior to beginning work of this section, and with the capability to produce the specified products to the delivery and quantity criteria of the project.

1.4.1.2. Current member of SSMA with current Quality Assurance Program.

1.4.2. Installing Contractor Qualifications

1.4.2.1. Company specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope.

1.4.2.2. Company has installed similar applications of the specified products within one year prior to beginning work of this section on DSA regulated projects.

1.4.2.3. Welders shall be certified for welding with light gauge metals in compliance with all applicable AWS and Title 24, Part 2, CCR requirements.

1.4.2.4. Installing Foreman: Individual specializing in installation of work of this Section, with minimum 5 years documented experience in installation of projects of similar scale and scope.

1.4.2.5. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5. SUBMITTALS

1.5.1. Submit product data under provisions of Section 01 33 00.

1.5.2. Product Data:

1.5.2.1. Submit a complete list of all materials proposed to be furnished and installed under this portion of the work.

1.5.2.2. Provide current ICC ES report showing compliance with specified references.

1.5.2.3. Provide framing member materials, dimensions, structural properties and finishes.

1.5.2.4. Provide fastener and anchor data, including type, size, corrosion resistance and load capacity.

1.5.3. Manufacturers' Recommendations: Accompanying the materials list, submit two copies of the manufacturer's current recommended method of installation for each item.

1.5.4. Shop Drawings

1.5.4.1. Accompanying materials list, submit complete shop drawings for all metal framing applications.

1.5.4.2. Detail all connections, including sill/stud track and top runner/ stud track.

1.5.4.3. Detail framing assembly for all openings, bracing and transitions in direction or plane of framing.

1.6. FIELD MEASUREMENTS

1.6.1. Verify field measurements are as shown on shop drawings.

1.7. DELIVERY, STORAGE AND HANDLING

1.7.1. Deliver and store on site under the provisions of Section 01 60 00.

1.7.2. Store materials above ground, protected from dirt, grease, corrosion and other damage.

1.7.3. Store all other materials in a waterproof manner.

1.7.4. Provide original packaged welding electrodes, clearly marked as to type and rating.

1.7.5. Do not store materials on structure in a manner causing potential distortion or damage to members, surfaces, or supporting structures.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products manufactured by Cemco Steel Framing Systems, www.cemcosteel.com, are indicated to establish required level of quality and performance. The Architect will consider comparable products by alternate manufacturers listed in this Section, and requests for substitutions, under the provisions of Section 01 25 00.

2.1.1.1. Acceptable Alternate Manufacturers: Dietrich, Clark-Western, or equal.

2.2. MATERIALS/DESIGN CRITERIA

2.2.1. Base Metal Thickness Criteria: All metal framing materials provided as work of this Section shall comply with the following minimum thickness criteria for uncoated sheet steel. Thicknesses indicated are the minimum acceptable thickness for materials delivered to jobsite.

2.2.1.1. Members designated as 20 gage (33 mil): 0.0329-inch

2.2.1.2. Members designated as 16 gage (54 mil): 0.0538-inch

2.3. WALL STUDS / VERTICAL SURFACE FRAMING MATERIALS

2.3.1. Type: Punched "C" studs, screwable, per ASTM C 955.

2.3.2. Series: CS Series

2.3.3. Characteristics:

2.3.3.1. Size: Depth as shown on drawings, 1-5/8 inch flange with 1/2 inch return, unless noted otherwise.

2.3.3.2. Base Metal:

2.3.3.2.1. 20 gage members: ASTM A 653 Grade 33 sheet steel, Fy = 33,000 psi, galvanized to G60 coating class per ASTM A 653.

2.3.3.2.2. 16 gage members: ASTM A 653 Grade 50 sheet steel, Fy = 50,000 psi, galvanized to G60 coating class per ASTM A 653.

2.3.3.3. Top and bottom Track: Same gage and material as wall framing or 20 gage, whichever is more restrictive, 1-1/2 inch leg unless noted otherwise, width to suit stud width.

2.3.3.4. Deflection Track: provide Cemco Deflection Track, or a comparable product.

2.3.3.5. Bracing: 20 gage, unless otherwise indicated.

2.3.3.6. Stud Punch-Outs: minimum 10 inches between end of member and near edge of web punch-out and 24 inches on center thereafter, per ASTM C 955.

2.4. FIRE RATED JOINT TOP TRACK

2.4.1. Provide Cemco Metal Framing FAS-TRK system or equal head of wall connection system complying with CBC Section 706A. Select configuration complying with project assembly as shown on drawings for all rated walls.

2.4.2. Provide track with thickness equal to studs, and of width to accommodate depth of studs.

2.4.2.1. System selected shall be listed with UL or approved alternate testing agency approved by DSA as complying with test standards as required by referenced section of Title 24.

2.5. WALL FURRING MATERIALS

2.5.1. Manufacturer: Cemco or equal.

2.5.2. Type: Hat channel, screwable, ASTM C 645.

2.5.2.1. Series: 20 gage (33 mil) .

2.5.2.2. Size: 7/ 8 inch OR 1- 1/ 2 inch depth, 1 1/2 inch nominal screw face width.

2.5.2.3. Base Metal: ASTM A 653 Grade 33 sheet steel, galvanized to G40 coating class per ASTM A 653.

2.5.3. Type: Z furring Channel, screwable, per ASTM C 645.

2.5.3.1. Series: 20 gage (33 mil).

2.5.3.2. Size: as shown on drawings for condition shown. minimum 7/ 8 inch leg.

2.5.3.3. Base Metal: ASTM A 653 Grade 33 sheet steel, galvanized to G40 coating class per ASTM A 653.

2.6. RESILIENT FURRING MATERIALS

2.6.1. Manufacturer: Cemco or equal.

2.6.2. Type: Unequal leg resilient sound attenuation channel, screwable, per ASTM C 645.

2.6.3. Series: RC-1, 25 gage (18 mil).

2.6.4. Characteristics:

2.6.4.1. Size: 1/2 inch depth, 2-1/4 inch nominal

2.6.4.2. Base Metal: ASTM A 653 Grade 33 sheet steel, galvanized to G40 coating class per ASTM A 653.

2.7. HORIZONTAL JOIST AND SOFFIT FRAMING MATERIALS

2.7.1. Type: Punched "C" studs, screwable, per ASTM C 955.

2.7.2. Series: CS Series

2.7.3. Characteristics:

2.7.3.1. Size: Depth as shown on drawings, 1-5/8 inch flange with 1/2 inch return, unless noted otherwise.

2.7.3.2. Base Metal:

2.7.3.2.1. 20 gage members: ASTM A 653 Grade 33 sheet steel, Fy = 33,000 psi, galvanized to G60 coating class per ASTM A 653.

2.7.3.2.2. 16 gage members: ASTM A 653 Grade 50 sheet steel, Fy = 50,000 psi, galvanized to G60 coating class per ASTM A 653.

2.7.3.3. Track, bracing and closures: Same gage and material as framing or 20 gage, whichever is more restrictive, 1-1/2 inch leg unless noted otherwise, width as required for transition.

2.8. ACCESSORIES

2.8.1. Self drilling Screws, Bolts, Nuts and Washers: ASTM C 954, corrosion resistant.

2.8.2. Metal Backing: 16 gage galvanized steel, as indicated on drawings, for attachment of wall mounted fixtures, equipment, cabinets, shelving, grab bars and handrails and other items not considered finish materials.

2.8.3. Anchorage Devices:

2.8.3.1. Expansion anchors: Galvanized steel, size as indicated on drawings.

2.8.3.2. Concrete screw anchors: Galvanized steel, size as indicated on drawings.

2.8.3.3. Powder Actuated Fasteners: Size and type as indicated on drawings.

2.8.4. Acoustic Sealant: As specified in Section 09 21 16.

2.8.5. Fire-Resistive Sealant: As specified in Section 09 21 16 and 07 84 00..

2.8.6. Fire Safing Insulation (where required): As specified in Section 09 21 16.

2.8.7. Primer: FS TT-P-645, for touch-up of galvanized surfaces.

2.9. FABRICATION

2.9.1. Fabricate assemblies of framed sections to sizes and profiles required; with framing members fitted, reinforced, and braced to suit design requirements.

2.9.2. Fit and assemble in largest practical sections for delivery to site, ready for installation.

2.10. SOURCE QUALITY CONTROL AND TESTS

2.10.1. Sample and test under the provision of Section 01 45 29.

2.10.2. Studs and track: Provide identification and testing of steel in accordance with Section 2212A.1, Title 24, CCR.

2.11. OTHER MATERIALS

2.11.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Where offset anchor plates are required, provide continuous plates fastened to building structure as shown on drawings.

3.2.2. Coordination and layout

3.2.2.1. Verify stud spacing as required for compliance with all pertinent regulations to give proper support for the covering material, and as indicated on drawings.

3.2.2.2. Carefully coordinate all requirements for backing support of items to be mounted on finished covering.

3.2.2.3. Carefully coordinate all requirements for pipes and other items located within wall system, including punched opening dimension and alignment.

3.3. ERECTION

3.3.1. General

3.3.1.1. Comply with ASTM C 754. In addition, comply with requirements defined in ASTM C 840 as applicable to steel framing application.

3.3.1.2. Coordinate and provide bucks, blocking, blocking and backing plates as required for support of architectural, electrical, and mechanical work placed in or behind stud framing.

3.3.1.3. Coordinate placement of insulation in multiple stud spaces made inaccessible after stud framing erection.

3.3.1.4. Connect members with mechanical fasteners as shown on drawings, with screws penetrating joined members by not less than three exposed screw threads. Wire tying of framing members is not permitted.

3.3.2. Studs

3.3.2.1. Connect studs to tracks using method called for on the drawings and as specified.

3.3.2.2. Install studs so flanges within framing system point in same direction. Stud splicing is not acceptable.

3.3.2.3. Construct corners using minimum three studs.

3.3.2.4. Brace framing system and make rigid.

3.3.2.5. Coordinate erection of studs with requirements of door and window frame supports and attachments.

3.3.2.6. Align stud punched web openings.

3.3.2.7. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated. Install partitions continuous from floor to underside of solid structure unless otherwise shown.

3.3.2.8. Provide fire rated top-of-wall assembly at all rated walls to maintain continuity of fire-resistance-rated assembly.

3.3.2.9. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

3.3.2.10. Door Openings: Install two studs at each jamb, unless otherwise indicated. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3.3.2.11. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

3.3.2.12. Curved Partitions: Bend track to uniform curve and locate straight lengths so they are tangent to arcs. Begin and end each arc with a stud, and space intermediate studs equally along arcs at maxium 16 inches on center. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches on center.

3.3.3. Tracks

3.3.3.1. Align and secure top and bottom wall tracks to structure as shown on drawings.

3.3.3.2. Fit tracks under and above openings; secure intermediate studs at spacing of wall studs.

3.3.3.3. Maintain clearance under structural building members to avoid deflection transfer to studs.

3.4. TOLERANCES

3.4.1. Tolerances

3.4.1.1. Align all partition and wall assemblies to a tolerance of 1/8 inch in 10 feet deviation from line or plumb. Tolerances are not cumulative.

3.4.1.2. All corners and angles shall be as shown on plans to a tolerance of 1/8 inch in 2 feet-0 inches deviation from square or angle shown.

3.5. FIELD QUALITY CONTROL

3.5.1. Perform field inspection and testing under the provisions of Section 01 45 00.

3.5.1.1. Expansion Anchors: Provide pullout testing per testing schedule on Drawings.

END OF SECTION

SECTION 09 30 13

CERAMIC TILE

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Ceramic tile.

1.1.2. Grout, mortar bed and setting materials.

1.1.3. Waterproof underlayment and membranes.

1.1.4. Crack isolation/Sound isolation/Cleavage membranes.

1.1.5. Sealers.

1.1.6. Thresholds and Transitions

1.2. REFERENCES

1.2.1. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.3. SUBMITTALS

1.3.1. Samples

1.3.1.1. Submit four samples of specified colors and patterns of each tile, grout, and accessory units of the specified items.

1.3.1.2. Submit as an assembly in 24 inch square sample.

1.3.2. Materials List/Details: Accompanying samples, submit complete list of all proposed materials, including details of all joints between tile and adjoining materials.

1.3.3. Mock-up: Prior to beginning tile on typical toilet wall and floor surface, prepare in-place mock-up of portion of installation and obtain Architect's approval.

1.3.4. Certification

1.3.4.1. Prior to installation of tile in any one area, submit written certification to Architect certifying that surfaces are properly prepared for specified installation, and that all depressions and abutting edges are properly spaced and aligned to permit installation in pattern shown on drawings. See 3.1 below.

1.3.4.2. Submit certification that selected sealant specified in Section 07 90 00 will achieve manufacturer's published adhesion values on specified tile.

1.3.5. Slip Resistance Testing: Test six representative tile from each tile specified, selected at random from project stock per ASTM C1028 to verify compliance with slip resistance criteria.

1.4. QUALITY ASSURANCE

1.4.1. Conform to ANSI A137.1.

1.4.2. Conform to Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation methods as defined in this Section.

1.5. QUALIFICATIONS

1.5.1. Manufacturer:

1.5.1.1. Manufacturer shall have produced tile products of similar type for a period of five (5) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.5.2. Staff

1.5.2.1. Use only personnel thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5.2.2. Staff installing specified grout shall have attended manufacturer's training sessions and have installed specified grout within the past 12 months prior to beginning work.

1.6. DELIVERY, STORAGE, AND HANDLING

1.6.1. Deliver products to site under provisions of Section 01 60 00.

1.6.2. Store and protect products under provisions of Section 01 60 00.

1.7. ENVIRONMENTAL REQUIREMENTS

1.7.1. Do not install adhesives in a closed, unventilated environment.

1.7.2. Maintain 50 degrees F during installation of mortar materials.

1.8. EXTRA STOCK

1.8.1. Provide sufficient field tile of each type and color to cover ten square feet. In addition, provide ten cove base tile of each type and color.

1.8.2. Package in clearly labeled containers, store as necessary until delivered to Owner.

2. PART 2 - PRODUCTS

2.1. CERAMIC TILE

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider comparable products by alternate manufacturers where listed, and requests for substitutions, under the provisions of Section 01 25 00.

2.1.1.1. All tile for like applications shall be the product of a single manufacturer as indicated below.

2.1.2. Product Characteristics: Interior Floor Tile CT-1

2.1.2.1. Manufacturer: Dal-Tile www.daltileproducts.com.

2.1.2.2. Series: Keystones Porcelain Mosaic Ceramics.

2.1.2.3. Size: 2 x 2.

2.1.2.4. Color:

2.1.2.4.1. Field Tile "CT-1A": Unglazed mosaic, as selected by Architect from Group 2 color line.

2.1.2.4.2. Accent tile "CT-1B": Unglazed mosaic, as selected by Architect from Group 3 color line.

2.1.2.5. Mix/Pattern Criteria:

2.1.2.5.1. Primary field tile color shall be CT-1A.

2.1.2.5.2. Provide, within a one foot square grid, a four inch square accent of CT-1B, placed in a random pattern.

2.1.2.5.3. Provide C-833 sanitary cove transition in CT-1A at all wall to floor transitions.

2.1.2.5.4. Provide CT-1A at all wall base conditions, 2 x 2 MDKB-5B, with additional row to approximately 7 inches above finish floor. Provide surface bullnose termination at conditions without wall tile continuation

2.1.2.6. Finish: Unglazed Matte.

2.1.2.6.1. Provide CT-1C, as selected by Architect from Group 3 color line, with abrasive grit finish at all shower and drying areas.

2.1.2.6.2. Coefficient of Friction: Minimum 0.60 per ASTM C1028.

2.1.2.7. Grout Joint: Nominal 1/16 inch, all joints equal, except at expansion joint conditions. Provide minimum 1/8 inch wide joint at all expansion joint conditions.

2.1.2.8. Provide surface bullnose trim at all open edges or ends. Unglazed or cut tile edges unacceptable.

2.1.3. Product Characteristics: Interior Wall Tile - CT-2

2.1.3.1. Manufacturer: Dal-Tile

2.1.3.2. Series: Keystones Porcelain Mosaic Ceramics.

2.1.3.3. Size: 2 x 2.

2.1.3.4. Color:

2.1.3.4.1. Field color "CT-2A": as selected by Architect from Group 2 colors.

2.1.3.4.2. Field Accent color "CT-2B": as selected by Architect from Group 3 colors.

2.1.3.5. Mix/Pattern Criteria:

2.1.3.5.1. Primary field tile color shall be CT-2A.

2.1.3.5.2. Provide two continuous rows of CT-2B, running horizontally above finish floor at height as directed by Architect, at all ceramic tile areas.

2.1.3.6. Finish: UnGlazed.

2.1.3.7. Grout Joint: Nominal 1/16 inch, all joints equal, except at expansion joint conditions. Provide minimum 1/8 inch wide joint at all expansion joint conditions.

2.1.3.8. Provide surface bullnose trim at all open edges or ends. Unglazed or cut tile edges unacceptable.

2.2. PORTLAND CEMENT MORTAR

2.2.1. Mortar Bed: Portland Cement and sand mixture, complying with specified method and ANSI A108.1B.

2.3. PORTLAND CEMENT BOND COAT

2.3.1. Mapei Ultra/Flex II www.mapei.com or equal, polymer-modified one-step mortar per ANSI A108.5 and A118.4. Provide white cement at all limestone/marble applications.

2.4. GROUT

2.4.1. All grouts shall be produced by same manufacturer.

2.4.2. Sanded Grouts: Mapei Keracolor Floor or equal, with Mapei Plastijoints acrylic grout additive, complying with ANSI A118.6. Two separate colors as selected by Architect from Classic or Designer Series color line.

2.4.3. UnSanded Grouts: Mapei Keracolor Wall or equal, with Mapei Plastijoints acrylic grout additive per ANSI A118.6. Two separate colors as selected by Architect from Classic or Designer Series color line.

2.4.4. Epoxy Grouts:

2.4.4.1. Manufacturer: Mapei or equal.

2.4.4.2. Series: Kerapoxy, 100 percent solids, two-component, non-sag grout, complying with ANSI A118.3, formulated for required joint widths.

2.4.4.3. Service Temperature Resistance: 350 degrees F.

2.4.4.4. Color: Three separate colors as selected by Architect from stock 10 color line.

2.4.4.5. Grout Sealer: Miracle Sealants 511 Impregnator.

2.5. SEALERS AND FINISHES

2.5.1. Grout Sealer: Miracle Sealants 511 Impregnator, phone (800)-350-1901.

2.5.2. Slip Resistant Coating: Miracle Sealants 511 Impregnator, phone (800)-350-1901.

2.6. ACCESSORIES

2.6.1. Sealants:

2.6.1.1. Interior sealants: Unless noted otherwise, provide sealants as manufactured by grout manufacturer.

2.6.1.1.1. Where exposed to pedestrian traffic, provide sealants rated for pedestrian traffic, with minimum Shore A value of 35, as manufactured by grout manufacturer.

2.6.1.1.2. Match adjacent grout color.

2.6.1.2. Exterior Ceramic Tile Paving Sealants: As specified in Section 07 90 00.

2.6.1.3. Exterior Ceramic Wall Tile Sealants: As specified in Section 07 90 00.

2.6.1.4. Stone Sealants: Non-staining sealants complying with certification criteria.

2.6.2. Reinforcing Mesh: 2 x 2 inch square x 16 gauge welded wire mesh.

2.6.3. Metal Lath: Diamond mesh lath complying with ASTM C847, galvanized, self-furring, 2.5 lb/square yard minimum weight.

2.6.4. Organic Adhesive: Type 1 organic adhesive, complying with ANSI A136.1 and approved by CTI for application.

2.6.5. Cleavage Membrane: Provide asphalt felt, ASTM D226, Type I (No. 15), or polyethylene sheet, ASTM D4397, 4.0 mils thick.

2.7. WATERPROOFING AND CRACK ISOLATION MEMBRANES

2.7.1. Thin-set Waterproofing Applications (Interior): NobleSeal TS, Dal-Seal TS, or equal preformed sheet CPE membrane, 30 mil thickness, with facing. Provide preformed corners and all manufacturers recommended accessories.

2.7.2. Thin-set Joint Isolation Membrane: NobleSeal CIS, Dal-Seal CIS, or equal preformed sheet CPE membrane, 30 mil thickness, with facing. Provide all manufacturers recommended accessories.

2.7.3. Mortar Bed Waterproofing Applications: NobleSeal Chloraloy 240, preformed sheet CPE membrane, 40 mil thickness. Provide preformed corners and all manufacturers recommended accessories.

2.8. THRESHOLDS/TRANSITIONS

2.8.1. Marble Thresholds: Provide marble thresholds, Grade B, color and profile as selected by Architect.

2.9. MORTAR AND GROUT MIXES

2.9.1. Mix and proportion cementitious materials for mortar and grout mixes in accordance with manufacturers requirements.

2.9.1.1. Do not mix more bond coat than can be used within one hour.

2.9.1.2. If bond coat mixture begins to skin, discard and make new batch.

2.10. ACCESSORY TILE

2.10.1. General

2.10.1.1. All accessory tile shall be in matching size, color, and finish.

2.10.1.2. Stretcher tile can be the standard size of the manufacturer.

2.10.1.3. Provide surface bullnose trim at all open edges or ends. Unglazed or cut tile edges unacceptable.

2.10.1.4. Provide surface bullnose trim at all tile abutting jamb conditions and extending beyond frame.

2.10.1.5. Provide full curved stretcher tile for all outside corners.

2.11. OTHER MATERIALS

2.11.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify joints in concrete substrate occur only at sealant expansion joint locations as specified for ceramic tile.

3.1.1.2.2. Where non-documented substrate cracks occur, obtain direction from Architect.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. MEMBRANE INSTALLATION

3.2.1. Verify slab preparation complies with criteria specified in Section 03 30 00 / 03 30 10.

3.2.1.1. Remove all sealers, curing compounds and other materials affecting proper bond of membranes with bead blast abrasive equipment.

3.2.2. Cleavage Membrane: Unless otherwise shown on drawings, where mortar bed is installed over concrete slab on grade at interior applications, provide specified cleavage membrane.

3.2.3. Waterproofing Membrane Installation:

3.2.3.1. Apply waterproofing membrane per manufacturers recommendations.

3.2.3.1.1. Apply thinset waterproofing membrane using approved latex modified mortar system.

3.2.3.2. Provide preformed corners. Seal all penetrations with specified sealant.

3.2.3.3. Detail all joints as required by manufacturer and approved submittal.

3.2.3.4. Extend membrane up wall surface as shown on drawings. Coordinate with wall underlayment.

3.2.3.5. At expansion joints, continue sheet material in looped fashion through joint to accommodate anticipated joint movement.

3.2.3.6. Allow sufficient time for all seams, transitions and setting beds to cure before installing subsequent materials. Do not install tile over waterproofing until waterproofing has been tested to determine that it is watertight.

3.2.4. Joint isolation membrane installation:

3.2.4.1. Install at all cracks in concrete slab substrates, control and expansion joints, and at all transitions between dissimilar materials.

3.2.4.2. Extend each side of crack or joint a minimum of 4 times diagonal tile dimension.

3.2.4.3. Apply using approved latex modified mortar system.

3.2.4.4. At expansion joints, continue sheet material in looped fashion through joint to accommodate anticipated joint movement.

3.3. MORTAR BED INSTALLATION

3.3.1. Unless noted otherwise, prepare floor substrate as required for complete bond. Remove all sealers, curing compounds and other materials affecting proper bond of membranes with bead blast abrasive equipment.

3.3.2. Coordinate lath and mortar bed installation with concrete slab substrate joints. Align expansion joints in mortar bed and tile with substrate joints.

3.3.3. Install mortar bed in accordance with specified method and referenced ANSI standard.

3.3.4. Where waterproof membrane is provided, do not penetrate membrane. Provide accessory supports.

3.4. TILE INSTALLATION

3.4.1. Install tile and grout in accordance with manufacturer's instructions and TCNA Handbook methods as specified.

3.4.2. Spread bond coat over area of installation using a notched trowel. Do NOT spread more bond coat than can be covered with tile within manufacturer's recommended time periods.

3.4.3. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Utilize bullnose trim shapes where tile terminates at dissimilar material in the same wall plane.

3.4.3.1. Use saw to cut tile fitting against curved surfaces or edges. Do not use nippers.

3.4.3.2. Use drill for all pipe or conduit penetrations. Do not split tile.

3.4.4. Place tile joints in uniform width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

3.4.5. Sound tile after setting. Replace hollow sounding units.

3.4.5.1. Back-butter all exterior tile installations.

3.4.6. Allow tile to set for a minimum of 48 hours prior to grouting, or as recommended by mortar manufacturer.

3.4.7. Grout tile joints. Do not allow grout to harden on face of tile.

3.4.7.1. Install grout at abrasive grit tile using grout bag or grouting machines. Conventional sponge spread technique not acceptable.

3.4.8. Install sealant under the provisions of Section 07 90 00 and as specified.

3.4.9. Interior Tile Installation:

3.4.9.1. Install wall tile at cementitious backer board per TCNA Method W244C, and per ANSI A108.5.

3.4.9.1.1. Provide portland cement leveling coat as required to provide surface complying with 1/8 inch in 8 feet tolerance.

3.4.9.2. Install wall tile at water resistant gypsum board per TCNA Method W223, and per ANSI A108.4.

3.4.9.3. Where wall tile installed at prefabricated shower/tub receptor, install per TCNA B411-09 and ANSI A108.1A.

3.4.9.4. Install wall tile at concrete/masonry wall per TCNA Method W211/222, and per ANSI A108.1B.

3.4.9.5. Grout all wall joints with specified sanded/unsanded grout per ANSI A108.10 epoxy/ grout per ANSI A118.3.

3.4.10. Interior Floor Tile Installation:

3.4.10.1. Where tile is installed as a shower receptor, coordinate wall and floor tile installation per TCNA Method B415-09 and ANSI A108.1B.

3.4.10.2. Install floor tile at waterproofed mortar bed areas per TCNA Method F121 and ANSI A108.1B.

3.4.10.3. Install floor tile at cleavage membrane mortar bed areas per TCNA Method F111 and ANSI A108.1B.

3.4.10.4. Install floor tile at thinset waterproof membrane per TCNA Method F122, and per ANSI A108.5.

3.4.10.5. Grout all floor joints with specified sanded/unsanded grout per ANSI A108.10 epoxy/ grout per ANSI A118.3.

3.4.11. Installation of expansion and control joint assemblies.

3.4.11.1. Provide expansion joints complying with TCNA Detail EJ171 at the following specified locations and as located and shown on drawings:

3.4.11.1.1. At wall tile to paver/floor tile joints.

3.4.11.1.2. At all expansion and control joints in substrate. Where tile joint does not occur directly over substrate joint, provide sealant joint on each side of joint.

3.4.11.1.3. At tile joint at inside vertical corners.

3.4.11.1.4. At interior applications, at approximately 24 feet on center each way in floor and wall tile surfaces. Adjust to 12 feet at toilet tile conditions, and 8 feet for dark tile in sunlight areas.

3.4.11.1.5. At exterior applications, at approximately 12 feet on center each way in floor and wall tile surfaces. Adjust to 8 feet as necessary for dark tile in sunlight areas.

3.4.11.1.6. Where material transitions occur, comply with expansion/control joint criteria.

3.4.11.1.7. At conditions where tile extends through doorways, extend wall cove/floor tile sealant joint across doorway.

3.4.11.1.8. At floor drain/tile edge, column penetrations, tile terminations against frames and other restraining elements.

3.4.11.1.9. At tile terminations against curbs, paving or other restraining elements.

3.5. CLEANING

3.5.1. Clean work under provisions of Section 01 77 19.

3.5.2. Clean tile surfaces in accordance with the tile and grout manufacturer's instructions; remove all traces of grout scum.

3.5.3. Do not use muriatic acid compounds.

3.5.4. Do not allow traffic on tile for a minimum of 72 hours after installation.

3.5.5. Provide damp cure of all installations per manufacturer's recommendations and per ANSI A108.

3.5.5.1. Do not damp cure latex modified grout systems unless recommended by manufacturer.

3.5.6. Sealing

3.5.6.1. Seal all interior toilet floor, base, and wall ceramic tile applications.

3.5.6.1.1. Do not seal epoxy grout applications.

3.5.6.2. Seal per manufacturer's recommendations.

3.6. PROTECTION

3.6.1. Protect finished installation under provisions of Section 01 50 00.

3.6.2. Provide non-staining protective coverings for all tile in traffic area.

3.6.3. Remove and replace any products that are cracked, scraped, or otherwise damaged after installation and before acceptance by Owner.

3.7. FIELD QUALITY CONTROL

3.7.1. Tolerances

3.7.1.1. Grout joint alignment with adjacent edge: 1/8" in 10 feet.

3.7.1.2. Row and column alignment: 1/8" in 10 feet deviation.

3.7.1.3. Alignment with adjacent tile: 1/16" +/-.

3.7.1.4. Level, plane and/or vertical: 1/8" in 10 feet deviation.

END OF SECTION

SECTION 09 51 00

ACOUSTICAL CEILINGS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Suspended metal grid ceiling system.

1.1.2. Acoustical panels.

1.1.3. Acoustical tiles.

1.1.4. Perimeter trim.

1.2. REFERENCES

1.2.1. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.2.2. ASTM E 580 Installation of Ceiling Suspension Systems for Acoustical tile and Lay-in Panels in areas Subject to Earthquake Ground Motions

1.2.3. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

1.2.4. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

1.2.5. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

1.2.6. ASTM E 1264 Classification for Acoustical Ceiling Products.

1.3. SYSTEM DESCRIPTION

1.3.1. Installed System: Conform to ASTM C635 and C636.

1.3.2. Ceiling Suspension System complying with requirements of Chapter 16A, Part 2, Title 24, CCR, including 1615A.1.1.6, modifications to ASCE 7, Section 13.5.6.

1.4. QUALITY ASSURANCE

1.4.1. Installer: Company with three years minimum documented experience with projects under the jurisdiction of DSA.

1.5. SUBMITTALS

1.5.1. Provide submittals under provisions of Section 01 33 00.

1.5.2. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

1.5.3. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

1.5.4. Shop Drawings: Indicate on shop drawings, grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system, and complete suspension system details. Layout and details of acoustical ceilings. Show items coordinated with, or supported by the ceilings.

1.5.5. Certifications: Provide manufacturer's certification of compliance with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

1.6. ENVIRONMENTAL REQUIREMENTS

1.6.1. Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy.

1.6.2. Building areas to receive ceilings shall be free of construction dust and debris

1.7. SEQUENCING/SCHEDULING

1.7.1. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

1.7.2. Schedule installation of acoustic units after interior wet work is dry.

1.8. WARRANTY

1.8.1. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:

1.8.1.1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.

1.8.1.2. Grid System: Rusting and manufacturer's defects

1.8.1.3. Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems exhibiting growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

1.8.2. Warranty Period:

1.8.2.1. Acoustical panels: Ten (10) year from date of substantial completion.

1.8.2.2. Grid: Ten years from date of substantial completion.

1.9. EXTRA STOCK

1.9.1. Provide extra quantity of acoustic units under provisions of Section 01 77 19.

1.9.2. Acoustical Panel: Provide five (5) unopened boxes of each type of acoustical panel.

1.9.3. Acoustically Reflective Panel: Provide five (5) of each type of panel.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. CEILING SUSPENSION SYSTEM

2.2.1. Manufacturer: USG Donn Brand Suspension System, www.usg.com, Armstrong World Industries, Inc., www.ceilings.com, Chicago Metallic, http://www.chicago-metallic.com, , or equal.

2.2.2. Series

2.2.2.1. USG Standard Face Series 15/16" tee system - Donn DX/DXL.

2.2.3. Duty Rating: Heavy Duty per ASTM C635.

2.2.3.1. Support/Fastening System: Components of size and type as shown in the drawings or identified in DSA IR 25-5, as required to rigidly secure acoustic ceiling system with maximum deflection of 1/360. Use perimeter attachment clips USG #AC M7, Armstrong #BERC-2, or equal to allow 3/4 inch movement, to retain the panel in place, and allow standard 7/8-inch perimeter wall angles. No perimeter pop rivets.

2.2.4. Code Compliance: Comply with applicable portions of Chapter 16A, Part 2, Title 24, CCR, including 1615A.1.16, modifications to ASCE 7, Section 13.5.6.

2.2.5. Fire Resistance Rating: Non-rated assembly.

2.2.6. Color: Painted finish, as selected from standard line.

2.2.7. Compression Strut: Provide vertical compression strut at grid as shown on drawings and per DSA IR 25-2.10

2.3. ACOUSTIC PANELS: ACP-1

2.3.1. Manufacturer: Armstrong World Industries, Inc., www.ceilings.com, USG www.usg.com or equal.

2.3.2. Series: Armstrong Fine Fissured Second Look, or USG Aspen 652 with Illusion Two center score line.

2.3.2.1. Style: Scored Tegular Medium Texture, 1761.

2.3.2.2. Edge: Tegular, Angled.

2.3.2.3. Size: 24 x48 x 3/4 inch.

2.3.3. Fire/Habitability Criteria:

2.3.3.1. Fire Resistance Rating: Class A per ASTM E1264, maximum Flame Spread of 25, maximum smoke contributed of 450, UL Labeled.

2.3.3.2. Noise Reduction: NRC range of .50 - .60.

2.3.3.3. Light Reflectance: LR-1 (Minimum 75%).

2.3.4. Finish: Factory applied paint.

2.3.5. Color: White.

2.4. ACOUSTIC PANELS: ACP-2

2.4.1. Manufacturer: Armstrong World Industries, Inc., www.ceilings.com, or equal.

2.4.2. Series: Optima

2.4.2.1. Style: No. 3250.

2.4.2.2. Edge: Square Tegular 15/16 in.

2.4.2.3. Size: 24 x 24 x 1 inch.

2.4.3. Fire/Habitability Criteria:

2.4.3.1. Fire Resistance Rating: Class A per ASTM E1264, maximum Flame Spread of 25, maximum smoke contributed of 450, UL Labeled.

2.4.3.2. Noise Reduction: NRC 0.95.

2.4.3.3. Light Reflectance: 0.90.

2.4.3.4. Labeling: All panels shall have UL Label.

2.4.4. Finish: Factory applied.

2.4.5. Color: White.

2.5. ACOUSTIC PANELS: ACP-3

2.5.1. Manufacturer: Armstrong World Industries, Inc., www.armstrong.com., USG www.usg.com or equal.

2.5.2. Series: Clean Room, Clima Plus, Class 100

2.5.2.1. Style: No. 56091 & 56099

2.5.2.2. Edge: Square.

2.5.2.3. Size: 24 x 24 x 5/8 inch.

2.5.2.4. Weight: 1.0 PSF or greater.

2.5.3. Fire/Habitability Criteria:

2.5.3.1. Fire Resistance Rating: Class A per ASTM E1264, maximum Flame Spread of 25, maximum smoke contributed of 450, UL Labeled

2.5.3.2. Noise Reduction: NRC range of 0.10.

2.5.3.3. Light Reflectance: LR-80 (Minimum 0.80).

2.5.3.4. Labeling: All panels shall have UL Label.

2.5.4. Finish: Factory applied paint.

2.5.5. Color: White.

2.6. ACOUSTIC PANELS: ACP-4

2.6.1. Manufacturer: Armstrong World Industries, Inc., www.ceilings.com, or equal.

2.6.2. Series: Optima

2.6.2.1. Style: No. 3255.

2.6.2.2. Edge: Square Tegular 15/16 in.

2.6.2.3. Size: 48 x 48 x 1 inch.

2.6.3. Fire/Habitability Criteria:

2.6.3.1. Fire Resistance Rating: Class A per ASTM E1264, maximum Flame Spread of 25, maximum smoke contributed of 450, UL Labeled.

2.6.3.2. Noise Reduction: NRC 0.95.

2.6.3.3. Light Reflectance: 0.90.

2.6.3.4. Labeling: All panels shall have UL Label.

2.6.4. Finish: Factory applied.

2.6.5. Color: White.

2.7. OTHER MATERIALS

2.7.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify hanger layout will not interfere with other work.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. CEILING GRID INSTALLATION

3.2.1. Install system in accordance with ASTM C635 and C636 as modified by CBC Section 1615A.1.16, including required vertical compression struts.

3.2.2. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.

3.2.3. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

3.2.4. Crimp or tightly twist wire ends around wire support. Do not leave ends angled away from line of wire support.

3.2.5. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

3.2.6. Where ducts or other equipment prevent the regular spacing of hangers, install independent framing below ductwork or equipment from which hangers may be attached. Hangers are prohibited from being attached to any non structural building element.

3.2.7. Locate system on room axis leaving equal border units according to reflected ceiling plan.

3.2.8. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions. Where round obstructions occur, provide preformed closers to match edge molding.

3.3. ADJUSTING AND CLEANING

3.3.1. Replace damaged and broken panels.

3.3.2. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

3.3.2.1. Where approved by Architect, touch up paint may be used to hide minor scratches and nicks in the surface.

3.3.3. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.4. TOLERANCES

3.4.1. Variation from Flat and Level Surface: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Resilient tile flooring.

1.1.2. Resilient base.

1.1.3. Resilient sheet flooring.

1.2. REFERENCES

1.2.1. ASTM D 2047 – Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine

1.2.2. ASTM D 4541-02 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

1.2.3. ASTM E 84 - Surface Burning Characteristics of Building Materials.

1.2.4. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.

1.2.5. ASTM E 648 – Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

1.2.6. ASTM E 662 – Specific Optical Density of Smoke Generated by Solid Materials

1.2.7. ASTM F 1861– Standard Specification for Resilient Wall Base

1.2.8. ASTM F 710-05 – Practice for Preparing Concrete Floors to Receive Resilient Flooring.

1.2.9. ASTM F 1869-04 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

1.3. QUALIFICATIONS

1.3.1. Applicator: Company specializing in flooring systems with 5 years documented experience, trained and approved by the flooring system manufacturer.

1.4. SUBMITTALS

1.4.1. Provide submittals under provisions of Section 01 33 00.

1.4.2. Product data

1.4.2.1. Submit product data for flooring materials and accessories.

1.4.2.2. Submit manufacturer's installation instructions.

1.4.3. Shop drawings.

1.4.3.1. Submit shop drawings indicating layout and dimensions for all seams and penetrations, including details of flooring termination and transitions.

1.4.3.2. Provide typical detail of inside/outside corner installation of resilient base.

1.4.4. Samples:

1.4.4.1. Submit four samples, 12x12 inches in size, illustrating color and pattern for each floor material specified.

1.4.4.2. Submit four 12 inch long samples of base material for each color specified.

1.4.5. Submit manufacturer's installation instructions.

1.4.6. Submit moisture test results on concrete substrate.

1.5. OPERATION AND MAINTENANCE DATA

1.5.1. Submit cleaning and maintenance data under provisions of Section 01 77 19.

1.6. ENVIRONMENTAL REQUIREMENTS

1.6.1. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.6.2. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.7. EXTRA STOCK

1.7.1. Flooring: Provide one box of each color and style of selected flooring in unopened box, from same run as installation.

1.7.2. Base: Provide 100 linear feet of base, in each color and style selected, with 10 each matching outside and inside corners, from same run as installation.

2. PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. RESILIENT TILE

2.2.1. Manufacturer: Armstrong World Industries, Inc., http://www.commercial-floors.com/.

2.2.2. Series: Excelon: Stonetex series.

2.2.3. Size/Gage: 12 inch square, 1/8 inch gage.

2.2.4. Fire Resistivity/Habitability Criteria:

2.2.4.1. Critical Radiant Flux: Minimum 0.45 watts/cm^2 per ASTM E648.

2.2.4.2. NBS Smoke Rating: maximum 450 per ASTM E662.

2.2.4.3. Slip Resistance: Greater than 0.60 per ASTM D2047.

2.2.5. Color: Two separate colors, as selected by Architect.

2.3. RESILIENT BASE MATERIALS: TYPE RB-1

2.3.1. Manufacturer: Burke Mercer, http://www.burkemercer.com/., or equal.

2.3.2. Type: Vulcanized rubber, with no recycled products.

2.3.3. Series: BurkeBase Coved Toe.

2.3.4. Size: 4 inch high x 48 inch stock.

2.3.5. Fire Resistivity/Habitability Criteria:

2.3.5.1. Fire Resistivity Rating: Class II per ASTM E84.

2.3.5.2. Smoke Density Rating: maximum 360 per ASTM E662.

2.3.5.3. Material Standard: Comply with ASTM F1861, Type TS, Group 1 (Solid).

2.3.5.4. Color: Provide 2 separate colors, distributed approximately equally throughout project, as selected by Architect from Decorator and Commercial color line

2.4. REDUCERS/EDGE STRIPS

2.4.1. Provide Roppe, style to fit job conditions and as approved by the Architect, color as selected from complete line.

2.4.1.1. Carpet to VCT Reducers/Edge Strips: Roppe 177 Tile-Carpet Joiner, 1/4 inch-1/8 inch, color as selected.

2.5. ACCESSORY MATERIALS

2.5.1. Subfloor Filler: Portland cement based, Ardex, http://www.ardex.com/, or equal, type recommended by flooring material manufacturer. Use of gypsum based filler is prohibited.

2.5.2. Adhesives shall be approved by the flooring manufacturer prior to Product DATA submittal

2.5.3. Adhesive: Provide W.F. Taylor [http://www.wftaylor.com/] or equal, Envirotec, (800)986-3888, low VOC adhesive, Series as recommended by manufacturer. Adhesive VOC emissions shall not exceed maximum 0.60 mg/square meter/hour after 24 hours per EPA D.E.C. Testing method. Confirm adhesive compatibility with resilient flooring manufacturer prior to installation.

2.6. OTHER MATERIALS

2.6.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify that surfaces comply with specified tolerances.

3.1.1.2.2. Verify concrete floors comply with specified moisture content criteria acceptable to the flooring manufacturer, and do not exhibit negative alkalinity, carbonization, or dusting.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Moisture and alkalinity testing

3.2.1.1. Conduct alkalinity and anhydrous calcium chloride testing using prepackaged kit systems approved by flooring manufacturer. Contractor shall employ an independent testing service or lab for moisture testing procedure, including placement and removal. Testing service shall be acceptable to Architect.

3.2.1.2. Provide test at coverage rate required by flooring manufacturer, with minimum of 3 tests/first 1,000 square feet and 1 test per each 1,000 square feet after. Distribute uniformly throughout building. Prepare map or diagram of test locations in each building.

3.2.1.3. Conduct one set of tests 60 days prior to scheduled flooring installation. Submit test results to Architect within 48 hours of test receipt.

3.2.1.4. Conduct second set of tests 14 days prior to scheduled flooring installation. Submit test results to Architect within 48 hours of test receipt.

3.2.2. Alkalinity Testing

3.2.2.1. Conduct alkalinity testing of slab surface immediately following removal of calcium chloride test kit, in accordance with ASTM F 710 procedure.

3.2.3. Submit testing data, including test location mapping, to Architect prior to beginning flooring installation.

3.2.4. Evaluate existing floor surface. Prepare surface and apply underlayment to all floor surfaces exhibiting the following characteristics:

3.2.4.1. Cracks, gouges or holes exceeding 1/16 inch in any dimension.

3.2.4.2. Cracks with adjacent surfaces exceeding 1/16 inch in height.

3.2.4.3. All expansion, weakened plane or construction joints.

3.2.4.4. All surfaces exhibiting rough or abraded texture exceeding 1/16 inch amplitude.

3.2.4.5. All surfaces with gap exceeding 3/16 inch under 10 foot metal straight edge.

3.2.5. Prepare existing concrete substrate as recommended by manufacturer, including mechanical shot-blasting or equivalent.

3.2.6. Acid etching is not acceptable.

3.2.7. Prepare existing cracks in substrate as recommended by manufacturer.

3.2.8. Apply filler and trowel to leave a smooth, flat, hard surface.

3.2.9. Prohibit traffic from area until filler is cured. Vacuum clean substrate.

3.3. INSTALLATION – RESILIENT TILE FLOORING MATERIALS

3.3.1. Install in accordance with manufacturers' instructions and recommendations.

3.3.2. Spread only enough adhesive to permit installation of materials before initial set.

3.3.3. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.3.4. Install reducer strips at exposed edges or where flooring material changes to another type. Trim reducer width as required to achieve proper thickness at edges of abutting flooring.

3.3.5. Install tile to square grid pattern with all joints aligned.

3.3.6. Unless otherwise directed by manufacturer, lay in step or fan pattern from center grid. Do not allow tile "run-off".

3.3.7. Provide minimum 1/2 full size tile width at room or area perimeter.

3.3.8. Align tile with tile joints in adjacent room.

3.4. INSTALLATION - BASE MATERIAL

3.4.1. Install in complete lengths, fit joints tight and vertical. Do not piece. Maintain minimum measurement of 18 inches between joints.

3.4.2. Use premolded units at all outside and inside corners.

3.4.3. Install base on solid backing. Bond tight to wall and floor surfaces.

3.4.4. Scribe and fit to door frames and other interruptions.

3.4.5. Install using a constant level line at top of base.

3.5. PROTECTION AND CLEANING

3.5.1. Prohibit traffic on floor finish for 48 hours after installation.

3.5.2. Remove excess adhesive from floor, base, and wall surfaces without damage.

3.5.3. Clean floor and base surfaces and buff floor without use of waxes or sealers in accordance with manufacturer's instructions.

END OF SECTION

SECTION 09 72 17

RIGID-SHEET VINYL WALL COVERING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Protective, prefinished rigid Wall Surfacing at areas as shown on drawings.

1.2. QUALITY ASSURANCE

1.2.1. Applicator: Company specializing in installing wall surfacing with 3 years documented experience.

1.3. SUBMITTALS

1.3.1. Submit product data under provisions of Section 01 33 00.

1.3.2. LEED Documentation: Provide documentation for Recycled Content and Regional Materials per the requirements of Section 01 35 44 LEED Requirements.

1.3.3. Submit samples under provisions of Section 01 33 00.

1.3.4. Submit four samples of wall covering 8x10 inch in size illustrating each color, finish, and texture.

1.4. DELIVERY, STORAGE, AND HANDLING

1.4.1. Deliver products to site under provisions of Section 01 60 00.

1.4.2. Store and protect products under provisions of Section 01 60 00.

1.4.3. Inspect materials on site to verify acceptance.

1.4.4. Protect packaged adhesive from temperature cycling.

1.5. ENVIRONMENTAL REQUIREMENTS

1.5.1. Provide lighting level of 80 ft candles measured mid - height at substrate surfaces.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. PROTECTIVE WALL COVERING: TYPE RPW

Manufacturer: Marlite, www.marlite.com, or equal

2.2.1. Type: Reinforced polyester resin panel.

2.2.2. Series/Style: Marlite Symmetrix.

2.2.3. Construction:

2.2.3.1. Thickness: 3/32 inch

2.2.3.2. Size: Panel size, 48 inches width by height as shown on drawings.

2.2.4. Fire/Habitability Criteria

2.2.4.1. Classification: Class III per Chapter 8, Title 24, Part 2, CCR.

2.2.4.2. Flame spread: Class B, 26-76, per CBC Section 803.1.

2.2.4.3. Smoke Density: Class B, 0-450, per ASTM E84 and CBC Section 803.1.

2.2.5. Performance Criteria

2.2.5.1. 1.6×10^4 psi per ASTM D790.

2.2.5.2. Flexural Modulus: 1.0×10^6 psi per ASTM D790.

2.2.5.3. Tensile Strength: 7.5×10^3 psi per ASTM D638.

2.2.5.4. Tensile Modulus: 1.7×10^6 per ASTM D638.

2.2.5.5. Impact Strength: 13 ft.-lbs/inch (IZOD) per ASTM D256.

2.2.5.6. Barcol Hardness: 50 per ASTM D 2583.

2.2.5.7. Water Absorption: 0.15 percent at 24 hours at 77 degrees F. per ASTM D570.

2.2.6. Color and Finish

2.2.6.1. Color: As selected by Architect from complete color line.

2.2.6.2. Finish: Matte.

2.3. MOLDINGS

2.3.1. Provide manufacturers aluminum moldings at all edges, corners and joints, color as selected by Architect.

2.4. ACCESSORIES

2.4.1. Adhesive: Provide manufacturers recommended adhesive, suitable for substrate.

2.4.2. Fasteners: Where required by substrate, provide color matched nylon drive rivet, spaced as recommended by manufacturer.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch per foot.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Verify drywall surfaces are ready to receive panels.

3.2.2. Fill cracks and smooth irregularities with filler; sand smooth.

3.2.3. Sand glossy surfaces.

3.2.4. Remove electrical, telephone, and wall plates and covers.

3.2.5. Vacuum clean surfaces free of loose particles.

3.3. INSTALLATION

3.3.1. Install panels in accordance with manufacturer's instructions. Pre-drill holes for all fasteners.

3.3.2. Begin panel layout at center of wall. Install edging and dividers in longest lengths possible. Miter interior corner joints. Butt vertical divider joints into continuous horizontal trim.

3.3.2.1. Install panels equally spaced, joints maximum of 48 inches on center, to height as shown on drawings.

3.3.3. Provide fasteners and adhesive as recommended by manufacturer.

3.3.4. Install panels before installation of bases, cabinets, hardware, or items attached to or spaced slightly from wall surface.

3.3.5. Re-install cover plates at electrical devices, HVAC registers, and other finishing items at panel locations.

3.3.6. Install sanitary sealant, clear, as specified in Section 07 90 00 at edge of trim as directed by Architect.

3.4. CLEANING

3.4.1. Clean panels in accordance with manufacturers recommendations.

3.5. PROTECTION

3.5.1. Protect finished installation under provisions of Section 01 50 00.

END OF SECTION

SECTION 09 72 33

DRY ERASE WALLCOVERING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. **Dry erase wallcovering for erasable markers.**

1.2. QUALITY ASSURANCE

1.2.1. Applicator: Company specializing in installing wall fabrics with 3 years documented experience.

1.2.2. Provide each type of dry erase wallcovering required produced by one manufacturer.

1.3. SUBMITTALS

1.3.1. Submit and product data under provisions of Section 01 33 00.

1.3.2. Submit samples under provisions of Section 01 33 00.

1.4. DELIVERY, STORAGE, AND HANDLING

1.4.1. Deliver products to site under provisions of Section 01 60 00.

1.4.2. Store and protect products under provisions of Section 01 60 00.

1.4.3. Inspect roll materials on site to verify acceptance.

1.4.4. Protect packaged adhesive from temperature cycling.

1.4.5. Do not store roll goods on end.

1.5. ENVIRONMENTAL REQUIREMENTS

1.5.1. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 68 degrees F, unless required otherwise by manufacturer's instructions.

1.5.2. Do not apply adhesive when substrate surface temperature or ambient temperature is below 68 degrees F or relative humidity is above 40 percent.

1.5.3. Maintain these conditions 24 hours before, during, and after installation of adhesive wall covering.

1.5.4. Provide lighting level of 80 ft candles measured mid - height at substrate surfaces.

1.6. EXTRA STOCK

1.6.1. Provide 25 lineal feet of each color of wall covering under provisions of Section 01 77 19.

1.7. WARRANTY

1.7.1. Submit manufacturer's limited five-year written warranty against manufacturing defects.

1.8. MAINTENANCE

1.8.1. Maintenance instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider comparable products by alternate manufacturers where listed, and requests for substitutions, under the provisions of Section 01610.

2.2. VINYL WALL COVERING: TYPE VWC

2.2.1. Manufacturer: Koroseal Interior Products LLC, Fairlawn, Ohio, or equal.

2.2.2. **Walltalkers® project-rite**: Smooth low gloss vinyl surface with slight emboss for projection and dry erase markers. Model PE50: 49/50 inch (1.25/1.27m) width, non-woven backing, white only.

2.2.3. Color and Finish: As selected by Architect from complete line.

2.2.4. Surface Burning Characteristics Classification: Provide materials that meet Class I/A rating when tested in accordance with ASTM E84 for flame spread and smoke developed.

2.2.5. Field Samples: Prepare field samples for architect's review and establish requirements for seaming and finish trim.

2.3. ACCESSORIES

2.3.1. Adhesive: Solvent-free, SBR type linoleum adhesive (L-910) or polyvinyl **acetate dispersion type (contact adhesive) when used in a press.**

2.3.2. **Color matched caulk by manufacturer to match tackable wall surface.**

2.3.3. J-Trim for **wallcovering, JT12-00: Clear satin, anodized aluminum, 1/4 inch (6 millimeter) trim**

2.3.4. **Plastic marker dispenser: PMD1-92, grey plastic marker dispenser.**

2.3.5. Presentation Starter Kit: Provide one Walltalkers starter kit containing eight dry erase markers, one eraser, two dry erase cleaning cloths, one empty bottle for water, and one 8 ounce (.23kg) bottle liquid surface cleaning solution for each room installed with dry erase wallcovering.

2.3.5.1. RK1 RSK2: Regular starter kit with standard dry erase markers.

2.4. OTHER MATERIALS

2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Examine substrates and installation conditions to ensure surface conditions meet or exceed a Level 4 finish, per GA-214-M-97: Recommended Levels of Gypsum Board Finish, and permanent lighting should be installed and operational.

3.1.1.3. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3.1. Verify substrate surface is clean, dry, smooth, structurally sound, and free from surface defects and imperfections that would show through the finished surface .

3.1.1.4. Test substrate with suitable moisture meter and verify that moisture content does not exceed four percent.

3.1.1.5. In the event of discrepancy, immediately notify the Architect.

3.1.1.6. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Remove hardware, accessories, plates, and similar items to **allow tackable wallcovering to be installed**.

3.2.2. Gypsum board surface: Recess nails and screws. Repair irregular tape **joints, sand and remove dust**.

3.2.3. Ensure wall surfaces scheduled to receive tackable wallcovering are properly sealed **with a quality primer specified for use under flexible vinyl wallcoverings**.

3.3. INSTALLATION

3.3.1. Comply with manufacturer's printed installation instructions.

3.3.2. Cut sheets to size including a few inches of overage. Allow sheets to lay flat for at least twenty four hours prior to the application. Mark roll direction and sequence on the backside of each sheet. Hang sheets in sequence as cut from the roll, do not reverse sheets.

3.3.3. Permanent HVAC system should be set to 68° F (20° C) for at least seventy-two hours prior to, during, and after the installation.

3.3.4. Back roll each sheet prior to the installation to release curl memory.

3.3.5. For seamed applications, using a seam and strip cutter remove the factory edge of one sheet. Using the same tool, overlap and trace cut the mating edge of the second sheet. Repeat this step for as many sheets as required for the job.

3.3.6. Scribe, cut, and fit material to butt tightly to adjacent surfaces, built-in casework, and permanent fixtures and pipes.

3.3.7. Apply adhesive with a 1/16 inch square notch trowel to the area to receiving the sheet (apply enough for one sheet at a time).

3.3.8. Work from top to bottom then side to side. Roll sheet firmly into adhesive for positive contact and to remove air bubbles.

3.3.9. Remove adhesive residue immediately after each panel is hung with a mild soap/water solution and a soft cloth/sponge.

3.3.10. Clean wallcovering using a sponge with a neutral pH cleaning solution. Do not use abrasive cleaners. Rinse thoroughly with water and let dry before using.

3.3.11. It is important to remove adhesive while wet.

3.4. CLEANING

3.4.1. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

3.4.2. Replace wall plates and accessories removed prior to work of this Section.

3.5. PROTECTION

3.5.1. Protect finished installation under provisions of the General Conditions.

END OF SECTION

SECTION 09 72 60

TACKABLE WALLCOVERING

1. PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Resilient cork/linoleum tackable wallcovering.

1.1.1.2. Accessories.

1.1.2. Related Sections/Items:

1.1.2.1. Primer/sealer application on gypsum board substrate, refer to Section 09 91 00.

1.1.2.2. Sheet vinyl wall covering, refer to Section 09 72 17.

1.1.2.3. Markerboards and tackboards, refer to Section 10 11 16.

1.2. SUBMITTALS

1.2.1. Comply with Section 01 33 00.

1.2.2. Product data indicating compliance with specified requirements.

1.2.3. Installation Instructions.

1.2.4. Samples: 6 X 9 inch (150 x 225 mm) samples of each type of tackable wallcovering material required.

1.3. QUALITY ASSURANCE

1.3.1. Fire Performance Characteristics: Comply with fire performance characteristics indicated below.

1.3.1.1. Identify components with markings from testing and inspection organization.

1.3.1.1.1. ASTM E 84 (Fuel contribution) - Class B

1.3.1.1.2. NFPA253 (Critical Radiant Flux) - Class II

1.3.2. Single Source Responsibility: Obtain tackable wallcovering system components from a single source.

1.3.3. Deliver materials in original factory wrappings and containers, clearly labeled with manufacturer, brand name, and fire hazard classification.

1.3.4. Store materials in original, undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, and extreme temperatures.

1.3.5. Maintain room temperature within the storage area at not less than 68° F (20° C) during the period materials are stored.

1.3.6. Mock-ups: Prepare mock-ups for Architect's review and to establish requirements for seaming and finish trim.

1.3.6.1. Correct areas, modify method of application/installation, or adjust finish texture as directed by Architect to comply with specified requirements.

1.3.6.2. Maintain mock-ups accessible to serve as a standard of quality for this Section.

1.3.6.3. Install sample panel of each type of wallcovering specified.

1.3.6.4. Install panels in areas designated by Architect.

1.4. PROJECT CONDITIONS

1.4.1. Maintain ambient temperature within the building at not less than 68° F (20° C) for a minimum of 72 hours prior to beginning of installation.

1.4.1.1. Do not install tackable wallcovering until the space is enclosed and weatherproof.

1.4.1.2. Do not install tackable wallcovering until temperature is stabilized and permanent lighting is in place.

1.5. MAINTENANCE

1.5.1. Maintenance Instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

1.5.2. Extra Materials: Deliver to Owner extra materials from same production run as installed products. Package with protective materials.

1.6. WARRANTY

1.6.1. Submit manufacturer's limited five-year written warranty against manufacturing defects.

2. PART 2 – PRODUCTS

2.1. TACKABLE WALLCOVERING

2.1.1. Manufacturer: Koroseal, www.koroseal.com, or equal.

2.1.2. Series/Style: Walltalkers tac•wall®

2.1.3. Construction/Performance Criteria:

2.1.3.1. Width: 48 or 72 inches.

2.1.3.2. Gauge: 1/4 inch.

2.1.3.3. ± 90 lineal foot rolls.

2.1.3.4. Flexible enough to bend around a 2-3/4 inch diameter cylinder.

2.1.3.5. Dimensionally stable due to burlap backing.

2.1.4. Color as selected by Architect from complete color line.

2.2. ACCESSORIES

2.2.1. Adhesive: Solvent-free, SBR type linoleum adhesive (L-910) or polyvinyl acetate dispersion type (contact adhesive) when used in press.

2.2.2. Color matched caulk:

2.2.2.1. Color as selected by Architect from complete color line.

2.2.3. Colonial tac•wall® Wood Trim: Provide wood trim in random lengths of 8 feet to 12 feet.

2.2.3.1. Color as selected by Architect from complete color line.

2.2.4. J-Trim for tac•wall

2.2.4.1. JTRM-00: Clear satin, anodized aluminum, 1/4 inch profile trim

2.2.5. Q-Pins:

2.2.5.1. Color as selected by Architect.

3. PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Examine areas and conditions in which tackable wallcoverings will be installed.

3.1.1.1. Complete finishing operations, including painting, before beginning installation of tackable wallcovering materials.

3.1.1.2. Wall surfaces to receive wallcovering materials shall be dry and free from dirt, grease, loose paint, and scale.

3.1.1.3. Do not proceed with installations until satisfactory conditions have been corrected.

3.2. PREPARATION

3.2.1. Surface Preparation: Remove hardware, accessories, plates, and similar items to allow tackable wallcovering to be installed.

3.2.1.1. Plaster surface: Remove surface chalk. In new work, use moisture meter to determine moisture content. Do not begin installation when moisture content is greater than five percent.

3.2.1.2. Gypsum board surface: Recess nails and screws. Repair irregular tape joints, sand and remove dust.

3.2.1.3. Painted surface: Remove loose paint or scale. Sand surface of enamel or gloss paint and wipe clean with damp cloth.

3.2.1.4. Ensure gypsum wallboard surfaces scheduled to receive wallcovering are properly primed with a quality acrylic wallcovering primer under Section 09 91 00.

3.2.2. Prime substrate as recommended by manufacturer.

3.3. APPLICATION

3.3.1. Comply with manufacturer's printed installation instructions.

3.3.2. Cut sheets to size including 2 to 3 inches of overage. Allow sheets to lay flat for at least 24 hours prior to the application. Mark roll direct on the backside of each sheet. Hang sheets in sequence as cut from the roll, do not reverse every other sheet.

3.3.3. Permanent HVAC system should be set to 68° F (20° C) for at least 72 hours prior to, during, and after the installation.

3.3.4. Back roll each sheet prior to the installation to release curl memory.

3.3.5. For seamed applications, using a seam and strip cutter remove the factory edge of one sheet. Using the same tool, overlap and trace cut the mating edge of the second sheet. Repeat this step for as many sheets as required for the job.

3.3.6. Scribe, cut, and fit material to butt tightly to adjacent surfaces, built-in casework, and permanent fixtures and pipes.

3.3.7. Apply adhesive (only enough to hang one sheet at a time) with a 1/16 inch trowel to the area to receiving the sheet.

3.3.8. Work from top to bottom then side to side. Roll sheet firmly into adhesive for positive contact and to remove air bubbles.

3.3.9. Remove adhesive residue immediately.

3.4. CLEANING

3.4.1. Clean wallcovering using a sponge with a neutral pH cleaning solution. Do not use abrasive cleaners. Rinse thoroughly with water and let dry before using.

3.4.2. Remove excess adhesive using methods and materials recommended by manufacturer.

3.5. PROTECTION

3.5.1. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

SECTION 09 91 00

PAINTING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Surface preparation.

1.1.2. Surface paint and stain finishes as scheduled.

1.2. REFERENCES

1.2.1. ASTM B 117 – Practice for Operating Salt Spray (Fog) Apparatus.

1.2.2. ASTM D 16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.

1.2.3. ASTM D 3359 – Test Method for Measuring Adhesion by Tape Test.

1.2.4. ASTM D 4060 – Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

1.2.5. ASTM E 84 – Test Method for Surface Burning Characteristics of Building Materials.

1.2.6. ASTM G 154 - Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials.

1.3. REGULATORY REQUIREMENTS

1.3.1. Submit manufacturer's certification of compliance with local criteria regarding VOC limits for all applied paints and coatings.

1.4. QUALITY ASSURANCE

1.4.1. Applicator: Company specializing in commercial painting and finishing with 5 years documented experience.

1.4.1.1. Installing Foreman: Individual specializing in applying specified systems with minimum 10 years documented experience.

1.5. SUBMITTALS

1.5.1. Provide submittals under provisions of Section 01 33 00.

1.5.2. Product Data: Submit product data of all proposed products, identifying product series, material composition, performance characteristics and sheen.

1.5.2.1. Submit manufacturer's certificate that products comply with current safety and environmental regulations, including hazardous materials labeling and air quality/VOC regulations

1.5.2.2. Submit manufacturer's certificate that products are physically and chemically compatible with each other and meet listed ASTM or Federal Specifications.

1.5.2.3. Where applicable, provide manufacturer's written evaluation of existing paint/coating systems, including directions as to surface preparation and primers compatible with existing systems.

1.5.3. Submit manufacturer's application instructions for each painting system, including surface preparation.

1.5.4. Color Selection procedure:

1.5.4.1. Provide Architect with samples of complete color and sheen range available for submitted products.

1.5.4.2. Based on submitted samples and specified color criteria, Architect will prepare preliminary color schedule for all field applied coatings.

1.5.4.3. Based on preliminary color schedule, submit samples of all coatings, applied on specified substrate. Submit three samples, approximately 8 x 10 inch in size, illustrating each color and sheen scheduled.

1.5.4.4. After review of preliminary color schedule samples, Architect will prepare final color schedule. Where different from preliminary schedule, submit three samples, approximately 8 x 10 inch in size, illustrating revised color and sheen.

1.6. DELIVERY, STORAGE, AND HANDLING

1.6.1. Deliver products to site under provisions of Section 01 60 00.

1.6.2. Store and protect products under provisions of Section 01 60 00.

1.6.3. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.

1.6.4. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.

1.6.5. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in an enclosed metal storage container located outside of building, unless required otherwise by manufacturer's instructions.

1.6.6. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.7. ENVIRONMENTAL REQUIREMENTS

1.7.1. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 65 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

1.7.2. Prior to beginning preparation and coating application, provide lighting level of 80 foot candles measured on substrate surface. Where natural lighting does not provide such levels, provide temporary lighting.

1.8. EXTRA STOCK:

1.8.1.1. Provide an unopened five gallon container of each color and sheen to Owner.

1.8.1.2. Label each container with color, sheen, and room locations, in addition to the manufacturer's label.

2. PART 2 - PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

2.1.1. Basis of Design: Specific products listed on Schedule in Part 3 of this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions under the provisions of Section 01 25 00.

2.1.2. High performance coatings are based on products manufactured by Tnemec, www.tnemec.com. Substitution limited to products with published test results equal to Tnemec in performance and test methodology.

2.2. MATERIALS

2.2.1. Coatings: Ready mixed, except field catalyzed coatings.

2.2.2. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

2.2.3. Accessory Materials: Provide all admixtures, thinners, flow agents and other materials not specifically indicated but required to achieve the finishes specified.

2.3. FINISHES/COLOR

2.3.1. Refer to schedule at end of Section for type of surface finish.

2.3.2. Colors shall be selected by Architect as specified.

2.3.3. Each coat shall be a perceptibly different tint.

2.3.4. Color Range:

2.3.4.1. Provide 4 separate colors, in custom, fully saturated deep hues for interior/exterior door frames and doors. Colors as selected by Architect.

2.3.4.2. Provide 4 separate colors, in custom, fully saturated deep hues for approximately 25 percent of interior wall surfaces, in each gloss level specified. Balance of wall and ceiling surfaces in one light color. Colors as selected by Architect.

2.3.4.3. Provide 3 separate colors, in custom, fully saturated deep hues, at all exterior wall and soffit plaster surfaces. Colors as selected by Architect.

2.3.4.4. Provide 2 separate colors, in custom, fully saturated deep hues, all at exterior metal fabrications, trusses, columns, and related components. Colors as selected by Architect.

2.3.4.5. Unless noted otherwise, where exterior painting occurs, match existing school color scheme.

2.3.5. Where no color range is specified, provide single color for each item or component.

2.4. WATER BASED EPOXY HIGH PERFORMANCE COATINGS

2.4.1. Manufacturer: Tnemec, www.tnemec.com, as distributed by TPC Consultants, phone 310-643-5191.

2.4.2. Type:. Water base acrylic epoxy system, high build film, chemically resistant.

2.4.3. Series: H.B. Tneme-Tufcoat, Series 113.

2.4.4. System Characteristics: Multiple coats of water based epoxy over primer recommended by manufacturer..

2.4.5. Epoxy Characteristics and Performance:

2.4.5.1. Adhesion: Minimum rating of 5, Method B, applied to SSPC-SP10 Near-White Blast Cleaned steel, 5 mm crosshatch per ASTM D 3359.

2.4.5.2. Scrubability: For 113 H.B., maximum 0.8 mils removed after 1,000 cycles and no more than 2 units gloss change per ASTM D 4213.

2.4.5.3. Temperature Resistance: Acceptable in-service temperature range of 170 degrees F continuous, 250 degrees F intermittent.

2.4.5.4. Abrasion Resistance: Maximum 160 mg weight loss at 1000 cycles with CS17 wheel, 1000 gram load, per ASTM D 4060.

2.4.5.5. Humidity Resistance: Series 113 HB applied to SSPC-SP10 Near-White Blast Cleaned steel, cured 4 weeks at 75 degrees F and 50 percent RH, with no blistering, cracking or delamination after 1,000 hours exposure.

2.4.5.6. Chemical Resistance: After chemical spot test on cured film, provide Series 113 HB coated surface complying with the following chemical resistance:

Sodium Hydroxide - 5%	No effect, 4 Hour
Hydrochloric Acid - 5%	No effect, 4 Hour
Sulfuric Acid - 5%	No effect, 4 Hour
Sodium Phosphate - 5%	No effect, 4 Hour

No Effect: No evidence of blistering, loss of adhesion or softening after 48 hour recovery period.

2.4.6. Fire/Life Safety/Habitability Criteria

2.4.6.1. Flammability: Minimum Class A Flame Spread value per ASTM E 84.

2.4.6.2. Smoke generated: maximum 450 per ASTM E 84.

2.4.6.3. Air Quality Compliance: All products used shall comply with local VOC criteria.

2.4.7. Accessory Products

2.4.7.1. Primers/Joint Detailing: Provide materials as recommended by manufacturer for application.

2.4.8. Finish and Color

2.4.8.1. Finish: Satin.

2.4.8.2. Color: Color selected from manufacturers complete Colorbook line for specified product.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

3.1.1.2.2. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the maximum levels recommended by the manufacturer:

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.

3.2.2. Correct minor defects and clean surfaces which affect work of this Section.

3.2.3. Shellac and seal marks which may bleed through surface finishes.

3.2.4. Steel Surfaces:

3.2.4.1. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous.

3.2.4.2. Bare Steel: Sand and scrape to remove loose primer and rust. Clean surfaces with solvent.

3.2.5. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair. Remove drywall texture nibs and other protrusions.

3.2.6. Plaster Surfaces: Repair minor defects, including cracks, in an approved manner. Remove plaster nibs and other protrusions.

3.2.7. Interior Wood millwork and miscellaneous Items: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried. Sand between coats.

3.2.8. Verify weatherstripping at door assemblies is compatible with specified paint finish.

3.2.9. Steel Doors and Door/Window Frames:

3.2.9.1. Provide specified primer at all frames, including frames with fabricators primer system. Comply with criteria specified in this Section.

3.2.9.2. Prepare frame steel surfaces as required for proper adhesion and appearance of specified finish coat system.

3.2.9.3. Paint all surfaces of window frames, including surfaces not visible when operable vent portions are in closed position.

3.3. PROTECTION

3.3.1. Protect elements surrounding the work of this Section from damage or disfiguration.

3.3.2. Repair damage to other surfaces caused by work of this Section.

3.3.3. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.

3.3.4. Remove empty paint containers from site.

3.4. APPLICATION

3.4.1. Apply products in accordance with manufacturer's instructions.

3.4.2. Do not apply finishes to surfaces that are not dry.

3.4.3. Apply each coat to uniform finish.

3.4.4. The number of coats specified are minimum. Additional coats shall be applied until finish is uniform in color and sheen.

3.4.5. Sand lightly between coats to achieve required finish.

3.4.6. Each coat to be approved by the Architect prior to applying succeeding coat.

3.4.7. Allow applied coat to dry before next coat is applied.

3.4.8. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

3.4.9. Finish all surfaces of doors, including tops and bottoms.

3.4.9.1. Apply two coats of approved sealer to all surfaces milled for hardware preparation, including hinge mortise, latching mechanism cutout and related door penetrations.

3.4.9.2. Apply paint to non-factory prefinished doors and frames by spray method only.

3.4.9.3. Before finishing, remove handling marks and exposure markings from all surfaces and edges with a complete block sanding using at least 150 grit sandpaper. Ease all edges. Steam out all scratches before sanding. Comply with WI Manual Section 1, including use of sanding sealers and fillers.

3.4.10. Do not paint over labels at fire rated doors, door or window frames or other fire rated assemblies.

3.4.11. Paint all structural components and surfaces visible through louvers and vents in wall and soffit surfaces.

3.4.12. Exterior metal fabrications, structural components and metal flashings: Unless noted otherwise, apply paints and coatings as specified below:

3.4.12.1. Unless noted otherwise, do not paint exterior galvanized metals, including railings, steel structural components, all roof flashings and accessories, all plaster trim and accessories, and all mechanical and electrical system components.

3.4.12.2. Do not paint exterior galvanized metal handrails and railings.

3.4.12.3. Apply exterior paint to all roof penetrations visible to the eye from typically occupied locations in the finished project. "Typically occupied" includes those portions of the project visible to a standing person from elevated portions of the site.

3.4.12.4. Apply exterior paint to steel structural components, canopy decking, canopy framing, and miscellaneous fabrications visible to the eye from typically occupied locations in the finished project.

3.4.12.5. Unless designated prefinished on drawings, apply exterior paint to metal roof copings, gutters, downspouts and flashings visible to the eye from typically occupied locations in the finished project.

3.4.12.6. Apply exterior paint to all plaster trim, reveals and accessories.

3.4.12.7. Apply paint to all other exterior components as specified or shown on drawings.

3.5. FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

3.5.1. Paint shop primed equipment. Paint shop prefinished items exposed to view in non - utility areas.

3.5.2. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

3.5.3. At interior and exterior applications, prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, mechanical equipment units, hangers, brackets, collars and supports, except where items are prefinished.

3.5.4. Replace identification markings on mechanical or electrical equipment when painted accidentally.

3.5.5. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with flat black paint, to limit of sight line. Paint dampers, except fire dampers, exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

3.5.6. Paint exposed panels, pedestals, boxes, conduit and related electrical equipment occurring in exterior and interior finished areas.

3.5.7. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.

3.6. CLEANING

3.6.1. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

3.6.2. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

3.6.3. At end of workday remove from building flammable paint, solvents, and reducing agents.

3.6.4. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.7. SCHEDULE

3.7.1. For ease of specifying, unless otherwise noted, product numbers of Frazee have been used. Equivalent products of Vista, Sherwin Williams, GliddenProfessional, Dunn Edwards, and other manufacturers may be used subject to the substitution provisions listed under Section 01 25 00.

3.7.2. INTERIOR SURFACES

3.7.2.1. Gypsum Board

3.7.2.1.1. Semi-Gloss Enamel finish (PF-1)

3.7.2.1.1.1. One coat Frazee Aqua Seal #061 Vinyl Acrylic Wall Sealer

3.7.2.1.1.2. Two coats Frazee Envirokote #032.

3.7.2.2. Low Sheen/Eggshell Paint Finish **(PF-2)**

3.7.2.2.1.1. One coat Frazee Aqua Seal #061 Vinyl Acrylic Wall Sealer

3.7.2.2.1.2. Two coats Frazee Envirokote #029.

3.7.2.3. Flat finish (PF-3)

3.7.2.3.1. One coat Frazee Aqua Seal #061 Vinyl Acrylic Wall Sealer,

3.7.2.3.2. Two coats Frazee Envirokote #018.

3.7.2.4. Ferrous metal piping, miscellaneous metal fabrications, and related components. (PF-4)

3.7.2.4.1. Solvent clean and rinse with clear water.

3.7.2.4.2. One coat primer #661 Metal Prime

3.7.2.4.3. Two Coats Finish #128 Satinglide

3.7.2.5. Galvanized flashings, ductwork, electrical conduit, and related components: Eggshell enamel finish (**PF-5**)

3.7.2.5.1. Solvent clean, etch with PCI 02150 Metal Conditioner solution and rinse with clear water.

3.7.2.5.2. One coat primer #661F Metal Prime

3.7.2.5.3. Two Coats Finish #022 Lo Glo

3.7.2.6. Wood - Opaque - semi gloss finish (PF-6).

3.7.2.6.1. One coat primer #168 Prime Plus for primer and backprime applications.

3.7.2.6.2. Two coats #124 Mirroglide.

3.7.2.7. Steel Doors/Door and Window Frames - primed - Semi-Gloss (**PFX-1**)

3.7.2.7.1. (Same as exterior steel surfaces)

3.7.3. EXTERIOR SURFACES

3.7.3.1. Steel Doors and Frames / Window Frames - Galvanized (PFX-1)

3.7.3.1.1. One coat primer # 661F Metal Prime

3.7.3.1.2. Two Coats Finish #124 Mirroglide

3.7.3.2. Exterior exposed metal, railings & trim – Acrylic polyurethane finish (**PFX-2**)

3.7.3.2.1. Solvent clean and rinse with clear water.

3.7.3.2.2. One coat Tnemec primer as recommended by manuf.

3.7.3.2.3. Two coats Tnemec Series 1075 Acrylic PolyUrethane.

3.7.3.3. Ferrous metal piping, exposed steel canopy members, miscellaneous metal fabrications, and related components (**PFX-3**)

3.7.3.3.1. Solvent clean and rinse with clear water.

3.7.3.3.2. One coat primer #661F Metal Prime

3.7.3.3.3. Two Coats Finish #124 Mirroglide

3.7.3.4. Galvanized flashings, exposed galvanized metal (typical).

3.7.3.4.1. One coat Tnemec primer as recommended by coating manufacturer.

3.7.3.4.2. Two coats Tnemec Series 1075 Acrylic PolyUrethane.

3.7.3.5. Wood - Opaque - semi gloss finish (typical)

3.7.3.5.1. (Same as interior wood surfaces)

3.7.3.6. Exterior metal railings & trim – Acrylic polyurethane finish (typical)

3.7.3.6.1. Solvent clean and rinse with clear water.

3.7.3.6.2. One coat Tnemec primer as recommended by manuf.

3.7.3.6.3. Two coats Tnemec Series 1075 Acrylic PolyUrethane.

3.7.3.7. Cast-in-place Concrete Wall Surfaces, - Flat - (typical).

3.7.3.7.1. One coat acrylic primer #266 Epotilt

3.7.3.7.2. Two coats #203 Duratec flat finish

END OF SECTION

SECTION 09 96 23

GRAFFITI RESISTANT COATING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Graffiti resistant coating applied to exterior simulated stone veneer surfaces.

1.2. QUALITY ASSURANCE

1.2.1. Coating Systems Manufacturer: Company specializing in VOC approved graffiti systems with three years minimum experience.

1.2.2. Applicator: Company specializing in application of specified coating, with 3 years minimum documented experience and approved by manufacturer.

1.3. SUBMITTALS

1.3.1. Submit product data under provisions of Section 01 33 00.

1.3.2. Material/Installation Data

1.3.2.1. Provide detailed product description, tests performed, limitations to coating, cautionary procedures required during application, and chemical properties, including percentage of solids.

1.3.2.2. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.3.3. Mock-Up

1.3.3.1. Coordinate with construction of mock up specified in Division 04.

1.3.3.2. Construct mock up, 3 X 6 feet of stone veneer.

1.3.3.3. Apply complete coating system to mock up, allow to cure.

1.3.3.4. District staff shall apply graffiti and remove it in accordance with manufacturer's recommendations.

1.3.3.5. Obtain Owner's approval of results prior to further application.

1.4. ENVIRONMENTAL REQUIREMENTS

1.4.1. Do not apply coating when ambient air and surface temperature is lower than 41 degrees F within 24 hours of application.

1.4.2. Do not apply coating when ambient humidity exceeds 80 percent within 8 hours before or after application.

1.5. EXTRA STOCK

1.5.1. Provide five (5) gallons of specified graffiti removal coating.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. GRAFFITI RESISTANT COATING

2.2.1. Manufacturer:

2.2.1.1. Prosoco, www.prosoco.com.

2.2.2. Product Series: Sure Klean Weather Seal.

2.2.2.1. Penetrating Sealer: Blok Guard & Graffiti Control

2.2.3. Characteristics:

2.2.3.1. Composition: Clear, solvent based silicone elastomer, in VOC compliant formulation.

2.2.4. Finish/Color

2.2.4.1. Finish: No sheen or change in substrate.

2.2.4.2. Color: Clear.

2.3. MASONRY VENEER CLEANER

2.3.1. Provide recommended ProSoCo Sure Klean cleaner.

2.4. GRAFFITI REMOVAL SOLVENT

2.4.1. Provide ProSoCo Defacer/Eraser Graffiti Wipe, in quantities specified in Article 3.4.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify joint sealants are installed and cured.

3.1.1.2.2. Verify surfaces to be coated are cured, dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Remove loose particles and foreign matter.

3.2.2. Clean surfaces with recommended cleaner. Do not use raw acids.

3.2.3. Scrub and rinse surfaces with water and let dry for minimum 24 hours.

3.2.4. Protect adjacent surfaces not scheduled to receive coating.

3.2.5. If applied on unscheduled surfaces, remove immediately, by approved method.

3.3. APPLICATION

3.3.1. Apply coating in accordance with manufacturer's instructions, as modified for each substrate and site conditions.

3.3.2. Apply at manufacturers recommended rate, from bottom up. Avoid excessive overlapping

3.3.2.1. Apply using spray equipment, maintaining "wet-on-wet" process, in two pass method. Let first application penetrate masonry for 2-3 minutes. Double pass within 5 minutes of first pass.

3.3.2.2. Do not over-apply.

3.3.2.3. Brush out any runs, drips or sags immediately.

END OF SECTION

SECTION 10 11 16

MARKERBOARDS AND TACKBOARDS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Markerboards

1.1.2. Tackboard wallcoverings

1.2. REFERENCES

1.2.1. ANSI A 208.1 - Mat Formed Wood Particleboard.

1.2.2. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.2.3. ASTM A 424 - Steel Sheet for Porcelain Enameling.

1.2.4. Porcelain Enamel Institute-Performance Specifications for Porcelain Enamel Markerboards.

1.3. SUBMITTALS

1.3.1. Submit shop drawings and product data under provisions of Section 01 33 00.

1.3.2. Indicate on shop drawings, wall elevations, dimensions, joint locations, and special anchor details.

1.3.3. Submit samples under provisions of Section 01 33 00.

1.3.4. Submit two samples 3x4 inches in size, illustrating materials, finish and color of board surfacing and trim.

1.4. MAINTENANCE DATA

1.4.1. Submit maintenance data under provisions of Section 01 77 19.

1.4.2. Include maintenance information on regular cleaning and stain removal.

1.5. REGULATORY REQUIREMENTS

1.5.1. Provide interior wall finish materials to comply with Class B indexes: Flame spread 26-75; smoke-developed 0-450 per CBC Section 803 & Table 803.5.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. MARKERBOARDS

2.2.1. Manufacturer: Claridge Products and Equipment Co. http://www.claridgeproducts.com/) are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2.1.1. Approved alternate manufacturer: Platinum Visual Systems

2.2.2. Factory built units of sizes indicated on drawings, consisting of whiteboard, designed for use with chalkless markers.

2.2.2.1. Boards shall be capable of:

2.2.2.1.1. Receiving and holding magnets and acting as a projection screen.

2.2.2.1.2. Being marked with projection ink and water soluble crayons.

2.2.2.1.3. Being marked with semi-permanent markers for drawing graphs and other such symbols which are to remain semi-permanently.

2.2.3. Type: Porcelain enamel markerboards.

2.2.3.1. Type A: Stationary, wall mount.

2.2.3.1.1. MKBD-1: 8 feet by 4 feet, unless shown otherwise.

2.2.3.1.2. MKBD-2: 12 feet by 4 feet, unless shown otherwise.

2.2.4. Series/Style:

2.2.4.1. Type A: Factory Built Unit, Series 3 frame.

2.2.4.1.1. Design: Unless otherwise shown on drawings, provide Type A design with STS trim and map rail.

2.2.5. Construction:

2.2.5.1. Size: Refer to Drawings.

2.2.5.2. Writing Surface: "Writanium" 24 gauge porcelain enamel skin.

2.2.5.3. Core: 1/2 inch particle board.

2.2.5.4. Back: 0.015 inch aluminum sheet.

2.2.5.5. Perimeter Trim: Aluminum channel trim.

2.2.5.6. Adhesives: Type recommended by manufacturer.

2.2.5.7. Map Rail: Aluminum map rail with cork insert.

2.2.5.8. Map Supports: Formed aluminum hooks, sliding type to fit map rail, provide two for each 4 feet of board length.

2.2.5.9. Marker trough: Extruded aluminum, one piece, full length of markerboard; molded end closures.

2.2.5.10. Fabricate in full lengths, no joints allowed except as shown on drawings.

2.2.6. Finish:

2.2.6.1. Porcelain Enamel: Glass fiber enamel, baked to vitreous surfaces; color as selected from manufacturer's standard range for standard dry marker surfaces.

2.2.6.2. Aluminum Frame and Accessories: Clear satin anodized finish.

2.3. TACKBOARDS WALLCOVERINGS

2.3.1. Manufacturer: Walltalkers Wallcoverings manufactured by RJF International, Inc., Marietta, OH. and distributed by Koroseal Wallcovering West, Inc., Van Nuys, CA. Contact sales representative 800-935-9359.

2.3.2. Type: Multi-purpose presentation wallcovering, non-glare project screen and dry erase surface.

2.3.3. Series/Style: Project-Rite, model number(s) PE50, PE60.

2.4. OTHER MATERIALS

2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install markerboards and tackboards in accordance with manufacturer's instructions.

3.2.2. Secure units level and plumb.

3.3. CLEANING

3.3.1. Clean board surfaces in accordance with manufacturer's instructions.

3.3.2. Cover board surfaces with protective cover, taped to frame.

3.3.3. Remove protective covers at Owner occupancy.

END OF SECTION

SECTION 10 14 00

SIGNAGE

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Interior and exterior graphic signage

1.1.2. Directional and Informational Signage, site, exterior and interior.

1.1.3. Vehicle traffic control signage.

1.1.4. Building identification signage.

1.1.5. Section 05500 - Metal Fabrications.

1.2. REGULATORY REQUIREMENTS

1.2.1. Comply with signage requirements of the 2010 Americans with Disabilities Act Standards for Accessible Design; Title 24, Part 2, CCR, including amendments; and California Building Code, as currently amended.

1.3. SUBMITTALS

1.3.1. Submit under provisions of Section 01 33 00.

1.3.2. Shop Drawings:

1.3.2.1. Indicate sign size, message, and mounting.

1.3.2.2. Identify mounting location and alignment with adjacent construction and features.

1.3.3. Product Data: Provide data on material construction, hardware, and accessories.

1.3.4. Samples:

1.3.4.1. Color range: Submit two brochures or other approved submittal of full color range available for each signage application.

1.3.4.2. Submit two samples of representative signage illustrating dimensional characteristics, finish and sheen for Architect selection.

1.3.4.2.1. Submit samples of representative tactile/braille signage illustrating letter stroke proportions and braille dot size, spacing and characteristics.

1.3.4.3. Submit two samples of exterior cast aluminum letters "D" & "P", 12 inches high with mounting mechanism illustrating font style, finish, and sheen for Architect selection & approval

1.3.5. Certification:

1.3.5.1. Certification: Accompanying submittal, provide sign fabricator/manufacturers written certification stating signs as designed comply with applicable criteria of 2010 ADA Standards for Accessible Design, CBC, and Title 24, including letter style, spacing and size.

1.3.5.2. Prior to installation, provide sign fabricator/manufacturers written certification stating tactile and braille signs comply with specified criteria, including proof-reading requirements.

1.4. DELIVERY, STORAGE, AND HANDLING

1.4.1. Deliver products to site. Store and protect under provisions of Section 01 60 00.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.1.2. Manufacturer: National Signage Affiliates (800) 322-4515. Email: www.ccswsignsystems.com (specified as basis of design), or equal.

2.2. INTERIOR SIGNAGE

2.2.1. Type: Extruded Engineered PVC/Acrylic alloy with integral background colors and high impact resistance.

2.2.2. Series: Luminous, or equal.

2.2.3. Sign thickness: 1/4-inch background at room name panel. 3/8-inch at number panel. 1/2-inch at accent bands. Polished square edges.

2.2.4. Tactile Characters/Symbols: Raised 1/32 inch (1 mm) from sign plate face.

2.2.5. Sign Size, Design, Style Criteria:

2.2.5.1. Tactile Character Type: Tactile characters on signs shall be raised 1/32 inch (0.794 mm) minimum and shall be sans serif uppercase characters accompanied by Contracted (Grade 2) Braille. Comply with CBC Section 11B-703.2.

2.2.5.2. Tactile Character size: Raised characters shall be a minimum 5/8 inch (15.9 mm), and a maximum of 2 inch (51 mm) high. Comply with CBC Section 11B-703.2.5.

2.2.5.3. Finish and Contrast: Contrast between character, symbols and their background must be 70% minimum and have a non-glare finish. Comply with CBC Section 11B-703.5.1.

2.2.5.4. Character Proportions: Raised characters on signs shall be selected from fonts where the width of the uppercase letter "O" is 60% minimum and 110% maximum of the height of the uppercase letter "I". Stroke thickness of the uppercase letter "I" shall be 15% maximum of the height of the character. Comply with CBC Section 11B-703.4 and 11B-703.6.

2.2.5.5. Braille: Provide contracted (Grade 2) braille, with dots spaced 1/10 inch (2.54 mm) on center in each cell, and cells spaced 2/10 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. Provide dots raised 1/40 inch min. and 0.037 inch max. above surface. Braille dots shall be domed or rounded. Comply with CBC Section 11B-703.2.7, 11B-703.2.8, 11B-703.3, and 11B-703.4.

2.2.5.6. Mounting Height: A tactile sign shall be located 48 inch minimum to the baseline of lowest Braille cells and 60 inches maximum to baseline of the highest line of raised characters above the finish floor or ground surface.

2.2.5.7. Mounting Location: A tactile sign shall be located on the approach side, as one enters or exits rooms or space, and be reached within the required floor space per CBC Section and Figure 11B-703.4.2 as follows:

2.2.5.7.1. A clear floor space of 18 x 18 inch minimum, centered on the tactile characters, shall be provided beyond the arc of any door swings between the closed position and 45 degree open position.

2.2.5.7.2. On the wall at the latch side of a single door.

2.2.5.7.3. On the inactive leaf of a double door with one active leaf.

2.2.5.7.4. On the wall at the right side of a double door with two active leafs.

2.2.5.7.5. On the nearest adjacent wall where there is no wall space at the latch side of a single door or no space at the right side of a double door with two active leafs.

2.2.5.8. Design sign with room name on maximum three lines, room number, and braille below each text line. See sign details. Provide minimum 1/2 inch clear space all around braille image.

2.2.5.9. Pictogram Criteria: Where pictograms are specified as room identification signage, provide pictogram centered in minimum 6 inch high space with no text or braille within this space. Provide tactile and braille message centered below pictogram.

2.2.5.10. Toilet Rooms: In addition to room identification signs, comply with 12 inch triangle/circle size requirements per CBC Section 11B Accessibility, Part 2, Title 24, CCR. Do not provide tactile and braille message.

2.2.5.11. Construction: One-piece; added on or engraved characters not acceptable.

2.2.6. Finish/Contrast/Color:

2.2.6.1. Color: Provide signs with two colors as selected by Architect from custom color line.

2.2.6.1.1. Background: Color 1, one color per sign detail.

2.2.6.1.2. Message: Color 2, one color per sign detail.

2.2.6.1.3. International Symbol of Accessibility: Light colored symbol on 70% contrasting color background.

2.2.6.1.4. Finish System: acrylic polyurethane coating system, VOC approved, complying with glare finish criteria.

2.2.7. Mounting:

2.2.7.1. Exterior: Provide stainless steel spanner head tamper resistant screw in expansion shields suitable for substrate. Countersink screw flush with surface.

2.2.7.2. Interior: Unless noted otherwise, provide double stick foam tape mounting, 1/32 inch thick.

2.2.7.3. Where signs are mounted on glass panels, install using structural silicone sealant method specified in this Section.

2.2.7.3.1. Provide matching 1/8-inch backer panel: Color 1 per sign detail.

2.2.7.4. Verify surfaces with irregular or rough finish have been properly finished to establish flush and lip free installation.

2.2.8. Fabrication Certification: Prior to installation, provide written certification stating permanent signage has been proofread by Library of Congress certified readers or approved alternate.

2.2.9. Interior room identification signage

2.2.9.1. **RI-A, RI-B, RI-C** - Room Signs: Provide signs at locations shown on drawings. At all exterior entrance doors, provide symbol of accessibility per details.

2.2.9.2. **TD-A, TD-B, TD-C** - Toilet room door symbols: Provide door mounted signs, separate from room identification signage, complying with CBC Section 1115B.5, Part 2, Title 24, CCR. Provide appropriate international gender symbol on each sign. Do not put tactile and braille message on sign.

2.2.9.3. **TI-A, TI-B, TI-C** - Toilet Room Signs: Provide signs at locations shown on drawings. At toilets, provide symbol of accessibility per details.

2.2.9.4. **E, ER** – Exit Signs: Provide signs at all door locations with exit egress signs required by CBC Section 1003.2.7, Part 2, Title 24, CCR indicating the path of exit travel within the means of egress system.

2.2.9.5. **OCC** – Occupant Load Signs: Provide sign at each room with occupancy greater than 50, and as shown on drawings.

2.2.10. Interior Directional and informational signage

2.2.10.1. **AR** - Accessible Route Direction Signs: Provide signage with symbol of accessibility with arrow pointed as directed by Architect. Provide signs as shown on drawings and as directed by Architect.

2.2.10.2. **ALS** - Assistive Listening Device: Provide signs indicating availability of assistive listening devices in compliance with Section 11B-703.7.2.4, Part 2, Title 24, CCR. In addition, provide message on sign stating "Contact School Administration to make arrangements for access to listening device for after school hours use". Provide signs as shown on drawings and as directed by Architect.

2.2.10.3. **FES** – Fire evacuation signage: Provide 2 signs at each floor of building or wing. Architect will provide CAD plan for graphics.

2.2.10.4. Miscellaneous signage: Provide other signs not listed above as indicated on the plans and specifications, as required. Architect to review graphics per submittal requirements in section 01 33 00.

2.3. ACCESSIBLE ENTRANCE DECAL

2.3.1. Provide Vomar http://www.vomarproducts.com/ or equal, 100 Series acrylic die cut graphic decal, complying with the following criteria:

2.3.1.1. Message: International Symbol of Accessibility.

2.3.1.2. Mounting/Location: Self adhesive, mounted as directed by Architect at facility entrances.

2.3.1.3. Size: 4 inches square.

2.3.1.4. Color: White image on "Accessible" blue color.

2.3.1.5. Location: One for each accessible entrance, and as shown on drawings.

2.4. EXTERIOR SITE VEHICLE CONTROL & DIRECTIONAL SIGNAGE

2.4.1. Manufacturer: Western Highway Products www.westernhighway.com or equal.

2.4.2. Provide painted aluminum series, design as shown on drawings and as specified, with H6-TP spanner head vandal resistant fasteners, H-5 spacer and all required mounting components. All accessible signs shall be painted with white message on dark blue background.

2.4.2.1. **VS-1** - Accessible Parking Site Entrance Sign: RFH 1830.

2.4.2.2. **VS-2** - Van Accessible Parking Space Stall Sign: RFH 1212PB, with 2RFH-VAN - R12 at van accessible spaces.

2.4.2.3. **VS-3** - Stop Sign per college standards, and as indicated on drawings.

2.4.2.4. **VS-4** - No Pedestrian or Vehicle access: 12 x 18 inches, and as indicated on drawings.

2.4.2.5. **VS-5** – Authorized Vehicles Only: 12 x 18 inches, and as indicated on drawings.

2.4.2.6. **DS-1** – Accessible Route Directional Sign: RFH1212P with RFH123P. Confirm direction arrow with Architect.

2.4.3. Concrete: 3,000 psi concrete in accordance with the provisions of Section 03 30 00 or 03 30 10.

2.4.4. Post: 2" x 2" galvanized steel break-away type sign post – Sign-mate by All State Signs, Ulti-mate by Western Highway Products, or equal, galvanized per Section 05 50 00.

2.5. EXTERIOR SAFETY SIGNAGE

2.5.1. Exterior Safety Signage: Provide custom painted aluminum series matching signage specified above, with H6-TP spanner head vandal resistant fasteners, H-5 spacer and all required mounting components. Provide signage as shown on drawings, required by jurisdictional authorities, and related signage, including but not necessarily limited to, signs with the following message:

2.5.1.1. **TE** - "Trash Enclosure".

2.5.1.2. **EL** - "Electrical". Provide at each electrical room door that opens to the exterior.

2.5.1.3. **GS** - "Gas Shut-Off Valve ". Provide at each gas shut-off valve.

2.5.1.4. **FSR** - "Fire Sprinkler Riser Inside". Provide at each riser room location.

2.5.1.5. **EO** – "Exit Only". Provide at exit only door locations.

2.5.2. Fire Lane Signage and Delineation: Fire lanes must be identified regarding their entrance and physical location with the placement of signs, gates, curbs, bollards and similar devices. Specific signage wording and other details must be coordinated with and approved by local fire authorities.

2.5.3. Interior Safety Signage: Provide signage matching product specified above, with all required mounting components. Provide signage as shown on drawings, required by jurisdictional authorities, and related signage, including but not necessarily limited to, signs with the following message:

2.5.3.1. "Room Occupancy Limit - XXX". Numbers shall be determined by Architect.

2.5.3.2. Evacuation Plan Signs: Provide evacuation plan at each elevator lobby. Fabricate with message, graphic character, and color as required by jurisdictional authority, in laminated plastic sign system.

2.6. EXTERIOR ALUMINUM LETTERS

2.6.1. Manufacturer: A.R.K. Ramos http://www.arkramos.com/ or equal.

2.6.2. Type: Cast aluminum letters, see Architectural drawings for mounting type.

2.6.3. Series: Standard Cast Aluminum Letters.

2.6.4. Size and Construction:

2.6.4.1. Size: As shown on Drawings, 12 inch minimum unless noted otherwise.

2.6.4.2. Material: Aluminum.

2.6.5. Graphics and Message

2.6.5.1. Letter Style: "American Classic Bold" style font or equal, final font style to be selected by Architect. Upper case, as shown on drawings. Architect shall have final review and approval of shop drawings prior to fabrication.

2.6.5.2. Message:

2.6.5.2.1. Building Name - West: As shown on Drawings. 8 inch high. Text: "DR. PREM REDDY HEALTH SCIENCE BUILDING".

2.6.5.2.2. Building Name - North: As shown on Drawings. 6 inch high. Text: "SCIENCE & HEALTH 33".

2.6.5.2.3. Building Name – South: As shown on Drawings. 6 inch high. Text: "SCIENCE & HEALTH 33".

2.6.5.2.4. Confirm final building name and number with College.

2.6.6. Mounting Hardware: PM-1, tamper resistant fasteners with collars as detailed on drawings.

2.6.7. Color: Clear Silver Anodized with clear protective coating, or otherwise selected by Architect from standard color line. Building numbers shall be Red, or other contrasting color as selected by the Architect.

2.7. OTHER MATERIALS

2.7.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. General criteria:

3.2.1.1. Install in accordance with manufacturer's instructions and approved submittals.

3.2.1.2. Coordinate location of all signage with Architect.

3.2.1.3. Install on clean and properly prepared surfaces.

3.2.2. Room, directional, graphic, and informational signage:

3.2.2.1. Install signs after substrate surfaces receive final finish.

3.2.2.2. Center room identification signage at 60 inches above floor, located on strike side of door or as directed by Architect.

3.2.2.3. Where signs are installed in sealant method on glass panels, provide back plate matching sign at opposite side of glass

3.2.2.4. When sign is installed on window surface or other similar recessed conditions, provide spacer as required to maintain sign face within 3 inches of outermost wall plane.

3.2.3. Exterior site, directional and informational signage:

3.2.3.1. Mount at locations as shown on drawings, level and plumb.

3.2.3.2. Coordinate location with Architect.

3.2.3.3. Mount wall mounted signage fasteners in sealant bedding.

3.2.3.4. Where signs are mounted on gate or fence mesh, sandwich mesh between sign and backing panel of same material and size as sign. Install using hex bolt, tamper resistant fasteners, mounted through aluminum sleeve/spacer.

3.2.3.5. Mount ground set signs in concrete footing, Type II cement, per Section 03 30 10.

3.2.4. Exterior letters and signs:

3.2.4.1. Mount at locations as shown on drawings, level and plumb.

3.2.4.2. Mount wall mounted signage fasteners in sealant bedding.

3.2.4.3. Coordinate location with Architect.

3.2.5. Clean and polish all signage after installation.

END OF SECTION

SECTION 10 26 00

WALL AND DOOR PROTECTION

1. PART 1 - GENERAL

1.1. RELATED DOCUMENTS

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

1.2. SUMMARY

1.2.1. Section Includes:

1.2.1.1. Wall guards.

1.2.1.2. Corner guards.

1.3. PERFORMANCE REQUIREMENTS

1.3.1. Structural Performance: Provide handrails capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1.3.1.1. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.

1.3.1.2. Concentrated load of 200 lbf (0.89 kN) applied in any direction.

1.3.1.3. Uniform and concentrated loads need not be assumed to act concurrently.

1.4. ACTION SUBMITTALS

1.4.1. Product Data: Include construction details, material descriptions, impact strength, fire-test-response characteristics, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.

1.4.2. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.

1.4.3. Samples for Initial Selection: For each type of impact-resistant wall protection unit indicated.

1.4.3.1. Include similar Samples of accent strips and accessories involving color selection.

1.4.4. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below. Include Samples of accent strips to verify color selected.

1.4.4.1. Wall and Corner Guards: 12 inches (300 mm) long. Include examples of joinery, corners, end caps, top caps, and field splices.

1.4.4.2. Handrails: 12 inches (300 mm) long. Include examples of joinery, corners, and field splices.

1.4.4.3. Impact-Resistant Wall Covering: 6 by 6 inches (150 by 150 mm) square.

1.5. INFORMATIONAL SUBMITTALS

1.5.1. Qualification Data: For qualified Installer.

1.5.2. Material Certificates: For each impact-resistant plastic material, from manufacturer.

1.5.3. Material Test Reports: For each impact-resistant plastic material.

1.5.4. Warranty: Sample of special warranty.

1.6. SUBMITTALS

1.6.1. VOC Content: For installation adhesives, including printed statement of VOC content.

1.6.1.1. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.

1.6.1.2. Submit Green Seal Certification to GS-36 and description of the basis for certification.

1.6.1.3. Submit manufacturer's certification that products comply with SCAQMD Rule 1168 in areas where exposure to freeze/thaw conditions and direct exposure to moisture will not occur. In areas where freeze/thaw conditions do exist or direct exposure to moisture can occur, submit manufacturer's certification that products comply with Bay Area AQMD Reg. 8, Rule 51 for containers larger than 16 oz and with California Air Resource Board (CARB) for containers 16 oz or less.

1.7. CLOSEOUT SUBMITTALS

1.7.1. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.

1.7.1.1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

1.8. QUALITY ASSURANCE

1.8.1. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1.8.2. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.

1.8.3. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Section 014000 "Quality Requirements."

1.8.4. Revise subparagraph below to suit Project.

1.8.4.1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.8.5. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.

1.8.6. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.8.7. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by a FSC-accredited certification body.

1.8.8. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by and FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship".

1.8.9. Engineering Wood Products:

1.8.9.1. Determine formaldehyde concentrations in air from wood products under test conditions of temperature and relative humidity in accordance with ASTM D6007 or E1333.

1.8.9.2. Determine Volatile Organic Compounds (VOC), excluding formaldehyde, emitted from manufactured wood-based panels in accordance with ASTM D6330.

1.9. PROJECT CONDITIONS

1.9.1. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F (21 deg C) for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.10. WARRANTY

1.10.1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.

1.10.1.1. Failures include, but are not limited to, the following:

1.10.1.1.1. Structural failures.

1.10.1.1.2. Deterioration of plastic and other materials beyond normal use.

1.10.1.2. Warranty Period: Five **(5)** years from date of Substantial Completion.

2. PART 2 - PRODUCTS

2.1. MATERIALS, GENERAL

2.1.1. Recycled Content: Use materials and products that contain the maximum amount of recycled content allowed that retains material integrity.

2.2. ACCESSORIES

2.2.1. Adhesive: Low VOC material, mildew-resistant, nonstaining adhesive, for use with specific wall covering and substrate application. Adhesive must comply with Bar Area AQMD Reg. 8, Rule 51 for containers larger than 16 oz and with California Air Resources Board (CARB) for containers 16 oz or less, and as specified.

2.3. MATERIALS

2.3.1. PVC Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout; extruded and sheet material, thickness as indicated.

2.3.2. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft-lbf/in. (800 J/m) of notch when tested according to ASTM D 256, Test Method A.

2.3.3. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated, but with not less than strength and durability properties specified in ASTM B 221 (ASTM B 221M) for Alloy 6063-T5.

2.3.4. Stainless-Steel Sheet: ASTM A 240/A 240M.

2.3.5. Brass: ASTM B 249/B 249M for extruded shapes and ASTM B 36/B 36 M for sheet.

2.3.6. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

2.3.7. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4. WALL GUARDS

2.4.1. Crash Rail: Heavy-duty assembly consisting of continuous snap-on plastic cover installed over concealed retainer system; designed to withstand impacts.

2.4.2. Bumper Rail: Assembly consisting of continuous snap-on plastic cover installed over concealed, continuous retainer; designed to withstand impacts.

2.4.3. Rub Rail: Assembly consisting of continuous snap-on cover installed over concealed, continuous retainer.

2.5. CORNER GUARDS

2.5.1. Surface-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

2.5.2. Flush-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover that is flush with adjacent wall surface, installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.

2.5.3. Fire-Rated, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover that is flush with adjacent wall surface, installed over continuous retainer and intumescent fire barrier; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.

2.5.4. Surface-Mounted, Opaque-Plastic Corner Guard: Fabricated from PVC plastic, acrylic-modified vinyl sheet or opaque polycarbonate sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.

2.5.5. Surface-Mounted, Transparent-Plastic Corner Guards: Fabricated from clear polycarbonate plastic sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.

2.5.6. Surface-Mounted, Metal Corner Guards: Fabricated from one-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.

2.5.7. Flush-Mounted, Stainless Steel Corner Guards (16 gauge stainless steel)

2.5.7.1. Construction Specialties, Inc. Model 8PH.

2.5.7.2. Construction Specialties, Inc. Model S8PH.

2.6. END-WALL GUARDS

2.6.1. Surface-Mounted, Resilient, Plastic End-Wall Guard: Assembly consisting of snap-on plastic cover installed over continuous retainer, continuous retainer at each corner, with end of wall covered by semi rigid, impact-resistant sheet wall covering; including mounting hardware.

2.6.2. Flush-Mounted, Resilient, Plastic End-Wall Guard: Assembly consisting of snap-on plastic cover that is flush with adjacent wall surface and that covers entire end of wall, installed over continuous retainer, continuous retainer at each corner, with end of wall covered by semi rigid, impact-resistant sheet wall covering; including mounting hardware.

2.6.3. See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers. Retain one of first two subparagraphs and list of manufacturers below. See Section 016000 "Product Requirements."

2.6.4. Fire-Rated, Resilient, Plastic End-Wall Guard: Assembly consisting of snap-on plastic cover that is flush with adjacent wall surface and that covers entire end of wall, installed over continuous retainer and intumescent fire barrier; including mounting hardware; full wall height.

2.6.5. Surface-Mounted, Metal, End-Wall Guards: Fabricated from one-piece, formed or extruded metal that covers entire end of wall; with formed edges.

2.7. FABRICATION

2.7.1. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

2.7.2. Preform curved semi rigid, impact-resistant sheet wall covering in factory for radius and sheet thickness as follows:

2.7.3. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

2.7.4. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.7.5. Miter corners and ends of wood handrails for returns.

2.8. METAL FINISHES

2.8.1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.8.2. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

3. PART 3 - EXECUTION

3.1. CONSTRUCTION WASTE MANAGEMENT

3.1.1. Manage construction waste in accordance with provisions of Section 01 74 19 Construction Waste Management and Disposal. Submit documentation to satisfy the requirements of that Section.

3.1.1.1. 1. Set aside scrap material to be returned to manufacturer for recycling into new product.

END OF SECTION

SECTION 10 28 00

TOILET ACCESSORIES

1. PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Commercial toilet accessories associated with public toilet rooms.

1.1.1.2. Supplementary components and accessories necessary for a complete installation.

1.2. SUBMITTALS

1.2.1. Action Submittals:

1.2.1.1. Product Data: Submit manufacturer's catalog cuts and data sheets, complete parts list, and installation requirements for each accessory specified.

1.2.2. Informational Submittals:

1.2.2.1. Installation Instructions:

1.2.2.1.1. Submit manufacturer-prepared instructions concerning proper handling, storing, installing and protecting materials.

1.2.2.1.2. If manufacturer-prepared instructions are either unavailable or do not apply to project-specific conditions, then consult with manufacturer's technical representative and obtain manufacturer-prepared installation requirements, recommendations or instructions in writing, and promptly distribute copies manufacturer-prepared requirements, recommendations or instructions to Architect before proceeding with work.

1.2.3. Closeout Submittals: Furnish operating instructions and keys for equipment and locks.

1.3. QUALITY ASSURANCE

1.3.1. California DSA Regulatory Requirements:

1.3.1.1. Toilet Accessories:

1.3.1.1.1. Toilet accessories required to be accessible must be mounted in conformance with CBC Sections 11B-602 through 11B-612.

1.3.1.1.2. Toilet paper and feminine napkin dispensers located on the grab bar side of an accessible toilet room or stall may not project more than the grab bar.

1.3.1.1.3. Grab bars in toilet facilities shall comply with CBC Section 11B-609.

1.3.1.1.3.1. Grab bars and any wall or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements and shall have rounded edges.

1.3.1.1.3.2. The space around the grab bars shall be as follows:

1) 1-1/2 inches between the grab bar and the wall. CBC Section 11B-609.3.
2) 1-1/2 inches minimum between the grab bar and the projecting objects below and at the ends.
3) 12 inches minimum between the grab bar and projecting objects above.

1.3.1.1.4. Locate toilet accessories 1-1/2 inches or greater clear of grab bar tangent point. Surface-mounted accessories located above grab bars are prohibited.

1.4. HANDLING

1.4.1. When possible, keep protective films, covers or other coating son accessories until their installation is complete, then remove at final cleanup.

1.5. WARRANTY

1.5.1. Manufacturer's Warranty: Warrant mirrors against silver spoilage for 5 years after Substantial Completion.

2. PART 2 – PRODUCTS

2.1. MATERIALS

2.1.1. Stainless Steel Sheet: ASTM A 666, cold-rolled or annealed, Type 304 No. 4 finish, unless otherwise indicated, tension-leveled to a flatness of 5 I-units or less.

2.1.2. Mirrored Glass: ASTM C 1036, Type I, Class, Quality-Q1.

2.2. TOILET ACCESSORIES

2.2.1. Manufacturers: Design is based on products manufactured by Bobrick.

2.2.2. Products:

2.2.2.1. B-301 Recessed Toilet Seat Cover Dispenser

2.2.2.2. B-750 Recessed Hand Dryer

2.2.2.3. B-1658 Mirror with Stainless Steel Channel Frame

2.2.2.4. B-3888 Recessed Multi-Roll Toilet Tissue Dispenser

2.2.2.5. B-5181 Reversible Solid Phenolic Folding Shower Seat

2.2.2.6. B-6806 1 ½" Diameter Stainless Steel Grab Bar with Snap Flange

3. PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Examine adjacent construction and supports.

3.1.2. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface, and correct conditions detrimental to the proper or timely completion of this work before proceeding with installation.

3.2. INSTALLATION

3.2.1. Drill holes to correct size and location. Install accessories plumb, level and equally spaced (when applicable).

3.2.1.1. Where accessories are attached to toilet compartments, do not "thru-bolt" but drill and tap partition reinforcement.

3.2.1.2. Provide templates of accessories for drilling and tapping required in Section 10 2113.

3.2.2. When installed in ceramic tile surfaces, coordinate accessory location with the tile work so that the top and one side (closest to the door) of the accessory will align with a tile joint.

3.2.3. Attach accessories securely with screws or bolts to steel studs or backing plates. Do not use Molly or toggle bolts in gypsum board.

3.2.4. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446,

3.2.5. Adjust accessories for proper operation. After completion of installation, clean and polish exposed surfaces after removal of protective coverings

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Fire extinguisher cabinets.

1.1.2. Fire extinguishers.

1.1.3. Wall bracket.

1.2. SUBMITTALS

1.2.1. Submit product data and installation instructions under provisions of Section 01 33 00.

1.2.2. Include physical dimensions, operational features, color and finish, wall mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.

1.2.3. Verify extinguisher size and type with Architect.

2. PART 2 - PRODUCTS

2.1. CABINETS

2.1.1. Basis of Design: Characteristics of specific products manufactured by J.L Industries are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under provisions of Section 01 25 00.

2.1.2. Fire Extinguisher Cabinets must comply with CBC Sections 1117B.6 and 1118B.

2.1.3. Type:

2.1.3.1. Type 1: Recessed stainless steel cabinet, flat edge trim and bubble door, located in kitchen area only.

2.1.3.2. Type 2: Semi - Recessed painted steel cabinet, rolled edge return trim and wire glass door, located at framed walls.

2.1.3.3. Type 3: Surface mounted painted steel cabinet, recessed pull, rolled edge return trim and wire glass door, located at concrete and masonry wall applications.

2.1.3.4. Type 4: Semi - Recessed painted/stainless steel cabinet, one hour fire rated tub, rolled edge return trim and tempered glass door, located at framed fire rated walls.

2.1.4. Type 1 Cabinet

2.1.4.1. Series/Model Number: Clear Vu 2535-F25.

2.1.4.2. Door Style: Clear Bubble.

2.1.4.3. Glazing: Clear Acrylic, with FE letters, red.

2.1.4.4. Finish/Color: Stainless Steel.

2.1.5. Type 2 Cabinet

2.1.5.1. Model Number: Ambassador # 1817-F13.

2.1.5.2. Door Style: Full glass.

2.1.5.3. Glazing: Clear wire glass, with FE letters, red.

2.1.5.4. Finish/Color: White Color Epoxy Coated tub and frame.

2.1.6. Type 3 Cabinet

2.1.6.1. Model Number: Ambassador # 1812-F13, with ADAC recessed pull.

2.1.6.2. Door Style: Full glass.

2.1.6.3. Glazing: Clear wire glass, with FE letters, red.

2.1.6.4. Finish/Color: White Color Epoxy Coated tub and frame.

2.1.7. Type 4 Cabinet for use in fire rated walls

2.1.7.1. Model Number: Ambassador # FX 1812-V17 , with ADAC recessed pull.

2.1.7.2. Door Style: Contemporary Vertical Duo.

2.1.7.3. Glazing: Clear tempered glass, with FE letters, red.

2.1.7.4. Finish/Color: White Color Epoxy Coated tub and frame.

2.1.8. Type 4 Cabinet: for use in fire rated walls

2.1.8.1. Model Number: Cosmopolitan # FX 8136 W17, with pull handle.

2.1.8.2. Door Style: Contemporary vertical duo, with Safti-loc feature.

2.1.8.3. Glazing: Clear tempered, with FE letters, red.

2.1.8.4. Finish/Color: No. 4 stainless steel at door/trim, White Epoxy Coated tub.

2.2. EXTINGUISHER

2.2.1. Manufacturers: J.L. Industries, www.jlindustries.com, or equal.

2.2.2. Types:

2.2.2.1. Type 1: Dry Chemical - UL Rating 40B:C, for use in Kitchen areas in Type 1 Cabinet. Provide sodium bicarbonate type only per Title 19, Chapter 5, Section 566, CCR.

2.2.2.2. *Type 1: Wet Chemical -- Class K "Saturn", in Kitchen areas for mounting on a MB810 wall hook, for use with liquid cooking media fires.*Type 2: Multi-Purpose Dry Chemical - UL Rating 2A-10B:C, for use in other areas in Type 2 and 3 cabinet.

2.2.3. Approvals:

2.2.3.1. Approved for intended use by California State Fire Marshal.

2.2.4. Color: Red Enamel (for dry chemical extinguishers) and Stainless Steel (for wet chemical extinguishers).

2.3. BRACKET

2.3.1.1. Where cabinet is not identified on drawings, provide approved bracket mounting for extinguisher.

2.4. OTHER MATERIALS

2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install cabinets plumb and level in wall openings, with cabinet and extinguisher handle located at maximum 48 inches above finish floor.

3.2.2. Secure rigidly in place.

3.2.3. Inspect, tag, and charge extinguishers not more than ten days nor less than one day before actual date of Notice of Substantial Completion.

END OF SECTION

SECTION 10 51 13

METAL LOCKERS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Lockers, hinged door type, staff/book/gymnasium application.

1.1.2. Hardware, base, top, and filler panels.

1.1.3. Bench.

1.2. REFERENCES

1.2.1. ASTM A 653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.

1.3. SUBMITTALS

1.3.1. Submit shop drawings and product data under provisions of Section 01 33 00.

1.3.2. Include locker types, sizes, configurations, layout of groups of lockers, accessories, and numbering plan.

1.3.2.1. Verify locker lay-out with actual conditions, including base alignment, clearance dimensions, and related criteria.

1.3.3. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.3.4. Provide two samples 3 x 6 inches of each color selected on actual base material.

1.4. PROTECTION

1.4.1. Store and protect lockers under provisions of Section 01 60 00.

1.4.2. Protect locker finishes and adjacent surfaces from damage during installation.

1.5. GUARANTEE

1.5.1. Manufacturers Guarantee:

1.5.1.1. Provide Owner with manufacturers written guarantee complying with the following criteria:

1.5.1.1.1. Type: Unlimited dollar amount of recovery for labor and material necessary to restore lockers to original condition, in accordance with manufacturers published warranty and limitations.

1.5.1.1.2. Term: Lifetime.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. STEEL LOCKERS

2.2.1. Manufacturer: DeBourg http://www.debourgh.com/ or equal.

2.2.2. Type: Steel Lockers, fully enclosed, fully assembled and welded. Welding of knockdown locker construction not acceptable.

2.2.3. Construction Characteristics

2.2.3.1. Sheet Steel: ASTM A 653 commercial quality, G60 coating; mill phosphatized; suitable for exposed applications, and stretcher or roller leveled to stretcher leveled flatness, in the following minimum thicknesses:

2.2.3.1.1. Tops, Bottoms, Shelves, Tier Dividers, end panels: 16 gauge, solid sheet steel.

2.2.3.1.2. Backs: 18 gauge, solid. Mesh not permitted.

2.2.3.1.3. Frames, Sides and Intermediate Partitions: 1 x 1 x 1/8 inch steel angle with 13 gauge, 3/4 inch mesh welded to frame.

2.2.3.1.4. Doors: 14 gauge, style as specified, welded door reinforcement.

2.2.3.1.5. Hinges: 3 inch, 5 knuckle, welded to door panel and frame.

2.2.3.1.6. Locking mechanism: Recessed stainless steel pan, operating latch free, with single point latch.

2.2.4. Characteristics: Teachers Lockers

2.2.4.1. Style: Single Tier, Secur-N-Vent Door, with stainless steel Sentry III recessed pan and single point latch.

2.2.4.1.1. Place pull/latch mechanism maximum 36 inches above finished floor at lower tier, centered in door panel at accessible lockers.

2.2.4.2. Locker Size: 12 inches wide x 16 inches deep x 72 inches high.

2.2.4.3. Top: Sloped Top.

2.2.4.4. Base: Concrete Base.

2.2.5. Hardware and Accessories

2.2.5.1. Lock: Padlocks provided by Owner.

2.2.5.2. Coat hook: Provide one double prong coat hook at locker top and one single prong coat hook on each side and back of locker.

2.2.5.3. Shelf: Provide one hat shelf, approximately 9 inches below top of locker at single tier locker.

2.2.5.4. Provide shelf at 9 inches above finish locker floor at accessible locker.

2.2.5.5. Numerals: Provide polished aluminum numeral plates at each locker.

2.2.6. Finish and Color

2.2.6.1. Finish: Manufacturer's standard baked-enamel finish (thermosetting topcoat), applied after phosphatized steel preparation. Provide minimum dry film thickness of 1.4 mils on doors, frames, and legs, and 1.1 mils elsewhere.

2.2.6.2. Colors: Two separate colors, as selected by Architect from manufacturers standard 24 color line.

2.3. STEEL LOCKERS

2.3.1. Manufacturer: List Industries, Superior Marquis-Champion series www.listindustries.com or equal.

2.3.2. Type: Steel Lockers, fully enclosed, fully assembled and welded. Welding of knockdown locker construction not acceptable.

2.3.3. Construction Characteristics

2.3.3.1. Sheet Steel: ASTM A 653 commercial quality, G60 electrogalvanized; and stretcher or roller leveled to stretcher leveled flatness, in the following minimum thicknesses:

2.3.3.1.1. Tops, Bottoms, Shelves, Tier Dividers: 16 gauge, solid sheet steel.

2.3.3.1.2. Frame and Base: 16 gauge and 14 gauge tubular sections, fully welded to 14 gage horizontal channel base, steel.

2.3.3.1.3. End panels: 18 gauge, solid sheet steel.

2.3.3.1.4. Backs: 18 gauge, solid. Mesh not permitted.

2.3.3.1.5. Frames, Sides and Intermediate Partitions: 1 x 1 x 1/8 inch steel angle with 13 gauge, 3/4 inch mesh welded to frame.

2.3.3.1.6. Doors: 14 gauge, style as specified, with 18 gage welded door reinforcement.

2.3.3.1.7. Hinges: 3-1/2 inch minimum, 7 knuckle, welded to door panel and bolted to frame to permit door replacement.

2.3.3.1.8. Locking mechanism: Recessed stainless steel pan, latch free, with single point latch.

2.3.4. Characteristics:

2.3.4.1. Style: 2-tier as shown on drawings. Marquis Gym Door, diamond perforated face, with stainless steel recessed handle.

2.3.4.2. Locker Sizes:

2.3.4.2.1. Type 2 – street, 2-tier: 12 inches wide x 12 inches deep x 30 inches high.

2.3.4.3. At Type 2 locker, place pull/latch mechanism maximum 36 inches above finished floor at lower tier, centered in door panel at accessible lockers.

2.3.4.4. Top: Sloped Top

2.3.4.5. Base: Concrete base.

2.3.5. Hardware and Accessories

2.3.5.1. Lock: Padlocks provided by Owner.

2.3.5.2. Coat hook: Provide one double prong coat hook at locker top and one single prong coat hook on each side and back of locker.

2.3.5.3. Shelf: Provide shelf at 9 inches above finish locker floor at accessible Type 2 locker.

2.3.5.4. Numerals: Provide polished aluminum numeral plates at each locker.

2.3.6. Finish and Color

2.3.6.1. Finish: Manufacturer's standard baked-enamel finish (thermosetting topcoat), applied after phosphatized steel preparation. Provide minimum dry film thickness of 1.4 mils on doors, frames, and legs, and 1.1 mils elsewhere.

2.3.6.2. Colors: Two separate colors, as selected by Architect from manufacturers standard 24 color line.

2.4. ACCESSIBLE BENCH

2.4.1. Manufacturer:

2.4.1.1. Approved Manufacturer: De Bourgh http://www.debourgh.com/ List, Superior, or equal.

2.4.2. Type: Maple bench with heavy duty steel or cast iron pedestals.

2.4.3. Material:

2.4.3.1. Style: Heavy duty plank style maple bench seat.

2.4.3.2. Size:1-1/4 x 9-1/2 inch seat by length and height as shown on Drawings.

2.4.3.2.1. Provide custom fabricated benches as shown on drawings.

2.4.3.3. Base: Heavy duty steel pipe or cast iron pedestals, De Bourgh Heavy Duty Pedestal, List Superior No. 4810 Heavy Duty cast iron pedestal, or equal. "Standard" duty bench pedestals are not acceptable.

2.4.4. Finish and Color

2.4.4.1. Metal Finish: Manufacturer's standard factory powder coat finish, color as selected by Architect.

2.4.4.2. Wood Finish: WIC System # 3, Polyurethane

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.2.1. Verify bases and recesses are properly sized and located, and that all required blocking is in place.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install lockers secure, plumb, square, and in line. Set on prepared base provided.

3.2.2. Anchor lockers with appropriate anchor devices to suit materials encountered.

3.2.3. Install end panels, filler panels, sloped tops, and bases to completely close off openings.

END OF SECTION

SECTION 10 56 13

METAL STORAGE SHELVING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Prefabricated, metal shelving system.

1.2. QUALITY ASSURANCE

1.2.1. Manufacturer shall have produced DSA approved shelving systems within the past 3 years.

1.3. REGULATORY REQUIREMENTS

1.3.1. Comply with Title 24 seismic attachment requirements, and DSA Interpretation of Regulations, 23-7.

1.3.1.1. Provide design and detailing for seismic attachment/bracing of all free - standing shelving units, including specifying and coordinating all required embedded shields necessary to comply with regulatory DSA requirements.

1.4. SUBMITTALS

1.4.1. Submit shop drawings and product data under provisions of Section 01 33 00.

1.4.2. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

1.4.3. Submittals shall include written certification of current regulatory DSA approval of anchorage method to overhead framing in accordance with referenced regulations.

1.4.4. Submit samples under provisions of Section 01 33 00.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. METAL STORAGE SHELVING SYSTEM

2.2.1. Manufacturer: Equipto http://www.equipto.com/ or equal

2.2.2. Series: Iron Grip, Series 70.

2.2.3. Characteristics

2.1.3.1 Size: 36 inch deep x 36 inch wide x 10 feet high.

2.2.3.1.1. Provide starter and additional units as required to complete plan layout, back to back configuration.

2.2.3.2. Back: Closed Back Panel only. Do not provide end panels.

2.2.3.3. Shelves: Metal, 18 gage, with shelf capacity of 700 pounds per shelf.

2.2.3.3.1. Provide shelves at 12 inches on center, with last shelf at 8 feet - 6 inches above finish floor.

2.2.3.4. Fasteners: Iron Grip stud system, with shelf stud, speed clip, and unit key.

2.2.3.5. Color: Custom color as selected by Architect.

2.3. ACCESSORIES

2.3.1. Provide clips, expansion anchors, and all other required components for seismic anchorage.

2.4. OTHER MATERIALS

2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Set and secure casework in accordance with approved shop drawing and T - 24 CCR.

END OF SECTION

SECTION 10 81 13

BIRD CONTROL SYSTEMS

1. PART 1 - GENERAL

1.1. SYSTEM DESCRIPTION:

1.1.1. K-Net HT Bird Netting is constructed of black & stone (tan) high density polyethylene (HDPE) that is abrasion, flame, rot and UV resistant. K-Net HT has a 3/4" (1.9cm) square mesh to keep out all but the smallest of pest birds. All K-Net netting pieces are both seamless and borderless for clean edges and easier perimeter fastening.

1.1.2. Bird Netting Hardware fastens the bird netting to all types of surface shapes and materials. A variety of netting installation tools and accessories are available to make the netting installation an efficient process.

1.1.3. Surface Cleaning System: surface disinfectants and deodorizers to neutralize potentially hazardous bird and/or animal wastes and properly prepare the surface for installation.

1.2. QUALITY ASSURANCE

1.2.1. Installer to obtain, review and understand all of Nixalite of America Inc.'s planning guidelines, estimating worksheets and installation instructions for the K-Net HT Bird Exclusion Netting.

1.2.2. Installer must be completely familiar with the proper installation procedures for the K-Net HT Bird Exclusion Netting and the specified mounting system.

1.2.3. Installer must obtain and record accurate and complete dimensions that define the areas specified for enclosure by the K-Net HT Bird Exclusion Netting. Accurate dimensions drive the bird netting and net hardware quantities. Accurate dimensions ensure accurate quotations and material orders.

1.2.4. Installer should contact manufacturer for any updated or newly developed planning or procedural information that may be pertinent to the K-Net HT installation.

1.2.5. Installer to ensure that bird netting meets or exceeds ISO 9001 2000 Quality Management Standards.

1.3. SUBMITTALS

1.3.1. Manufacturer's literature including K-Net HT Bird Exclusion Netting brochures and installation guidelines. All guides for installing the specified bird netting hardware system and the specified surface cleaning system.

1.3.2. Sample of the K-Net HT Bird Exclusion Netting, in the specified color (black or stone) Sample to be not less than 4" square (10.16 cm. square).

1.3.3. Contractor to complete estimate worksheet detailing the scope of the netting enclosure, and the mounting hardware type, location and spacing.

1.4. STORAGE & HANDLING

1.4.1. Provide storage to keep all K-Net HT Bird Exclusion Netting system boxes dry, clean and undamaged. Do not stack or place other packaging or objects on the bird netting shipping boxes.

1.4.2. Keep the K-Net HT Bird Exclusion Netting system in original packaging until needed for installation.

2. PART 2 - PRODUCTS

2.1. ACCEPTABLE MANUFACTURER

2.1.1. Nixalite of America Inc, 1025 16th Avenue, PO Box 727, Dept. NI, East Moline, Illinois 61244; U.S.A., P: 800.624.1189 or 309.755.8771 - F: 800.624.1196 or 309.755.0077, E: birdcontrol@nixalite.com or planning@nixalite.com, www.nixalite.com

2.1.2. ABC Advanced Bird Control – A division of Nixalite of America Inc., PO Box 727, Dept. NI, East Moline, Illinois 61244, U.S.A., P: 888.212.8682 or 309.755.4708 - F: 309.755.1865, E: info@abcbirdcontrol.com, www.abcbirdcontrol.com

2.2. K-NET HT BIRD NETTING

2.2.1. **Material:** High density polyethylene (HDPE) that is abrasion, UV, flame and rot resistant. Netting to be water proof. Resulting K-Net HT Bird Exclusion Netting is ideal for all bird exclusion applications.

2.2.2. **Color:** Black or Stone mesh (stone is tan).

2.2.3. **Construction**: Knotted 3/4" (1.9 cm) square mesh netting. Netting comprised of 12 ply (4 x 3) strands with 75 pounds (33.9 kg) knotted breaking strength. All K-Net netting pieces are both seamless and borderless for clean edges and easier perimeter fastening.

2.2.4. **Standards**: Must meet **ISO 9001 2000 Quality Management Standards**.

2.2.5. **Mesh size:** 3/4" (1.9 cm) square mesh keeps out all but the smallest of birds.

2.2.6. Netting Sizes:

2.2.6.1. Widths: 25' (7.6 m), 50' (15.2 m).

2.2.6.2. Lengths: 25' (7.6 m), 50' (15.2 m) and 100' (30.4 m).

2.2.7. **Warranties**:

2.2.7.1. Black K-Net HT has a 10 year limited warranty.

2.2.7.2. Stone (tan) K-Net HT has a 3 year limited warranty.

2.2.8. **Thermal & Physical Properties**:

2.2.8.1. Softening point: 250 F° (122° C).

2.2.8.2. Melting point: 293 F° (145° C).

2.2.8.3. Flash point: 660 F° (349° C).

2.2.8.4. Remains flexible at very low temperatures.

2.2.8.5. Specific gravity: 0.96 (it floats). K-Net HT will not absorb water.

2.2.8.6. Chemically inert. Resistant to acids and alkalis at room temperature.

2.3. BIRD NETTING HARDWARE

2.3.1. Installer to contact manufacturer for up-to-date information and recommendations for bird netting hardware applications, item combinations as well as new items and procedures.

2.3.2. Available in Tensioned Cable Hardware system, the Poly Hardware system or a hybrid system that combines methods from different fastening procedures. Choose the hardware system that best suits the netting installation and conditions.

2.3.3. **Tensioned Perimeter and Support Cable Hardware System**: Choose the **Connection, Corner, Cable Guide** and **Finishing** hardware that best suits the installation surface. Net Hardware can be mixed to suit changing surface materials and conditions.

2.3.4. **Net Cable & Connection Hardware:**

2.3.4.1. **Net Cable:** Aircraft grade, all stainless steel, 7 x 7 (49 strand), 3/32" (2.2 mm) diameter cable with 900 lb. (407 kg) breaking strength. Net Cable comes in 250' (76.2 m) and 500' (152.4 m) spools.

2.3.4.2. **Turnbuckles:** Stainless steel, hook & eye turnbuckles. The size of the turnbuckle is determined by the maximum continuous cable length of any one cable run.

2.3.4.2.1. For one **Small Turnbuckle** the max continuous cable length is 25 ft. (7.6 m).

2.3.4.2.2. For one **Medium Turnbuckle** the max continuous cable length: 50 ft. (15.2 m).

2.3.4.2.3. For one **Large Turnbuckle** the max continuous cable length: 75 ft. (22.9 m).

2.3.4.3. **Net Ferrules:** Zinc plated copper core crush ferrules for 3/32" (2.2 mm) dia. cable. Acceptable connection when the max continuous cable length is 25 ft. (7.6 m) **OR LESS**. Always use at least 2 ferrules per cable loop connection. Always use Nixalite's Cable Swaging Tool to crush the ferrules onto the cable at all loop connections. Always use a Cable Thimble with Net Ferrules.

2.3.4.4. **Wire Rope Clamps**: Galvanized or stainless steel wire rope clamps for 3/32" (2.2 mm) diameter cable. Mandatory for all loop connections on cable runs of 25' (7.6 m) **OR MORE**. Always use 2 clamps per cable loop connection. Always use a Net Cable Thimble with wire rope clamps. Use the appropriate wrench or hex driver to tighten the Wire Rope Clamp around the Net Cable at all loop connections.

2.3.4.5. **Cable Thimble:** Forged stainless steel Cable Thimble for 3/32" (2.2 mm) diameter cable. The Thimble prevents cable fraying and creasing when creating loop connections and/or tensioning the Net Cable after installation. One Thimble is required for each loop connection.

2.3.5. Corner Hardware (Anchoring):

2.3.5.1. **Eyebolts:** Use as corner hardware in steel, thick sheet steel, cast iron, masonry and stone (with Machine Screw Anchors). Extreme duty stainless steel eyebolt, 2" (51 mm) long, 9/16" I.D. (14.3 mm) with 1/4-20 NC threads and stainless steel hex nut. Maximum distance between eyebolts: 50' (15.2 m).

2.3.5.1.1. **To fasten to Steel:** If back of steel is accessible, drill clearance hole for stem, apply adhesive in hole, install eyebolt and use ¼ - 20 NC hex nut to secure. If back of steel is not accessible, drill then tap the hole for ¼ - 20 NC thread. Apply adhesive into hole, apply thread locker on eyebolt threads. Install the eyebolt.

2.3.5.1.2. **To fasten to Masonry:** Drill the recommended hole diameter and depth in the masonry surface to receive the Machine Screw Anchors. Apply adhesive/sealer in the hole. Push Machine Screw Anchor into the hole and seat it properly with the Setting Tool. Thread eyebolt into the anchor threads until tight.

2.3.5.2. **Screw Eyes:** Use as corner hardware in wood and wood core surfaces. Extreme duty stainless steel screw eyes 2" (51 mm) long, 17/32" I.D. (13.5mm). Pilot holes recommended. Apply adhesive sealer into pilot holes before installing the Screw Eyes. Maximum spacing between screw eyes: 50' (15.2 m).

2.3.5.3. **Machine Screw Anchor:** Zinc plated anchor – 1/2" (12.7mm) diameter x 1" (25.4mm) deep with 1/4-20 threads inside. Setting tool included with anchors.

2.3.6. Cable Guide Hardware:

2.3.6.1. **Small Screw Eyes:** Use to keep cable close to the installation surface. Use on wood, sheet metal and wood core surfaces. Heavy duty, stainless steel, 1-3/16" long x 7/32" I.D. (31 mm long x 5.3 mm I.D.). Maximum spacing: 24" (61 cm) O. C. Pilot holes recommended. Apply adhesive/sealer in all pilot holes before installing the Screw Eyes.

2.3.6.2. **Small Eyebolts:** Use to keep cable close to the installation surface. Use on steel, thick sheet metal and masonry surfaces. Heavy duty, stainless steel, 1 3/8" long x 9/32" I.D. (35 mm long x 7.1 mm I.D.) with stainless steel hex nut. Maximum spacing: 24" (61 cm) O. C.

2.3.6.2.1. **To fasten to Steel:** If back of steel is accessible, drill clearance hole for stem, apply adhesive in hole, install eyebolt and use 10 - 24 NC hex nut to secure. If back of steel is not accessible, drill then tap the hole for 10-24 NC thread. Apply adhesive into hole, apply thread locker on eyebolt threads and install the eyebolt.

2.3.6.2.2. **To fasten to Masonry:** Drill the recommended hole diameter and depth in the masonry surface to receive the Machine Screw Anchors. Apply adhesive/sealer in the hole. Push Machine Screw Anchor into the hole and seat it properly with the Setting Tool. Thread eyebolt into the anchor threads until tight.

2.3.6.3. **Sidewinders:** for heavy gauge sheet metal, structural steel up to 1/2" thick and masonry surfaces. Maximum spacing: 24" (61 cm) O. C. All Sidewinders to be installed with the Sammy Socket. No substitutions. Sidewinders for steel are self-drill, self-tap items, no pilot hole is required. Sidewinders for concrete require ¼" (6.35 mm) diameter and 2" (50.8 mm) deep drilled holes. Apply adhesive/sealer into the drilled holes and install the Sidewinder Sammy Socket Driver.

2.3.6.4. **E-Z Clip:** Use to keep cable close to the installation surface. Stainless steel bracket holds cable very tight to surface. Used on all types of installation surfaces. E-Z Clip has mounting hole(s) for 1/8" shank screws or nails (not supplied).

2.3.6.5. **Hammer-On Flange Clips:** Used to keep cable close to the installation surface. Hammer-On Flange Clips are available in block oxide coated spring steel or stainless steel. Hammer-On Flange Clips routes the Net Cable parallel to the outer edges of beams or other structural steel flanges. Contact manufacturer for installation guidelines.

2.3.6.6. **Stainless Steel Angle Bracket:** Used to keep the Net Cable close to the installation surface. A 90° stainless steel angle bracket with two (2) holes – one for mounting the other for the cable. Fasten with the appropriate fastener (not supplied). Use stainless steel screws or nails. Apply adhesive/sealer over head of installed hardware.

2.3.6.7. **HD Stainless Steel Cable Clamp:** Used to keep the Net Cable close to the installation surface. A heavy duty saw-tooth edge clamp that fits up to ¾" (19.0 mm) thick steel. Routes the Net Cable parallel to the outer edges of beams, plates and other structural steel flanges. Contact manufacturer for installation guidelines.

2.3.6.8. **Stainless Steel J-Clamp:** Used to keep the Net Cable close to the installation surface. A J-shaped strap of stainless steel with mounting and cable guide holes. Fasten with the appropriate fastener (not supplied). Use stainless steel screws or nails. Apply adhesive/sealer over head of installed hardware.

2.3.6.9. **Stainless Steel Lag Screw w/eyelet:** Used to keep the Net Cable close to the installation surface. Fastens to wood, composite, wood core products. Drill pilot hole, apply adhesive/sealant in pilot, install Lag Screw so eyelet is no more than ½" (12.7 mm) above the installation surface.

2.3.7. Finishing Hardware:

2.3.7.1. **Net Rings:** Three (3) styles of stainless steel net rings used to attach the netting mesh to the cables, to close openings in the netting mesh and to fasten the Net Zippers to the netting. Net ring quantity requirements per attachment:

2.3.7.1.1. **Netting to Cable**: 16 net rings per foot (each netting mesh).

2.3.7.1.2. **Lapped Seams**: 32 net rings per foot (1 ring per mesh on each side of seam).

2.3.7.1.3. **Net Zipper Installation**: 32 net rings per foot (1 ring per mesh on each side of zipper).

2.3.7.2. **Net Zipper:** Allows for access to areas behind the bird netting installation. Available in both black and stone (tan) and in 2 ft. (61 cm), 4 ft. (122 cm), 6 ft. (183 cm) and 8 ft. (244 cm) lengths. Heavy duty, marine-grade, black and tan Net Zipper with 3/4" (1.9 cm) heavy fabric tape, open top and auto lock slider.

2.3.8. **Poly Hardware**: All poly hardware is made from UV stabilized black polypropylene. While it can be used to install the K-Net HT Bird Netting, it is more commonly used with the PollyNet line of bird exclusion netting. Poly Hardware combinations can be mixed to suit changing surface materials and conditions.

2.3.8.1. **Poly Clip:** Perimeter fastening. The Poly Clip can be fastened to the cable of a tensioned perimeter cable system or it can be snapped shut over the outer edges of the bird netting. Secure to the installation surface with the appropriate fastener (not supplied). Maximum spacing: 12" (30.5cm) O.C.

2.3.8.2. **Net Ties:** Multi-purpose fastener. Quickly fastens the netting fabric to all types of objects. Use to prevent netting sag or loose fitting nets by securing the netting to objects above or behind netting installation. Three sizes to choose from.

2.3.8.3. **Poly Cord:** Multi-purpose fastener. Reinforce seams, patch tears, close circular openings, use for overhead support. NOT for perimeter fastening.

2.4. SURFACE DISINFECTANTS

2.4.1. **Steri-Fab**: Surface disinfectant and bactericide designed to neutralize bird waste, making it safe for removal. Steri-Fab quickly kills disease causing bacteria, parasites, fungi, insects, etc. This is a non-residual product. It becomes completely inert after it dries. **Do not use with Microcide-SQ on the same surface at the same time.**

2.4.2. **Microcide-SQ:** A broad spectrum disinfectant, cleaner and deodorizer used to sanitize hard surfaces as well as fabrics and clothing. Use to kill a wide spectrum of organisms and disease causing bacteria. **Do not use with Steri-Fab on the same surface at the same time.**

2.4.3. **Microsan:** Anti-microbial personal protection products to help prevent disease transmittal before, during and after working on and around surfaces contaminated with bird and animal wastes. Use to compliment personal protection equipment standards (PPE).

2.4.4. **Safety Equipment:** Nixalite offers personal protection equipment (PPE) to protect personnel from the hazards related to pest bird and animal waste materials.

3. PART 3 - EXECUTION

3.1. INSPECTION

3.1.1. Visually inspect the surfaces that will receive the netting hardware and all areas that will end up behind or inside the netting installation. Note damaged surfaces or incomplete construction that could compromise the bird netting installation.

3.1.2. Note all areas, surfaces or objects that may require maintenance or periodic replacement after the bird netting is installed (i.e. lights, electrical equipment, etc.). Use the appropriate netting accessories to allow access behind the installed netting system.

3.1.3. Note any objects or conditions that could damage the installed bird netting. Install the K-Net HT in such a manner as to avoid these conditions.

3.2. PREPARATION

3.2.1. **Field Measurements**: Verify the dimensions for each area specified for enclosure with the K-Net HT Bird Exclusion Netting. Use manufacturers Planning Guides and Estimate Worksheets to verify that sufficient quantities of bird netting and net hardware will be installed at each location specified for bird netting.

3.2.2. Make sure all installation surface finishing requirements have been accomplished before installing the K-Net HT Bird Enclosure Netting. Bird Exclusion Netting is to be the last item installed on each specified surface. DO NOT apply any surface coating or treatment (paint, sealer, etc.) over or on the installed K-Net HT Bird Exclusion Netting or the mounting hardware.

3.3. SURFACE CLEANING

3.3.1. All surfaces to be clean, dry and free of obstructions before the K-Net HT Bird Exclusion Netting is installed.

3.3.2. **If Bird Waste Is Present:**

3.3.2.1. Treat, neutralize and safely remove all bird waste from installation surfaces. Installer must follow all municipal, state and federal regulations regarding the proper removal and disposal of bird droppings and waste materials such as nests and dead birds.

3.3.3. Use Nixalite's surface cleaning products to neutralize any bird droppings, nests and related waste materials that may be present. Allow all surfaces to air dry completely, and then reapply to sanitize and deodorize the surface before proceeding. Strictly follow treatment instructions provided with Nixalite's surface cleaning products.

3.3.4. Use Nixalite anti-microbial and anti-bacterial personal protection products to help prevent disease transmittal when working around surfaces contaminated with bird droppings.

3.4. INSTALLATION

3.4.1. Make sure the installation surfaces are clean, dry and free of any debris or obstructions.

3.4.2. Install the bird netting hardware as recommended by manufacturer. General order of installation is to install all the Corner hardware, cable guides and connection hardware. Run the Net Cable through the net hardware. Leave the turnbuckles loose.

3.4.3. Install K-Net HT as recommended by the manufacturer. If necessary cut the K-Net HT to fit the area. If multiple pieces are needed, join the pieces together with the recommended Net Ring hardware. Use the Net Rings to fasten the netting mesh to the perimeter and support cables. Tighten the turnbuckles to eliminate any wrinkles in the netting.

3.4.4. Install K-Net HT to avoid contact with machinery, vehicles, extreme heat, tree branches, etc. Make necessary adjustments to keep netting a sufficient distance from these objects or conditions.

3.4.5. Finished K-Net HT installation to be taught, free of wrinkles, gaps and openings.

3.5. ADJUSTMENTS / CLEANING

3.5.1. Remove net or cable hardware debris and waste from project site. Inspect finished installation. Make any adjustments needed to conform to Nixalite's bird netting installation guidelines.

3.5.2. K-Net HT Bird Exclusion Netting is a physical and passive barrier. It relies on optimal placement and proper installation. Exclusion netting must block off or seal up all routes and paths that pest birds follow to their preferred roosts. Periodic inspections are recommended to make sure the bird netting stays in good condition.

3.5.3. Note any holes, gaps or openings in the bird net installation that birds can use to bypass or get around the netting barrier. Correct these conditions immediately.

END OF SECTION

SECTION 11 16 00

BULLET RESISTANT FIBERGLASS

1. PART 1 – GENERAL

1.1. REFERENCE

1.1.1. The publication below forms a part of this specification.

1.1.1.1. UNDERWRITERS LABORATORY UL 752 9th Edition, Standard for Bullet Resisting Equipment dated Jan. 27,1995

1.2. SUBMITTALS

1.2.1. The following shall be submitted in accordance with Sections 01340 and the SPECIAL CONTRACT REQUIREMENTS: Submit for approval prior to fabrication catalog cuts, brochures, specifications, UL LISTING VERIFICATION, proof of possession of PRODUCT LIABILITY INSURANCE in an amount not less than five million U.S. dollars, and printed data in sufficient detail to indicate compliance with the contract documents and the manufacturer's instructions for the installation of Bullet Resistant Fiberglass.

1.3. DESIGN

1.3.1. Through the design, manufacturing technique and material application the Bullet Resistant Fiberglass shall be of the "non-ricochet type". This design is intended to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.

1.4. DELIVERY, STORAGE AND HANDLING

1.4.1. Deliver the materials to the project with the manufacturer's UL Labels intact and legible. Handle the material with care to prevent damage. Store the materials inside under cover, stack flat and off the floor.

1.5. WARRANTY

1.5.1. All materials and workmanship shall be warranted against defects for a period of one (1) year from the date of receipt at the project site.

2. PART 2 PRODUCTS

2.1. BULLET RESISTANT FIBERGLASS MATERIAL

2.1.1. The panels shall be made of multiple layers of starch-oil woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets. The production technique and materials used shall provide the controlled internal delamination to permit the encapture of a penetrating projectile.

2.1.2. Bullet Resistant Fiberglass panels shall be UL Listed **(BRF100/BRF200/BRF300)** manufactured/distributed by:

2.1.2.1. C.R. Laurence Co., Inc., 2503 E. Vernon Ave., Los Angeles, CA 90058, Attn: Tech Sales, 800-421-6144 Phone Extension 7760, 800-458-7496 Fax, crlaurence.com

2.1.3. Unlisted UL752 bullet resistant fiberglass products will not be considered acceptable or equal.

2.2. SECURITY LEVEL

2.2.1. The Bullet Resistant Fiberglass must be **UL LISTED RATED FOR LEVEL (3/2/1)**

2.3. SUBSTITUTIONS

2.3.1. Other UL Listed bullet resistant fiberglass products are acceptable if in compliance with all requirements of this specification. Alternate products must be submitted to the architect for approval.

3. PART 3 EXECUTION

3.1. SUPPORTING MEMBERS

3.1.1. Prior to installing the bullet resistive material the contractor shall verify that all supports have been installed as required by the contract documents and the architectural drawings.

3.2. JOINTS

3.2.1. All joints shall be reinforced by a back-up layer of bullet resistive material. The bullet resistance of the joint, as reinforced, shall be at least equal to that of the panel. Minimum width of reinforcing layer at joint shall be 4". (2" on each panel side or a 2" minimum overlap per side)

3.3. APPLICATION

3.3.1. Armor shall be installed in accordance with the manufacturer's printed recommendations. Armor panels shall be adhered using an industrial adhesive, mastic, screws or bolts. Method of application shall maintain the bullet resistive rating at junctures with the concrete floor slab, the concrete roof slab, the bullet resistive door frames, the bullet resistive window frames, and all required penetrations.

END OF SECTION

SECTION 11 52 00

AUDIO-VISUAL EQUIPMENT

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. 3LCD Projector and Mount.

1.2. SUBMITTALS

1.2.1. Submit manufacturers data and shop drawings in accordance with Section 01 33 00.

1.2.2. Submit shop drawings indicating mounting devices and clearance requirements. Provide all calculations required by DSA for anchorage.

1.3. OPERATION AND MAINTENANCE DATA

1.3.1. Submit operation and maintenance instructions under the provisions of Section 01 77 19.

1.4. QUALITY ASSURANCE

1.4.1. Assembly to comply with and bear label of Underwriters Laboratory.

1.5. DELIVERY STORAGE AND HANDLING

1.5.1. Deliver products to site and store under the provisions of Section 01 60 00.

1.5.2. Store products clear of floor in manner to prevent damage from impact or moisture.

1.6. WARRANTY

1.6.1. Provide manufacturers one year warranty.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will requests for substitutions, under the provisions of Section 01 25 00.

2.2. 3LCD PROJECTOR AND MOUNT

2.2.1. Manufacturer: Epson, https://epson.com/, or equal.

2.2.2. Series:

2.2.2.1. BrightLink 595Wi

2.3. OTHER MATERIALS

2.3.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install level, plumb, and secure at proper location.

3.2.2. Install flush with adjacent finish.

3.3. ADJUSTING AND CLEANING

3.3.1. Adjust for proper operation and door fully closed in up position.

END OF SECTION

SECTION 11 52 01

ASSISTIVE LISTENING SYSTEM

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Assistive Listening System (ALS)

1.2. SUBMITTALS

1.2.1. Submit manufacturers data and shop drawings in accordance with Section 01 33 00.

1.2.2. Submit shop drawings indicating mounting devices and clearance requirements. Provide all calculations required by DSA for anchorage.

1.3. OPERATION AND MAINTENANCE DATA

1.3.1. Submit operation and maintenance instructions under the provisions of Section 01 77 19.

1.4. QUALITY ASSURANCE

1.4.1. Assembly to comply with and bear label of Underwriters Laboratory.

1.5. DELIVERY STORAGE AND HANDLING

1.5.1. Deliver products to site and store under the provisions of Section 01 60 00.

1.5.2. Store products clear of floor in manner to prevent damage from impact or moisture.

1.6. WARRANTY

1.6.1. Provide manufacturers one year warranty.

2. PART 2 – PRODUCTS

2.1. ASSISTIVE LISTENING SYSTEM (ALS)

2.1.1. ALS System Description

2.1.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00

2.1.1.2. Manufacturer: ALS manufactured by Williams Sound, or equal. (714) 839-9991. Provide one (1) PPA T27 transmitter for Meeting Room; Provide PPA R37 receivers for 5% occupancy in each lab, not less than two receivers per lab. CBC Section 1104B.2.

2.1.1.3. The PPA R37 receiver shall be encased in black, PC/ABS impact-resistant plastic with a hinged battery door. The receiver shall be a body-pack style and include a detachable belt-clip for hands-free operation. The receiver shall have a 3.5mm stereo/mono jack to accommodate stereo low

impedance earphones or headphones. The receiver shall have a combination volume control with power on/off rotator dial. It shall have a green LED indicating battery and system status codes. The R37 shall have access to 17 preset wideband channels between 72-76MHz. Channel selection shall be made by pushing the seek button inside the battery compartment. The receiver shall have channel-lock capability. The receiver shall have a slide switch inside the battery compartment to select disposable Alkaline or NiMH rechargeable battery operation. It shall have charger contacts on the bottom of the receiver for use with Williams Sound drop-in chargers CHG 3512 and CHG 3502. The R37 shall operate up to 50 hours with two disposable AA Alkaline batteries and up to 32 hours with two AA NiMH rechargeable batteries (BAT 026). The receiver shall provide a maximum out of 35mW at 16ø with an earbud type earphone. The systems audio frequency response shall be 200Hz to 15kHz ± 3dB and the signal to noise ratio shall be 65dB min. The receiver sensitivity shall be 2µV or better at 12dB Sinad with squelch defeated. The R37 shall accept up to ±75kHz FM deviation and have a 75 µ s de-emphasis time constant. The R37 shall have FCC, Industry Canada approvals and be compliant with RoHS and WEEE regulations. The receiver shall be covered by a Lifetime PLUS Limited Warranty, excluding earphones, headphones and batteries. This receiver model shall be the Williams Sound model PPA R37.

2.1.1.4. The PPA T27 Transmitter shall be housed in a heavy duty black plastic case 4.1" x 6.1" x 1.3". It shall be microprocessor controlled with push button configuration. It shall have an operating range of up to 1000ft. with optional ANT 005. It shall have seventeen wideband channels operating on the hearing assistance bandwidth between 72 MHz to 76 MHz. There shall be a 'rubber duckie' antenna output through the top of the enclosure. Front Panel The front panel shall have a push button controlled LED digital display showing the frequency selection. Once a frequency is selected, there shall be a lock or unlock feature by holding down both the up and down frequency buttons for three seconds. There shall be a 3.5mm mono microphone input jack for two wire electret microphones. It shall have a rotary input level control. There shall be up and down frequency select buttons. Back Panel The PPA T27 shall be powered by a 24VAC power supply via a 5 pin DIN connector. It shall have a 75 Ohm F-connector antenna output. It shall have a Line-level, high impedance RCA, mono/unbalanced input. The PPA T27 shall have FCC, Industry Canada approvals, be compliant with RoHS and WEEE regulations, and be powered by a UL and CSA approved power supply. It shall be covered by a Lifetime PLUS Limited Warranty. It shall be compatible with Williams Sound FM equipment operating on 72 MHz to 76 MHz. The Transmitter shall be the Williams Sound model number PPA T27

2.1.2. PPA R37 Receiver Specifications

2.1.2.1. Dimensions: 4.1" x 2.85" x 1.38" (104 x 72 x 35mm)

2.1.2.2. Weight: 4.6oz (130g) with batteries. 2.6oz (73g) without batteries

2.1.2.3. Color: Black

2.1.2.4. Battery Type: (2) AA Alkaline or 2 x AA NiMH

2.1.2.5. Battery Life: Two (2) AA non-rechargeable alkaline batteries (BAT 001), approx. 50 hrs

2.1.2.6. Current Consumption: 52mA nominal

2.1.2.7. Temperature Range: – 0 to 50C

2.1.2.8. Channels 17, accessed via seek button in battery compartment

2.1.2.9. Operating Freq.: 72.1, 72.2, 72.3, 72.4, 72.5, 72.6, 72.7, 72.8, 72.9, 74.7, 75.3, 75.4, 75.5, 75.6, 75.7, 75.8, 75.9 MHz*

2.1.2.10. Intermediate Freq.: 75 kHz

2.1.2.11. FM Deviation: 75 kHz

2.1.2.12. De-Emphasis: 75 µS

2.1.2.13. LED Indicator: Power: Green; Low Battery: Flashes Green

2.1.2.14. AFC Range: ± 120 kHz

2.1.2.15. Sensitivity: 2 µV at 12 dB Sinad with squelch defeated

2.1.2.16. Input Overload: 100 mV

2.1.2.17. Frequency Response: 200 – 15 kHz

2.1.2.18. Modulation: FM, +/- 75 kHz peak deviation

2.1.2.19. Signal-to-Noise Ratio: 65 dB min @ 100 uV

2.1.2.20. Receive Antenna: Integral with earphone/headphone cord

2.1.2.21. Audio Output: 35 mW max, peak into 16 ohms

2.1.2.22. Output Connector: 3.5 mm stereo/mono phone jack

2.1.2.23. Earphone for each Receiver: Earbud-type with foam cushion, 3.5 mm plug, 32 Ω

2.1.2.24. Auto Shut-off Enters sleep mode after approx 6 mins of no RF signal

2.1.2.25. Approvals: FCC, Industry Canada, RoHS, WEEE

2.1.2.26. Warranty: Lifetime PLUS Limited Warranty, 90 Days on most accessories.

2.1.3. PPA T27 Transmitter Specification

2.1.3.1. Dimensions: 4.1" W x 6.1" L x 1.3" H (104.1 mm x 154.9 mm x 33 mm)

2.1.3.2. Weight: 7.8 oz. (221 g)

2.1.3.3. Color: Black

2.1.3.4. Power (U.S./Canada): 105-130 VAC, 50-60 Hz, 3.2 W at 120 VAC

2.1.3.5. Operating Frequencies: 72-76 MHz*: 72.1 (CH A), 72.2 (CH K), 72.3 (CH B), 72.4 (CH N), 72.5 (CH C), 72.6 (CH O), 72.7 (CH D), 72.8 (CH P), 72.9 (CH E), 74.7 (CH I), 75.3 (CH J), 75.4 (CH R), 75.5 (CH F), 75.6 (CH S), 75.7 (CH G), 75.8 (CH T), 75.9 (CH H)

2.1.3.6. Frequency Selector: External switches, 17 channels (lockable)

2.1.3.7. RF Field Strength: Does not exceed 80mV/m @ 3m

2.1.3.8. Nominal Range: Up to 1000 feet (305 m) w/standard ANT 021 "rubber duckie" antenna or optional ANT 005 coaxial antenna.

2.1.3.9. Modulation: FM, 75 kHz deviation (wide–band) max.

2.1.3.10. Stability: ± .005% over 0-50°C

2.1.3.11. Pre-Emphasis: 75 µS

2.1.3.12. Frequency Response: 85Hz - 14kHz ±3dB

2.1.3.13. Distortion: 1% Max. THD

2.1.3.14. Signal to Noise Ratio: 65 dB with R35 Receiver

2.1.3.15. Microphone Input: 3.5mm mini phone jack, supplies +DC for electret mics

2.1.3.16. Mic Input Level: 1–10 mV, nominal

2.1.3.17. Line-Level Input: RCA Jack, Hi Z, unbal.

2.1.3.18. Line Input Level: .1–1 Vrms, nominal

2.1.3.19. Input Attenuator: Pot, screwdriver-adjustable

2.1.3.20. Antenna Outputs: Thread mount for ANT 021 "rubber duckie" antenna or ANT 025 telescoping antenna RF connector for ANT 024 dipole or ANT 005 coaxial antenna

2.1.3.21. Approvals: FCC, Industry Canada, RoHS, WEEE

2.1.3.22. Warranty: Lifetime PLUS Limited Warranty, 90 Days on most accessories.

2.2. OTHER MATERIALS

2.2.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. INSTALLATION

3.1.1. Install items in accordance with manufacturers' instructions

3.1.2. When equipment will be installed, a finished ceiling, floor and space may be installed prior to this work. All existing conditions, ceilings, and flooring are to be protected during installation and cleaned upon completion. If any existing conditions are damaged, the contractor is responsible for replacing and repairing as required, including finish painting.

3.2. FIELD QUALITY CONTROL

3.2.1. Assist with field test of each unit performed by equipment manufacturer's technicians after installation to verify proper operation of equipment items in accordance with manufacturer's specified requirements. Perform adjustments necessary to fulfill specified requirements and achieve proper operation. All equipment shall be ready for use, when complete.

3.3. ADJUSTING AND CLEANING

3.3.1. Clean and adjust equipment and apparatus to ensure proper working order and conditions.

3.3.2. Remove masking or protective covering from finished surfaces. Wash and clean equipment. Polish hardware, and accessories.

3.4.3 Remove and dispose of all packaging materials, pallets etc, off-site.

3.3.3. Clean all flooring affected by the installation.

END OF SECTION

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

1. GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Identification for Plumbing Piping and Equipment.

1.1.1.2. Sleeves.

1.1.1.3. Mechanical sleeve seals.

1.1.1.4. Formed steel channel.

1.2. DESCRIPTION

1.2.1. Work Included: The work includes the furnishing of labor, materials, appliances and tools necessary for the installation, in complete working order, of plumbing systems as herein specified and as indicated on the drawings. The item of work shall include, but not be limited to, the following principal items:

1.2.1.1. Fixtures and equipment included in plumbing schedule or as indicated on the drawings.

1.2.1.2. Waste and vent piping system.

1.2.1.3. Natural gas piping system.

1.2.1.4. Potable hot and cold water, tempered water, and piping systems.

1.2.1.5. Sleeves, hangers and seismic bracing for piping systems.

1.2.1.6. Insulation of piping.

1.2.1.7. Testing.

1.2.1.8. Excavation and backfill.

1.2.1.9. Rough-in and final gas and water connections to equipment.

1.2.2. Other work herein specified and shown on the accompanying drawings including addenda, change order and approved shop drawings.

1.2.3. The Contractor shall furnish other tradesmen with drawings and directions necessary to enable them to properly construct their work so that the systems shall be properly interconnected.

1.2.4. The Contractor shall be responsible for the correctness of his drawings and instructions and make, at his expense, necessary changes in the completed work of other trades made necessary by errors in his drawings or instructions.

1.3. FEES, PERMITS AND PAYMENTS

1.3.1. Fees, Permits and Payments: Contractor shall secure permits and inspections and pay full cost of same.

1.4. CODES, ORDINANCES, REGULATIONS AND DEFINITIONS

1.4.1. Work and materials shall be in full accordance with ules and regulations of the following Agencies and Codes:

1.4.1.1. Division of the State Architect

1.4.1.2. The Safety Orders of the Division of Industrial Safety

1.4.1.3. The 2013 Edition of California Title 24 State Code of Regulations including: California Building Code, California Mechanical Code, California Plumbing Code, California Fire Code, and California Energy Code.

1.4.1.4. City ordinances and other applicable laws or regulations.

1.5. EQUIPMENT RESTRICTIONS

1.5.1. The proprietary name, and/or model indicated on the drawings, or the first listed for each category in the specifications is the make and/or model used as the basis for design. Bids shall be based on the use of the products of the selected manufacturers. The contract drawings indicate the installation of the products or equipment of selected manufacturers. Other acceptable manufacturers are named in these specifications.

1.5.1.1. Substitutions will be considered as outlined in General Conditions and Division 1; Section, "Substitutions."

1.5.2. Choice of Equipment: Equipment has been chosen, which will properly fit into the physical spaces provided and indicated, allowing ample room for access, serving, removal and replacement of parts, etc. Adequate space shall be allowed for clearance in accordance with the code requirements and the requirements of the local inspection Department. Physical dimensions and arrangements of equipment to be installed shall be subject to the Owner's approval. Submit shop drawings of equipment layout for approval where equipment space does not comply with drawings. Changes in piping, motors, wiring, controls, structural or installation procedures required by the substituted product or equipment shall be made at no additional cost to the Owner, and with no reduction in scope.

1.5.3. Space Requirements: In the preparation of drawings, a reasonable effort has been made to include equipment manufacturers' recommendations. Since space requirements and equipment arrangement vary according to manufacturer, the responsibility for initial access and proper fit rests with the Contractor. The final arrangement of the equipment and service connections shall allow the unit to be serviced. This shall include space to pull motors, filters, coils, tubes, etc. Make changes in piping and ductwork to suit actual installed equipment without further instructions or additional cost.

1.5.4. Certificates: Execute on behalf of the Owner and deliver to the Owner manufacturers' warranty certificates and instructions, etc. required to assure that the manufacturers' warranties are properly documented and in full effect for the warranty period.

1.6. SUBMITTALS

1.6.1. Section 013300 – Submittal Procedures

1.6.2. Product Data:

1.6.2.1. Submit six copies of data as specified hereafter and in individual sections.

1.6.2.2. Substituted Products:

1.6.2.2.1. The contract drawings indicate the installation of the products or equipment of selected manufacturers. Other acceptable manufacturers are named in these specifications.

1.6.2.2.2. If the installation of the particular product or equipment the Contractor has submitted requires changes in material or size from that required in the contract drawings and specifications, such changes shall be submitted as shop drawings.

1.6.2.2.3. Changes in piping, motors, wiring, controls, structural or installation procedures required by the substituted product or equipment shall be made at no additional cost to the Owner, and with no reduction in scope.

1.6.3. Shop Drawings: Submit for piping and equipment identification list of wording, symbols, letter size, and color coding for pipe identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

1.7. CLOSEOUT SUBMITTALS

1.7.1. Section 017700 – Execution and Closeout Requirements.

1.7.2. Record Drawings:

1.7.2.1. On completion of work, furnish the Owner through the Architect, with a complete set of record drawings which properly reflect the locations of equipment, fixtures, piping, controls, etc., as actually installed. Where necessary to locate concealed equipment, dimensions, shall be included on these drawings.

1.7.2.2. Maintain a separate set of drawings at the job site for such marking of "As-Built" locations. This set shall be updated as the installation work progresses and shall be available to the Architect at job visits. The Contractor shall indicate on the "Record Drawings As-Built" deletions in green. Additions, relocations, rerouting and modifications shall be indicated in red.

1.7.3. Operating and Maintenance Books (Refer to Division 1): Provide the Owner through the Architect, operating instructions and maintenance data books for equipment and materials furnished under this Division.

1.7.3.1. Submit four copies of operating and maintenance data books to the Architect for review two weeks before final inspection of the project. Assemble data in a single complete indexed volume and identify the size, model and features indicated for each item.

1.8. QUALITY ASSURANCE

1.8.1. Complete Performance Of Work

1.8.1.1. Practices of the Trades: Work shall be executed in strict accordance with the best practice of the trades by competent workmen.

1.8.1.2. Complete Functioning of Work: Labor, materials, apparatus, and appliances essential to the complete functioning of the systems described and/or indicated, or which may be reasonably implied as essential, whether mentioned in these contract documents or not, shall be furnished and installed by the Contractor. In cases of doubt as to the work intended, or in the event of need for explanation thereof, the Contractor shall call upon the Architect for supplemental instructions.

1.8.2. Control And Observation

1.8.2.1. The Architect, Engineer, and Owner shall have the right to reject materials or workmanship, which in their opinion are not in accordance with this contract, to interpret contract provisions and the meaning of the drawings and specifications. The above named parties shall be allowed access to the work for observation.

1.8.2.2. Defective work or work contrary to the contract documents may be rejected without regard to state of completion, even though said work has been accepted as a result of a previous observation.

1.8.3. Damage By Leaks

1.8.3.1. During the time period from the date of contract until termination date of this guarantee, the Contractor shall be responsible for damages to the ground, walls, roads, building, piping systems, electrical systems, heating, ventilating and air conditioning systems, building equipment, furniture and other building contents caused by leaks in the piping systems or equipment being installed or having been installed by him. Repair work shall be done as directed by, in a manner satisfactory to the Owner at no additional cost to the Owner.

1.9. DELIVERY, STORAGE, AND HANDLING

1.9.1. Section 016000 – Product Requirements: Product storage and handling requirements.

1.9.2. Deliver and store valves in shipping containers, with labeling in place.

1.9.3. Furnish cast iron and steel valves with temporary protective coating.

1.9.4. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.9.5. Protection: Protect the materials of this section before, during, and after installation and to protect the work and materials of other trades.

1.9.6. Replacements: In the event of damage, immediately make repairs and replacements necessary and at no additional cost to the Owner.

1.10. WARRANTY

1.10.1. Section 017700 – Execution and Closeout Requirements: Product warranties and product bonds.

1.10.2. Furnish one year manufacturer warranty for plumbing materials and methods.

1.10.3. The Contractor shall leave the entire installation in complete working order and free from defects in materials, workmanship or finish. Contractor shall repair or replace at his own expense a part that may develop defects due to faulty material or workmanship during the tests and within a period of one year after the work is accepted by the Owner. Contractor shall guarantee also to repair or replace with like materials existing work of the building or equipment, which is damaged during the repairing of such defective apparatus, materials or workmanship. The signing of the contract for his work covered by these specifications and of which they shall become a part, shall become a written guarantee on the part of the Contract to carry out the provisions of this section of these specifications.

1.11. EXTRA MATERIALS

1.11.1. Section 017700 – Execution and Closeout Requirements: Spare parts and maintenance products.

2. PRODUCTS

2.1. GENERAL

2.1.1. Standard of Quality: Materials and equipment shall be new and in good condition. The commercially standard items of equipment and the specific names mentioned in sections of Division 22 are intended to establish the standards of quality and performance necessary for the proper functioning of the mechanical work.

2.1.2. Variations: Since manufacturing methods vary, reasonable minor equipment variations are expected; however, performance and material specifications are minimum requirements. The Architect retains the right to judge equality of equipment that deviates from the specifications.

2.1.3. Symbols are for identification. Symbols, capacities, sizes, and electrical characteristics are indicated on the drawings. Contractor shall make necessary provisions for installation of his equipment and for attaching or connecting his work to other trades.

2.2. IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

2.2.1. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light background color.

2.2.2. Plastic Tags: Laminated three-layer plastic with engraved black letters on light background color, minimum 1-1/2-inch diameter.

2.2.3. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener. Color and Lettering: Conform to ASME A13.1.

2.2.4. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Color and Lettering: Conform to ASME A13.1.

2.2.5. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6-inch wide by 4-mil thick, manufactured for direct burial service.

2.3. FLASHINGS

2.3.1. Make pipes and vents passing through roof or outside wall waterproof with flashings and storm collars or counter flashings.

2.3.2. Except as otherwise noted or required, extend vent pipes passing through roof at least 12-inch above finished roofline.

2.3.3. Furnish and install on each pipe passing through the roof a galvanized sheet metal flashing assembly with eight-inch skirt.

2.3.4. Furnish and install on each pipe passing through the roof a six-pound seamless lead flashing assembly with eight-inch skirt. Flashing shall have steel reinforced conical boot and be complete with open top cast iron counter flashing and permaseal waterproofing compound. For sanitary vent, provide a hood with a minimum 2 to 1 free area to vent pipe size.

2.4. SLEEVES

2.4.1. Sleeves for Pipes Through Non-fire Rated Floors: 18-gage thick galvanized steel.

2.4.2. Sleeves for Pipes Through Non-fire Rated Walls, Footings, and Potentially Wet Floors: Steel pipe.

2.4.2.1. For waterproof sleeves, use J.R. Smith Fig. 172 or equivalent by Zurn or Josam.

2.4.3. Size pipe sleeves to permit placing pipe and specified isolation material for pipes passing through concrete or masonry walls or concrete slabs.

2.4.4. Insulated pipe shall be insulated in sleeves, caulked and sealed as above. Use type CS-CW inserts as manufactured by Pipe Shields, Inc.

2.5. MECHANICAL SLEEVE SEALS

2.5.1. Manufacturers:

2.5.1.1. Thunderline Link-Seal, Inc.

2.5.1.2. NMP Corporation.

2.5.1.3. Or approved equal.

2.5.2. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.6. PIPE ISOLATORS AND COVERING PROTECTION

2.6.1. Pipe isolators: Provide each hanger or clamp for un-insulated piping with an isolation material, having metal backing, to isolate sound vibration and electrolysis. Provide Elcen "Isolator or appeared equal." Isolator not required for fire protection automatic sprinkler piping, waste, vent and natural gas piping.

2.7. ESCUTCHEONS

2.7.1. Provide heavy chrome-plated or nickel plated plates or approved pattern on pipe passing through floors, walls and ceilings in finished areas. Escutcheons shall be chrome-plated steel plates with concealed hinges and setscrew. Pattern shall be approved by the Architect.

2.8. ACCESS COVER AND ACCESS DOORS

2.8.1. Provide access covers over under floor buried mechanical valves, controls, cleanouts, located in interior and exterior floor and grade areas.

2.8.2. Provide access door over concealed mechanical valves, controls, duct coils, dampers, fire dampers, pipe chases, concealed mechanical equipment through fire rated walls and ceilings.

2.8.3. Provide fire rated doors for access to mechanical equipment valves.

2.8.4. Access covers – Interior concrete floors:

2.8.4.1. Type: Square or rectangular frame with hinged and secured cover.

2.8.4.2. Size: Nominal 10-inch x 10-inch.

2.8.4.3. Construction: Aluminum alloy frame and hinged score rated XH cover with lifting device. Secure with vandal proof screws.

2.8.4.4. Marking: Cast cover with words "CLEANOUT", "GAS SHUT-OFF" or "WATER SHUT-OFF" when used for these services.

2.8.4.5. Acceptable manufacturers: Smith No. 4915, Zurn, Josam.

2.8.5. Access Covers – Interior vinyl/asbestos tile floors:

2.8.5.1. Type: Square or rectangular frame with recessed cover.

2.8.5.2. Size: Nominal 10-inch x 10-inch.

2.8.5.3. Construction: Aluminum alloy frame and tile recess XH cover with lifting device. Secure with vandal proof screws at each corner.

2.8.5.4. Acceptable manufacturers: Smith No. 4920, Zurn, Josam.

2.8.6. Access Doors – Walls and ceilings:

2.8.6.1. Type: Flush or recessed panel.

2.8.6.2. Size: Minimum 12-inch x 12-inch nominal door for hand access, minimum 16-inch x 20-inch nominal door for personal access.

2.8.6.3. Location and style:

Masonry/concrete walls	Milcor "M" Standard
Gypsum wallboard walls and ceilings	Milcor "M" Standard
Plastered surfaces (except toilet and walls)	Milcor "K" Standard
Tile/terrazzo/kitchen/toilet room walls (with casing bead stainless)	Milcor "M" Standard
Acoustical tile (check type of ceiling system)	Milcor "A"
General areas	Milcor "M" Standard
Fire rated shafts, rated walls and ceilings	Milcor "B" Standard

2.8.6.4. Material:

2.8.6.4.1. Stainless Steel, No. 302 with No. 4 finish.

2.8.6.4.2. Standard manufacturer's standard construction and finish for type specified.

2.8.6.5. Locking: Screwdriver: Flush screwdriver operated with case hardened cam.

2.8.6.6. Acceptable Manufacturers Milcor, Zurn, Miami, Carey, Potter-Roemer.

2.9. FORMED STEEL CHANNEL

2.9.1. Manufacturers:

2.9.1.1. Allied Tube & Conduit Corp.

2.9.1.2. B-Line Systems.

2.9.1.3. Unistrut Corp.

2.9.1.4. Or approved equal.

2.9.2. Product Description: Galvanized 12-gage thick steel. With holes 1-1/2-inch on center.

3. EXECUTION

3.1. PROTECTION, CARE AND CLEANING

3.1.1. The premises shall be maintained as required by Division 1.

3.1.2. Materials and Equipment:

3.1.2.1. Effectively protect materials and equipment to be installed on a project against moisture, dirt and damage during the construction period, to the entire satisfaction of the Owner. Special care shall be taken to provide protective and similar equipment that are particularly vulnerable to grit and dirt.

3.1.2.2. Drain and flush piping to remove grease and foreign matter. Thoroughly clean out valves, traps, strainers, and demonstrate the cleanliness to the Owner.

3.2. PIPING AND EQUIPMENT IDENTIFICATION

3.2.1. Equipment Labels: Equipment furnished and installed under this section shall be provided with manufacturers metal labels securely attached to each individual piece of equipment and showing complete and comprehensive performance characteristics, size, model, serial number etc.

3.2.2. Install plastic nameplates with adhesive.

3.2.3. Install plastic tags with corrosion resistant metal chain.

3.2.3.1. Valves shall have tags attached with "S" mounting. Tags shall be at least 1-1/2-inch in diameter. Tags shall be stamped with valve I.D. number and be keyed to valve identification table submitted as part of the Operating Instruction and Maintenance Manuals.

3.2.4. Piping shall have color coded markers as to type of use, service, and direction of flow in accordance with the latest edition of ANSI A 13.1. Locate markers at each valve, at entries to walls, and 20-foot on center for straight runs of pipe. Provide a flow arrow at each identification marker. Labels or markers shall be made of plastic sheet with pressure sensitive adhesive suitable for the intended application.

3.2.4.1. Color Coding for Labels and Bands by Hazard Classification:

3.2.4.1.1. Safe Materials – Green:

3.2.4.1.1.1. Domestic cold and hot water – green with black letters.

3.2.4.1.1.2. City water – green with white letters

3.2.4.1.2. Dangerous Materials – Yellow:

3.2.4.1.2.1. Natural Gas – yellow with black letters

3.2.4.1.2.2. Heating hot water – yellow with black letters

END OF SECTION

SECTION 22 05 48

VIBRATION AND SEISMIC CONTROLS FOR PLUMBING

1. GENERAL

1.1. DESCRIPTION

1.1.1. General: Furnish and install necessary equipment for building systems seismic controls, including, but not limited to, brackets, base frames where required, seismic restraints, and flexible connectors.

1.1.2. Code Requirements: Under no circumstances shall the requirements in this section take precedence over code or life safety requirements. The seismic resistance capability of all seismic control equipment shall be certified by a registered professional engineer in the state in which the project resides, and the requirements of all applicable codes shall be met.

1.2. GENERAL REQUIREMENTS FOR THE MANUFACTURER

1.2.1. Schedules: Consult drawings or specifications for equipment types and required devices including types, bases, seismic restraints, etc.

1.2.2. Equipment: Provide base frames, inertia bases and seismic restraints of sufficient size and distribution to assure that deflection, stability and seismic restraint requirements are met.

1.2.3. Specific Equipment: Specific manufacturer's equipment items are listed in this specification. All current and complete requirements from the listed manufacturer of these items shall be integral to this specification, unless such requirements conflict with requirements herein.

1.2.4. Instructions to Contractor:

1.2.4.1. Provide written installation instructions to the Contractor.

1.2.4.2. Provide a visit or visits to the jobsite before equipment is installed for the purposes of instruction. During the visit the manufacturer will inspect intended equipment locations and instruct installers in correct equipment installation procedure and sequence.

1.2.5. Final Inspections: Provide a visit or visits to the jobsite after equipment is installed for the purposes of inspection. Identify all improperly installed vibration isolation equipment and instruct the contractor in corrective work.

1.3. GENERAL REQUIREMENTS FOR THE CONTRACTOR

1.3.1. Extra Parts: Supply and install any incidental equipment or parts needed to meet the requirements stated, even if not specified or shown on drawings, without claim for additional payment.

1.3.2. Post-Installation Inspection and Adjustment:

1.3.2.1. Obtain "rough-in" inspection and approval from the Architect of any installation to be covered or enclosed, prior to such closure.

1.3.2.2. Schedule final inspection(s) by the equipment Manufacturer after installation. Obtain "rough-in" inspection by the Manufacturer of any installation to be covered or enclosed, prior to such closure.

1.3.3. Response to Punchlists: Upon completion of the work, the Architect or Architect's representative will carry out an inspection of the project and of final project record documents and will inform the installing contractor via punchlists of any further work that must be completed. Correct, at no additional cost to the Owner, all installations that are deemed defective in workmanship or materials by the Architect or Architect's representative.

1.4. SEISMIC RESTRAINT CODE REQUIREMENTS

1.4.1. Seismic Design: Contractor shall be responsible for anchors and connections of mechanical work to the building structure to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. Provide structural calculations certified and stamped by a Registered Professional Structural Engineer in the State of California prior to installation.

1.4.1.1. Plumbing equipment shall be anchored or braced to meet the horizontal and vertical forces prescribed in the 2013 CBC, Section 1614A.1.13 and ASCE 7-05 Sections 13.3, 13.4, 13.6, and Chapter 6.

1.4.1.1.1. The attachment of the following items shall be designed to resist the forces prescribed above, but may not be detailed on the plans. The DSA project inspector shall verify that these items have been anchored.

1.4.1.1.1.1. Equipment weighing less than 400-lb supported directly on the floor or roof.

1.4.1.1.1.2. Temporary or movable equipment with flexible connection to power or utilities.

1.4.1.1.1.3. Equipment weighing less than 20-lb supported by vibration isolators.

1.4.1.1.1.4. Equipment weighing less than 20-lb suspended from a floor or roof or hung from a wall.

1.4.1.2. Piping shall be braced to resist the forces prescribed in ASCE 7-05 Section 13.3 as defined in ASCE 7-05 Section 13.6.8, 13.6.7, 13.6.5.5 item 6, and 2010 CBC 1614A.1.13.

1.4.1.2.1. The bracing and attachments to the structure shall comply with one of the OSHPD Pre-Approvals and bearing an OPA number as modified to satisfy anchorage requirements of ACI 318, Appendix D.

1.4.1.2.1.1. Mason Industries, OPA-349

1.4.1.2.1.2. ISAT, OPA-485

1.4.2. Where anchorage details are not shown on the drawings the field installation shall be subject to the approval of the Structural Engineer.

1.4.3. Where platform details, anchorage details, or location are not shown or are different than shown on the drawings, the field installation shall be subject to the approval of the Division of the State Architect.

1.5. MATERIAL REQUIREMENTS

1.5.1. Design Life: Bases, vibration isolation equipment, and seismic restraint equipment shall be capable of surviving the life of the equipment served.

1.5.1.1. Materials, components and parts shall be new.

1.5.1.2. Metal parts of vibration isolators to be installed out of doors shall be hot-dip galvanized after fabrication. Galvanizing shall comply with ASTM A123 and A153 as applicable.

1.5.2. Bases: For equipment that is not constructed with a base structure compatible with vibration isolation mounts, a base frame shall be supplied with the isolators. A base frame shall also be supplied where an item or equipment and its drive motor require a common rigid base.

1.5.3. Seismic Restraints: Seismic restraints shall resist a seismic acceleration in any direction in accordance with all relevant codes without damage or deformation to equipment, building or mounts. Restraints shall not short-circuit vibration isolators during normal operation. Generally, there shall be as many seismic restraints as there are vibration isolators on a piece of equipment. Restraints and isolators shall be located close together on equipment or frames.

1.6. SUBMITTALS BY THE MANUFACTURER

1.6.1. Compliance: Comply with the general requirements for this project.

1.6.2. Specifications: Submit Manufacturer's specifications and other data needed to prove compliance with all specified requirements.

1.6.3. Installation Instructions: Submit Manufacturer's recommended installation instructions and procedures, including written instructions and checklists to be delivered to the Contractor to aid in proper installation of manufacturer's equipment.

1.6.4. Schedules and Shop Drawings: Submit schedules and large scale Shop Drawings clearly showing all pertinent data.

1.6.5. Structural Requirements: Submit calculations by a structural engineer licensed in the state in which the building is to be erected, certifying that all seismic restraints, bolts, cables and associated components will conform with all pertinent seismic- related requirements.

1.6.6. Exceptions: Identify proposed changes, differences and/or discrepancies, including verbiage, terms and definitions between Contract Documents and submittals.

1.6.7. Samples: Submit samples of any or all proposed equipment at no charge to the owner.

1.6.8. Detrimental Field Conditions: Submit a list of field conditions which the manufacturer has determined will limit the specified operational performance requirements specified for isolation devices.

1.7. SUBMITTALS BY THE CONTRACTOR

1.7.1. Compliance: Comply with the general requirements for this project.

1.8. QUALITY ASSURANCE

1.8.1. Manufacturer's Responsibility: A single firm shall be responsible for the design, fabrication and delivery of all components for seismic restraints.

1.8.2. Manufacturer's Experience: The Manufacturer shall have successful experience in vibration isolation and seismic control equipment fabrication, including no less than five years experience in fabrication and delivery of equipment equal in quantity or complexity to this work.

1.8.3. Structural Certification: The seismic resistance capability of all equipment shall be certified by a registered professional engineer in the state in which the project resides.

1.8.4. Mountings shall have anchorage pre-approval "OPA" number from OSHPD in the State of California certifying the maximum certified horizontal and vertical load ratings.

1.9. WARRANTY

1.9.1. Bases, vibration isolation equipment, and seismic restraint equipment shall be warranted against defective workmanship, operation and materials for the life of the equipment supported by these items.

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

2.1.1. International Seismic Application Technology

2.1.2. Mason Industries Inc.

2.1.3. Tolco

2.2. SEISMIC RESTRAINTS

2.2.1. Seismic restraints shall be designed to meet the code requirements of article 1.5 above.

2.2.2. Slack Cable Restraint: Provide slightly slack steel cables of appropriate sizes and lengths and with appropriate fittings and anchorage for isolated pipes. Hanger rods shall be reinforced against upward vertical loads where required. Use seismic restraint cables as engineered and fabricated by A/B, Mason or approved equal.

2.3. PIPING ISOLATORS

2.3.1. Flexible Pipe Connectors: Flexible pipe connectors shall be fabricated of multiple plies of nylon cord, fabric, and neoprene, vulcanized so as to become inseparable and homogeneous. Straight connectors shall be formed into a double sphere shape. Elbow connectors shall have a single sphere shape at the curve of the unit. Flexible connectors shall be able to accept compressive, elongating, transverse, and angular movements. Flexible connectors shall be selected and specially outfitted if necessary to suit the system temperature, pressure, and fluid type. Connectors for pipe sizes 2-inch and smaller shall have threaded female union couplings on each end. Larger sizes shall be fitted with metallic flange couplings. Control cables shall be provided if required. Provide "MFTNC, MFNEC or MFTFU" by Mason or approved equal.

2.3.2. Resilient Pipe Anchor or Guide: These units shall be the standard product of the vibration isolation mounting manufacturer, incorporating neoprene isolation elements that are specifically designed for providing resilient vertical and/or horizontal support when serving as a pipe anchor or guide. Minimum neoprene thickness 1/2-inch. Maximum neoprene durometer 50. Provide "Custom" by A/B, "ADA/GDA" by Mason, "RSF" by Peabody or approved equal.

2.3.3. Resilient Pipe Sleeve at Support or Construction Penetration: Sleeve shall consist of a formed and stiffened galvanized steel sleeve lined on the inside with moisture and vermin resistant felt bonded to the metal sleeve and 1/2-inch thick. Sleeve inside diameter shall equal pipe outside diameter in each application. Sleeve shall be split longitudinally so it can be snapped over pipes and re-closed without damage. Sleeve lengths shall be as recommended by the manufacturer for the given diameters, but shall not be less than 3-inch. Provide "PR-Isolator" by Porter-Roemer, "Trisolator" by Stoneman Engineering or approved equal.

2.3.4. Resilient Pipe Sleeve at Construction Penetration: This unit shall consist of two bolted pipe halves with 3/4-inch or thicker neoprene sponge bonded to the inner faces. The seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping. Sleeve shall be 2-inch longer than the thickness of the construction it penetrates. Where pipe temperatures exceed 240°F, use 10-lb/ft^3 density glass fiber insulation in lieu of sponge neoprene. Provide "SWS" by Mason, "PS-1-D" by Peabody or approved equal.

2.3.5. Freshwater Piping Isolation Systems: Holdrite Silencer System by Hubbard or equal.

2.4. CUSTOM RESILIENT AND AIRTIGHT SLEEVES

2.4.1. Sleeve shall be custom-fabricated. It shall be formed from pipe or sheet metal that is 1-inch larger in each cross-sectional dimension than the penetrating element and is 2-inch longer than the thickness of the construction penetrated. The annular space between the sleeve and the penetrating element shall be packed tightly with long-fiber glass fiber of 2- to 3-lb/ft^3 density to within 1/2-inch of the ends of the sleeve. The remaining 1/2-inch space at each end shall be filled completely with acoustical sealant to form an airtight seal. Glass fiber packing by CertainTeed, Manville, or Owens-Corning. Acoustical Sealant by DAP, Tremco or U.S. Gypsum, choice depending on application and as approved by Architect.

2.5. PIPING VIBRATION ISOLATION PRODUCT REQUIREMENTS

2.5.1. Felt Lined Saddles or Metal Sleeves: General piping supports or penetrations throughout the building.

END OF SECTION

SECTION 22 07 00

PLUMBING INSULATION

1. GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Piping insulation, jackets and accessories.

1.1.1.2. Equipment insulation and covering.

1.2. QUALITY ASSURANCE

1.2.1. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.

1.2.2. Pipe insulation thickness shall be in accordance with State of California Energy Code (CEC) as a minimum. Use thickness specified, if greater than CEC requirements

1.3. ENVIRONMENTAL REQUIREMENTS

1.3.1. Do not install insulation and related products when ambient temperatures and conditions are not meeting manufacturer's requirements.

1.3.2. Maintain temperature before, during, and after installation for minimum period of 24-hour or as required by manufacturer.

2. PRODUCTS

2.1. PIPE INSULATION

2.1.1. Manufacturers:

2.1.1.1. Johns Manville.

2.1.1.2. Owens Corning.

2.1.1.3. Pittsburgh Corning Corp.

2.1.1.4. Childers Products Co.

2.1.1.5. Or approved equal.

2.1.2. Glass Fiber: ASTM C547; rigid molded, noncombustible.

2.1.2.1. k (ksi) factor: 0.24 at 75°F.

2.1.2.2. Maximum service temperature: 850°F.

2.1.2.3. Vapor Retarder Jacket: White Kraft paper with glass fiber yarn and bonded to aluminized film, secured with self-sealing longitudinal laps and butt strips or with outward clinch expanding staples and vapor retarder mastic.

2.1.3. Cellular Foam: ASTM C534; flexible, cellular elastomeric, molded or sheet.

2.1.3.1. k (ksi) Value: 0.27 at 75°F.

2.1.3.2. Maximum Service Temperature: 220°F.

2.1.3.3. Connection: Waterproof vapor retarder adhesive, Rubatex R-373.

2.1.3.4. Outdoor Protection: Outdoor installation shall have UV-protective coating, Rubatex 374

2.1.4. Jackets:

2.1.4.1. PVC Plastic: One piece molded type fitting covers and sheet material, off-white color.

2.1.4.1.1. Thickness: 20-mil.

2.1.4.1.2. Connections: Tacks; Pressure sensitive color matching vinyl tape.

2.1.4.2. Canvas Jacket: UL listed fabric, 6-oz/yd^2, plain weave cotton treated with dilute fire retardant lagging adhesive.

2.1.4.3. Aluminum Jacket: 0.025-inch thick sheet, smooth finish, with longitudinal slip joints and 2-inch laps, die shaped fitting covers with factory attached protective liner.

2.1.4.4. Stainless Steel Jacket: Type 304 stainless steel, 0.010-inch thick sheet, corrugated finish.

2.1.4.5. Facing: One inch galvanized steel hexagonal wire mesh stitched on one face of insulation.

3. EXECUTION

3.1. SCHEDULES

3.1.1. Piping Insulation:

3.1.1.1. Domestic Hot Water (70 to 200°F):

3.1.1.1.1. Glass Fiber Insulation, thickness per pipe size.

3.1.1.1.1.1. Up to 2-inch: 1-inch thick.

3.1.1.1.1.2. 2 to 4-inch: 1-1/2-inch thick.

3.1.1.1.1.3. 4-inch and above: 2-inch thick

3.1.1.1.2. Elastomeric Cellular Foam, thickness per pipe size

3.1.1.1.2.1. Up to 2-inch: 1-inch thick

END OF SECTION

SECTION 22 10 00

PLUMBING PIPING AND PUMPS

1. GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Pipe hangers and supports.

1.1.1.2. Pipe and pipe fittings.

1.1.1.3. Valves.

1.1.1.4. Piping specialties.

1.1.1.5. Plumbing drainage specialties.

1.1.1.6. Plumbing supply specialties.

1.1.1.7. Plumbing pumps.

1.2. QUALITY ASSURANCE

1.2.1. Natural gas piping shall be in accordance with NFPA 54.

1.2.2. List and label natural gas flexible connectors in accordance with UL 536.

1.3. WELDING PROCEDURES

1.3.1. General: Piping shall comply with the provisions and latest revisions of the applicable sections of the ASME Code for Pressure Piping, ANSI/ASME B31.9, "Building Service Piping."

1.3.2. Before welding is performed, Contractor shall submit to the Architect and Owner, a copy of his Welding Operator Qualification Tests as required by Section IX of the ASME Boiler and Pressure Vessel Code.

1.3.3. Welding Procedure: Carbon steel piping shall be welded in accordance with the National Certified Pipe Welding Bureau (NCPWB) Welding Procedure Specification No. 1-12-1 which requires root pass weld with SMAW using E6010 electrode; second and third pass welds using E7018 electrodes.

1.3.4. Contractor shall be responsible for the quality of welding done by this organization and shall repair work not in accordance with these specifications.

2. PRODUCTS

2.1. PIPE HANGERS AND SUPPORTS

2.1.1. Manufacturers:

2.1.1.1. Carpenter & Paterson Inc.

2.1.1.2. Creative Systems Inc.

2.1.1.3. Flex-Weld, Inc.

2.1.1.4. Glope Pipe Hanger Products Inc.

2.1.1.5. Michigan Hanger Co.

2.1.1.6. Superior Valve Co.

2.1.1.7. Or approved equal.

2.1.2. Conform to ASME B31.9.

2.1.3. Hangers for Pipe Sizes 1/2 to 1-1/2-inch: Carbon steel, adjustable swivel, split ring.

2.1.4. Hangers for Pipe Sizes 2-inch and larger: Carbon steel, adjustable, clevis.

2.1.5. Hangers for Hot Pipe Sizes 2 to 4-inch: Carbon steel, adjustable, clevis.

2.1.6. Hangers for Hot Pipe Sizes 6-inch and larger: Adjustable steel yoke, cast iron roll, double hanger.

2.1.7. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

2.1.8. Multiple or Trapeze Hangers for Hot Pipe Sizes 6-inch and larger: Steel channels with welded spacers and hanger rods, cast iron roll.

2.1.9. Wall Support for Pipe Sizes to 3-inch: Cast iron hook.

2.1.10. Wall Support for Pipe Sizes 4-inch and larger: Welded steel bracket and wrought steel clamp.

2.1.11. Vertical Support: Steel riser clamp.

2.1.12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.1.13. Floor Support for Hot Pipe Sizes to 4-inch: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.1.14. Floor Support for Hot Pipe Sizes 6-inch and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

2.1.15. Copper Pipe Support: Copper-plated, carbon-steel adjustable, ring.

2.2. PIPES AND TUBES

2.2.1. Sanitary Sewer Piping, Buried Within 5-foot of Building and Sanitary Sewer Piping, above Grade:

2.2.1.1. Cast Iron Pipe: CISPI 301, hub less, service weight, with neoprene gaskets and stainless steel clamps.

2.2.2. Water Piping, Buried Within 5-foot of Building:

2.2.2.1. Copper Tubing: ASTM B88, Type K, seamless hard drawn with ASTM B16.22 wrought copper fittings.

2.2.3. Water Piping, above Grade:

2.2.3.1. Copper Tubing: ASTM B88, Type L, hard drawn, with ASTM B16.22 wrought copper fittings and Grade 95TA solder joints. Flanges, bronze solder joint, ANSI 150-lb.

2.2.4. Storm Water Piping, Buried Within 5-foot of Building and Storm Water Piping, above Grade:

2.2.4.1. Cast Iron Pipe: CISPI 301, hub less, service weight with neoprene gaskets and stainless steel clamps.

2.2.5. Equipment Drains and Overflows:

2.2.5.1. Copper Tubing: ASTM B88, Type L, hard drawn, cast brass, wrought copper fittings, lead free solder joints.

2.2.6. Natural Gas Piping, above Grade:

2.2.6.1. Pipe:

2.2.6.1.1. 1-inch and smaller: ASTM A-53, Schedule 40, black steel, butt welded.

2.2.6.1.2. 2 to 6-inch ASTM A-53, Schedule 40, black steel, seamless.

2.2.6.1.3. 8 to 12-inch: ASTM A-53, Schedule 20, black steel, seamless.

2.2.6.2. Fittings:

2.2.6.2.1. 2-inch and under: Screwed: malleable iron, black, 150-lb unions: Malleable iron, black, ground joint, 250-lb, Grinnel No. 554.

2.2.6.2.2. 2-1/2-inch and larger: Welded only, 3 pass, butt welded fittings.

2.2.7. Natural gas piping, below grade: Same as "gas piping above grade" except polyethylene coated or wrapped to a point 12-inch above grade.

2.2.8. Flue and Combustion Air Piping:

2.2.8.1. PVC Pipe: ASTM D1785, Schedule 40, polyvinyl chloride (PVC) material.

2.2.8.1.1. Fittings: ASTM D2466, Schedule 40, PVC.

2.2.8.1.2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement. Prime joints with a contrasting color.

2.2.8.2. PVC Pipe: ASTM D1785, Schedule 80, polyvinyl chloride (PVC) material.

2.2.8.2.1. Fittings: ASTM D2467, Schedule 80, PVC.

2.2.8.2.2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement. Prime joints with a contrasting color.

2.2.8.3. CPVC Pipe: ASTM F441/F441M, Schedule 40, chlorinated polyvinyl chloride (CPVC) material.

2.2.8.3.1. Fittings: ASTM F438, CPVC, Schedule 40, socket type.

2.2.8.3.2. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement. Prime joints with a contrasting color.

2.2.8.4. CPVC Pipe: ASTM F441/F441M, Schedule 80, chlorinated polyvinyl chloride (CPVC) material.

2.2.8.4.1. Fittings: ASTM F439, CPVC, Schedule 80, socket type.

2.2.8.4.2. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement. Prime joints with a contrasting color.

2.2.8.5. ABS Pipe: ASTM D2661, Acrylonitrile-Butadiene-Styrene (ABS) material.

2.2.8.5.1. Fittings: ABS, ASTM D2661 or ABS, ASTM D3311.

2.2.8.5.2. Joints: ASTM D2235, solvent weld applied after cleaning.

2.3. VALVES

2.3.1. Manufacturers:

2.3.1.1. NIBCO.

2.3.1.2. Stockham.

2.3.1.3. Crane.

2.3.1.4. Or approved equal.

2.3.2. Unless otherwise indicated, valves of types installed in connection with mechanical piping shall comply with the following:

2.3.2.1. Pack stems in conformance to ASTM B16.34.

2.3.2.2. Valves 4-inch and larger mounted in excess of 7-foot above the floor in mechanical rooms shall be equipped with chain operators and guides. Extend chains to within 6'-6" of floor.

2.3.2.3. Mark each valve at the factory with the following minimum information, engraved, stamped or cast on each valve or metal tag permanently attached to the valve.

2.3.2.3.1. Manufacturer's name.

2.3.2.3.2. Catalog or figure number.

2.3.2.3.3. Size and pressure class.

2.3.2.3.4. Arrows to indicate direction of flow on check, globe, angle, non-return and eccentric plug valves.

2.3.2.3.5. UL approved valves shall bear the UL label.

2.3.2.4. Each valve shall be the same size as the pipe in which it is installed.

2.3.2.5. Provide extended valve stem with tee handle on valves installed in insulated piping.

2.3.2.6. Provide valves designed for 125-psig steam and 200-psig non-shock water, oil or gas working pressures.

2.3.3. Gate Valves:

2.3.3.1. 2-inch and smaller: Bronze body, bonnet and disc conforming to ASTM B62, non-rising bronze silicon alloy stem, hand wheel, inside screw, double wedge disc, soldered or threaded.

2.3.3.2. 2-1/2-inch and larger: Iron body, bronze trim, rising stem, hand wheel, OS&Y, solid wedge, flanged or grooved ends.

2.3.4. Ball Valves:

2.3.4.1. 2-inch and smaller: Bronze or stainless steel two-piece body, 316 stainless steel ball, Teflon seats and stuffing box ring, lever handle, solder or threaded ends.

2.3.4.2. 2-1/2-inch and larger: Cast steel flanged body, chrome plated steel ball, Teflon seat and stuffing box seals and lever handle.

2.3.5. Butterfly Valves:

2.3.5.1. 2-inch and smaller: Bronze body, stainless steel disc, resilient replaceable seat, threaded ends, extended neck, 10-position lever handle.

2.3.5.2. 2-1/2-inch and larger: Iron body, chrome plated iron disc, resilient replaceable seat, wafer or lug ends, extended neck, 10 position lever handle.

2.3.6. Swing Check Valves:

2.3.6.1. 2-inch and smaller: Bronze body and horizontal swing disc, solder or threaded ends.

2.3.6.2. 2-1/2-inch and larger: Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.

2.3.7. Relief Valves:

2.3.7.1. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated capacities ASME certified and labeled.

2.3.7.2. Potable Water Temperature and Pressure: On hot water storage tanks provide an ASME rated McDonald Miller, Watts Regulator Co., or equal, thermostatic, self-closing temperature and pressure relief valve, located in the relief valve openings of tanks. Valve shall have a minimum thermal discharge capacity equal to the input capacity of the heater, standard pressure setting of 125-psig and standard temperature setting of 210°F. Route discharge pipe to service sink.

2.4. CORROSION PROTECTION

2.4.1. Prior to delivery to the job site, wrap buried steel pipe with corrosion protective wrap of pressure sensitive polyvinyl chloride or polyethylene tape applied after pipe has been thoroughly cleaned. Tape shall be nominal thickness of 20-mil consisting of one layer of 20-mil tape or two separate layers of 10-mil tape. Apply with suitable primer adhesive recommended by manufacturer.

2.4.2. Tightly apply tapes with 1/2-inch minimum uniform lap, free from wrinkles and voids. Use approved wrapping machines and experienced operators.

2.4.3. Tapes: "Chasekote" No. 775, Plicoflex No. 340-25, Polyker 922 and 923, "Scotchwrap" No. 51 or equal. Apply tape after pipe is cleaned as recommended by the tape manufacturer.

2.4.4. Cover filed joints and fittings by wrapping polyethylene or polyvinyl tape specified for wrapping piping, except use two layers of 10-mil thick tape. Wrap joints to provide minimum of six-inches over adjacent pipe covering. Where fittings are wrapped, width of tape shall not exceed two inches. Apply adequate tension so tape will conform tightly to contours of fittings. Use putty tape insulation compounds such as "Scotchfil" or equal to fill voids and provide smooth even surface for application of tape wrap.

2.4.5. Alternate: In lieu of tape wrap, factory applied plastic coating on steel pipe will be acceptable. Use tapes for field joints, fittings and valves same as specified above. Pipe Coating: "X-Tru Coat" (20-mil thick) as manufactured by Standard Pipe Protection, Republic, Pipe Line Service Corp., Scotchkote 202 (12-mil thick) as manufactured by 3M Company, or equal, with "X-Tru-Tape", or equal, for joints and valves.

2.4.6. Test wrapped or coated pipe, fittings and field joints on job site, after assembly, with approved high voltage holiday detector Tinker and Rasor, or equal, with positive signaling device to indicate flaws, holes or breaks in wrapping. Set peak voltage to 10,000-Volt. If Scotchkote 202 is used, set peak voltage to 1,000-Volt. Place piping on temporary blocks to allow testing to run along underside of pipe. Repair defects before covering. Conduct testing in presence of Architect or his representative.

2.4.7. No special precautions are required for copper or plastic piping below grade.

2.4.8. Special wrapping is required for contact with concrete such as thrust blocks or floor slabs. Piping shall be wrapped with minimum 8 mil thick polyethylene plastic sheets.

2.5. PIPING SPECIALTIES

2.5.1. Flanges, Unions, and Couplings:

2.5.1.1. Pipe Size 2-inch and Smaller: Malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

2.5.1.2. Pipe Size 2-1/2-inch and Larger: Forged steel flanges for ferrous piping; bronze flanges for copper piping; preformed neoprene gaskets.

2.5.1.3. Grooved and Shouldered Pipe End Couplings: Malleable iron housing, C-shape elastomer composition sealing gasket, steel bolts, nuts, and washers.

2.5.1.4. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.5.2. Strainers:

2.5.2.1. Size 2-inch and Smaller: Threaded brass or iron body for 175-psig working pressure, Y pattern with 1/32-inch stainless steel perforated screen.

2.5.2.2. Size 2-1/2 to 4-inch: Flanged iron body for 175-psig working pressure, Y pattern with 3/64-inch stainless steel perforated screen.

2.5.2.3. Size 5-inch and Larger: Flanged iron body for 175-psig working pressure, basket pattern with 1/8-inch stainless steel perforated screen.

2.5.3. Flexible Connectors:

2.5.3.1. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9-inch long with copper tube ends; for maximum working pressure 300-psig.

2.5.4. Pressure Gages:

2.5.4.1. Manufacturers:

2.5.4.1.1. Weiss Model LF4UGY.

2.5.4.1.2. Trerice

2.5.4.1.3. Marsh.

2.5.4.1.4. Tyco.

2.5.4.2. Gage: ASME B40.1, UL 393 with bourdon tube, liquid filled stainless steel movement, brass socket, front calibration adjustment, black scale on white background.

2.5.4.3. Case: Fiberglass reinforced polypropylene with o-ring weatherproof seals and replaceable acrylic window.

2.5.4.4. Bourdon Tube: Phosphor bronze.

2.5.4.5. Dial Size: 4-1/2-inch diameter.

2.5.4.6. Mid-Scale Accuracy: 1%.

2.5.4.7. Scale: Psi. Midpoint of scale range shall be operating pressure.

2.5.5. Thermometers:

2.5.5.1. Manufacturers:

2.5.5.1.1. Weiss Model Vari-angle.

2.5.5.1.2. Trerice

2.5.5.1.3. Marsh.

2.5.5.1.4. Tyco.

2.5.5.2. Stem Type Thermometer: ASTM E1, adjustable angle, red appearing mercury, lens front tube, cast aluminum adjustable joint with positive locking device.

2.5.5.3. Size: 9-inch scale.

2.5.5.4. Window: Clear glass.

2.5.5.5. Stem: Brass, 3/4-inch NPT, 3-1/2 inch long.

2.5.5.6. Accuracy: ASTM E77.

2.5.5.7. Calibration: Degrees F.

2.6. PLUMBING DRAINAGE SPECIALTIES

2.6.1. Floor Drains:

2.6.1.1. Manufacturers: Refer to Plumbing Fixture Schedule on P0.1 for manufacturer and model number.

2.6.1.2. Floor Drain (FD-1): Lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.6.2. Floor Sinks:

2.6.2.1. Manufacturers: Refer to Plumbing Fixture Schedule on P0.1 for manufacturer and model number.

2.6.2.2. Floor Sink (FS-1): Lacquered cast iron body with dome strainer and seepage flange.

2.6.3. Cleanouts:

2.6.3.1. Finished Floor: Lacquered cast iron body with anchor flange, reversible clamping collar, and adjustable nickel-bronze round scored cover in service areas and round depressed cover to accept floor finish in finished floor areas.

2.6.3.2. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

2.7. PLUMBING SUPPLY SPECIALTIES

2.7.1. Backflow Preventers:

2.7.1.1. Manufacturers:

2.7.1.1.1. Wilkins.

2.7.1.1.2. Cla-Val.

2.7.1.1.3. Or approved Equal.

2.7.1.2. Reduced Pressure Backflow Preventers: ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; pressure relief valve located between check valves; third check valve opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.7.2. Water Hammer Arrestors:

2.7.2.1. Manufacturers:

2.7.2.1.1. J.R. Smith Model Hydrotol.

2.7.2.1.2. Greer Model Surge Kushon.

2.7.2.1.3. Wade Model Shockstops.

2.7.2.1.4. Or approved equal.

2.7.2.2. Copper construction, piston type To PDI WH 201, pre-charged suitable for operation in temperature range -100 to 300°F and maximum 250-psig working pressure.

2.7.3. Hose Bibbs/Hydrants:

2.7.3.1. Manufacturers: Refer to Plumbing Fixture Schedule on P0.1 for manufacturer and model number.

2.7.3.2. Interior Hose Bibs: Bronze or brass, replaceable hexagonal disc, hose thread spout, chrome plated with vacuum breaker.

2.7.3.3. Wall Hydrant: Wall plate, lockable recessed box, hose thread spout, removable key, and vacuum breaker.

2.7.4. Diaphragm-type Compression Tanks:

2.7.4.1. Construction: Welded steel, ASME tested and stamped; rated for working pressure of 125-psig, with flexible diaphragm sealed into tank, and steel legs or saddles.

2.7.4.2. Accessories: Pressure gage and air-charging fitting and drain.

2.8. IN-LINE CIRCULATOR PUMPS

2.8.1. Construction: Bronze casing, bronze impeller, alloy steel shaft with integral thrust collar and two oil-lubricated bronze-sleeve bearings and mechanical seal.

2.9. MOTORS

2.9.1. Horizontal mounted pump motors (close coupled excepted) shall be of the "Premium" efficiency type. Provide General Electric "Energy Saver," Westinghose" Tee 11", U.S. Motors,"XB", Baldor "Super E", "Lincoln" "Ultimate EI" motors or approved equal unless otherwise specified. Guaranteed minimum full load efficiencies shall be certified in accordance with Institute of Electrical and Electronic Engineers (IEEE) Standard 112 Test Method B, National Electric Manufacturers' Association (NEMA) MG-1-12.53a.

2.9.1.1. 1/2 HP and Larger: 208 Volt 3 phase, 60 Hertz.

2.9.1.2. Smaller than 1/2 HP: 115 Volt, 1 phase, 60 Hertz.

2.9.2. General:

2.9.2.1. Motors shall be started across the line unless otherwise specified. Motors shall be selected with low starting current and shall be designed for continuous duty to provide the running torque and pull-in-torque required to suit the load. Unless otherwise specified, motors shall be single speed –1750 rpm.

2.9.2.2. Motors shall have standard drip-proof enclosure unless otherwise specified.

2.9.2.3. Motors exposed to weather shall be of the totally enclosed fan-cooled type.

2.9.2.4. Motors shall have at least 1.15 service factor. Motors shall be selected to operate at design conditions without exceeding nameplate ratings without operating using the service factor.

2.9.2.5. Motors shall be sealed or field-lubricated in which case the latter shall be provided with grease fittings.

2.9.2.6. Pump motors shall be selected to drive the pump through its characteristic curve, from zero to 25% above the design flow, without exceeding rated full load nameplate horsepower. Pump motor nameplate rating shall not be exceeded in pump operation anywhere in the pump curve.

2.9.3. Three-Phase: Three-phase motors 10 horsepower and smaller shall have cast iron or steel housings and shall be of the squirrel cage induction type. Three-phase motors 15 horsepower and larger shall have cast iron housings and shall be of the squirrel cage induction type.

2.9.4. Single Phase: Single phase motors shall be capacitor-start type having internal thermal overload protection and with starting, pull-in and running characteristics to suit the load.

2.9.5. Where motor is an integral part of equipment, motor manufacturer shall be as recommended by the equipment manufacturer. However, other items shall comply with these specifications.

2.9.6. Nameplate: A motor nameplate shall be securely affixed to each motor and shall clearly indicate the class of insulation and the service factor in addition to the usual electrical data.

2.9.7. Special Requirements: Refer to various sections of this Division for special requirement for specific items of equipment requiring motors.

2.9.8. Motor Controllers

2.9.8.1. Where required: In general, motor controllers for motors shall be furnished and installed under Division 26 unless indicated or specified otherwise. Motor controller that is not an integral part of a piece of equipment shall be furnished under this Division and shall be installed in accordance with the following specifications.

2.9.8.2. General: The motor controller shall be steel mounted. Controllers shall be front wired and terminals shall be accessible for wiring directly from the front. No slate or ebony asbestos shall be permitted on a controller from size 00 through size 8. Contacts shall be solid silver cadmium oxide alloy. Bare copper or silver flashed contacts shall not be permitted. Operating coils shall be pressure molded and so designed that if accidentally connected to excessive voltage, they will not expand, bubble or melt. When a coil fails under over-voltage condition, the motor controller shall definitely drop and not freeze the contacts in the "on" position.

2.9.8.3. Overload Relays: Overload relays shall be furnished for each of the three phases and shall be of the hand-reset variety so that blocking the reset mechanism in the reset position will not prevent the starter from dropping out if the motor is overloaded. This specifically excludes those overload relays which change to automatic reset from hand-reset when the reset mechanism is blocked unless the automatic reset feature can be removed or voided. Accidental depressing of the reset button or mechanism shall not shut off the motor. Overload relays shall not be field convertible from hand to automatic reset type.

2.9.8.4. Interlocks: Provide space to field-add one or more extra N.O. or N.C. interlocks to (except size 00) motor controllers without removing existing wiring or removing the controller from its enclosure.

2.9.8.5. Bulletin Numbers: Full voltage magnetic motor controller to be furnished under this Division shall be similar and approved equal to Allen-Bradley (AB) Bulletin Numbers as follows:

2.9.8.5.1. Individual three phase motor controller – AB Bul. 709.

2.9.8.5.2. Individual single phase motor controller – AB Bul. 709SP.

2.9.8.5.3. Combination three phase motor controller with fusible or non-fusible disconnect switch –AB Bul. 712.

2.9.8.5.4. Combination three motor controller with circuit breaker –AB Bu. 713.

2.9.8.5.5. Individual three multi-speed motor controller for two speed, single or two winding motors –AB Bul. 716.

2.9.8.5.6. Combination three phase multi-speed controller with circuit breakers for two speed, single or two winding motors –AB Bul. 717.

2.9.8.6. NEMA Type: In general, motor controller enclosures shall be NEMA Type 1 general purpose unless exposed to the weather or otherwise indicated on the drawings. Motor controller, including variable frequency drives, exposed to the weather shall have NEMA Type 3R watertight enclosure.

2.9.8.7. Holding Coils: General holding coils in full voltage magnetic motor controllers shall be suitable for use on 120-Volt AC control voltage.

2.9.8.8. Overload Protection: Three phase full voltage magnetic motor controller shall be suitable for us on 120-Volt AC control voltage.

2.9.8.9. Manual Controllers: Manual motor controllers where indicated on the drawings, required and/or specified shall be similar and equal to Allen Bradley Bul. 600 in NEMA Type 1 enclosure or otherwise required for the location of the installation.

2.9.8.10. Accessories: Motor controllers shall be provided with accessories such as control power transformers, push buttons, selector switches, pilot lights, etc., as indicated on the drawings and as specified herein. In general, most motor controllers shall include a maintain-contract start-stop button or run switch.

2.9.8.11. Manufacturer: Allen-Bradley or approved equal.

3. EXECUTION

3.1. PIPE CLEANING AND DISINFECTION FOR POTABLE WATER PIPING

3.1.1. Pipe cleaning and disinfection applied to hot and cold potable water systems and shall be performed after pipes, valves, fixtures, and other components of the systems are installed, tested and ready for operation.

3.1.2. Potable water piping shall be thoroughly flushed with clean potable water prior to disinfection to remove dirt and other contaminants. Screens to faucets shall be removed before flushing and reinstalled after completion of disinfection.

3.1.3. Disinfection shall be done using either chlorine gas or liquid chlorine. Calcium or sodium hypochlorite may be used as approved in AWWA C601 procedures.

3.1.4. A service valve shall be provided and located at the water service entrance. The disinfecting agent shall be injected into the system from this cock only.

3.1.5. The disinfecting agent shall be injected by a proportioning pump or device through the service cock slowly and continuously at an even rate. During disinfection, backflow of disinfecting agent into main water supply is not permitted.

3.1.6. Sectional valves must be operated during disinfection. Outlets must be fully opened at least twice during injection and the residual checked with orthotolin solution.

3.1.7. When the chlorine residual concentration, calculated on the volume of water the piping will contain, indicated not less than 50-ppm at outlets, then valves must be closed and secured.

3.1.8. The residual chlorine shall be retained in piping systems for a period of at least 24-hour.

3.1.9. After the retention, the residual shall be not less than 5-ppm. If less, then the process shall be repeated as described above.

3.1.10. If satisfactory, then fixtures shall be flushed with clean potable water until residual chlorine by ortholine tests shall be not greater than the incoming water supply (this may be zero).

3.1.11. Work and certification of performance shall be performed by approved applicators or qualified personnel with chemical and laboratory experience.

3.1.12. Upon completion of final flushing (after retention period), the Contractor shall obtain one water sample from hot water system and one from the cold water system and submit samples to a State approved laboratory. Results from laboratory shall be provided to Architect and shall indicate:

3.1.12.1. Name and address of approved laboratory testing the samples.

3.1.12.2. Name and location of job and date the samples were obtained.

3.1.12.3. The coliform organism count. An acceptable test shall show absence of coliform organisms.

3.1.13. If analysis does not satisfy the above minimum requirements, the disinfection procedure must be repeated.

3.1.14. Before acceptance of the systems, the Contractor shall submit to the Architect for his review, three copies of Laboratory Report.

3.1.15. Under no circumstances shall the Contractor permit the use of potable water systems until properly disinfected, flushed and certified.

END OF SECTION

SECTION 22 30 00

PLUMBING EQUIPMENT

1. GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Water heaters.

1.2. QUALITY ASSURANCE

1.2.1. Water Heater Performance Requirements: Equipment efficiency not less than prescribed by California Energy Code.

2. PRODUCTS

2.1. TANKLESS GAS WATER HEATERS

2.1.1. Manufacturers: Refer to Plumbing Fixture Schedule on P0.1 for manufacturer and model number.

2.1.2. Water Heater shall be a copper coil integral fin and tube construction with quick release brass or bronze waterways. Water Heater shall be factory assembled and tested.

2.1.3. The heater shall be vented with 3" or 4" Schedule 40 PVC, CPVC, or ABS vent pipe, or stainless steel Category III vent pipe at a distance not to exceed 70' (equivalent) for 3" vent or 100' (equivalent) for 4" vent, terminating vertically or horizontally as prescribed.

2.1.4. Intake air pipe may be of such material as ABS, PVC, galvanized B-Vent, corrugated aluminum or stainless steel, or Category IV stainless steel not to exceed 70' (equivalent) for 3" vent or 100' (equivalent) for 4" vent.

2.1.5. The water heater shall be controlled by an onboard solid-state printed circuit board monitoring incoming and outgoing temperatures with factory installed thermistors, sensing and controlling flow rate to set point temperature, controlling both air and gas mixture inputs to maintain thermal combustion efficiency. The heater(s) shall also consist of inline fusing, a spark ignition and sensor system, aluminized stainless steel burners, an air-fuel ratio sensor, a hi-limit temperature switch, modulating and proportional gas valves, a freeze protection sensor with ceramic heating blocks, and an overheat cutoff fuse.

2.1.6. The water heater shall be CSA listed, exceed the energy efficiency requirements of ASHRAE 90.1b-1992, and shall comply with SCAQMD Rule 1146.2 Ultra-Low NOx Standards.

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

1. GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Water closets.

1.1.1.2. Urinals.

1.1.1.3. Lavatories.

1.1.1.4. Sinks.

1.1.1.5. Electric water coolers.

1.1.1.6. Service sinks.

2. PRODUCTS

2.1. FLUSH VALVE WATER CLOSETS

2.1.1. Manufacturers: Refer to Plumbing Fixture Schedule on P0.1 for manufacturer and model number.

2.1.2. Bowl: Floor mounted vitreous china closet with elongated rim, 1-1/2-inch spud, china bolt caps; maximum 1.28 gallon flush volume.

2.1.3. Flush Valve: Exposed chrome plated, diaphragm type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker.

2.1.4. Seat: Solid white plastic, elongated open front, extended back, self-sustaining hinge, brass bolts, without cover.

2.2. LAVATORIES

2.2.1. Manufacturers: Refer to Plumbing Fixture Schedule on P0.1 for manufacturer and model number.

2.2.2. L-2: Wall hung lavatory, with drillings on 4-inch centers

2.2.3. L-1: Counter Top Lavatory: Vitreous china self-rimming counter top lavatory, with drillings on 4-inch centers, seal of putty, caulking, or concealed vinyl gasket.

2.2.4. Trim: cover plate, open grid strainer, chrome plated brass P-trap with clean- out plug and arm with escutcheon.

2.2.5. Wall Mounted Carrier: Cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.

2.3. SINKS

2.3.1. Manufacturers: Refer to Plumbing Fixture Schedule on P0.1 for manufacturer and model number.

2.3.2. SK-1: Single Compartment Bowl: Single stainless steel, self-rimming with undercoating, 3-1/2-inch crumb cup and chromed brass drain, ledge back drilled for trim.

2.3.3. Trim: chrome plated brass P-trap with clean-out plug and arm with escutcheon.

2.4. ELECTRIC WATER COOLERS

2.4.1. Manufacturers: Refer to Plumbing Fixture Schedule on P0.1 for manufacturer and model number.

2.4.2. Fountain: ARI 1010; recessed handicapped mounted electric water cooler with stainless steel top, stainless steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, mounting bracket, refrigerated with integral air cooled condenser.

2.5. SERVICE SINKS

2.5.1. Manufacturers: Refer to Plumbing Fixture Schedule on P0.1 for manufacturer and model number.

2.5.2. Bowl: floor mounted, with one inch wide shoulders, stainless steel strainer.

2.5.3. Trim: Exposed wall type supply with lever handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges. 5-foot of 1/2-inch diameter plain end reinforced rubber hose, hose clamp and mop hanger.

END OF SECTION

SECTION 23 05 00

COMMON WORK RESULTS FOR HVAC

1. GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Identification for HVAC Piping and Equipment.

1.1.1.2. Sleeves.

1.1.1.3. Mechanical sleeve seals.

1.1.1.4. Formed steel channel.

1.2. DESCRIPTION

1.2.1. Work included: Provide labor, materials, appliances and tools necessary for the installation of the systems as herein specified and indicated on the drawings. The items of work shall include, but shall not be limited to, the following principal items:

1.2.1.1. Equipment including: condensing units, fan coil units, boilers, pumps, fans, etc.

1.2.1.2. Air distribution system, including ductwork, diffusers, registers, grilles, dampers, etc.

1.2.1.3. New clean filters for fan coil units and ventilation fan prior to tests.

1.2.1.4. Insulation for ductwork and piping.

1.2.1.5. Condensate drain piping from fan coil units to the drain receptors.

1.2.1.6. Exhaust systems including fans, drives, ductwork, registers, etc.

1.2.1.7. Miscellaneous hangers, supports, sleeves, inserts, isolators, flexible connections, seismic bracings, and other auxiliary equipment for systems under this section.

1.2.1.8. Equipment identification, operations and maintenance instructions.

1.2.1.9. Testing, adjustment and balancing of air systems.

1.2.1.10. Measurement and recording of final operating condition of HVAC Systems.

1.2.2. Apparatus, piping, ductwork, etc. shall be installed and interconnected so as to form complete systems.

1.2.3. One 4-hour day of instructional time to Owner's maintenance of personnel by Contractor's start-up mechanic.

1.2.4. Other work herein specified and shown on the accompanying drawings, including addendum, change orders and approved shop drawings.

1.3. FEES, PERMITS AND PAYMENTS

1.3.1. Fees, Permits and Payments: Contractor shall secure permits and inspections and pay full cost of same.

1.4. CODES, ORDINANCES, REGULATIONS AND DEFINITIONS

1.4.1. Work and materials shall be in full accordance with the rules and regulations of the following Agencies and Codes:

1.4.1.1. Division of the State Architect

1.4.1.2. The Safety Orders of the Division of Industrial Safety

1.4.1.3. 2013 California Title 24 State Code of Regulations including: California Building Code, California Mechanical Code, California Plumbing Code, California Fire Code, and California Energy Code.

1.4.1.4. City ordinances and other applicable laws or regulations.

1.4.2. Nothing in the drawings or specifications is to be constructed to permit work not conforming to these codes. Drawings and specifications shall take precedence when work and materials called for exceed code requirements.

1.4.3. References to Code Specifications shall mean editions in effect at date of proposals.

1.4.4. Reference to technical societies, trade organizations, governmental agencies are made in Mechanical Sections in accordance with the following abbreviations:

1.4.4.1. AABC - Associated Air Balance Council

1.4.4.2. AGA – American Gas Association

1.4.4.3. AMCA – Air Moving and Conditioning Association

1.4.4.4. ANSI – American National Standards Institute

1.4.4.5. ARI – Air Conditioning and Refrigeration Institute

1.4.4.6. ASHRAE – American Society of Heating, Refrigerating, and Air Conditioning Engineers

1.4.4.7. ASTM – American Society of Testing and Materials

1.4.4.8. CCR – California Code of Regulations

1.4.4.9. DSA – Division of the State Architect

1.4.4.10. ETL – Electrical Testing Laboratory

1.4.4.11. FM – Factory Mutual

1.4.4.12. IRI – Industrial Risk Insurers

1.4.4.13. ISO – Insurance Service Organization

1.4.4.14. NEBB – National Environmental Balancing Bureau

1.4.4.15. NEC – National Electrical Code

1.4.4.16. NFC – National Fire Codes

1.4.4.17. NFPA – National Fire Protection Association

1.4.4.18. NRCA – National Roofing Contractors' Association

1.4.4.19. OSHA – Occupational Safety and Health Administration

1.4.4.20. SMACNA – Sheet Metal and Air Conditioning Contractors' National Association

1.4.4.21. UL – Underwriters Laboratories, Inc.

1.5. EQUIPMENT RESTRICTIONS

1.5.1. The proprietary name, and/or model indicated on the drawings, or the first listed for each category in the specifications is the make and/or model used as the basis for design. Bids shall be based on the use of the products of the selected manufacturers. The contract drawings indicate the installation of the products or equipment of selected manufacturers. Other acceptable manufacturers are named in these specifications.

1.5.1.1. Substitutions will be considered as outlined in General Conditions and Division 1; Section, "Substitutions."

1.5.2. Choice of Equipment: Equipment has been chosen, which will properly fit into the physical spaces provided and indicated, allowing ample room for access, serving, removal and replacement of parts, etc. Adequate space shall be allowed for clearance in accordance with the code requirements and the requirements of the local inspection Department. Physical dimensions and arrangements of equipment to be installed shall be subject to the Owner's approval. Submit shop drawings of equipment layout for approval where equipment space does not comply with drawings. Changes in piping, motors, wiring, controls, structural or installation procedures required by the substituted product or equipment shall be made at no additional cost to the Owner, and with no reduction in scope.

1.5.3. Space Requirements: In the preparation of drawings, a reasonable effort has been made to include equipment manufacturers' recommendations. Since space requirements and equipment arrangement vary according to manufacturer, the responsibility for initial access and proper fit rests with the Contractor. The final arrangement of the equipment and service connections shall allow the unit to be serviced. This shall include space to pull motors, filters, coils, tubes, etc. Make changes in piping and ductwork to suit actual installed equipment without further instructions or additional cost.

1.5.4. Certificates: Execute on behalf of the Owner and deliver to the Owner manufacturers' warranty certificates and instructions, etc. required to assure that the manufacturers' warranties are properly documented and in full effect for the warranty period.

1.6. SUBMITTALS

1.6.1. Section 013300 – Submittal Procedures

1.6.2. Product Data:

1.6.2.1. Submit six copies of data as specified hereafter and in individual sections.

1.6.2.2. Air and Water Balance Report Forms:

1.6.2.2.1. Submit reports on AABC National Standards for Total System Balance.

1.6.3. Shop Drawings:

1.6.3.1. Shop drawings shall be 1/4-inch scale minimum.

1.6.3.2. Dimension Drawings for concrete pad, curb and equipment foundation (1/4-inch scale minimum) including bolt sizes and locations.

1.6.3.3. Seismic Shop Drawings

1.6.3.4. Provide calculations (including the combining of tensile and shear loadings) to support seismic restraint design.

1.6.3.5. Provide hot water piping, plans and sections at 1/4-inch scale.

1.6.3.6. Provide complete scale (1/4-inch minimum) duct fabrication drawings for duct systems and equipment to be installed on this project to the Architect for approval prior to fabrication and installation.

1.6.3.7. The submittal drawings shall be six sets of prints. The five sets shall be returned to the contractor with comments and approvals as noted.

1.7. CLOSEOUT SUBMITTALS

1.7.1. Section 017700 – Execution and Closeout Requirements.

1.7.2. Record Drawings:

1.7.2.1. On completion of work, furnish the Owner through the Architect, with a complete set of record drawings which properly reflect the locations of equipment, fixtures, piping, controls, etc., as actually installed. Where necessary to locate concealed equipment, dimensions, shall be included on these drawings.

1.7.2.1.1. Maintain a separate set of drawings at the job site for such marking of "As-Built" locations. This set shall be updated as the installation work progresses and shall be available to the Architect at job visits. The Contractor shall indicate on the "Record Drawings As-Built" deletions in green. Additions, relocations, rerouting and modifications shall be indicated in red.

1.7.2.2. As a condition of Architect's partial and final review of payment requests, the general contractor shall prepare and maintain record drawings in electronic format. The record drawings model space shall be updated monthly.

1.7.3. Operating and Maintenance Books (Refer to Division 1): Provide the Owner through the Architect, operating instructions and maintenance data books for equipment and materials furnished under this Division.

1.7.3.1. Submit four copies of operating and maintenance data books to the Architect for review two weeks before final inspection of the project. Assemble data in a single complete indexed volume and identify the size, model and features indicated for each item.

1.8. QUALITY ASSURANCE

1.8.1. Complete Performance Of Work

1.8.1.1. Practices of the Trades: Work shall be executed in strict accordance with the best practice of the trades by competent workmen.

1.8.1.2. Complete Functioning of Work: Labor, materials, apparatus, and appliances essential to the complete functioning of the systems described and/or indicated, or which may be reasonably implied as essential, whether mentioned in these contract documents or not, shall be furnished and installed by the Contractor. In cases of doubt as to the work intended, or in the event of need for explanation thereof, the Contractor shall call upon the Architect for supplemental instructions.

1.8.2. Control And Observation

1.8.2.1. The Architect, Engineer, and Owner shall have the right to reject materials or workmanship, which in their opinion are not in accordance with this contract, to interpret contract provisions and the meaning of the drawings and specifications. The above named parties shall be allowed access to the work for observation.

1.8.2.2. Defective work or work contrary to the contract documents may be rejected without regard to state of completion, even though said work has been accepted as a result of a previous observation.

1.8.3. Electrical equipment shall meet the listing requirements and bear a minimum of one of the following agency labels:

1.8.3.1. Underwriter's Laboratories (UL)

1.8.3.2. Electrical Testing Laboratories (ETL)

1.9. DELIVERY, STORAGE, AND HANDLING

1.9.1. Section 016000 – Product Requirements: Product storage and handling requirements.

1.9.2. Deliver and store valves in shipping containers, with labeling in place.

1.9.3. Furnish cast iron and steel valves with temporary protective coating.

1.9.4. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.9.5. Protection: Protect the materials of this section before, during, and after installation and to protect the work and materials of other trades.

1.9.6. Replacements: In the event of damage, immediately make repairs and replacements necessary and at no additional cost to the Owner.

1.10. WARRANTY

1.10.1. Section 017700 – Execution and Closeout Requirements: Product warranties and product bonds.

1.10.2. Furnish one year manufacturer warranty for HVAC materials and methods.

1.10.3. The Contractor shall leave the entire installation in complete working order and free from defects in materials, workmanship or finish. Contractor shall repair or replace at his own expense a part that may develop defects due to faulty material or workmanship during the tests and within a period of one year after the work is accepted by the Owner. Contractor shall guarantee also to repair or replace with like materials existing work of the building or equipment, which is damaged during the repairing of such defective apparatus, materials or workmanship. The signing of the contract for his work covered by these specifications and of which they shall become a part, shall become a written guarantee on the part of the Contract to carry out the provisions of this section of these specifications.

1.11. EXTRA MATERIALS

1.11.1. Section 017700 – Closeout Procedures: Spare parts and maintenance products.

2. PRODUCTS

2.1. GENERAL

2.1.1. Standard of Quality: Materials and equipment shall be new and in good condition. The commercially standard items of equipment and the specific names mentioned in sections of Division 23 are intended to establish the standards of quality and performance necessary for the proper functioning of the mechanical work.

2.1.2. Variations: Since manufacturing methods vary, reasonable minor equipment variations are expected; however, performance and material specifications are minimum requirements. The Architect retains the right to judge equality of equipment that deviates from the specifications.

2.1.3. Symbols are for identification. Symbols, capacities, sizes, and electrical characteristics are indicated on the drawings. Contractor shall make necessary provisions for installation of his equipment and for attaching or connecting his work to other trades.

2.2. IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

2.2.1. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light background color.

2.2.2. Plastic Tags: Laminated three-layer plastic with engraved black letters on light background color, minimum 1-1/2-inch diameter.

2.2.3. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener. Color and Lettering: Conform to ASME A13.1.

2.2.4. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Color and Lettering: Conform to ASME A13.1.

2.2.5. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6-inch wide by 4-mil thick, manufactured for direct burial service.

2.3. FLASHINGS

2.3.1. Ductwork-penetrating roof or exterior walls shall be flashed and counter flashed with galvanized sheet metal.

2.3.2. Furnish and install on each pipe passing through the roof a six-pound seamless lead flashing assembly with eight-inch skirt. Flashing shall have steel reinforced conical boot and be complete with open top cast iron counter flashing and perma-seal waterproofing compound. For sanitary vent, provide a hood with a minimum 2 to 1 free area to vent pipe size.

2.3.3. Ductwork-penetrating roof or exterior walls shall be flashed and counter flashed with galvanized sheet metal.

2.4. SLEEVES

2.4.1. Sleeves for Pipes through Non-fire Rated Floors: 18-gage thick galvanized steel.

2.4.2. Sleeves for Pipes through Non-fire Rated Walls, Footings, and Potentially Wet Floors: Steel pipe.

2.4.2.1. For waterproof sleeves, use J.R. Smith Fig. 172 or equivalent by Zurn or Josam.

2.4.3. Size pipe sleeves to permit placing pipe and specified isolation material for pipes passing through concrete or masonry walls or concrete slabs.

2.4.4. Insulated pipe shall be insulated in sleeves, caulked and sealed as above. Use type CS-CW inserts as manufactured by Pipe Shields, Inc.

2.4.5. Sleeves for Ductwork: Galvanized steel.

2.5. MECHANICAL SLEEVE SEALS

2.5.1. Manufacturers:

2.5.1.1. Thunderline Link-Seal, Inc.

2.5.1.2. NMP Corporation.

2.5.1.3. Or approved equal.

2.5.2. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.6. PIPE ISOLATORS AND COVERING PROTECTION

2.6.1. Pipe isolators: Provide each hanger or clamp for un-insulated piping with an isolation material, having metal backing, to isolate sound vibration and electrolysis. Provide Elcen "Isolator or appeared equal." Isolator not required for fire protection automatic sprinkler piping, waste, vent and natural gas piping.

2.7. ESCUTCHEONS

2.7.1. Provide heavy chrome-plated or nickel plated plates or approved pattern on pipe passing through floors, walls and ceilings in finished areas. Escutcheons shall be chrome-plated steel plates with concealed hinges and setscrew. Pattern shall be approved by the Architect.

2.8. ACCESS COVER AND ACCESS DOORS

2.8.1. Provide access covers over under floor buried mechanical valves and controls located in interior and exterior floor and grade areas.

2.8.2. Provide access door over concealed mechanical valves, controls, duct coils, dampers, fire dampers, pipe chases, concealed mechanical equipment through fire rated walls and ceilings.

2.8.3. Provide fire rated doors for access to mechanical equipment valves.

2.9. ELECTRIC MOTORS

2.9.1. Horizontal mounted fan and pump motors (close coupled excepted) shall be of the "Premium" efficiency type. Provide General Electric "Energy Saver," Westinghose" Tee 11", U.S. Motors,"XB", Baldor "Super E", "Lincoln" "Ultimate EI" motors or approved equal unless otherwise specified. Guaranteed minimum full load efficiencies shall be certified in accordance with Institute of Electrical and Electronic Engineers (IEEE) Standard 112 Test Method B, National Electric Manufacturers' Association (NEMA) MG-1-12.53a, and shall meet or exceed the following minimum criteria:

GUARANTEED MINIMUM FULL-LOAD NOMINAL EFFICIENCY						
MOTOR HORSEPOWER	OPEN MOTORS			ENCLOSED MOTORS		
	1,200 rpm	1,800 rpm	3,600 rpm	1,200 rpm	1,800 rpm	3,600 rpm
1	80.0	82.5	--	80.0	82.5	75.5
1.5	84.0	84.0	82.5	85.5	84.0	82.5
2	85.5	84.0	84.0	86.5	84.0	84.0
3	86.5	86.5	84.0	87.5	87.5	85.5
5	87.5	87.5	87.5	87.5	87.5	87.5
7.5	88.5	88.5	87.5	89.5	89.5	88.5
10	90.2	89.5	88.5	89.5	89.5	89.5
15	90.2	91.0	89.5	90.2	91.0	90.2
20	91.0	91.0	90.2	90.2	91.0	90.2
25	91.7	91.7	91.0	91.7	92.4	91.0
30	92.4	92.4	91.0	91.7	92.4	91.0
40	93.0	93.0	91.7	93.0	93.0	91.7
50	93.0	93.0	92.4	93.0	93.0	92.4
60	93.6	93.6	93.0	93.6	93.6	93.0
75	93.6	94.1	93.0	93.6	94.1	93.0
100	94.1	94.1	93.0	94.1	94.5	93.6
125	94.1	94.5	93.6	94.1	94.5	94.5
150	94.5	95.0	93.6	95.0	95.0	94.5
200	94.5	95.0	94.5	95.0	95.0	95.0

2.9.1.1. 1/2-Hp and Larger: 460-Volt, 3-phase, 60-Hz

2.9.1.2. Smaller than 1/2-Hp: 115-Volt, 1-phase, 60-Hz

2.9.2. General:

2.9.2.1. Motors shall be started across the line unless otherwise specified. Motors shall be selected with low starting current and shall be designed for continuous duty to provide the running torque and pull-in-torque required to suit the load. Unless otherwise specified, motors shall be single speed –1750 rpm.

2.9.2.2. Motors shall have standard drip-proof enclosure unless otherwise specified.

2.9.2.3. Motors exposed to weather shall be of the totally enclosed fan-cooled type.

2.9.2.4. Motors shall have at least 1.15 service factor. Motors shall be selected to operate at design conditions without exceeding nameplate ratings without operating using the service factor.

2.9.2.5. Motors shall be sealed or field-lubricated in which case the latter shall be provided with grease fittings.

2.9.2.6. Pump motors shall be selected to drive the pump through its characteristic curve, from zero to 25% above the design flow, without exceeding rated full load nameplate horsepower. Pump motor nameplate rating shall not be exceeded in pump operation anywhere in the pump curve.

2.9.3. Three-Phase: 3-phase motors 10-Hp and smaller shall have cast iron or steel housings and shall be of the squirrel cage induction type. 3-phase motors 15-Hp and larger shall have cast iron housings and shall be of the squirrel cage induction type.

2.9.4. Single Phase: 1-phase motors shall be capacitor-start type having internal thermal overload protection and with starting, pull-in and running characteristics to suit the load.

2.9.5. Where motor is an integral part of equipment, motor manufacturer shall be as recommended by the equipment manufacturer. However, other items shall comply with these specifications.

2.9.6. Nameplate: A motor nameplate shall be securely affixed to each motor and shall clearly indicate the class of insulation and the service factor in addition to the usual electrical data.

2.10. MOTOR CONTROLLERS

2.10.1. Where required: In general, motor controllers for motors shall be furnished and installed under Division 26 unless indicated or specified otherwise. Motor controller that is not an integral part of a piece of equipment shall be furnished under this Division and shall be installed in accordance with the following specifications.

2.10.2. General: The motor controller shall be steel mounted. Controllers shall be front wired and terminals shall be accessible for wiring directly from the front. No slate or ebony asbestos shall be permitted on a controller from size 00 through size 8. Contacts shall be solid silver cadmium oxide alloy. Bare copper or silver flashed contacts shall not be permitted. Operating coils shall be pressure molded and so designed that if accidentally connected to excessive voltage, they will not expand, bubble or melt. When a coil fails under over-voltage condition, the motor controller shall definitely drop and not freeze the contacts in the "on" position.

2.10.3. Overload Relays: Overload relays shall be furnished for each of the three phases and shall be of the hand-reset variety so that blocking the reset mechanism in the reset position will not prevent the starter from dropping out if the motor is overloaded. This specifically excludes those overload relays which change to automatic reset from hand-reset when the reset mechanism is blocked unless the automatic reset feature can be removed or voided. Accidental depressing of the reset button or mechanism shall not shut off the motor. Overload relays shall not be field convertible from hand to automatic reset type.

2.10.4. Interlocks: Provide space to field-add one or more extra N.O. or N.C. interlocks to (except size 00) motor controllers without removing existing wiring or removing the controller from its enclosure.

2.10.5. Bulletin Numbers: Full voltage magnetic motor controller to be furnished under this Division shall be similar and approved equal to Allen-Bradley (AB) Bulletin Numbers as follows:

2.10.5.1. Individual three phase motor controller – AB Bul. 709.

2.10.5.2. Individual single phase motor controller – AB Bul. 709SP.

2.10.5.3. Combination three phase motor controller with fusible or nonfusible disconnect switch –AB Bul. 712.

2.10.5.4. Combination three motor controller with circuit breaker –AB Bu. 713.

2.10.5.5. Individual three multi-speed motor controller for two speed, single or two winding motors –AB Bul. 716.

2.10.5.6. Combination three phase multi-speed controller with circuit breakers for two speed, single or two winding motors –AB Bul. 717.

2.10.6. NEMA Type: In general, motor controller enclosures shall be NEMA Type 1 general purpose unless exposed to the weather or otherwise indicated on the drawings. Motor controller, including variable frequency drives, exposed to the weather shall have NEMA Type 3R watertight enclosure.

2.10.7. Holding Coils: General holding coils in full voltage magnetic motor controllers shall be suitable for use on 120-Volt AC control voltage.

2.10.8. Overload Protection: Three phase full voltage magnetic motor controller shall be suitable for us on 120-Volt AC control voltage.

2.10.9. Manual Controllers: Manual motor controllers where indicated on the drawings, required and/or specified shall be similar and equal to Allen Bradley Bul. 600 in NEMA Type 1 enclosure or otherwise required for the location of the installation.

2.10.10. Accessories: Motor controllers shall be provided with accessories such as control power transformers, push buttons, selector switches, pilot lights, etc., as indicated on the drawings and as specified herein. In general, most motor controllers shall include a maintain-contract start-stop button or run switch.

2.10.11. Manufacturer: Allen-Bradley or approved equal.

2.11. BELT DRIVES AND GUARDS

2.11.1. Belt Driven Equipment: Provide with V-belt type, adjustable-pitch driving sheaves for up through 25-Hp motors. 30-Hp and above shall have fixed pitch. Provide additional drive changes for motors when necessary to meet specified CFM for final air balance (one change minimum) at no additional cost to owner.

2.11.2. Drives: Minimum horsepower rating of 1.5 times motor nameplate horsepower.

2.11.3. Sheaves: Cast iron, machined, balanced, and keyed to shaft and locked with Allen type set screws.

2.11.4. Pitch Diameters: Minimum 3-inch for A section belts, minimum 5-inch for B section belts.

2.11.5. Guards: Provide belt drives with guards per OSHA requirements, metal construction, with angle iron framework with 1/2-inch expanded metal front panels and removable section held in place with studs and wing nuts for easy replacement of belts. Provide openings at shaft ends for tachometer readings.

2.12. FORMED STEEL CHANNEL

2.12.1. Manufacturers:

2.12.1.1. Allied Tube & Conduit Corp.

2.12.1.2. B-Line Systems.

2.12.1.3. Unistrut Corp.

2.12.1.4. Or approved equal.

2.12.2. Product Description: Galvanized 12-gage thick steel. With holes 1-1/2-inch on center.

3. EXECUTION

3.1. PIPING AND EQUIPMENT IDENTIFICATION

3.1.1. Equipment Labels: Equipment furnished and installed under this section shall be provided with manufacturers metal labels securely attached to each individual piece of equipment and showing complete and comprehensive performance characteristics, size, model, serial number etc.

3.1.2. Dampers: Volume dampers above new or existing ceilings shall be marked by attaching a bright yellow, 12" length strip of cloth attached to damper rod. Groove ends of shafts to indicate open and closed position.

3.1.3. Piping shall have color coded markers as to type of use, service, and direction of flow in accordance with the latest edition of ANSI A 13.1. Locate markers at each valve, at entries to walls, and on 20 foot centers on straight runs of pipe. Provide a flow arrow at each identification marker. Labels or markers shall be made of plastic sheet with pressure sensitive adhesive suitable for the intended application.

3.1.3.1. Color Coding for Labels and Bands by Hazard Classification:

3.1.3.1.1. Dangerous Materials – Yellow:

3.1.3.1.1.1. Natural Gas – yellow with black letters

3.1.3.1.1.2. Industrial cold water – yellow with black letters

3.1.3.1.1.3. Heating hot water – yellow with black letters

END OF SECTION

SECTION 23 05 48

VIBRATION AND SEISMIC CONTROLS FOR HVAC

1. GENERAL

1.1. DESCRIPTION

1.1.1. General: Furnish and install necessary equipment for building systems vibration and seismic controls, including, but not limited to, isolation mounts, brackets, base frames where required, seismic restraints, flexible connectors, pipe isolation hangers, and ductwork isolation hangers.

1.1.2. Primary Requirements: Vibration or structural noise from vibration-producing building systems shall not transmitted to building structure or components, including, but not limited to, roofs, floors, beams, columns, walls, partitions, ceilings, studs, ceiling framing and suspension systems. Vibration and seismic control installations shall be complete in every respect, and shall be tested and adjusted to the satisfaction of the Architect.

1.1.3. Code Requirements: Under no circumstances shall the requirements in this section take precedence over code or life safety requirements. The seismic resistance capability of vibration and seismic control equipment shall be certified by a registered professional engineer in the state in which the project resides, and the requirements of applicable codes shall be met.

1.2. VIBRATION-PRODUCING BUILDING SYSTEMS

1.2.1. Vibration-producing systems on this project include, but are not limited to, the following:

1.2.1.1. HVAC equipment including (but not limited to) fan coil units, fans, and condensing units.

1.2.1.2. Internally-isolated equipment.

1.3. GENERAL REQUIREMENTS FOR THE MANUFACTURER

1.3.1. Schedules: Consult vibration isolation schedule in drawings or specifications for equipment types and required isolation devices including types, static deflections, bases, seismic restraints, etc. Static deflections specified are based on the anticipated equipment characteristics. In the event the equipment proposed by the Contractor has characteristics other than those indicated, particularly the rated rpm, the static deflection shall be re-evaluated and the proper mountings and other devices shall be provided.

1.3.2. Equipment: Provide vibration isolators, base frames, inertia bases and seismic restraints of sufficient size and distribution to assure that deflection, stability and seismic restraint requirements are met. For typical units, no fewer than four isolators shall be provided. Isolators shall be provided to deflect uniformly under operating gravity and equipment thrust loadings to within ±10% of specified deflection values.

1.3.3. Specific Equipment: Specific manufacturer's equipment items are listed in this specification. All current and complete requirements from the listed manufacturer of these items shall be integral to this specification, unless such requirements conflict with requirements herein.

1.3.4. Instructions to Contractor:

1.3.4.1. Provide written installation instructions to the Contractor.

1.3.4.2. Provide a visit or visits to the jobsite before equipment is installed for the purposes of instruction. During the visit the manufacturer will inspect intended equipment locations and instruct installers in correct equipment installation procedure and sequence.

1.3.5. Final Inspections: Provide a visit or visits to the jobsite after equipment is installed for the purposes of inspection. Identify all improperly installed vibration isolation equipment and instruct the contractor in corrective work.

1.4. GENERAL REQUIREMENTS FOR THE CONTRACTOR

1.4.1. Short-Circuiting: Rigorously avoid short-circuiting to the building any vibration-isolated piece of equipment, pipe, duct or other component. Short-circuits with or via rigid conduits, drain lines, rigid braces, rigid sleeves, framing, etc. all shall be avoided. The Contractor shall oversee trades to prevent the short-circuiting of any vibration isolation system and shall bring any unresolved conflicts to the Architect's attention.

1.4.2. Extra Parts: Supply and install any incidental equipment or parts needed to meet the requirements stated, even if not specified or shown on drawings, without claim for additional payment.

1.4.3. Packaged Units: Where equipment within Packaged Units is provided with separate isolators by the equipment manufacturer and the package enclosure is scheduled to be on an isolator assembly, the internal isolators shall be removed or permanently blocked and the isolated components they supported shall be rigidly attached to the enclosure.

1.4.4. Pre-Installation Instruction by Manufacturer: Make installers of vibration isolation equipment available for instruction by the equipment Manufacturer.

1.4.5. Post-Installation Inspection and Adjustment:

1.4.5.1. After each equipment unit installation is complete and under full operational load, vibration isolators shall be adjusted so that loads are transferred to them and away from temporary blocking washers and shims. Blocks and shims then shall be removed and used as gauges to judge required clearances. Washers shall be moved away.

1.4.5.2. Inspect all vibration-isolated equipment, coordinate the work of all involved trades, and see that vibration isolators are not short-circuited by seismic restraints, drain lines, conduits, stanchions, control tubing, duct connections, pipe connections, etc. Ensure that hanger isolators and their rods or wires do not touch any other building component.

1.4.5.3. Obtain "rough-in" inspection and approval from the Architect of any installation to be covered or enclosed, prior to such closure.

1.4.5.4. Schedule final inspection(s) by the equipment Manufacturer after installation as required in Section 1.0.E. Obtain "rough-in" inspection by the Manufacturer of any installation to be covered or enclosed, prior to such closure.

1.4.6. Response to Punchlists: Upon completion of the work, the Architect or Architect's representative will carry out an inspection of the project and of final project record documents and will inform the installing contractor via punchlists of any further work that must be completed. Correct, at no additional cost to the Owner, all installations that are deemed defective in workmanship or materials by the Architect or Architect's representative.

1.5. SEISMIC RESTRAINT CODE REQUIREMENTS

1.5.1. Seismic Design: Contractor shall be responsible for anchors and connections of mechanical work to the building structure to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. Provide structural calculations certified and stamped by a Registered Professional Structural Engineer in the State of California prior to installation.

1.5.1.1. HVAC equipment shall be anchored or braced to meet the horizontal and vertical forces prescribed in the 2013 CBC.

1.5.1.1.1. The attachment of the following items shall be designed to resist the forces prescribed above, but may not be detailed on the plans. The DSA project inspector shall verify that these items have been anchored.

1.5.1.1.1.1. Equipment weighing less than 400-lb supported directly on the floor or roof.

1.5.1.1.1.2. Temporary or movable equipment with flexible connection to power or utilities.

1.5.1.1.1.3. Equipment weighing less than 20-lb supported by vibration isolators.

1.5.1.1.1.4. Equipment weighing less than 20-lb suspended from a floor or roof or hung from a wall.

1.5.1.2. Ductwork and piping shall be braced to resist the forces prescribed in ASCE 7-05 Section 13.3 as defined in ASCE 7-05 Section 13.6.8, 13.6.7, 13.6.5.5 item 6, and 2013 CBC.

1.5.1.2.1. The bracing and attachments to the structure shall comply with one of the OSHPD Pre-Approvals and bearing an OPA number as modified to satisfy anchorage requirements of ACI 318, Appendix D.

1.5.1.2.1.1. Mason Industries, OPA-349

1.5.1.2.1.2. ISAT, OPA-485

1.5.2. Where anchorage details are not shown on the drawings the field installation shall be subject to the approval of the Structural Engineer.

1.5.3. Where platform details, anchorage details, or location are not shown or are different than shown on the drawings, the field installation shall be subject to the approval of the Division of the State Architect.

1.6. MATERIAL REQUIREMENTS

1.6.1. Design Life: Bases, vibration isolation equipment, and seismic restraint equipment shall be capable of surviving the life of the equipment served.

1.6.1.1. Materials, components and parts shall be new.

1.6.1.2. Mmetal parts of vibration isolators to be installed out of doors shall be hot-dip galvanized after fabrication. Galvanizing shall comply with ASTM A123 and A153 as applicable.

1.6.2. Steel Springs: Springs shall be so selected and installed that the ratio of spring diameter to final compressed height shall be no less than 0.8 and no more than 1.2. Further, each spring shall have a minimum additional travel to solid equal to 50% of its actual deflection.

1.6.3. Neoprene Elements: All elastomeric mounts, pads, bushings, sleeves, grommets, washers, etc., shall have a Shore-A hardness of 30 to 50 durometer after minimum aging of 20 days or corresponding oven-aging.

1.6.4. Bases: For equipment that is not constructed with a base structure compatible with vibration isolation mounts, a base frame shall be supplied with the isolators. A base frame shall also be supplied where an item or equipment and its drive motor require a common rigid base.

1.6.5. Seismic Restraints: Seismic restraints shall resist a seismic acceleration in any direction in accordance with all relevant codes without damage or deformation to equipment, building or mounts. Restraints shall not short-circuit vibration isolators during normal operation. Generally, there shall be as many seismic restraints as there are vibration isolators on a piece of equipment. Restraints and isolators shall be located close together on equipment or frames.

1.7. SPEED AND BALANCE REQUIREMENTS FOR ROTATING EQUIPMENT

1.7.1. Speed Limits: Fans and other rotating mechanical equipment shall not operate at speeds in excess of 80% of their true critical speed.

1.7.2. Balancing: Rotating devices such as fans shall be balanced according to the schedule below. The following vibration displacement levels shall not be exceeded when the equipment is rigidly grounded to structure (with the isolators blocked or "grounded out.")

1.7.2.1. Fans

1.7.2.1.1.	< 600 rpm	4 mils peak to peak
1.7.2.1.2.	600 to 999 rpm	3
1.7.2.1.3.	1000 to 2000 rpm	2
1.7.2.1.4.	> 2000 rpm	1

1.7.3. Remedial Work: Should any rotating equipment cause excessive noise or vibration, the Contractor shall be responsible for rebalancing, realignment, or other remedial work required to reduce noise and vibration levels. Excessive is defined as exceeding the manufacturer's specifications for the unit in question or exceeding the above displacement values.

1.8. SUBMITTALS BY THE MANUFACTURER

1.8.1. Compliance: Comply with the general requirements for this project.

1.8.2. Specifications: Submit Manufacturer's specifications and other data needed to prove compliance with all specified requirements.

1.8.3. Installation Instructions: Submit Manufacturer's recommended installation instructions and procedures, including written instructions and checklists to be delivered to the Contractor to aid in proper installation of manufacturer's equipment.

1.8.4. Schedules and Shop Drawings: Submit schedules and large scale Shop Drawings clearly showing all pertinent data including, but not limited to:

1.8.5. Structural Requirements: Submit calculations by a structural engineer licensed in the state in which the building is to be erected, certifying that all seismic restraints, bolts, cables and associated components will conform with all pertinent seismic- related requirements.

1.8.6. Exceptions: Identify proposed changes, differences and/or discrepancies, including verbiage, terms and definitions between Contract Documents and submittals.

1.8.7. Samples: Submit samples of any or all proposed equipment at no charge to the owner.

1.8.8. Detrimental Field Conditions: Submit a list of field conditions which the manufacturer has determined will limit the specified operational performance requirements specified for isolation devices.

1.9. SUBMITTALS BY THE CONTRACTOR

1.9.1. Compliance: Comply with the general requirements for this project.

1.9.2. Contract Closeout: At completion of installation, submit the following documents. Submission of these documents must be complete before final acceptance of vibration isolation systems is given. Assistance from the vibration isolation equipment Manufacturer may be required.

1.9.2.1. A complete tabulation showing for each vibration isolator:

1.9.2.1.1. The actual static deflection measured at the project.

1.9.2.1.2. The specified minimum static deflection.

1.9.2.2. A report certifying:

1.9.2.2.1. That each piece of operative rotating mechanical equipment does not exceed the specified vibration displacement level.

1.9.2.2.1.1. That each piece of isolated equipment or equipment component (ducts, pipes, conduit, etc.) is not short-circuited.

1.9.2.2.1.2. That the requirements of Articles 1.7 are satisfied for equipment.

1.10. QUALITY ASSURANCE

1.10.1. Manufacturer's Responsibility: A single firm shall be responsible for the design, fabrication and delivery of vibration isolation equipment, including all components and seismic restraints.

1.10.2. Manufacturer's Experience: The Manufacturer shall have successful experience in vibration isolation and seismic control equipment fabrication, including no less than five years experience in fabrication and delivery of equipment equal in quantity or complexity to this work.

1.10.3. Structural Certification: The seismic resistance capability of all equipment shall be certified by a registered professional engineer in the state in which the project resides.

1.10.4. Mountings shall have anchorage pre-approval "OPA" number from OSHPD in the State of California certifying the maximum certified horizontal and vertical load ratings.

1.11. WARRANTY

1.11.1. Bases, vibration isolation equipment, and seismic restraint equipment shall be warranted against defective workmanship, operation and materials for the life of the equipment supported by these items.

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

2.1.1. International Seismic Application Technology (ISAT)

2.1.2. Mason Industries Inc. (Mason)

2.1.3. M. W. Sausse and Co. (Sausse)

2.2. VIBRATION ISOLATORS

2.2.1. The listing of a Manufacturer's product in sections below does not certify that it fully complies with these specifications. Modifications of a listed product required to bring it into compliance with these specifications shall be indicated in submittals and made prior to jobsite delivery.

2.2.2. Neoprene Pad and Bearing Plate: Neoprene pad shall be waffled, 3/4-inch thick, 30 or 40 or 50 durometer, as scheduled, with a minimum 1/16-inch thick steel bearing plate on top. Pad areas shall be selected so no more than 15% and no less than 10% deflection occurs due to the supported load. Provide single or multiple pads and plates in series as specified with 1/16-inch-thick steel shim between layers. Provide "Super W + plate(s) or SWM" by Mason or approved equal.

2.2.3. Neoprene Bushing for Bolt Holes in Pads: Bushings shall be minimum 3/16-inch thick in all places and maximum 40-durometer. Provide steel washer to distribute bolt head loads to bushing. Provide bushings by Mason or approved equal.

2.2.4. Steel Spring Isolator with Integral Seismic Restraint: Mount shall resist a seismic acceleration in any direction of at least 0.5-G or as required by the relevant codes. Restraint housing shall not short-circuit the vibration-isolation performance of the spring during normal operation. Each spring sub-assembly shall have a friction pad of ribbed or waffled neoprene permanently adhered to the bottom. The pad shall be 5/16 to 1/2-inch thick, 40-durometer hardness, and sized for a load of 60-psig. Mount shall be welded or bolted to the building structure with bolts designed to resist the results of seismic or wind loading forces acting on the mount including mount overturning. Provide "SSLFH" by Mason, "FYS" by Peabody or approved equal.

2.2.5. Steel Spring Isolation Hanger: Vibration isolation hangers shall contain a laterally-stable steel spring set in a neoprene cup manufactured with a bushing to prevent short-circuiting of the hanger rod as it passes through the hanger housing. The cup shall contain a steel washer designed to properly distribute the spring load on the neoprene and prevent its crushing. Spring diameters and hanger housing lower hole sizes shall be large enough to permit the hanger rod to swing through a 30-degree arc before contacting the housing. Neoprene cup shall be minimum 1/4-inch thick and maximum 50-durometer. Provide "30" by Mason or approved equal.

2.3. BASES

2.3.1. Structural Bases:

2.3.1.1. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and restraints.

2.3.1.2. Construction: Welded structural steel with gusset brackets, supporting equipment and motor with motor slide rails.

2.4. SEISMIC RESTRAINTS

2.4.1. Seismic restraints shall be designed to meet the code requirements of article 1.5 above.

2.4.2. Floor-Mounted Restraint: Separate earthquake restraints shall be provided for floor-mounted equipment on vibration isolation mounts that do not include seismic restraint housings. Provide a minimum of four all-directional earthquake restraints that are located as close to the vibration isolators as possible to facilitate attachment to both the equipment base and the structure. The restraints shall consist of interlocking steel members restrained by a shock-absorbent neoprene bushing. Bushing shall be a minimum of 1/4-inch thick. Restraints shall be manufactured with an air gap between hard and resilient material of 3/16 to 1/4-inch. Snubbers shall be installed with factory-set clearances. Snubber end shall be removable to allow inspection of internal clearances. Provide "Z-1011 or Z-1225" by Mason or approved equal.

2.4.3. Slack Cable Restraint: Provide slightly slack steel cables of appropriate sizes and lengths and with appropriate fittings and anchorage for all isolated ceiling-suspended equipment, all isolated roof-mounted equipment, and all isolated pipes and ducts. Hanger rods shall be reinforced against upward vertical loads where required. Use seismic restraint cables as engineered and fabricated by A/B, Mason or approved equal.

2.5. PIPING ISOLATORS

2.5.1. Flexible Pipe Connectors: Flexible pipe connectors shall be fabricated of multiple plies of nylon cord, fabric, and neoprene, vulcanized so as to become inseparable and homogeneous. Straight connectors shall be formed into a double sphere shape. Elbow connectors shall have a single sphere shape at the curve of the unit. Flexible connectors shall be able to accept compressive, elongating, transverse, and angular movements. Flexible connectors shall be selected and specially outfitted if necessary to suit the system temperature, pressure, and fluid type. Connectors for pipe sizes 2-inch and smaller shall have threaded female union couplings on each end. Larger sizes shall be fitted with metallic flange couplings. Control cables shall be provided if required. Provide "MFTNC, MFNEC or MFTFU" by Mason or approved equal.

2.5.2. Resilient Pipe Anchor or Guide: These units shall be the standard product of the vibration isolation mounting manufacturer, incorporating neoprene isolation elements that are specifically designed for providing resilient vertical and/or horizontal support when serving as a pipe anchor or guide. Minimum neoprene thickness 1/2-inch. Maximum neoprene durometer 50. Provide "Custom" by A/B, "ADA/GDA" by Mason, "RSF" by Peabody or approved equal.

2.5.3. Resilient Pipe Sleeve at Support or Construction Penetration: Sleeve shall consist of a formed and stiffened galvanized steel sleeve lined on the inside with moisture and vermin resistant felt bonded to the metal sleeve and 1/2-inch thick. Sleeve inside diameter shall equal pipe outside diameter in each application. Sleeve shall be split longitudinally so it can be snapped over pipes and re-closed without damage. Sleeve lengths shall be as recommended by the manufacturer for the given diameters, but shall not be less than 3-inch. Provide "PR-Isolator" by Porter-Roemer, "Trisolator" by Stoneman Engineering or approved equal.

2.5.4. Resilient Pipe Sleeve at Construction Penetration: This unit shall consist of two bolted pipe halves with 3/4-inch or thicker neoprene sponge bonded to the inner faces. The seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping. Sleeve shall be 2-inch longer than the thickness of the construction it penetrates. Where pipe temperatures exceed 240°F, use 10-lb/ft^3 density glass fiber insulation in lieu of sponge neoprene. Provide "SWS" by Mason, "PS-1-D" by Peabody or approved equal.

2.5.5. Freshwater Piping Isolation Systems: Holdrite Silencer System by Hubbard or equal.

2.6. FLEXIBLE DUCT CONNECTORS

2.6.1. Fabricate flexible sleeves for connecting ducts to fans of neoprene-impregnated fabric or loaded vinyl, as scheduled. Sleeve material shall be impervious to air. Loaded vinyl shall weigh minimum 1-lb/ft^2 and shall be "KNC-100B" by Peabody or equal.

2.7. CUSTOM RESILIENT AND AIRTIGHT SLEEVES

2.7.1. Sleeve shall be custom-fabricated. It shall be formed from pipe or sheet metal that is 1-inch larger in each cross-sectional dimension than the penetrating element and is 2-inch longer than the thickness of the construction penetrated. The annular space between the sleeve and the penetrating element shall be packed tightly with long-fiber glass fiber of 2- to 3-lb/ft^3 density to within 1/2-inch of the ends of the sleeve. The remaining 1/2-inch space at each end shall be filled completely with acoustical sealant to form an airtight seal. Glass fiber packing by CertainTeed, Manville, or Owens-Corning. Acoustical Sealant by DAP, Tremco or U.S. Gypsum, choice depending on application and as approved by Architect.

2.8. PIPING VIBRATION ISOLATION PRODUCT REQUIREMENTS

2.8.1. Felt Lined Saddles or Metal Sleeves: General HVAC piping supports or penetrations throughout the building.

2.8.2. Neoprene Lined Saddles or Metal Sleeves: HVAC piping supports or penetrations within 10-foot of the project spaces listed below.

2.8.3. 1-inch Deflection Steel Spring Isolators or Hangers: For use within three pipe support points of major plumbing or HVAC equipment, including, but not limited to pumps and chillers.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

1. GENERAL

1.1. RELATED DOCUMENTS

1.1.1. Division 23 specification sections, drawings, and general provisions of the contract apply to work of this section, as do other documents referred to in this section.

1.2. SCOPE OF WORK

1.2.1. The work included in this section consists of furnishing labor, instruments, and tools required in testing, adjusting and balancing the HVAC systems, as described in these specifications or shown on accompanying drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results.

1.2.2. The items requiring testing, adjusting and balancing include the following:

AIR SYSTEMS:
Fan Coil Units
Exhaust Fans
Diffusers, Registers and Grilles
Coils (Air Temperatures)

1.3. DEFINITIONS, REFERENCES, STANDARDS

1.3.1. Work shall be in accordance with the latest edition of the AABC National Standards. If these contract documents set forth more stringent requirements than the AABC National Standards, these contract documents shall prevail.

1.3.1.1. AABC: The Associated Air Balance Council is a nonprofit association of independent, certified agency specializing in testing, adjusting, and balancing HVAC systems. The AABC National Standards (latest edition), provides standards and operational criteria for HVAC Systems

1.4. ACOUSTICAL PERFORMANCE REQUIREMENTS

1.4.1. Noise levels shall be quantified in all project spaces and compared with the specified maximum allowable Background Noise Criteria (NC). Insofar as possible under the jurisdiction of the Air Balance Contractor and the Mechanical Contractor, adjustments shall be made to air handling equipment to insure that maximum NC are not exceeded in any project space.

1.5. QUALIFICATIONS

1.5.1. Agency Qualifications: The TAB Agency shall be a current member of the Associated Air Balance Council (AABC).

1.6. SUBMITTALS

1.6.1. Qualifications: The TAB Agency shall submit a company resume listing personnel and project experience in air and hydronic system balancing and a copy of the agency Test and Balance Engineer (TBE) certificates.

1.6.2. Procedures and Agenda: The TAB Agency shall submit the TAB procedures and agenda proposed to be used.

1.6.3. Sample Forms: The TAB Agency shall submit sample forms, which shall include the minimum data required by the AABC National Standards.

1.7. REPORTS

1.7.1. Final TAB Report – The TAB Agency shall submit the final TAB report for review by the engineer. Outlets, devices, and equipment shall be identified, along with a numbering system corresponding to report unit identification. The TAB Agency shall submit an AABC "National Project Performance Guaranty" assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and AABC National Standards.

1.7.2. Submit five copies of the Final TAB Report.

1.8. ACOUSTICAL QUALITY ASSURANCE

1.8.1. The same Air Balance Contractor shall be responsible for all aspects of air balancing including all sound level measurements.

1.8.2. The Air Balance Contractor shall have successful experience in air balancing and sound level measurements including no less than five years experience on projects equal to the size and complexity of this work.

1.8.3. Measurement equipment shall be of the class specified below and shall have been calibrated within six months prior to this work.

2. PRODUCTS

2.1. INSTRUMENTATION

2.1.1. Instruments used for measurements shall be accurate and calibrated. Calibration and maintenance of instruments shall be in accordance with the requirements of AABC National Standards.

3. EXECUTION

3.1. OPTIONAL TAB SERVICES

3.1.1. Duct Leakage Testing: The installing contractor shall isolate and seal sections of ductwork for testing. The test pressures required and the amount of the duct to be tested shall be described by the engineer in the appropriate duct classification section. Testing shall be based on one test per section only unless otherwise noted.

3.1.2. Temperature Testing: To verify system control and operation, a series of three temperature tests shall be taken at approximately two hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than 2°F from the thermostat or control-set point during the tests. Outside temperature and humidity shall also be recorded during the testing periods.

3.1.3. TAB report verification: At the time of final inspection, the TAB Agency may be required to recheck, in the presence of the owner's representative, specific or random selections of data recorded in the certified report. Points and areas for rechecks shall be selected by the Owner's representative. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for rechecks, specific plus ranadom, will not exceed 10% of the total number tabulated in the report.

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

1. GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Piping insulation, jackets and accessories.

1.1.1.2. Equipment insulation and covering.

1.1.1.3. Breeching insulation.

1.1.1.4. Ductwork insulation and jackets.

1.1.1.5. Internal ductwork insulation.

1.2. QUALITY ASSURANCE

1.2.1. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.

1.2.2. Pipe insulation thickness shall be in accordance with State of California Energy Code (CEC) as a minimum. Use thickness specified, if greater than CEC requirements

1.2.3. Sound absorption measurements and calculations shall be made in complete conformance with the latest revision of ASTM C 423, *Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method*, and ASTM E795, *Standard Practice for Mounting Specimens during Sound Absorption Tests*. Test specimens shall be tested in an F-25 Mounting configuration. Tests shall be conducted by a laboratory that is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) to conduct the test.

2. PRODUCTS

2.1. PIPE INSULATION

2.1.1. Manufacturers:

2.1.1.1. Johns Manville.

2.1.1.2. Owens Corning.

2.1.1.3. Pittsburgh Corning Corp.

2.1.1.4. Childers Products Co.

2.1.1.5. Or approved equal.

2.1.2. Glass Mineral Fiber: ASTM C547; rigid molded, noncombustible.

2.1.2.1. k (ksi) factor: 0.24 at 75°F.

2.1.2.2. Maximum service temperature: 850°F.

2.1.2.3. Vapor Retarder Jacket: White Kraft paper with glass fiber yarn and bonded to aluminized film, secured with self-sealing longitudinal laps and butt strips or with outward clinch expanding staples and vapor retarder mastic.

2.1.3. Cellular Foam: ASTM C534; flexible, cellular elastomeric, molded or sheet.

2.1.3.1. k (ksi) Value: 0.27 at 75°F.

2.1.3.2. Maximum Service Temperature: 220°F.

2.1.3.3. Connection: Waterproof vapor retarder adhesive, Rubatex R-373.

2.1.3.4. Outdoor Protection: Outdoor installation shall have UV-protective coating, Rubatex 374

2.1.4. Jackets:

2.1.4.1. PVC Plastic: One piece molded type fitting covers and sheet material, off-white color.

2.1.4.1.1. Thickness: 20-mil.

2.1.4.1.2. Connections: Tacks; Pressure sensitive color matching vinyl tape.

2.1.4.2. Canvas Jacket: UL listed fabric, 6-oz/yd^2, plain weave cotton treated with dilute fire retardant lagging adhesive.

2.1.4.3. Aluminum Jacket: 0.025-inch thick sheet, smooth finish, with longitudinal slip joints and 2-inch laps, die shaped fitting covers with factory attached protective liner.

2.1.4.4. Stainless Steel Jacket: Type 304 stainless steel, 0.010-inch thick sheet, corrugated finish.

2.2. DUCTWORK INSULATION

2.2.1. Manufacturers:

2.2.1.1. Johns Manville.

2.2.1.2. Owens Corning.

2.2.1.3. Pittsburgh Corning Corp.

2.2.1.4. Childers Products Co.

2.2.1.5. Or approved equal.

2.2.2. Flexible Glass Fiber: ASTM C553; flexible, noncombustible blanket.

2.2.2.1. k (ksi) Value: 0.27 at 75°F.

2.2.2.2. Vapor Retarder Jacket: FSK, aluminum foil reinforced with fiberglass yarn and laminated to fire-resistant kraft, paper secured with UL listed pressure sensitive tape and/or outward clinched expanded staples and vapor barrier mastic as needed.

2.2.3. Canvas Jacket: UL listed fabric, 6-oz/yd^2, plain weave cotton treated with dilute fire retardant lagging adhesive.

2.3. DUCT LINER

2.3.1. Manufacturers:

2.3.1.1. Johns Manville.

2.3.1.2. Owens Corning.

2.3.1.3. Pittsburgh Corning Corp.

2.3.1.4. Childers Products Co.

2.3.1.5. Or approved equal.

2.3.2. The sound absorbing characteristics of duct and plenum lining shall comply with this specification. Representative samples shall be subjected to tests in accordance with applicable standards and procedures in order to demonstrate such compliance. A special test for this project is not required if the manufacturer has certified test results for proposed products.

2.3.3. Minimum Sound Absorption Requirements

2.3.3.1. Duct or plenum lining at specified thicknesses and densities shall have the following minimum octave band sound absorption coefficients when tested in the F-25 Mounting configuration in accordance with ASTM E 795:

	Octave Band Center Frequency in Hertz					
	125	250	500	1000	2000	4000
1 inch thick, 2.0 pcf	.15	.50	.55	.80	.85	.95
2 inch thick, 2.0 pcf	.25	.75	.90	.95	.95	.95
4 inch thick, 2.0 pcf	.60	.90	.95	.95	.95	.95

2.3.4. Rectangular Duct Liner:

2.3.4.1. Permacote Linacoustic meeting ASTM C1071 with air surface coated with acrylic coating treated with EPA registered anti-microbial agent proven to resist microbial growth as determined by ASTM G 21 and G 22.

2.3.4.2. 'k" (ksi) value: ASTM C 518, 0.25 at 75°F.

2.3.4.3. Noise Reduction Coefficient: .70 or higher based on "Type A mounting" and tested in accordance to ASTM C423.

2.3.4.4. Maximum Velocity: 5,000 ft/min.

2.3.4.5. Adhesive: Meeting ASTM C 916.

2.3.4.6. Fasteners: Duct Liner galvanized steel pins, welded or mechanically fastened.

2.3.5. Round Duct Liner:

2.3.5.1. Permacote Spiracoustic, rigid preformed round liner, or Spiracoustic Plus with air surface coated with acrylic coating treated with EPA register anti-microbial agent proven to resist microbial growth as determined by ASTM G21 and G22.

2.3.5.2. 'k' (ksi) Value: ASTM C 518, 0.23 at 75°F.

2.3.5.3. Noise Reduction Coefficient of .70 as per ASTM C 423. (Type A mounting).

2.3.5.4. Maximum Velocity: 5,000 ft/min.

3. EXECUTION

3.1. SCHEDULES

3.1.1. Piping Insulation:

3.1.1.1. Condensate Drain:

3.1.1.1.1. Glass Fiber Insulation, 1-inch thick

3.1.1.2. Refrigerant Suction:

3.1.1.2.1. Elastomeric Foam Insulation: 1-inch thick

3.1.1.3. Refrigerant Hot Gas:

3.1.1.3.1. Elastomeric Foam Insulation: ¾-inch thick

3.1.2. Ductwork Insulation:

3.1.2.1. Supply Ducts (Cooling Systems):

3.1.2.1.1. Flexible Glass Fiber: R-8

3.1.2.2. Return Ducts in Unconditioned Spaces:

3.1.2.2.1. Flexible Glass Fiber: R-8

END OF SECTION

SECTION 23 20 00

HVAC PIPING AND PUMPS

1. GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Pipe hangers and supports.

1.1.1.2. Pipe and pipe fittings.

1.1.1.3. HVAC piping specialties.

2. PRODUCTS

2.1.1. PIPE HANGERS AND SUPPORTS

2.1.2. Manufacturers:

2.1.2.1. Carpenter & Paterson Inc.

2.1.2.2. Creative Systems Inc.

2.1.2.3. Flex-Weld, Inc.

2.1.2.4. Glope Pipe Hanger Products Inc.

2.1.2.5. Michigan Hanger Co.

2.1.2.6. Superior Valve Co.

2.1.3. Conform to ASME B31.1.

2.1.4. Hangers for Pipe Sizes 1/2 to 1-1/2-inch: Carbon steel, adjustable swivel, split ring.

2.1.5. Hangers for Cold Pipe Sizes 2-inch and larger: Carbon steel, adjustable, clevis.

2.1.6. Multiple or Trapeze Hangers for Pipe Sizes to 4-inch: Steel channels with welded spacers and hanger rods.

2.1.7. Wall Support for Pipe Sizes to 3-inch: Cast iron hooks.

2.1.8. Vertical Support: Steel riser clamp.

2.1.9. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.1.10. Floor Support for Hot Pipe Sizes to 4-inch: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.1.11. Copper Pipe Support: Copper-plated, carbon steel ring.

2.2. PIPES AND TUBES

2.2.1. Refrigerant Piping:

2.2.1.1. Copper Tubing: ASTM B280, Type ACR hard drawn.

2.2.1.2. Fittings: ANSI/ASME B16.22 wrought copper.

2.2.1.3. Joints: ANSI/ASTM B32, solder Grade 95TA.

2.2.2. Equipment Drains and Overflows:

2.2.2.1. Copper Tubing: ASTM B88, Type L, hard drawn, cast brass, wrought copper fittings, lead free solder joints.

2.3. PIPING SPECIALTIES

2.3.1. Flanges, Unions, and Couplings:

2.3.1.1. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3.2. Pressure Gages:

2.3.2.1. Manufacturers:

2.3.2.1.1. Weiss Model LF4UGY.

2.3.2.1.2. Trerice

2.3.2.1.3. Marsh.

2.3.2.1.4. Tyco.

2.3.2.2. Gage: ASME B40.1, UL 393 with bourdon tube, liquid filled stainless steel movement, brass socket, front calibration adjustment, black scale on white background.

2.3.2.3. Case: Fiberglass reinforced polypropylene with o-ring weatherproof seals and replaceable acrylic window.

2.3.2.4. Bourdon Tube: Phosphor bronze.

2.3.2.5. Dial Size: 4-1/2-inch diameter.

2.3.2.6. Mid-Scale Accuracy: One percent.

2.3.2.7. Scale: Psi. Midpoint of scale range shall be operating pressure.

2.3.3. Thermometers:

2.3.3.1. Manufacturers:

2.3.3.1.1. Weiss Model Vari-angle.

2.3.3.1.2. Trerice

2.3.3.1.3. Marsh.

2.3.3.1.4. Tyco.

2.3.3.2. Stem Type Thermometer: ASTM E1, adjustable angle, red appearing mercury, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.

2.3.3.3. Size: 9-inch scale.

2.3.3.4. Window: Clear glass.

2.3.3.5. Stem: Brass, 3/4-inch NPT, 3-1/2-inch long.

2.3.3.6. Accuracy: ASTM E77.

2.3.3.7. Calibration: Degree F.

END OF SECTION

SECTION 23 30 00

HVAC AIR DISTRIBUTION

1. GENERAL

1.1. SUMMARY

1.1.1. Section Includes:

1.1.1.1. Ductwork.

1.1.1.2. Ductwork accessories.

1.1.1.3. Fans.

1.1.1.4. Air Outlets.

1.1.1.5. Filters.

2. PRODUCTS

2.1. DUCTWORK

2.1.1. General

2.1.1.1. Ductwork shown on the drawings unless otherwise indicated or specified shall be constructed of zinc-coated steel.

2.1.1.2. Galvanized steel sheets (Min. 24 gage) shall be first quality cold rolled, galvanized, open hearth soft steel sheets, capable of double seaming without fracture, meeting ASTM A525-87.

2.1.1.3. Aluminum sheets shall meet requirements of ASTM B209, 2, 1.4 mil finish.

2.1.1.4. Steel shapes shall be hot rolled, galvanized.

2.1.1.5. Screws and bolts shall be cadmium plated.

2.1.1.6. Materials and fabrication shall be incompliance with California Code of Regulations as a minimum.

2.1.2. Materials, Application:

2.1.2.1. Ductwork constructed under functional criteria in Section VII of SMACNA.

2.1.2.2. Pressure: Unless otherwise indicated, ductwork shall be constructed for 2-inch pressure class. Materials and construction shall be in accordance with tables listed in SMACNA HVAC Duct Construction Standards and California Code of Regulations (Title 24, Part 4). The most stringent of the SMACNA Standards or the California Code of Regulations, shall be applicable.

2.1.2.3. Ducts shall be sealed to SMACNA seal class "A", UL 555 and shall be Division of the State Architect approved. No duct tape shall be permitted.

2.1.3. Circular Ducts:

2.1.3.1. Circular (cross section) sheets shall be galvanized steel of spiral seam construction.

2.1.3.2. Joints between two ducts shall be made with beaded sleeve joint having duct sealer applied to joint. Mechanically fasten joints with sheet metal screws or pop rivets.

2.1.3.3. The radius of elbows shall be minimum of 150% of the diameter or maximum width of duct. Gored elbows are not acceptable.

2.1.3.4. The fittings shall be of conical type change in shape from round to rectangular mode with transformation joint with minimum of 1 to 7 taper.

2.1.3.5. Corrugated or flexible metal duct circular ducts will not be acceptable.

2.1.4. Insulated Flexible Ducts:

2.1.4.1. Manufacturers:

2.1.4.1.1. Thermaflex Model G-KM.

2.1.4.1.2. Genflex.

2.1.4.1.3. Glass-Flex.

2.1.4.2. Insulated flexible ductwork shall be a factory fabricated assembly composed of a coated spring steel wire spiral helix permanently bounded to a CPE interior liner, and supporting a fiberglass insulating blanket with a fiberglass scrim vapor barrier. Working pressure: Plus 6-inch W.G. minimum.

2.1.4.3. Length of flex ducts shall be 6'-0" maximum. Suspend at maximum 3'-0" O.C. with 1-1/2-inch wide galvanized sheet metal straps.

2.1.4.4. Ductwork shall have precut lengths with continuous inner liner.

2.1.4.5. Round duct takeoffs from main ducts shall be provided with "Spin-In" or "Twist-Lok" fittings and a factory installed manual balancing damper assembly complete with a level position indicator and a positive locking device.

2.1.4.6. The flexible duct shall be listed in accordance with U 181, Class 1 flexible air duct requirements and comply with NFPA 90A and 90B with a flame and smoke spread rating not in excess of 25/50.

2.1.4.7. Insulation must achieve a minimal thermal conductance (c) rating of 0.23 and must be completely shielded from the airstream.

2.2. DUCT ACCESSORIES

2.2.1. Volume Control Dampers:

2.2.1.1. Manual volume dampers in ducts up to 48-inch in width shall conform to SMACNA Duct Construction Standards Fig. 2-12 or 2-13 plus its accompanying description except that the following shall be provided:

2.2.1.2. Gauge and rod size: The gauge of leaf shall be equal to that of duct in which damper is located, except that it shall never be less than 22 gauge. Fasten damper leaves to square rods using damper blade clips. Use a 3/8-inch square rod for leaves up to 18-inch long and 1/2-inch square rod for leaves 19-inch to 48-inch long. Damper leaves shall not exceed 8-inch in width. Use multiple leaves when required.

2.2.1.3. For accessible locations in low pressure ducts, provide each leaf with No. 607 "Ventlok" end bearing and a No. 640 or No. 641 "Ventlok" self-locking regulator or approved equal by "Young Regulator" or "Duro-Dyne".

2.2.1.4. For inaccessible locations above the ceiling, provide opposed blade volume damper with frame conforming to SMACNA Duct Construction Standards Figure 2-15 and accompanying description, plus No. 680 "Ventlok" miter gears, No. 666 or No. 667 concealed damper regulator and universal joints as required or approved equal by "Young Regulator" or Pottorff No. RCS210. Concealed regulator cover plate shall be suitable for field painting. When a single leaf of 8-inch is used, use two end bearings of type previously described, in lieu of a frame.

2.2.1.5. Steel parts shall be galvanized.

2.2.1.6. For insulated ductwork, the operator arm shall be set on an extension bracket flush with the outside of the insulation. Notch damper rod ends to indicate position of installed damper blades.

2.2.1.7. Dampers shall be stiffened where necessary to prevent noise. A damper causing noise shall be replaced by new ones or additional stiffeners added so as to eliminate the noise. Individual damper blades shall not exceed eight inches (8-inch) wide by length required.

2.2.1.8. Volume dampers above new or existing suspended ceilings shall be marked by attaching a bright yellow, 12-inch length strip of cloth attached to damper rods.

2.2.1.9. Manual Volume Dampers over 48-inch are to be sectioned horizontally and constructed as specified previously.

2.2.2. Turning Devices and Extractors:

2.2.2.1. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

2.2.2.2. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with push-pull operator strap.

2.2.3. Flexible Duct Connections:

2.2.3.1. At least 12-inch wide flexible connections with 1-inch to 4-inch slack in ventilating and air conditioning systems located indoors shall be Vent fabrics Ventfab waterproof and fire retardant canvas, "Duro-Dyne" or equal.

2.2.4. Duct Access Doors:

2.2.4.1. Non-walk-in access doors in rectangular sheet metal ducts shall conform to SMACNA Duct Construction Standards, Fig. 2-10, plus accompanying description, except that the following shall be provided:

2.2.4.1.1. Use #140 "Ventlok", "Duro-Dyne" or equal latch for access doors in ductwork too small to permit entrance of a man. Hinges: Use two hinges on doors where the hinged edge is under 24-inch, three hinges on doors where the hinged edge is 24-inch and over. Doors under 14-inch x 14-inch size shall be No. 24 gauge with piano hinge and edge stiffeners.

2.2.4.1.2. Access Door Thickness: Doors shall be double thickness. Provide full thickness of insulation inside door panels in insulated ducts.

2.2.4.1.3. Gasketing: The door shall have a compressible gasket seal of incombustible material.

2.2.4.1.4. Dimensions: Minimum 12-inch X 12-inch in furred spaces and 18-inch X 18-inch in equipment rooms.

2.2.4.2. Non-walk-in access doors for circular ducts shall conform to SMACNA Duct Construction Standards, Figure 2-13 and accompanying description, except other items shall be the same as for rectangular ducts.

2.2.5. Combination Fire/Smoke Damper (CFSD)

2.2.5.1. Manufacturer:

2.2.5.1.1. Square or rectangular duct type shall be "Pottorff" FSD Model FSD-142. Other acceptable manufacturers are "Ruskin", "C & S" or approved equal.

2.2.5.1.2. Round duct type shall be "Pottorff" FSD Model FSD-125r. Other acceptable manufacturers are "Ruskin", "C & S" or approved equal.

2.2.5.2. CFSD shall be designed and constructed in accordance with NFPA Standard 90A, 92A, UL555S and DSA requirements.

2.2.5.3. Manufacturer's approved installation instructions shall be shipped with each CFSD.

2.2.5.4. Rating 1-1/2 hour fire-resistive rating.

2.2.5.5. Provide access doors in ducts on each CFSD.

2.2.5.6. Damper shall also close and mechanically lock upon signals from smoke detector or loss of power. Each damper assembly shall be provided with a Pottorff PI-50 indicator switch package having two blade position indicator switches to indicate the status of the dampers as to full open or full closed and Pottorff Model RCP-1 remote command station to reset CFSD.

2.2.5.7. Smoke/ Fire Closure "Motor w/ Bimetal Links" Combination fire and smoke dampers will be louver bladed type. Dampers must be tested and listed under both UL 555 and UL 555S. Units must be factory supplied assemblies that consist of damper, sleeve and 1 cycle/year actuator. Dampers must have a minimum class II leakage and dynamic closure rating under UL 555S. Provide units as power-open unless otherwise noted. Actuators to have a minimum operating temperature of 350° F. Seals should be metal to metal without the use of synthetic gasket. Dual temperature thermal switches (DRS-30) rated for 212° F and 350° F, unless otherwise noted. Install in accordance with manufacturer's installation instructions provided with units. Provide suitable access for inspection and servicing of each damper. Provide integrated CSFM listed duct smoke detector model 2151 or DH-100 AC/DC except in the city of LA.

2.2.5.8. Motor actuators must be by ISO 9000 recognized control manufacturer and certified by ETL laboratories for 1 year continuous power applications such. Stall motors will not be accepted. Dual temperature thermal switches shall be equipped with auxiliary contacts for remote annunciation. Pottorff Model FSD 142. (CSFM No. 3225-0368: 110 & 3230 – 368: 111) or approved equal.

2.2.6. Back-draft Dampers:

2.2.6.1. Back draft dampers shall be low-leakage type with aluminum blades with neoprene seals mounted in a 16-gauge minimum steel frame. Bearings shall be oil-impregnated bronze, Teflon or nylon of the sleeve type. The steel frame shall be a factory finished with a mill galvanized finish.

2.2.6.2. Manufacturer shall be Pottorff series 60 Model BD64 or approved equal by Ruskin or C & S.

2.3. FANS

2.3.1. Upblast Centrifugal Roof Fans:

2.3.1.1. Manufacturers:

2.3.1.1.1. Greenheck Corp.

2.3.1.1.2. Loren Cook Company.

2.3.1.1.3. Twin City.

2.3.2. Spun aluminum exhaust fans shall be centrifugal belt driven type.

2.3.3. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.

2.3.4. The fan housing shall be constructed of heavy gauge aluminum with a rigid internal support structure. The windband shall be welded to the one-piece curb cap and on all sizes with UL/CUL-762.

2.3.5. Motors shall be heavy duty ball bearing type, carefully matched to the fan load, and furnished at the specified voltage, phase and enclosure. Drive frame assembly shall be constructed of heavy gauge steel.

2.3.6. Motors and drives shall be mounted on vibration isolators, out of the airstream where no steel to steel contact between rotating components and the base shall occur.

2.3.7. Fresh air for motor cooling shall be drawn into the motor compartment through a ten square inch tube free of discharge contaminants.

2.3.8. Motors and drives shall be readily accessible for maintenance.

2.3.9. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speed. Drives shall be sized for a minimum of 150% of driven horsepower.

2.3.10. Pulleys shall be of the cast type, keyed and securely attached to the wheel and motor shafts. Motor pulleys shall be adjustable for final system balancing.

2.3.11. A disconnect switch shall be factory installed and wired from the fan motor to a junction box installed within the motor compartment. A conduit chase shall be provided through the base to the motor compartment for ease of electrical wiring.

2.3.12. Fans shall bear the AMCA Certified Ratings Seal for sound and air performance.

2.3.13. Each fan shall bear a permanently affixed manufacturer's engraved metal nameplate containing the model number and individual serial number for future identification.

2.4. AIR OUTLETS AND INLETS

2.4.1. Manufacturers:

2.4.1.1. Krueger Model LMHS

2.4.1.2. Anemostat Air Products.

2.4.1.3. Price

2.4.2. Submittals: Submit one sample of each type, tagged for identification to the Architect for approval. Install one of each type and obtain written approval from Architect prior to ordering.

2.4.3. Diffusers (Lay-In Ceiling): Modular snap-in cores with nominal 24-inch x 24-inch perforated panel for mounting in 2' x 2' lay-in tee grid ceiling suspension system. Steel construction. Size as indicated on the drawings. Provide a round neck adaptor.

2.4.4. Diffusers (Hard Ceiling): Modular snap-in cores with beveled frame panel for surface mounting. Steel construction. Size as indicated on the drawings. Provide a round neck adaptor. For hard ceilings, provide ceiling diffusers of neck size.

2.4.5. Return and Exhaust Air Registers: Perforated face type of steel construction. The frame shall be nominal 24-inch x 24-inch for mounting in 2' x 2' lay-in tee grid ceiling suspension system. Provide a round neck adaptor. For hard ceilings, provide return and exhaust air registers of neck size.

2.4.6. Painting: Sheet metal duct collars or plenum boxes for the diffuses and registers shall be painted black prior installation of the diffuser and register. Unless otherwise noted, diffusers and registers shall be furnished with off-white baked enamel finish. After balancing and testing, the Contractor shall refinish damaged spots and screw heads.

2.5. FILTERS

2.5.1. Disposable, Extended Area Panel Filters: Pleated, reinforced cotton or glass fiber fabric; supported and bonded to welded wire grid.

2.5.1.1. Frame: Cardboard.

2.5.1.2. Nominal thickness: 1-inch.

2.5.1.3. Performance Rating: ASHRAE 52.1, MERV-8.

2.5.2. Extended Surface Non-Supported Media Filters: Reinforced glass fiber formed into pockets with galvanized steel header frame.

2.5.2.1. Performance Rating: MERV-13.

2.5.3. Filter Gages:

2.5.3.1. Direct Reading Dial: 3-1/2 inch diameter diaphragm actuated dial in metal case, vent valves, black figures on white background, range 0-2-inch wg, 3% of full scale accuracy.

END OF SECTION

SECTION 23 81 26

VARIABLE REFRIGERANT FLOW SYSTEMS

1. GENERAL

1.1. SYSTEM DESCRIPTION

1.1.1. The system shall be a variable capacity, heat pump heat recovery air conditioning system with all components by the same manufacturer. Acceptable manufacturers are:

1.1.1.1. Mitsubishi

1.1.1.2. Trane

1.1.1.3. Samsung

1.1.2. Simultaneous Heating and Cooling Systems:

1.1.2.1. The system shall consist of an outdoor unit, branch circuit controller, multiple indoor units, and direct digital controls. Each indoor unit or group of indoor units shall be capable of operating in any mode independently of other indoor units or groups. System shall be capable of changing mode (cooling to heating, heating to cooling) with no interruption to system operation. To ensure user comfort, each indoor unit or group of indoor units shall be independently controlled and capable of changing mode automatically when zone temperature strays 1.8°F from set point for 10-minutes. The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of outdoor rated capacity.

1.2. QUALITY ASSURANCE

1.2.1. The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.

1.2.2. Wiring shall be in accordance with the National Electrical Code (N.E.C.).

1.2.3. The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

1.2.4. Units must meet or exceed the 2010 Federal minimum efficiency requirements and the proposed ASHRAE 90.1 efficiency requirements for VRF systems. Efficiency shall be published in accordance with the DOE alternative test procedure, which is based on the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standards 340/360, 1230 and ISO Standard 13256-1.

1.2.5. A full charge of R-410A for the condensing unit only shall be provided in the condensing unit.

1.3. CONTROLS

1.3.1. The control system shall consist of a low voltage communication network of unitary built-in controllers with on-board communications and a web-based operator interface. A web controller with a network interface card shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.

1.3.2. System controls and control components shall be installed in accordance with the manufacturer's written installation instructions.

1.3.3. Furnish energy conservation features such as optimal start, night setback, request-based logic, and demand level adjustment of overall system capacity as specified in the sequence.

1.3.4. System shall provide direct and reverse-acting on and off algorithms based on an input condition or group conditions to cycle a binary output or multiple binary outputs.

1.3.5. Provide capability for future system expansion to include monitoring and use of occupant card access, lighting control and general equipment control.

1.3.6. System shall be capable of email generation for remote alarm annunciation.

1.3.7. Control system start-up shall be a required service to be completed by the manufacturer or a duly authorized, competent representative that has been factory trained in the controls system configuration and operation. The representative shall provide proof of certification manufacturer indicating successful completion of no more than 2-years prior to system installation. This certification shall be included as part of the equipment and/or controls submittals. This service shall be equipment and system count dependent and shall be a minimum of one 8-hour period to be completed during normal working hours.

1.4. WARRANTY

1.4.1. The units shall be covered by the manufacturer's limited warranty for a period of 1-year from date of installation.

1.4.2. In addition the compressor shall have a manufacturer's limited warranty for a period of 7-years from date of installation.

1.4.3. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer.

1.4.4. This warranty shall not include labor.

2. PRODUCTS

2.1. SIMULTANEOUS HEATING AND COOLING OUTDOOR UNITS

2.1.1. The outdoor unit shall be designed to be specifically used with other components as provided by the manufacturer. The outdoor units shall be equipped with multiple circuit boards that interface to the controls system and shall perform all functions necessary for operation. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.

2.1.2. Units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s).

2.1.3. Outdoor unit shall have a sound rating no higher than 60-dB(A) individually or 64-dB(A) twinned. Units shall have a sound rating no higher than 50-dB(A) individually or 53-dB(A) twinned while in night mode operation.

2.1.4. Both refrigerant lines from the outdoor unit to the BC (Branch Circuit) Controller (Single or Main) shall be insulated.

2.1.5. There shall be no more than 3 branch circuit controllers connected to any one outdoor unit.

2.1.6. Outdoor unit shall be able to connect to up to 50 indoor units depending upon model.

2.1.7. The outdoor unit shall have an accumulator with refrigerant level sensors and controls.

2.1.8. The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.

2.1.9. The outdoor unit shall have the ability to operate with a maximum height difference of 164-foot and have total refrigerant tubing length of 1804 to 2625-foot. The greatest length is not to exceed 541-foot between outdoor unit and the indoor units without the need for line size changes or traps.

2.1.10. The outdoor unit shall be capable of operating in heating mode down to -4°F ambient temperatures or cooling mode down to 23°F ambient temperatures, without additional low ambient controls. If an alternate manufacturer is selected, any additional material, cost, and labor to meet low ambient operating condition and performance shall be incurred by the contractor.

2.1.11. The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained.

2.1.12. Unit must defrost all circuits simultaneously in order to resume full heating more quickly. Partial defrost which may extend "no or reduced heating" periods shall not be allowed.

2.1.13. Unit Cabinet: The casing shall be fabricated of galvanized steel, bonderized and finished. Units cabinets shall be able to withstand 960-hour per ASTM B117 criteria.

2.1.14. Fan:

2.1.14.1. Each outdoor unit module shall be furnished with one direct drive, variable speed propeller type fan. The fan shall be factory set for operation under 0-inch wg external static pressure, but capable of normal operation under a maximum of 0.24-inch wg external static pressure via dipswitch.

2.1.14.2. Fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.

2.1.14.3. Fan motors shall be mounted for quiet operation.

2.1.14.4. Fans shall be provided with a raised guard to prevent contact with moving parts.

2.1.15. The outdoor unit shall have vertical discharge airflow.

2.1.16. Refrigerant

2.1.16.1. R410A refrigerant shall be required for the system.

2.1.16.2. Polyolester (POE) oil shall be required.

2.1.17. Coil:

2.1.17.1. The outdoor coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.

2.1.17.2. The coil fins shall have a factory applied corrosion resistant blue-fin finish.

2.1.17.3. The coil shall be protected with an integral metal guard.

2.1.17.4. Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.

2.1.17.5. The outdoor coil shall include 4 circuits with two position valves for each circuit, except for the last stage.

2.1.18. Compressor:

2.1.18.1. Each outdoor unit module shall be equipped with one inverter driven scroll hermetic compressor. Non inverter-driven compressors shall not be allowed.

2.1.18.2. A crankcase heater(s) shall be factory mounted on the compressor(s).

2.1.18.3. The outdoor unit compressor shall have an inverter to modulate capacity. The capacity shall be completely variable with a turndown of 19%-5% of rated capacity, depending upon unit size.

2.1.18.4. The compressor will be equipped with an internal thermal overload.

2.1.18.5. The compressor shall be mounted to avoid the transmission of vibration.

2.1.18.6. Field-installed oil equalization lines between modules are not allowed.

2.1.19. Controls:

2.1.19.1. The outdoor unit shall have the capability of up to 8 levels of demand control for each refrigerant system

2.1.19.2. The outdoor unit shall be controlled by integral microprocessors.

2.1.19.3. The control circuit between the indoor units, BC Controller and the outdoor unit shall be 24-Volt DC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

2.2. BRANCH CIRCUIT CONTROLLERS

2.2.1. The Branch Circuit Controllers (BC) shall include multiple branches to allow simultaneous heating and cooling by allowing either hot gas refrigerant to flow to indoor unit(s) for heating or subcooled liquid refrigerant to flow to indoor unit(s) for cooling. Refrigerant used for cooling must always be subcooled for optimal indoor unit LEV performance; alternate branch devices with no subcooling risk bubbles in liquid supplied to LEV and are not allowed.

2.2.2. These units shall be equipped with a circuit board that interfaces to the controls system and shall perform all functions necessary for operation. The unit shall have a galvanized steel finish. The BC shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory. This unit shall be mounted indoors, with access and service clearance provided for each controller.

2.2.3. BC Cabinet:

2.2.3.1. The casing shall be fabricated of galvanized steel.

2.2.3.2. Each cabinet shall house a liquid-gas separator and multiple refrigeration control valves.

2.2.3.3. The unit shall house two tube-in-tube heat exchangers.

2.2.4. Refrigerant: R410A.

2.2.5. Refrigerant valves:

2.2.5.1. The unit shall be furnished with multiple branch circuits which can individually accommodate up to 54,000-Btu/h and up to three indoor units. Branches may be twinned to allow more than 54,000-Btu/h.

2.2.5.2. Each branch shall have multiple two-position valves to control refrigerant flow.

2.2.5.3. Service shut-off valves shall be field-provided/installed for each branch to allow service to any indoor unit without field interruption to overall system operation.

2.2.5.4. Linear electronic expansion valves shall be used to control the variable refrigerant flow.

2.2.6. Future Use: Each VRF system shall include at least one unused branches or branch devices for future use. Branches shall be fully installed & wired in central location with capped service shutoff valve & service port.

2.2.7. Integral Drain Pan: An Integral drain pan and drain shall be provided

2.2.8. The BC Controller shall be controlled by integral microprocessors

2.2.9. The control circuit between the indoor units and outdoor units shall be 24-Volt DC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

2.3. LAY-IN TILE 4-WAY CEILING-RECESSED CASSETTE WITH GRILLE INDOOR UNIT

2.3.1. The unit shall be a four-way cassette style indoor unit that recesses into the ceiling with a ceiling grille. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

2.3.2. Unit Cabinet:

2.3.2.1. The cabinet shall be a compact 22-7/16-inch wide x 22-7/16-inch deep so it will fit within a standard 24-inch square suspended ceiling grid.

2.3.2.2. The cabinet panel shall have provisions for a field installed filtered outside air intake.

2.3.2.3. Four-way grille shall be fixed to bottom of cabinet allowing two, three or four-way blow.

2.3.3. Fan:

2.3.3.1. The indoor fan shall be an assembly with a turbo fan direct driven by a single motor.

2.3.3.2. The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.

2.3.3.3. The indoor fan shall consist of three speeds, Low, Mid, and High.

2.3.4. The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow.

2.3.5. The auto air swing vanes shall be capable of automatically swinging up and down for uniform air distribution.

2.3.6. Filter: Return air shall be filtered by means of a long-life washable filter.

2.3.7. Coil:

2.3.7.1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.

2.3.7.2. The tubing shall have inner grooves for high efficiency heat exchange.

2.3.7.3. All tube joints shall be brazed with phos-copper or silver alloy.

2.3.7.4. The coils shall be pressure tested at the factory.

2.3.8. A condensate pan and drain shall be provided under the coil.

2.3.8.1. The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 19-3/4-inch above the condensate pan.

2.3.9. Both refrigerant lines to the units shall be insulated.

2.3.10. Controls:

2.3.10.1. This unit shall use controls provided by the manufacturer to perform functions necessary to operate the system.

2.3.10.2. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

2.3.10.3. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F to 9.0°F adjustable deadband from set point.

2.3.10.4. Indoor unit shall include no less than four digital inputs capable of being used for customizable control strategies.

2.3.10.5. Indoor unit shall include no less than three digital outputs capable of being used for customizable control strategies.

2.3.11. Manufacturer to provide drain pan level sensor powered by a 20-year life lithium battery. Sensor shall require no external power for operation and shall have an audible indication of low battery condition. The drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.

2.4. CEILING-CONCEALED DUCTED INDOOR UNIT

2.4.1. The unit shall be a ceiling-concealed ducted indoor fan coil design that mounts above the ceiling with a 2-position, field adjustable return and a fixed horizontal discharge supply and shall have a modulating linear expansion device.

2.4.2. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

2.4.3. Unit Cabinet: The unit shall be, ceiling-concealed, ducted. The cabinet panel shall have provisions for a field installed filtered outside air intake.

2.4.4. Fan:

2.4.4.1. Unit shall feature external static pressure settings from 0.14 to 0.60-inch wg.

2.4.4.2. The indoor unit fan shall be an assembly with one or two Sirocco fan(s) direct driven by a single motor.

2.4.4.3. The indoor fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.

2.4.4.4. The indoor fan shall consist of three speeds, High, Mid, and Low plus the Auto-Fan function

2.4.5. The indoor unit shall have a ducted air outlet system and ducted return air system.

2.4.6. Filter:

2.4.6.1. Return air shall be filtered by means of a standard factory installed return air filter.

2.4.6.2. Return filter box (rear placement) with high-efficiency filter shall be provided.

2.4.7. Coil:

2.4.7.1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.

2.4.7.2. The tubing shall have inner grooves for high efficiency heat exchange.

2.4.7.3. All tube joints shall be brazed with phos-copper or silver alloy.

2.4.7.4. The coils shall be pressure tested at the factory.

2.4.8. A condensate pan and drain shall be provided under the coil. The condensate shall be gravity drained from the fan coil.

2.4.9. Both refrigerant lines to the PEFY indoor units shall be insulated.

2.4.10. Controls:

2.4.10.1. This unit shall use controls provided by the manufacturer to perform functions necessary to operate the system.

2.4.10.2. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

2.4.10.3. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F to 9.0°F adjustable deadband from set point.

2.4.10.4. Indoor unit shall include no less than four digital inputs capable of being used for customizable control strategies.

2.4.10.5. Indoor unit shall include no less than three digital outputs capable of being used for customizable control strategies.

2.4.11. Manufacturer to provide drain pan level sensor powered by a 20-year life lithium battery. Sensor shall require no external power for operation and shall have an audible indication of low battery condition. The drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.

2.5. CONTROLS

2.5.1. Electrical Characteristics

2.5.1.1. The CN shall operate at 24-Volt DC. Controller power and communications shall be via a common non-polar communications bus.

2.5.1.2. Wiring:

2.5.1.2.1. Control wiring shall be installed in a daisy chain configuration from indoor unit to remote controller to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.

2.5.1.2.2. Control wiring for centralized controllers shall be installed in a daisy chain configuration from outdoor unit to outdoor unit, to the system controllers (centralized controllers and/or integrated web based interface), to the power supply.

2.5.1.2.3. Centralized controller shall be capable of being networked with other centralized controllers.

2.5.1.3. Wiring type:

2.5.1.3.1. Wiring shall be 2-conductor (16 AWG), twisted, stranded, shielded wire as defined by the Diamond System Builder output.

2.5.1.3.2. Network wiring shall be CAT-5e with RJ-45 connection.

2.5.2. Controls Network (CN)

2.5.2.1. The CN consists of remote controllers, centralized controllers, and/or integrated web based interface communicating over a high-speed communication bus. The CN shall support operation monitoring, scheduling, error email distribution, personal web browsers, tenant billing, online maintenance support, and integration with Building Management Systems (BMS) using either LonWorks® or BACnet® interfaces.

2.5.3. Remote Controller (RC) shall be capable of controlling up to 16 indoor units (defined as 1 group). The RC shall be compact in size, approximately 3-inch x 5-inch and have limited user functionality. The RC shall allow the user to change on/off, mode (cool, heat, auto (R2/WR2-Series only), dry, and fan), temperature setting, and fan speed setting and airflow direction. The RC shall be able to limit the set temperature range. The RC shall be capable of night setback control with upper and lower set temperature settings. The room temperature shall be sensed at either the RC or the Indoor Unit dependent on the indoor unit dipswitch setting. The RC shall display a four-digit error code in the event of system abnormality/error. The RC shall require no addressing. The RC shall connect using two-wire, stranded, non-polar control wire to TB15 connection terminal on the indoor unit. The RC shall require cross-over wiring for grouping across indoor units.

2.5.4. Centralized Controller (Web-enabled)

2.5.4.1. The Centralized Controller (CC) shall be capable of controlling a maximum of 50 indoor units across multiple outdoor units. The CC shall be approximately 7-1/2-inch X 12-inch in size and shall be powered from a Power Supply Unit. The CC shall support system configuration, daily/weekly scheduling, monitoring of operation status, night setback settings, free contact interlock configuration and malfunction monitoring. The CC shall have five basic operation controls which can be applied to an individual indoor unit, a group of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the CC shall include on/off, operation mode selection (cool, heat, auto (R2/WR2-Series only), dry, and fan), temperature setting, fan speed setting, and airflow direction setting. Since the CC provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the CC shall allow the user to define both daily and weekly schedules with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.

2.5.4.2. CCs shall be equipped with one RJ-45 Ethernet port to support interconnection with a network PC via a closed/direct Local Area Network (LAN).

2.5.4.3. The CC shall be capable of performing initial settings via the 9" high-resolution, backlit, color touch panel on the controller or via a PC using the CC's initial setting browser.

2.5.4.4. Standard software functions shall be available so that the building manager can securely log into each AG-150 via the PC's web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics. Additional optional software functions of personal browser for PCs and MACs and Tenant Billing shall be available. The Tennant Billing function shall require TG-2000 Integrated System software in conjunction with AG-150 Centralized Controllers.

2.5.5. CMCN shall be capable of supporting integration with Building Management Systems (BMS).

2.5.5.1. BACnet® Interface: The interface shall be compliant with BACnet® Protocol (ANSI/ASHRAE 135-2004) and be Certified by the (BTL) BACnet® Testing Laboratories. The BACnet® interface shall support BACnet Broadcast Management (BBMD). The BACnet® interface shall support a maximum of 50 indoor units. Operation and monitoring points include, but are not limited to, on/off, operation mode, fan speed, prohibit remote controller, filter sign reset, alarm state, error code, and error address.

2.5.5.2. The power supply shall supply 24VDC (TB 3) for the AG-150 centralized controller and 24VDC (TB 2) voltage for the central control transmission.

END OF SECTION

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

1. GENERAL

1.1. DESCRIPTION

1.1.1. Principal Work Items are: Provide all labor, material and equipment necessary to complete and test the electrical work as shown on the drawings and as specified herein. Work will include, but not limited to the following:

1.1.1.1. Underground duct banks and pre-cast concrete pull-boxes/manholes, including furnishing hardware and accessories (pulling eyes, drainage, necking, traffic cover, ladder, cable racks, perimeter grounding bus and ground rods) in each pull-box/manhole of the Power and Low Voltage Communication system (for telephone data copper, fiber-optic, low voltage control and Fire Alarm network systems).

1.1.1.2. A complete electrical grounding system for the building, including electrical service grounding (Ground Rods in ground well, concrete encased electrode underground (Ufer) and cold water pipe) and Low Voltage Communication system reference ground with a single point of ground connection at the Main Ground Bus.

1.1.1.3. Supports, duct spacers, clamps, hangers, fastening devices, sleeves, slots, concrete bases, physical protection, caulking, weatherproofing, sealing, closing, etc.

1.1.1.4. Relocation of utility services (power, fire alarm, fiber optic, tel/data, PV connections and etc.) for the portable buildings and incoming Cox Fiber Optic service which are in the foot-print of the new building in this scope of work. The utility relocation works shall be done prior to grading works starting date.

1.1.1.5. Complete installation and supply of 480/277-Volt and 208/120-Volt, 3-Phase, 4-Wire Switchboard, Distribution Switchboards, feeders, pull-boxes, distribution transformers, control transformers, motor starters, disconnect switches, panel boards, branch circuit conduit and wiring and all other electrical devices.

1.1.1.6. A complete grounding system for the 480/277-Volt and 208/120-Volt derived systems and all of the electrical equipment.

1.1.1.7. Luminaires (lighting fixtures), including LED driver, electronic ballasts, lamps, emergency battery pack and occupancy sensor control, day light control, classroom lighting control system, corridor & lobby & exterior lighting control system and other control complete. Including the daylight dimming control system for the specified Tubular Daylight System.

1.1.1.8. Exterior lighting fixtures including concrete bases for poles / low level area lights, walkway/bollard, step lights and planter lights.

1.1.1.9. Electrical work for the mechanical system, except as specified to be furnished or installed as part of other Sections in the Specifications.

1.1.1.10. Distribution materials and connection of the following listed equipment by the specific equipment furnished so that a complete and operable system results:

1.1.1.10.1. Building power, communication and fire alarm system connections to Campus systems.

1.1.1.10.2. Electrical operated roll down doors, gates and other type of door operator.

1.1.1.10.3. Electrical operated shades system as applicable.

1.1.1.10.4. Irrigation power connections.

1.1.1.10.5. Audio/Video equipment for classroom.

1.1.1.10.6. Hearing Assistance system.

1.1.1.11. Complete installation of the emergency generator set (self-contained an outdoor in NEMA 3R enclosure, diesel generator set with sub-base double wall fuel tank), Automatic Transfer Switch with the 480/277-Volt and 208/120-Volt distribution system for the Emergency Egress Lighting system and IT equipment and selected emergency outlets designated by the College.

1.1.1.12. Furnish and install all hangers, anchors, sleeves, chases, access panels and supports required for electrical works.

1.1.1.13. Electrical conduit system rough-in.

1.1.1.14. Complete Fire Detection and Alarm system including all control equipment, devices, terminal cabinets, backboards, boxes, conduits, wiring and connections.

1.1.1.15. Complete system of empty conduit, outlets, back-boxes, cabinets and/or terminal backboards for the security distribution system or other low voltage /signal systems.

1.1.1.16. Complete system of conduit with voice/data cables, outlets with devices, back-boxes, cabinets and/or terminal backboards with terminating blocks or patch panels for voice/data distribution system.

1.1.1.17. Excavation, backfill and concrete works required to complete items of this section.

1.1.1.18. Closing of all openings resulting from coring, sleeving, removal of conduit and/or equipment.

1.1.1.19. Cleaning, patching, fire stopping/proofing seal, repairing and painting.

1.1.1.20. Permits and Code Inspection fees.

1.1.1.21. Prime coat painting of all electrical equipment exposed to view in public area where required and deemed necessary by Architect.

1.1.1.22. Identified and instruction plates, tags, labels, magnetic yellow tapes, underground warning tapes etc.

1.1.1.23. Shop drawings and technical data; operating instruction and maintenance manual.

1.1.1.24. Test of all equipment and system installed.

1.1.1.25. "As-built" drawings, including but not limited to record of actual routing of duct banks, location of Power Pull-boxes/Manholes and Communication Pull-boxes, lighting and power/communication plan as-built condition.

1.1.1.26. Incidental items not indicated on the drawings nor mentioned in the specifications that belong to the work described, or are required to provide complete systems, as though called out here in every detail.

1.1.2. Work in Cooperation with Other Trades:

1.1.2.1. Examine the Drawings and Specifications and determine the work to be performed by the electrical, and other trades. Provide the type and amount of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested, and ready for use. This shall include all conduits, conductor, and all other devices for the required operation and control sequences of all electrical, and other existing systems or equipment.

1.2. QUALITY ASSURANCE

1.2.1. Standards:

1.2.1.1. Comply with standards listed in the following:

1.2.1.1.1. Underwriters' Laboratories Inc. (UL).

1.2.1.1.2. The 2013 California Electrical Code, National Electric Code (NEC) 2011 edition, with California Amendments.

1.2.1.1.3. The USA National Fire Code (NFPA).

1.2.1.1.4. The National Electrical Manufacturers' Association (NEMA).

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

1.2.1.1.6. American National Standards Institute (ANSI).

1.2.1.1.7. 2013 California Code of regulations, Title 24, Part 1, 2 and 3.

1.2.1.2. Off-Site Work: Conform to Governing Agencies requirements.

1.2.1.3. Earthquake Provisions: Electrical components shall be anchored and braced to meet the force and displacement requirements prescribed in the 2013 CBC, Sections 1613 and ASCE 7-05 Chapter 6 and 13.

1.2.1.4. In case of conflict among the reference standards, the more stringent provisions shall govern and shall be resolved before installation at Contractor's expense. Prepare and secure approval for any clarifying details required by inspection authorities.

1.2.1.5. Nothing in the Contract Documents shall be construed as authority to permit work not conforming to codes, ordinances, standards or regulations.

1.2.2. Qualification of Installers:

1.2.2.1. Throughout the progress of installation of the work of each Section, provide where required as indicated in respective Sections, at least one manufacturer's authorized representative who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, who shall be present at the job site and shall direct all work performed under that particular Section.

1.2.2.2. Cutting and patching finish work shall be performed by workmen of the proper trade.

1.2.3. Qualification of Manufacturers:

1.2.3.1. Manufacturers of the products supplied for this project shall have been in the business of manufacturing the particular product for at least five years and be able to prove a history of successful production acceptable to the Architect. As a condition for approval and when directed by the Architect, submit a list of past projects showing a minimum of five projects of similar scope to the Architect for approval.

1.2.3.2. Provide together with the Shop Drawing submittal, where called for in these Specifications, a list of five projects which shall have been in satisfactory operation for the past five years.

1.3. GUARANTEE

1.3.1. Manufacturers Guaranties: Submit guarantees for all applicable equipment and devices.

2. PRODUCTS

2.1. MATERIALS

2.1.1. General: See General Conditions, Article titled "Materials".

2.1.1.1. Architect shall be the sole judge of material conformance to Contract Documents. Equal products shall be as selected by the Architect.

2.1.1.2. Materials and products shall be new and in perfect condition, and of the manufacturer's latest type and model. Unless otherwise noted, each material or product type shall be from one manufacturer only.

2.1.1.3. Exterior mounted electrical boxes, devices and miscellaneous items shall be tamper-proof assemblies. Where not a standard feature, shop modify assembly to meet this requirement.

2.1.1.4. Where any devices or equipment is referred to or indicated in these documents or on the Drawings in the singular number, such reference shall be deemed to apply to as many such devices as are required to complete the intended installation as specified and/or as shown on the Drawings.

2.1.1.5. In case of conflicts among Drawings and Specifications, the more stringent requirement, larger quantities, better qualities and/or more proper application and installation for the particular situation shall govern.

2.1.1.6. Wherever "finishes" are indicated to be selected by the Architect, such "finishes" shall include all standard as well as optional finishes offered by the Manufacturers.

2.1.1.7. Materials shall be UL listed where applicable.

2.1.2. Manufacturer and Catalog Numbers:

2.1.2.1. Where manufacturer and catalog numbers are indicated, the published data on the product by the manufacturer are deemed to be part of this specification.

2.1.2.2. Numbers used indicate basic minimum design and appearance required, and must be modified to meet all specific requirements of Contract Documents.

2.1.2.3. Before submitting bid, verify availability of such modification. Where manufacturers cannot meet these modifications, notify Architect 10 days prior to bid date and deem these products removed from approved list of equipment.

2.1.2.4. Act of submitting bid is certification that all equipment specified, with required modifications, is available from at least one manufacturer listed.

2.2. CONDUIT

2.2.1. General: Provide only new conduit with UL listing or label and deliver to the site in standard lengths.

2.2.2. Types:

2.2.2.1. Rigid Steel Conduit and Couplings: Hot-dipped galvanized or sherardized inside and out, with galvanized threads. Electro-galvanizing is not acceptable. Provide insulated throat metallic bushings.

2.2.2.2. Electric Metallic Steel Tubing: Hot-dipped galvanized or sherardized inside and out, with galvanized threads. Electro-galvanizing is not acceptable. Provide insulated and bushed tap-on type connectors and couplings as made by Tomic or T&B, or wrench-tightened compression type couplings. Set-screw type couplings or connectors are not acceptable.

2.2.2.3. Flexible Conduit: Manufacture from single strip steel, hot-dip galvanized on all four sides prior to conduit fabrication. Provide insulated die-cast connectors with ridges that thread into the inside of the conduit to ensure a force fit as made by T&B or approved equal. Binding-screw type connectors are not acceptable.

2.2.2.4. Liquid-Tight Flexible Conduit: Identical to flexible steel conduit but with overall polyvinyl chloride plastic jacket. Provide insulating connectors, Appleton STN series, or approved equal.

2.2.2.5. Rigid Plastic Conduit: Extrude from virgin polyvinyl chloride compound, Schedule 40 heavy wall, in 10-foot lengths with couplings. Where threaded connection is required or for allowed exposed application where subject to physical damage provide Schedule 80 conduit.

2.3. GROUND WELL AND GROUND ELECTRODE

2.3.1. Ground Well

2.3.1.1. Ground well shall be of the pre-cast concrete type with armored body and cast iron lid. Inside dimensions shall be 10-inch diameter by 12-inch deep.

2.3.1.2. Provide permanent marking on top of lid identifying as "GROUND WELL".

2.3.2. Ground Electrode:

2.3.2.1. Install a grounding electrode constructed of ¾-inch diameter by 10-feet long copper-weld rod driven vertically full length into the ground through the ground well.

2.3.2.2. Fill the inside of the ground well with a layer of fine sand and layer of crushed rock on top with the ground rod protruding approximately 3-inch above the two layers.

2.3.3. Acceptable Manufacturers: Provide Brooks Product No. 3RT or approved equal by Quick set for the Ground Well and J.A. Weaver W-3410 for the grounding electrode

2.4. WORKMANSHIP

2.4.1. General:

2.4.1.1. Materials and equipment shall be installed in accordance with approved recommendations of the manufacturer and conforming to the Contract Documents. All devices and equipment are laid out per requirements of one manufacturer. Modify work and arrangements to suit actual equipment installed and pay for additional costs incurred, if any. The installation shall conform to the applicable codes, rules, and regulations. The Drawings indicate, in diagrammatic form, the work to be done rather than exact routing, location and arrangement of equipment, conduit, and wiring. Make use of data in Contract Documents, verify against developed field conditions, install work in an orderly arrangement in a manner to overcome structural and other interference.

2.4.1.2. Study all Drawings and properly locate the outlets and equipment so that they are readily accessible. Locate equipment and outlets to avoid interference with mechanical or structural features. Do not support any electrical material, equipment or device from sheet metal roof decks or ductworks. If any conflicts occur necessitating departures from the Drawings, details of such departures and reasons therefore shall be submitted as soon as practicable for written approval.

2.4.1.3. Where developed conditions make revisions necessary to indicated locations and arrangements, Contractor shall make changes, at no additional cost, provided:

2.4.1.3.1. Change is ordered prior to time conduit is installed.

2.4.1.3.2. Length of conduit run is not changed more than 10-percent.

2.4.1.4. Architectural and structural drawings take precedence over electrical drawings in representation of general construction work, and drawings of various trades take precedence in representation of work of these trades. Refer to all Contract Documents and coordinate electrical work with other work.

2.4.1.5. Where discrepancies arise among the various Contract Documents, stop work in affected areas. Promptly notify Inspector of conditions.

2.4.1.6. Galvanic and chemical corrosion shall be prevented by isolating dissimilar metals and preventing contact of aluminum with concrete, plaster, mortar or earth.

2.4.1.7. All equipment shall be braced and/or anchored to meet the force and displacement requirements prescribed in the 2013 CBC, Sections 1615A.1.12 through 1615A.1.22 and ASCE 7-05 Chapter 6 and 13.

2.4.1.8. The bracing and attachments to the structure shall be detailed on the approved drawings or they shall comply with one of the OSHPD pre-approvals (OPA #) as modified to satisfy anchorage requirements of ACI 318, Appendix D.

2.4.1.9. The Structural Engineer of Record shall verify the adequacy of the structure to support the hanger and brace loads

END OF SECTION

SECTION 26 05 13

HIGH VOLTAGE CABLES (ABOVE 600 VOLTS)

1. STANDARDS

1.1. REFERENCE

1.1.1. General: Requirements in Addenda, Conditions and Division 1 collectively apply to this work.

1.1.1.1. Examination of site prior to bidding: Supplementary conditions, Section 00 08 00, Article 1.04.

1.2. DESCRIPTION

1.2.1. Work Included: Provide all labor, material, equipment, necessary testing, and complete the power and service distribution system as shown on the Drawings and as specified herein.

1.2.2. Related Work Described Elsewhere:

1.2.2.1. For detailed description of the electrical work also see other Sections in Division 26.

1.2.3. This section specifies the furnishing, installation and connection of the high voltage cables.

1.3. RELATED WORK

1.3.1. Bedding of conduits: Section 02 20 00 - Earthwork

1.3.2. General electrical requirement and items that are common to more than one section of Division 26: Section 26 05 00 - Common Work Results for Electrical

1.4. SUBMITTALS

1.4.1. Submit in accordance with Section 00 13 40 – Samples and Shop Drawings and Section 26 05 00 - Common Work Results for Electrical

1.4.2. Shop Drawings:

1.4.2.1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

1.4.2.2. Include splice and termination kit information prior to purchase and installation.

1.4.3. Samples:

1.4.3.1. After approval and prior to installation, furnish the Resident Engineer with a 12-inch length of each type and size of wire and cable along with the tag from the coils or reels from which the samples were taken. The sample shall contain the manufacturer's markings.

1.4.4. Certifications:

1.4.4.1. Factory test reports: Prior to installation of the cables, deliver four copies of the manufacturers certified NEMA WC 7 or WC 8, standard factory test reports for representative cables to the Project Engineer.

1.4.4.2. Field test reports: After testing, submit four certified copies of each of the graphs, specified under field testing, to the Project Engineer. Adequate information shall be included identifying the cable locations, types, voltage rating and sizes.

1.4.4.3. Splices and terminations, after having been installed and tested, deliver four copies of a certificate by the Contractor to the Project Engineer which includes the following:

1.4.4.3.1. A statement that the materials, detail drawings and printed instructions used were those contained in the kits approved for this contract.

1.4.4.3.2. Statement that each splice and each termination was completely installed without any overnight interruption.

1.4.4.3.3. A statement that field made splices and terminations conform to the following requirements:

1.4.4.3.3.1. Pencil the cable insulation precisely.

1.4.4.3.3.2. Connector installations: Use tools which are designed for the connectors being installed. Round and smooth the installed connectors to minimize localized voltage stressing of the insulating materials.

1.4.4.3.3.3. Remove contaminants from all surfaces within the splices and terminations before installing the insulating materials.

1.4.4.3.3.4. Solder block throughout stranded grounding wires which will penetrate the splicing and terminating materials.

1.4.4.3.3.5. Use mirrors to observe the installation of materials on the back sides of the splices and terminations.

1.4.4.3.3.6. Eliminate air voids throughout the splices and terminations.

1.4.4.3.3.7. Stretch each layer of tape properly during installation.

1.4.4.3.4. List all of the materials purchased and installed for the splices and terminations for this contract including the material descriptions, manufacturer's names, catalog numbers and total quantities.

1.4.5. Installer Approval:

1.4.5.1. Employees who install the splices and terminations shall have not less than five years of experience splicing and terminating cables which are equal to those being spliced and terminated, including experience with the materials in the kits.

1.4.5.2. Furnish satisfactory proof of such experience for each employee who splices or terminates the cables.

1.5. APPLICABLE PUBLICATIONS

1.5.1. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the designation only.

1.5.2. Underwriters Laboratories (UL):

1.5.2.1. 1072-2001 Safety Medium-Voltage Power Cables

1.5.3. National Fire Protection Association (NFPA):

1.5.3.1. 2013 Edition California Electrical Code (CEC)

1.5.4. National Electrical Manufacturers Association (NEMA):

1.5.4.1. WC71-1999 Standard for Non-Shielded Cables Rated 2001-5000 Volts for Use in the Distribution of Electrical Energy

1.5.4.2. WC74-20005-46 KV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy

1.5.5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1.5.5.1. 48-96 Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 KV Through 765 KV

1.5.5.2. 386-95 (R2001) Separable Insulated Connector Systems for Power Distribution Systems above 600 V

1.5.5.3. 404-2000 Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500-500,000 Volts

1.5.5.4. 592-90 (R1996) Exposed Semi-conducting Shields on High-Voltage Cable Joints and Separable Insulated Connectors

2. MATERIALS

2.1. MATERIAL, HIGH VOLTAGE

2.1.1. High voltage cable shall be in accordance with the CEC and NEMA WC71, WC74 and UL 1072.

2.1.2. Shall be single conductor stranded copper.

2.1.3. Insulation:

2.1.3.1. Insulation level shall be 133%.

2.1.3.2. Types of insulation:

2.1.3.2.1. Cable type abbreviation, EPR: Ethylene propylene rubber insulation shall be thermosetting, light and heat stabilized.

2.1.4. Conductors and insulation shall be wrapped separately with semiconducting tape.

2.1.5. Insulation shall be wrapped with non-magnetic, metallic shielding.

2.1.6. Heavy duty, overall protective jackets of chlorosulphonated polyethylene, neoprene, polyvinyl chloride or equal shall enclose every cable.

2.1.7. Cable temperature ratings for continuous operation, emergency overload operation and short circuit operation shall be not less than the NEMA WC 7 or the NEMA WC 8 Standard for the respective cable.

2.1.8. Manufacturer's name and other pertinent information shall be marked or molded clearly on the overall outside surface of the jackets, or incorporated on marker tapes within the cables at reasonable intervals.

2.2. MATERIAL, SPLICES AND TERMINATIONS

2.2.1. The materials shall be compatible with the conductors, insulations and protective jackets on the cables and wires.

2.2.2. The splices shall insulate and protect the conductors not less than the insulation and protective jackets on the cables and wires which protect the conductors. In locations where moisture might be present, the splices shall be watertight. In manholes and handholes the splices shall be submersible.

2.2.3. Splicing and Terminating Fittings: Shall be in accordance with IEEE 386, 404 and 592.

2.2.3.1. Shall be heavy duty, pressure type fittings, which will assure satisfactory performance of the connections under conditions of temperature cycling and magnetic forces from available short circuit currents.

2.2.3.2. The fittings shall be suitably designed and the proper size for the cables and wires being spliced and terminated. Terminations to bus shall be with two hole lugs.

2.2.3.3. Where the District determines that unsatisfactory fittings have been installed, remove the unsatisfactory installations and install approved fittings at no additional cost to the District.

2.2.4. Splicing and Terminating Kits:

2.2.4.1. General:

2.2.4.1.1. Shall be assembled by the manufacturer or supplier of the materials and shall be packaged for individual splices and terminations or for groups of splices and terminations.

2.2.4.1.2. Shall consist of materials designed for the cables being spliced and terminated and shall be suitable for the prevailing environmental conditions.

2.2.4.1.3. Shall include detail drawings and printed instructions for each type of splice and termination being installed, as prepared by the manufacturers of the materials in the kits.

2.2.4.1.4. Detail drawings, and printed instructions shall indicate the cable type, voltage rating, manufacturer's name and catalog numbers for the materials indicated.

2.2.4.1.5. Voltage ratings for the splices and terminations shall be not less than the voltage ratings for the cables on which they are being installed.

2.2.4.1.6. Shall include shielding and stress cone materials.

2.2.4.2. Taped splices and terminations with insulating and semiconducting rubber tapes shall withstand 200% elongation without cracking, rupturing or reducing their electric and self-bonding characteristics by more than 5%.

2.2.4.3. Epoxy resin kits shall be as follows:

2.2.4.3.1. Compatible with the cable insulations and jackets and make the splices watertight and submersible.

2.2.4.3.2. Thermosetting and generate its own heat so that external fire or heat will not be required.

2.2.4.3.3. Set solid and cure in approximately 60-minute in 70°F ambient temperature.

2.2.4.3.4. Not deteriorate when subjected to oil, water, gases, salt water, sewage and fungus.

2.2.4.3.5. Furnished in pre-measured quantities, sized for each splice and each termination, with two resin components in an easy mixing plastic bag which will permit mixing the resin without entrapping air or contaminants. Other methods of packaging and mixing the epoxy resin components will be considered for approval, provided they include adequate safeguards to assure precise proportioning of the resin components and to prevent entrapping air and contaminants.

2.2.4.3.6. Use snap-together, longitudinally-split, interlocking seam, transplant mold bodies or taped frameworks, injection fittings and injection gun or pouring equipment. Completely fill voids within the splices and terminations.

2.2.5. Pre-molded Rubber Splices and Terminations:

2.2.5.1. Splices and terminations shall be in accordance with IEEE 48, 386, 404 and 592.

2.2.5.2. Pre-molded rubber devices shall have a minimum of 0.125-inch semi-conductive shield material covering the entire housing. Test each rubber part prior to shipment from the factory.

2.2.5.3. Grounding of metallic shields shall be accomplished by a solderless connector enclosed in a watertight rubber housing covering the entire assembly. The grounding device and splice or terminator shall be of same manufacturer to insure electrical integrity of the shielded parts.

2.2.5.4. The pre-molded parts shall be suitable for indoor, outdoor, submersible, or direct-burial applications.

2.3. MATERIAL, FIREPROOFING TAPE

2.3.1. The tape shall consist of a flexible, conformable fabric of organic composition coated one side with flame-retardant elastomer.

2.3.2. The tape shall be self-extinguishing and shall not support combustion. It shall be arc proof and fireproof.

2.3.3. The tape shall not deteriorate when subjected to water, gases, salt water, sewage, or fungus. It shall be resistant to sunlight and ultraviolet light.

2.3.4. The finished application shall withstand a 200-Amp arc for not less than 30-second.

2.3.5. Securing tape: Shall be glass cloth electrical tape not less than 7-mil thick, and ¾-inch wide.

2.4. MATERIAL, WARNING TAPE

2.4.1. The tape shall be standard, 3-inch wide, 4-mil polyethylene detectable type.

2.4.2. The tape shall be red with black letters indicating "CAUTION BURIED ELECTRIC LINE BELOW".

3. EXECUTION

3.1. INSTALLATION, HIGH VOLTAGE CABLE

3.1.1. Installation shall be in accordance with the CEC, and as shown on the drawings.

3.1.2. Use suitable lubricating compounds on the cables and wires to prevent damage to them during pulling-in. Provide compounds that are not injurious to the cable and wire jackets and do not harden or become adhesive.

3.1.3. Splice the cables and wires only in manholes and accessible junction boxes. Ground shields in accordance with Section GROUNDING.

3.1.4. In manholes, trenches and vaults install the cables on suitable porcelain insulators with steel cables racks. Ground cable racks in accordance with CEC.

3.1.5. In manholes, underground raceways and other outdoor locations:

3.1.5.1. Seal the cable ends prior to pulling them in to prevent the entry of moisture.

3.1.5.2. For ethylene propylene rubber and polyethylene insulated cables, use bags of epoxy resin which are not less than ¼-inch larger in diameter than the overall diameter of the cable. Clean each end of each cable before installing the epoxy resin over it.

3.2. INSTALLATION, SPLICES AND TERMINATIONS

3.2.1. Install the materials as recommended by their manufacturer including special precautions pertaining to air temperature during installation.

3.2.2. Ethylene Propylene Rubber and Polyethylene Insulated Cables:

3.2.2.1. Cables rated 8000-Volt or less: Install epoxy resin splices and terminations, or pre-molded rubber splices and terminations.

3.2.3. Installation shall be accomplished by qualified personnel trained to accomplish high voltage equipment installations. All instructions of the manufacturer shall be followed in detail.

3.3. INSTALLATION, FIREPROOFING

3.3.1. Cover all power cables located in manholes, handholes and junction boxes with arc proof and fireproof tape.

3.3.2. Apply the tape in a single layer, one-half lapped or as recommended by the manufacturer. Install the tape with the coated side towards the cable and extend it not less than 25 mm (one inch) into each duct.

3.3.3. Secure the tape in place by a random wrap of glass cloth tape.

3.4. FEEDER IDENTIFICATION

3.4.1. In each manhole and pullbox install permanent tags on each circuit's cables and wires to clearly designate their circuit identification and voltage. In manholes the tags shall be the embossed brass type and shall also show the cable type and voltage rating. Position the tags so they will be easy to read after the fireproofing is installed.

3.5. FIELD TESTS FOR HIGH VOLTAGE CABLE

3.5.1. New Cable:

3.5.1.1. Acceptance tests shall be performed on new cable in accordance with IEEE 48 and as specified herein.

3.5.1.2. Test new cable after installation, splices, and terminations have been made, but before connection to equipment and existing cable.

3.5.2. Existing Cable:

3.5.2.1. Maintenance tests shall be performed on existing cable interconnected to new cable. See test voltages below.

3.5.2.2. After new cable test and connection to an existing cable, test the interconnected cable. Disconnect cable from all equipment that might be damaged by the test voltages.

3.5.3. High Potential Test:

3.5.3.1. Leakage current test shall be by high potential dc step voltage method.

3.5.3.2. Prior to high potential test, test the cable and shields for continuity, shorts, and grounds.

3.5.3.3. High potential test shall measure the leakage current from each conductor to the insulation shield. Use corona shields, guard rings, taping, mason jars, or plastic bags to prevent corona current from influencing the readings. Unprepared cable shield ends shall be trimmed back 1- inch or more for each 10-kV of test voltage.

3.5.4. Safety Precautions:

3.5.4.1. Exercise suitable and adequate safety measures prior to, during, and after the high potential tests, including placing warning signs and preventing people and equipment from being exposed to the test voltages.

3.5.5. Test Voltages:

3.5.5.1. New shielded EPR cable dc test voltages shall be as follows:

Rated Circuit Voltage	Wire Size	Test Voltage KV	
(Phase-to-Phase Volt)	(AWG or MCM)	100% Insulation Level	133% Insulation Level
2001-5000	8-1000	25	25
5001-8000	6-1000	35	35

3.5.5.2. Existing cable of all types interconnected to a new cable shall be tested at 1.7 times the existing cable rated voltage (maintenance test).

3.5.6. High Potential Test Method:

3.5.6.1. Apply voltage in approximately 8 to 10 equal steps.

3.5.6.2. Raise the voltage slowly between steps.

3.5.6.3. At the end of each step, allow the charging currents to decay, and time the interval of decay.

3.5.6.4. Read the leakage current and plot a curve of leakage currents versus test voltage on graph paper as the test progresses. Read the leakage current at the same time interval for each voltage step.

3.5.6.5. Stop the test if leakage currents increase excessively or a "knee" appears in the curve before maximum test voltage is reached.

3.5.6.5.1. For new cable, repair or replace the cable and repeat the test.

3.5.6.5.2. For existing cable interconnected to new cable, notify the Project Engineer for further instructions.

3.5.6.6. Upon reaching maximum test voltage, hold the voltage for five minutes. Read the leakage current at 30-second intervals and plot a curve of leakage current versus time on the same graph paper as the step voltage curve. Stop the test if leakage current starts to rise, or decreases and again starts to rise. Leakage current should decrease and stabilize for good cable.

3.5.6.7. Terminate test and allow sufficient discharge time before testing the next conductor.

3.5.7. The contractor shall furnish the instruments, materials and labor for these tests.

END OF SECTION

SECTION 26 05 45

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL AND COMMUNICATION SYSTEMS

1. GENERAL

1.1. DESCRIPTION

1.1.1. Work Included: Provide all labor, material, equipment, necessary testing, and complete the power and service distribution system as shown on the Drawings and as specified herein.

2. PRODUCTS

2.1. CONCRETE PULL BOXES/MANHOLE

2.1.1. General:

2.1.1.1. Provide pre-cast concrete pull boxes where pull boxes are indicated complete with cover, drain hole, removable steel ladder, four pull irons, ground bus and ground rods. Pull box/manhole size shall be as indicated.

2.1.1.2. Pre-cast concrete manholes shall conform to the requirements of ASTM C478 – Standard Specification for Pre-cast Reinforced Concrete Manhole

2.1.1.3. Pull box/manhole shall meet all legal requirements as to size for conduits terminating therein.

2.1.1.4. Reinforced concrete shall be Class A, 3,000-psig type. Minimum design loading shall be 300-lb/ft^2.

2.1.2. Covers:

2.1.2.1. Covers shall be concrete with a cast-iron lid and frame. Minimum clear opening through the frame shall be 36-inch in diameter.

2.1.2.2. Cast-iron lid shall have lid lettering designation; "ELECTRIC", "HIGH-VOLTAGE", for Power Manhole/Pull box and "SIGNALS" for Communication pull boxes. Submit to the Architect for review.

2.1.2.3. Provide traffic-type construction with traffic covers in areas involving vehicular traffic suitable for AASHTO HS-20 wheel loads.

2.1.3. Accessories:

2.1.3.1. Provide hooked manhole ladder that complies with OSHA 29 CFR 1910.27 and ANSI A14.36 – Safety Code for Fixed Ladders. Ladder shall be coated with non-corrosive finish.

2.1.3.2. Provide heavy duty cable racks and arms by Hubbell Power Systems/Chance Group for each manhole.

2.1.4. Acceptable Manufacturers: Pre-cast concrete pull boxes shall be Quikset EPB-2100 Series or equal by Oldcastle Pre-cast or Brooks Jensen Pre-cast.

2.2. UNDERGROUND CONDUIT SYSTEM

2.2.1. Underground Conduit System: Provide as shown on the Drawings and as specified.

2.2.2. Excavation: Provide excavation for underground conduit system and manholes as shown on the Drawings and as specified hereinbefore.

2.2.3. Conduit for the underground conduit system shall be as shown on the Drawings, and as specified in Section 26 05 00 and in Part Three of this Section.

2.2.4. The conduit length for each size shall be the length that is standard with the manufacturer with a permissible tolerance of ¼-inch in a 10-foot length.

2.2.5. Conduit fittings shall be UL approved and shall conform to applicable standards, except that where NEMA Standards for conduit fittings do not exist, fittings shall be as recommended by the conduit manufacturer.

2.2.6. Conduit fittings shall be of a type especially made for use with the conduit for electrical service. Plastic conduit and fittings shall be capable of being joined, by means of a solvent welding cement, so as to provide a watertight root-proof joint.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION OF ELECTRICAL SYSTEMS

1. GENERAL

1.1. SUMMARY

1.1.1. This Section includes the following:

1.1.1.1. Identification for conductors and communication and control cable.

1.1.1.2. Warning labels and signs.

1.1.1.3. Equipment identification labels.

1.2. RELATED SECTIONS:

1.2.1. Section 26 05 73 OPD Coordination Study/Arc Flash Analysis

2. PRODUCTS

2.1. CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

2.1.1. Marker Tape: Vinyl or vinyl -cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2. WARNING LABELS AND SIGNS

2.2.1. Comply with NFPA 70 and 29 CFR 1910.145.

2.2.2. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

2.2.3. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch grommets in corners for mounting. Nominal size, 7-inch by 10-inch. Metal-Backed, Butyrate Warning Signs: Weather-resistant, non-fading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch grommets in corners for mounting. Nominal size, 10-inch by 14-inch.

2.2.4. Fasteners for Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

2.2.5. Warning label and sign shall include, but are not limited to, the following legends:

2.2.5.1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2.2.5.2. Dimension in first subparagraph below is clear space prescribed in NFPA 70 (2002 Edition), Table 110-26(A)(1), for equipment with nominal voltage to ground of 151 to 600-Volt, and with grounded parts, including concrete, brick, or tile walls, opposite the equipment. Additional clear space is required at this voltage if there are unguarded exposed live parts on both sides of the workspace. Retain below and revise to suit Project conditions or requirements of authorities having jurisdiction, or indicate varying clearance requirements on Drawings.

2.2.5.3. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES WIDE (PARALEL TO EQUIPMENT) AND CLEAR DEPTH REQUIRED IN ACCORDACE WITH NEC ARTICLE 110.32

2.2.5.4. Equipment containing or operating circuits more than 240-Volt nominal: Provide laminated plastic warning signs engraved in ½-inch high by 3/8-inch wide white letters on red background to read: "CAUTION HIGH VOLTAGE-'XXX' VOLT" , 'XXX' indicating actual voltage.

2.2.5.5. Provide Arc Flash Name Label with PPE category information on each electrical equipment, which are likely require examination, adjustment, servicing, or maintenance while energized, including but not limited to Switchgear, Switchboards, Transformers, Industrial Control Panels, Motor Control Centers, Disconnect Switches and Panels. PPE level shall be in accordance with the Arc Flash Hazard Analysis report done on the Short Circuit and Over-current Protective Device Coordination study

2.2.5.6. Arc Flash Label must contain the following important elements:

2.2.5.6.1. Location / Equipment Designation.

2.2.5.6.2. Nominal System Voltage

2.2.5.6.3. Arc Flash Boundary, Restricted Approach and Limited Approach.

2.2.5.6.4. Available Incident Energy cal/cm^2 and Working Distance

2.2.5.6.5. Arc Flash PPE Hazard Category and Arc Rated of Clothing

2.2.5.6.6. Registered Professional Engineer performing the studies and date.

2.2.5.7. Arc Flash Label shall be supplied by Switchgear Factory, included in the scope of Short-circuit and Protective Device Coordination and Arc Flash Hazard Analysis Studies.

2.3. EQUIPMENT IDENTIFICATION LABELS

2.3.1. Provide laminated plastic warning signs engraved in ½-inch high by 3/8-inch wide white letters on red background to Provide laminated plastic warning signs engraved in ½-inch high by 3/8-inch wide white letters on red background to Provide laminated plastic warning signs engraved in ½-inch high by 3/8-inch wide white letters on red background to Retain one of two paragraphs below to specify type of labels Contractor must use to comply with NFPA 70 (2011 Edition), Article 110-22, "Identification of Disconnecting Means." Note that, unless otherwise indicated, the labeling products selected below will also be used for labeling that is not required by NFPA 70 but may be specified in Part 3 "Application" Article to identify equipment other than disconnect devices. See Evaluations.

2.3.2. Provide three layers laminated plastic (micarta) nameplates engraved in ¼-inch (minimum) high black letters on white background to correspond with the designations on the Drawings, electrical equipment nameplate shall be as follows:

2.3.3. The main nameplate shall give the equipment designation in ½-inch high letters, the second line in ¼-inch high letters shall indicate the Amperage, Voltage, Phase, and Wire. The third line of same dimensions as the second line shall indicate where the equipment fed from. Following is an example of Panelboard nameplate:

PANEL "1HA"

100A MAIN, 480Y/277-VOLT, 3-PH, 4W

FED FM "1MS" – 100A CB

2.3.4. Provide red letters on white background for emergency equipment.

3. EXECUTION

3.1. APPLICATION

3.1.1. Auxiliary Electrical Systems Conductor and Cable Identification: Use marker tape to identify field-installed alarm, control, signal, sound, intercommunications, voice, and data wiring connections.

3.1.1.1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and cable pull points. Identify by system and circuit designation.

3.1.1.2. Use system of designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

3.1.2. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply metal-backed, butyrate warning signs. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

3.1.2.1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:

3.1.2.1.1. Power transfer switches.

3.1.2.1.2. Controls with external control power connections.

3.1.2.2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

3.1.3. Coordinate paragraph and subparagraphs below with electrical Sections in Divisions 26, 27, and 28. Delete items not in Project.

3.1.4. Equipment Identification Labels (name plates): On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

3.1.4.1. Labeling Instructions:

3.1.4.1.1. Indoor Equipment: Provide laminated plastic nameplates engraved in black letters on white background (for emergency power equipment, provide white letters on red background), attached with rivets or self-taping screws or with nuts and flat and lock washers.

3.1.4.1.2. Outdoor Equipment: Engraved, laminated acrylic or melamine label, drilled for screw attachment.

3.1.4.1.3. Elevated Components: Increase sizes of labels and legend to those appropriate for viewing from the floor.

3.1.4.1.4. Provide engraved branch circuit breaker numbering strip, screw or riveted on branch circuit and lighting panelboard internal trim. Permanent engraved numbering on internal trim is acceptable, sticker numbering system is not permitted.

3.1.4.1.5. Provide load schedules for all branch circuit and lighting panelboards, identifying type, size and location of load. Schedules shall be typewritten and protected by transparent plastic cover.

3.1.4.2. Equipment to be Labeled:

3.1.4.2.1. Identification labeling of some items listed below may be required by individual Sections or by NFPA 70.

3.1.4.2.2. Panelboards, electrical cabinets, and enclosures.

3.1.4.2.3. Electrical switchgear and switchboards.

3.1.4.2.4. Transformers.

3.1.4.2.5. Substations.

3.1.4.2.6. Generators.

3.1.4.2.7. Motor-control centers.

3.1.4.2.8. Disconnect switches.

3.1.4.2.9. Enclosed circuit breakers.

3.1.4.2.10. Motor starters.

3.1.4.2.11. Push-button stations.

3.1.4.2.12. Power transfer equipment/MV Switches.

3.1.4.2.13. Contactors.

3.1.4.2.14. Pull boxes.

3.1.4.2.15. Terminal Cabinet

END OF SECTION

SECTION 26 05 73

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY / ARC FLASH HAZARD ANALYSIS

1. GENERAL

1.1. SUMMARY

1.1.1. Section includes short circuit and protective device coordination study encompassing portions of electrical distribution system from normal power source or sources up to and including breakers in service entrance switchboard, fuses in service entrance switchboard, main breaker in sub-distribution panels, fuses in sub-distribution panels and main breaker in each panelboard.

1.1.1.1. The contractor shall furnish short circuit and protective device study prepared by electrical equipment manufacturer for the protective devices to be installed under this project to assure proper equipment and personnel protection.

1.1.1.2. The study shall present an organized time-current analysis of each protective device in series from individual device back to the normal power source.

1.1.1.3. The study shall include an Arc Flash Hazard Analysis Study per the requirements set forth in NFPA 70E – Standard for Electrical Safety in the Workplace. The Arc Flash Hazard Analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.

1.2. REFERENCES

1.2.1. Institute of Electrical and Electronics Engineers:

1.2.1.1. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings (Gray Book).

1.2.1.2. IEEE 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (Buff Book).

1.2.1.3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis (Brown Book).

1.2.1.4. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.

1.2.1.5. IEEE 1584 – Guide for Performing Arc-Flash Hazard Calculations.

1.2.2. American National Standard Institute (ANSI):

1.2.2.1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.

1.2.2.2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures.

1.2.2.3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis

1.2.2.4. ANSI C 37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.

1.2.3. National Fire Protection Association:

1.2.3.1. NFPA 70 - National Electrical Code.

1.2.3.2. NFPA 70E – Standard for Electrical Safety in the Workplace.

1.3. DESIGN REQUIREMENTS

1.3.1. Complete Short Circuit and Protective Device Coordination Study to meet requirements of NFPA 70.

1.3.2. Complete an Arc Flash Hazard Analysis Study per the requirements set forth in NFPA 70E – Standard for Electrical Safety in the Workplace. The Arc Flash Hazard Analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.

1.3.3. Report Preparation:

1.3.3.1. Prepare study prior to ordering distribution equipment to verify equipment ratings required.

1.3.3.2. Perform study with aid of computer software program.

1.3.3.3. Obtain actual settings for packaged chiller and motor characteristics and for equipment incorporated into Work.

1.3.3.4. Calculate short circuit interrupting and, when applicable, momentary duties for assumed 3-phase bolted fault short circuit current and phase to ground fault short circuit current at each of the following:

1.3.3.4.1. Electrical Utility supply termination point.

1.3.3.4.2. Automatic transfer switch.

1.3.3.4.3. Engine generator.

1.3.3.4.4. Main Service Switchboard.

1.3.3.4.5. Distribution panelboards.

1.3.3.4.6. Branch circuit panelboards.

1.3.3.4.7. Each other significant equipment location throughout system.

1.3.4. Report Contents:

1.3.4.1. Include the following:

1.3.4.1.1. Executive Summary.

1.3.4.1.2. Descriptions, purpose, basis and scope of study.

1.3.4.1.3. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties.

1.3.4.1.4. Protective device time versus current coordination curves, tabulation of relay and circuit breaker trip unit settings and fuse selection.

1.3.4.1.5. Fault current calculations including definition of terms and guide for interpretation of the computer printout.

1.3.4.1.6. Details of incident energy and flash protection boundary calculations.

1.3.4.1.7. One-line diagram revised by adding actual instantaneous short circuits available.

1.3.4.1.8. State conclusions and recommendations for system improvements, where needed.

1.4. QUALITY ASSURANCE

1.4.1. Perform Work in accordance with IEEE 242 and IEEE 1584.

1.4.2. Studies shall be performed using the latest revision of the SKM System Analysis Power Tools for Windows (PTW) software program. Submit for review information on alternative equal software proposed to be used in performing study.

1.4.3. Maintain one copy of each document on site.

1.5. QUALIFICATIONS

1.5.1. Study Preparer: Electrical equipment manufacturer Engineering Services specializing in performing work of this section with minimum five years documented experience and having completed projects of similar size and complexity within the past years.

1.5.2. Perform study under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location in State of with minimum of five years experience in power system analysis.

1.5.3. The Registered Professional Electrical Engineer shall be a full time employee of the equipment manufacturer or an approved engineering firm by the equipment manufacturer.

1.5.4. The equipment manufacturer or approved engineering firm shall demonstrate experience with Arc Flash Hazard Analysis by submitting names of at least ten actual Arc Flash Hazard Analysis it has performed in the past year.

1.5.5. Demonstrate company performing study has capability and experience to provide assistance during system start up.

2. PRODUCTS

2.1. STUDIES

2.1.1. Contractor to furnish short-circuit and protective device coordination studies as prepared by equipment manufacturer engineering services department.

2.1.2. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E - Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D.

2.1.3. Provide related Equipment Warning labels and Signs under "IDENTIFICATION OF ELECTRICAL SYSTEMS" Section.

2.2. DATA COLLECTION

2.2.1. Contractor shall furnish all data as required by the power system studies. The Engineer performing the short-circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.

2.2.2. Source combination may include present and future motors and generators.

2.2.3. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner, or Contractor.

2.2.4. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.3. SHORT CIRCUIT AND PROTECTIVE DEVICE EVALUATION STUDY

2.3.1. Use actual conductor impedances if known. If unknown, use typical conductor impedances based on IEEE Standard 141-1993.

2.3.2. Transformer design impedances shall be used when test impedances are not available.

2.3.3. Provide the following:

2.3.3.1. Calculation methods and assumptions

2.3.3.2. Selected base per unit quantities

2.3.3.3. One-line diagram of the system being evaluated

2.3.3.4. Source impedance data, including electric utility system and motor fault contribution characteristics

2.3.3.5. Tabulations of calculated quantities

2.3.3.6. Results, conclusions, and recommendations.

2.3.4. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each:

2.3.4.1. Electric utility's supply termination point

2.3.4.2. Main Service Switchboard.

2.3.4.3. Motor control centers

2.3.4.4. Standby generator and automatic transfer switch

2.3.4.5. Branch circuit panelboards

2.3.4.6. Other significant locations throughout the system.

2.3.5. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study.

2.3.6. Protective Device Evaluation:

2.3.6.1. Evaluate equipment and protective devices and compare to short circuit ratings

2.3.6.2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses.

2.3.6.3. Notify Owner in writing, of existing, circuit protective devices improperly rated for the calculated available fault current.

2.4. PROTECTIVE DEVICE COORDINATION STUDY.

2.4.1. Proposed protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.

2.4.2. Include on each TCC graph, a complete title and one-line diagram with legend identifying the specific portion of the system covered.

2.4.3. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.

2.4.4. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.

2.4.5. Plot the following characteristics on the TCC graphs, where applicable:

2.4.5.1. Electric utility's overcurrent protective device

2.4.5.2. Medium voltage equipment overcurrent relays

2.4.5.3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands

2.4.5.4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands

2.4.5.5. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves

2.4.5.6. Conductor damage curves

2.4.5.7. Ground fault protective devices, as applicable

2.4.5.8. Pertinent motor starting characteristics and motor damage points, where applicable

2.4.5.9. Pertinent generator short-circuit decrement curve and generator damage point

2.4.5.10. The largest feeder circuit breaker in each motor control center and applicable panelboard.

2.4.6. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

2.5. ARC FLASH HAZARD ANALYSIS

2.5.1. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.

2.5.2. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.

2.5.3. The Arc-Flash Hazard Analysis shall include all significant locations in 240-Volt and 208-Volt systems fed from transformers equal to or greater than 125-kVA where work could be performed on energized parts.

2.5.4. Safe working distances shall be based upon the calculated arc flash boundary considering an incident energy of 1.2-cal/cm^2.

2.5.5. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations

2.5.6. The short-circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for all normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum and will assume a minimum motor contribution (all motors off). Conversely, the maximum calculation will assume a maximum contribution from the utility and will assume the maximum amount of motors to be operating. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable.

2.5.7. The incident energy calculations must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators should be decremented as follows:

2.5.7.1. Fault contribution from induction motors should not be considered beyond 3 to 5 cycles.

2.5.7.2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g. contributions from permanent magnet generators will typically decay from 10 per unit to 3 per unit after 10 cycles).

2.5.8. For each equipment location with a separately enclosed main device (where there is adequate separation between the line side terminals of the main protective device and the work location), calculations for incident energy and flash protection boundary shall include both the line and load side of the main breaker.

2.5.9. When performing incident energy calculations on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.

2.5.10. Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.

2.5.11. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2-second based on IEEE 1584-2002 section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than 2-second during an arc flash event, a maximum clearing time based on the specific location shall be utilized.

3. EXECUTION

3.1. FIELD QUALITY CONTROL

3.1.1. Provide assistance to electrical distribution system equipment manufacturer during start-up of electrical system and equipment.

3.1.2. Select each primary protective device for delta-wye connected transformer so device's characteristic or operating band is within transformer characteristics, including point equal to 58% of ANSI withstand point to provide secondary line-to-ground fault protection.

3.1.3. Separate transformer primary protective device characteristic curves from associated secondary device characteristics by 16% current margin to provide proper coordination and protection in event of secondary line-to-line faults.

3.1.4. Separate medium-voltage relay characteristic curves from curves for other devices by at least 0.4-second time margin.

3.2. ADJUSTING

3.2.1. Perform field adjustments of protective devices and modifications to equipment to place equipment in final operating condition. Adjust relay and protective device settings in accordance with recommended settings table on the approved short circuit and protective device coordination study.

3.3. ARC FLASH WARNING LABELS

3.3.1. The contractor of the Arc Flash Hazard Analysis shall provide a 3.5-inch x 5-inch thermal transfer type label of high adhesion polyester for each work location analyzed.

3.3.2. All labels will be based on recommended overcurrent device settings and will be provided after the results of the analysis have been presented to the owner and after any system changes, upgrades or modifications have been incorporated in the system.

3.3.3. Arc Flash Label must contain important elements as required in the NFPA 70 and NFPA 70E, and further detailed in Section 26 05 53.

3.3.4. Labels shall be machine printed, with no field markings.

3.3.5. Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.

3.3.5.1. For each 600, 480 and applicable 208-Volt panelboard, one arc flash label shall be provided.

3.3.5.2. For each low voltage switchboard, one arc flash label shall be provided.

END OF SECTION

SECTION 26 11 16

SECONDARY UNIT SUBSTATION

1. GENERAL

1.1. REFERENCE

1.1.1. General: Requirements in Addenda, General/Special Conditions and Division 1, 2, 3, collectively apply to this work.

1.1.1.1. Examination of site thoroughly prior to bidding is a requirement of bid submittal.

1.2. DESCRIPTION

1.2.1. Work Included: Provide all labor, material, equipment, necessary testing, and complete the power and service distribution system as shown on the Drawings and as specified herein.

1.2.2. Related Work Described Elsewhere:

1.2.2.1. For detailed description of the electrical work also see other Sections in Division 26.

1.3. SUBSTITUTIONS

1.3.1. General: Only written approval of Architect will permit substitutions for materials specified; See Section 00 08 00, Supplementary Conditions for procedure.

1.4. QUALITY ASSURANCE

1.4.1. General: As specified in Section 26 05 00.

1.5. SUBMITTALS

1.5.1. General: Comply with the provisions of Section 00 13 00 and as specified in Section 26 05 00.

1.5.2. Shop Drawings:

1.5.2.1. Include sufficient information, clearly presented, to determine compliance with drawings and specifications.

1.5.2.2. Include electrical ratings, dimensions, mounting details, winding materials, required clearances, terminations, fuses (if required), safety features, weight, decibel rating, temperature rise, nominal impedance, regulation, no load and full load losses, wiring and connection diagrams, front, side and rear elevations, sectional views, accessories, and nameplate data.

1.5.3. Manuals:

1.5.3.1. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering replacement parts. It shall also include installation, operating instructions, maintenance, trouble shooting and repair procedures and technical literature pertaining to all components or instruments provided.

1.5.3.2. Two weeks prior to final inspection, submit four copies of the final up-dated maintenance and operating manuals to the Project Engineer.

1.5.4. Certificates:

1.5.4.1. Two weeks prior to final inspection, submit four copies of the following to the Project Engineer:

1.5.4.1.1. Certification by the Contractor that the substations have been properly installed, adjusted, and tested, including final circuit breaker settings.

1.5.4.1.2. Certified copies of all of the factory design and production tests, field test data sheets and reports for the substations.

1.5.5. Manufacturer Seismic Qualification Certification: Submit certification that the switchgear, overcurrent protective devices, accessories, and components will withstand seismic forces at location being installed. Include the following:

1.5.5.1. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

1.5.5.1.1. The term "withstand" means "the unit remain in place without separation of any parts from the equipment when subjected to the seismic forces, and the unit will be fully operational after the seismic event".

1.5.5.2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

1.5.5.3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

2. PRODUCTS

2.1. GENERAL REQUIREMENTS

2.1.1. Unit substations shall be in accordance with ASTM, ANSI, IEEE, CEC, and as shown on the drawings.

2.1.2. The substations shall be complete, grounded, continuous-duty, unitized integral assembly, metal clad, dead-front, dead-rear types, with dry-type transformers.

2.1.3. Ratings shall be not less than required by the CEC and not less than shown on the drawings. Short circuit current ratings shall be not less than the maximum short circuit currents available, where the substation is being installed, as shown on the drawings.

2.1.4. Provide substations that conform to the arrangements and details shown on the drawings and to the space designated for installation.

2.1.5. Coordinate the components of the substations and their arrangements electrically and mechanically. Coordinate all circuit entrances into the substations, including methods of entrance and connections.

2.1.6. The substation equipment shall have the capability to withstand and interrupt fault currents supplied by the utility.

2.1.7. Incorporate interlocking as shown on the drawings and as required for the safe operation of the substations.

2.1.8. The substation shall be assembled and prewired by the manufacturer at the factory.

2.1.9. Substation shall be thoroughly cleaned, phosphate treated and painted at the factory with rust-inhibiting paint and baked enamel or lacquer light gray finish.

2.1.10. Coordinate the high and low voltage sections with their associated transformers. Sections shall be fabricated by a single manufacturer.

2.1.11. Bolts, nuts and washers shall be rustproof metal, corrosion resistant (zinc chrome plated).

2.2. HIGH VOLTAGE SECTION

2.2.1. Housing shall be of outdoor type. Outdoor housings shall be gasketed, weatherproof construction.

2.2.2. Preformed Terminations:

2.2.2.1. May be used for cables.

2.2.2.2. Shall conform to the requirements in Section 260513-Medium-Voltage Cables (Above 600 Volts).

2.2.2.3. Independently support each cable by a clamp to a structural support within 6-inch of the termination to relieve any strain imposed by cable weight or movement.

2.2.3. High Voltage Lightning Arresters:

2.2.3.1. Shall have the following features:

2.2.3.1.1. Class as recommended by the manufacturer of the lightning arresters for protecting the installations.

2.2.3.1.2. Valve type or gaplers, metal oxide disk per ANSI/IEEE C62.11.

2.2.3.1.3. Wet process porcelain, glass polyester, or epoxy insulators.

2.2.3.1.4. Supports shall be rustproof metal and shall hold the porcelain in compression.

2.2.3.2. Install the arresters on each underground conductor of each circuit at the locations indicated on the drawings.

2.2.4. High Voltage Fused Switches:

2.2.4.1. Shall have the following features:

2.2.4.1.1. Load-break air interrupter duplex switch consisting of two 3 pole, 2 position-open/closed interrupter switches with the load sides connected together.

2.2.4.1.2. Quick-make, quick-break, operating mechanisms.

2.2.4.1.3. Copper blades.

2.2.4.1.4. A separate door for the fuse section. A mechanical interlock shall prevent opening the door unless the switch blades are open.

2.2.4.1.5. A manual operating handle with lock-open padlocking provisions.

2.2.4.1.6. When the switches are open, the fuses shall be de-energized.

2.2.4.1.7. Phase barriers for the full length of the blades and fuses for each pole.

2.2.4.1.8. A protective shield to cover the cable connections on the line terminals.

2.2.4.1.9. A safety window for viewing the switch blades.

2.2.4.1.10. Provide heater via control transformer and thermostat.

2.2.4.2. Provide fuses of the current limiting power type.

2.2.5. Interrupting ratings for the switches shall be not less than the maximum short circuit current available where the substation is being installed, as shown on the drawings.

2.3. DRY TYPE TRANSFORMERS

2.3.1. Shall have the following features:

2.3.1.1. The transformer shall be 3-phase, 60-Hz, air cooled dry type mounted in a suitable ventilated enclosure and barriered from the high voltage and low voltage sections. Self-cooled capacity shall be as indicated per single line diagram: primary voltage 4260-Volt delta; secondary voltage 480/277 3-phase, 4 wire. Primary taps shall be full capacity, with a minimum of 2 to 2-1/2% above and below rated voltage.

2.3.1.2. The transformer shall have a 115°C temperature rise above a 40°C ambient. All insulating materials used shall be in accordance with NEMA ST20 NEMA TR27 Standards for a 220°C insulation system. The temperature rise shall be designated on the transformer nameplate.

2.3.1.3. The coil design and all winding materials shall be copper.

2.3.1.4. The completed coils shall be pre-heated, vacuum-impregnated with non-hygroscopic, thermosetting insulating varnish, and then thoroughly baked. This process shall completely seal the coils against moisture, and eliminate any voids which could create hot spots, or cause corona formation.

2.3.1.5. The transformer cores are to be constructed of high grade, non-aging silicon steel laminations with high magnetic permeability, and low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point. The core laminations shall be clamped together with heavy, structural steel angles.

2.3.1.6. The basic impulse levels (BIL) shall be a minimum of 30-kV for the 5-kV class.

2.3.1.7. The enclosure shall be constructed of heavy gauge sheet steel. All ventilating openings shall be in accordance with NEMA and California Electrical Code standards for ventilated enclosures. Large enclosures are to be provided with lifting devices bolted or welded to the base structure, and shall have jacking pads designed to be flush with the enclosure. The base is to be constructed of structural steel members to permit skidding or rolling in any direction. The enclosure is to be cleaned, phosphatized, primed and finished with gray, baked enamel.

2.3.1.8. Metal oxide gapless type lighting arresters, or equivalent, shall be installed by the manufacturer on the high voltage side of the transformer to provide additional protection against high voltage lightning or switching surges.

2.4. LOW VOLTAGE SECTION

2.4.1. Refer to Distribution Switchboards in Section 26 24 00.

2.5. AUXILIARIES

2.5.1. Install additional components as shown on the drawings or otherwise required for the substations.

3. EXECUTION

3.1. INSTALLATION

3.1.1. Install the equipment in accordance with the CEC, as shown on the drawings and as recommended by the equipment manufacturer.

3.1.2. Foundations:

3.1.2.1. Provide foundations of reinforced concrete, Type C (3000-psig minimum, 28 day compressive strength), and comply with the ACI 318.

3.1.2.2. Locate the top of the foundation pad 6-inch above the adjacent finished grade unless otherwise shown on the drawings. Refer to drawings for size, location, and structural steel reinforcing required.

3.1.2.3. Grade the adjacent terrain so that surface water will flow away from the foundation.

3.1.2.4. Anchor the unit with rust-proofed bolts not less than ½-inch. In seismic areas, substation shall be adequately anchored and braced to withstand the seismic forces at the location where installed.

3.2. INSTRUCTIONS

3.2.1. Furnish the services of a competent instructor for two, 4-hour periods for instructing personnel in the operation and maintenance of the substation, on the date requested by the Project Engineer.

END OF SECTION

SECTION 26 24 00

BUILDING SERVICE AND DISTRIBUTION

1. STANDARDS

1.1. DESCRIPTION

1.1.1. Work Included: Provide labor, material, equipment, necessary testing, and complete the building service and distribution system as shown on the Drawings and as specified herein.

2. MATERIALS

2.1. CONCRETE PULL BOXES

2.1.1. General:

2.1.1.1. Provide precast concrete pull boxes where pull boxes are indicated complete with cover, drain hole and two pull irons. Unless otherwise indicated, inside dimensions for pull boxes shall be 2-foot 6-inch wide by 4-foot long by 4-foot deep.

2.1.1.2. Pull boxes shall meet all legal requirements as to size for conduits terminating therein.

2.1.1.3. Reinforced concrete shall be Class A, 3,000-psig type.

2.1.2. Covers:

2.1.2.1. Covers shall be concrete with a cast-iron lid and frame.

2.1.2.2. Cast-iron lid shall have bead weld designation; "ELECTRICAL", "HIGH-VOLTAGE", "COMMUNICATIONS" , "FIBER-OPTIC" and etc., as required. Submit to the Architect for review.

2.1.2.3. Provide traffic-type construction with traffic covers in areas involving vehicular traffic.

2.1.3. Acceptable Manufacturers: Pre-cast concrete pull boxes shall be Quikset EPB-2100 Series or equal by Brooks Products, Jensen or Oldcastle.

2.2. UNDERGROUND CONDUIT SYSTEM

2.2.1. Underground Conduit System: Provide as shown on the Drawings and as specified.

2.2.2. Excavation: Provide excavation for underground conduit system and manholes as shown on the Drawings and as specified hereinbefore.

2.2.3. Conduit for the underground conduit system shall be as shown on the Drawings, and as specified in Section 26 05 00 and in Part Three of this Section.

2.2.4. The conduit length for each size shall be the length that is standard with the manufacturer with a permissible tolerance of ¼-inc in a 10-foot length.

2.2.5. Conduit fittings shall be UL approved and shall conform to applicable standards, except that where NEMA Standards for conduit fittings do not exist, fittings shall be as recommended by the conduit manufacturer.

2.2.6. Conduit fittings shall be of a type especially made for use with the conduit for electrical service. Plastic conduit and fittings shall be capable of being joined, by means of a solvent welding cement, so as to provide a watertight root-proof joint.

2.3. CABLES

2.3.1. General: Provide all cables as indicated and specified.

2.3.2. 600-Volt Class and Under: Provide conductors of the 600-Volt class and under as specified under paragraph, "Wire and Cable", in Section 26 05 00.

2.3.3. Over 600-Volt Class: Refer to Section 26 13 00.

2.3.4. Auxiliary Systems: Provide clock, voice/data, security, fire alarm or other auxiliary type system cables as specified under the respective sections.

2.4. INTEGRATED POWER CENTER

2.4.1. General

2.4.1.1. Integrated power center (IPC) combine power distribution and controls into one integrated package.

2.4.1.2. The IPC structure is 84-inch high x 10-9/32-inch deep load conductors exit the top or bottom of the IPC.

2.4.1.3. The IPC consist combination of 480Y/277V, 3-phase, 4 wire main circuit breaker panelboard, 3-phase 480 Delta – 208Y/120V, 3-phase distribution transformer assembly and 208Y/120V, 3-phase, 4 wire panelboard.

2.4.1.4. The integrated power center equipment rating are indicated in the single line diagram.

2.4.2. Standard

2.4.2.1. The integrated power center shall be manufactured and tested to meet the following standards: UL 50, UL 67, UL 98, UL 489, UL 891, NEMA AB1, NEMA PB1, NEMA PB2, NEMA 250, NEC Art 384, NFPA 70.

2.4.2.2. The integrated power center and the devices within shall be manufactured and tested to meet the following federal specifications: W-C 375B/Gen, W-C 865C, WP 115B Type 1, Class 1.

2.4.3. Enclosure

2.4.3.1. The IPC enclosure shall be NEMA3R floor standing in 4-inch concrete pad grounded in accordance with NEC for system and equipment ground.

2.4.3.2. Enclosure shall be steel construction in accordance to applicable U.L. standards.

2.4.4. Main circuit breakers

2.4.4.1. Main circuit breakers rating and short circuit duty are as indicated.

2.4.4.2. Refer to standard for compliance.

2.4.5. Transformer

2.4.5.1. Three phase, 480 Delta – 208Y/120V. KVA as indicated.

2.4.5.2. H-220C insulation system with 150°C rise above 40°C ambient.

2.4.5.3. Provision for close coupling to integrated power center line-up.

2.4.5.4. Copper winding.

2.4.5.5. Green premium (RoHS/Reach Compliance product environmental profile)

2.4.5.6. Electrostatic shield.

2.4.5.7. UL listed to UL1561 under file E6868.

2.4.5.8. Complying with DOE 10 CFR 431 (78 FR 2335 – April 18, 2013)

2.4.6. Power Panelboard

2.4.6.1. 208Y/120V, 3-phase, 4-wire, with main circuit breaker.

2.4.6.2. Refer to single line diagram for trip and frame size.

2.4.6.3. Refer to standard Panelboards Section below for compliance.

2.4.7. Integrated System

2.4.7.1. Power panelboards shall be installed in common-depth and front-accessible switchboard enclosures.

2.4.7.2. Factory installed power cables shall electrically connect main breaker, transformer and panelboard in the line-up.

2.4.8. Fronts

2.4.8.1. Trim front shall meet strength and rigidity requirements or applicable UL standards.

2.4.8.2. Each section shall have a hinged door with a three-point latch with locking provisions.

2.4.8.3. A clear plastic directory card holder shall be mounted on the inside of the door.

2.4.8.4. Locks shall be cylindrical tumbler type. All lock assemblies shall be keyed alike. One key shall be provided with each lock.

2.4.9. Acceptable manufacturers: Integrated power center shall be Square D, Eaton or General Electric.

2.5. TRANSFORMERS (600-VOLT CLASS AND BELOW)

2.5.1. General: Provide transformers for use on 60-Hz system with the following characteristics:

2.5.1.1. Type: Dry, ventilated, self-cooled type with provisions for future cooling fans where indicated.

2.5.1.2. Complying with DOE 10 CFR 431 (78 FR 2335 – April 18, 2013)

2.5.1.3. Ratings: Phase, voltage and connection arrangement as indicated.

2.5.1.4. Capacities: The kVA capacities as indicated with capability of carrying a continuous 10% overload at rated voltage without exceeding NEMA average and hot spot temperature ratings of the insulation at 104°F ambient air temperature.

2.5.1.5. Windings: Constructed of copper and shall be of the fire-resistant type, designed for natural convection cooling through normal air circulation.

2.5.1.6. Insulation Class H (Class 220 Insulation Rating) 150°C average winding temperature rise.

2.5.1.7. Dimensions: Within the limitations indicated or the space available for installing the transformers.

2.5.1.8. Taps: Four 2-1/2% primary taps, 2 above and 2 below rated voltage.

2.5.1.9. Terminals: Locate terminals at the bottom of the transformer or other area where the temperature, when operating at 10% overload and in an ambient of 104°F will not exceed 140°F.

2.5.1.10. Mounting: Floor, wall or ceiling mounted, as indicated. Transformers shall be furnished complete with mounting channels and mounting bolts. Enclosures shall be provided with lifting lugs and jacking plates as required.

2.5.1.11. Vibration Dampening: Constructed with built in vibration dampeners which completely isolate the cores and coils from all supports and enclosures.

2.5.1.12. Sound Ratings: In the installed condition, the sound levels shall not exceed:

2.5.1.12.1. 45-dB for 0 to 45-kVA.

2.5.1.12.2. 50-dB for 46 to 150-kVA.

2.5.1.12.3. 55-dB for 151 to 300-kVA.

2.5.1.12.4. 60-dB for 301 to 500-kVA.

2.5.1.13. Enclosure: Cover plates shall be Code-gauge sheet steel, captive type, bolted to the enclosure framework. Enclosure shall have suitable ventilating openings with rodent-proof screens. Provide weatherproof type when located outdoors.

2.5.1.14. Finish: Metal parts excepting cores or core mounting frames shall be cleaned, rust-proofed, and be given a heavy coating of an inert primer. Cover plates and external metal parts shall be finished with two full-bodied coatings of oil-resistant industrial gray enamel.

2.5.1.15. Nameplates: Provide nameplates, identifying the characteristics, as specified in Section 26 05 00.

2.5.2. Acceptable Manufacturers: Transformers shall be manufactured by Square D; Eaton or General Electric.

2.6. PANELBOARDS

2.6.1. General:

2.6.1.1. Provide flush or surface mounted panelboards with main breakers or lugs, sub-fed lugs, bus size and circuit breakers of a rating as shown on the Drawings.

2.6.1.2. Each branch circuit breaker shall be identified by permanent number identification as to circuit numbers. Adhesive sticker numbering identification system is not acceptable.

2.6.1.3. Panelboard shall have "field marked" to warn qualified persons of the potential for arc-flash hazards.

2.6.1.4. Top of panelboard shall not be higher than 78-inch above finished floor.

2.6.1.5. Space for controls such as time clocks, time controlled relays and air-conditioning controls shall be located in a separate compartment with hinged doors within respective panelboards. Where limited by the height of the panels, locate controls in a separate cabinet adjacent to the respective panelboard.

2.6.2. Bus bars shall be rectangular in cross-section constructed of copper with silver-plated joints and interconnections. Unless otherwise indicated, neutral buses shall be full size. Bus bars shall be isolated from wiring troughs and working spaces and be braced to withstand a minimum short circuit fault of 25,000-Amp RMS symmetrical or larger as indicated. Provide split bus where indicated on the Drawings.

2.6.3. Circuit Breakers:

2.6.3.1. Circuit breakers shall have interrupting capacities as indicated on the Drawings. Minimum interrupting capacities for 120/208 and 277/480-Volt circuit breakers shall be 10,000-Amp and 14,000-Amp RMS symmetrical respectively. Provide breakers of the bolt-on molded case type. Plug-in types are not acceptable.

2.6.3.2. Single-pole breakers shall be full module size; two poles shall not be installed in a single module. Multi-pole circuit breakers shall be of the common-trip type having a single operating handle and for sizes of 50-Amp or less, may consist of single-pole circuit breakers permanently assembled at the factory into a multi-pole unit.

2.6.3.3. Circuit breakers used for motor-circuit disconnects and not within sight of the motor controller shall be capable of being locked in the open position.

2.6.3.4. Circuit breakers shall have provisions for lock out clips which shall be provided for breakers serving motors, signal systems and air-conditioning controls, and as indicated on the schedules on the Drawings.

2.6.3.5. Provide approved "Lock-Off" devices for all circuit breakers serving lighting circuits without local switching.

2.6.3.6. Circuit breakers shall be arranged in the panels to correspond exactly with the schedules on the Drawings. Circuit numbers shall be black-on-white plastic tabs or other such permanent type which cannot be changed readily from the front of the panel.

2.6.3.7. Breakers serving loads comprised of large wattage incandescent lamps shall be equipped with desensitized magnetic trip mechanisms which prevent tripping by in-rush currents.

2.6.3.8. Provide approved handle ties for individual circuit breakers protecting each ungrounded branch circuit conductor of multi-wire branch circuits.

2.6.3.9. Provide ground fault circuit-interrupter for Code required lighting or receptacle circuits rated at 15, 20, 25 or 30-Amp at 120-Volt or above. The bolt-on molded-case type circuit breaker, similar to General Electric Type THQB-GF, shall be of the quick-make, quick-break operating mechanism with construction as described above and with the following additional features:

2.6.3.9.1. Amperes line-to-line, ground fault conditions: 0.005.

2.6.3.9.2. Amperes, symmetrical RMS at 120-Volt: 10,000.

2.6.3.9.3. Push-to-test circuit.

2.6.3.9.4. Trip-free handle to allow breaker to trip even if handle is held or blocked in the "ON" position.

2.6.3.9.5. If the above requirements cannot be met, the following shall be provided:

2.6.3.9.5.1. Provide ground fault circuit-interrupter for all Code required circuits. Ground-fault protection shall consist of a ground-sensor encircling all phase conductors, connected to a solid-state ground relay which initiates tripping of the circuit breaker.

2.6.3.9.5.2. Ground protection shall be adjustable from 5 to 50-Amp. Circuit-interrupter shunt-trip and relay shall operate from a 120-Volt control source. Time-current characteristic shall provide 0.1-second operation at about 10 times pickup. Relay shall be surface mounted in a separate barriered space.

2.6.4. Control Devices: Contactors, relays, time switches and related equipment shall be as specified in Section 26 05 00 and shall be mounted in a separate barriered space. Refer to the paragraph, "Cabinets", herein.

2.6.5. Cabinets:

2.6.5.1. Back boxes shall be flush or surface mounted as shown on the Drawings. Construction shall be of Code gauge zinc-coated sheet steel bearing the UL label where required. Back boxes shall be galvanized when recess mounted. Refer to "Painting" section for finish requirement of galvanized surfaces.

2.6.5.2. Panelboards shall be minimum 20-inch wide and shall be of types as required by the schedules and these Specifications. Where specifically indicated on the Drawings, provide UL listed column-type panelboards. All other requirements of the column-type panelboard shall comply with those specified in this section.

2.6.5.3. Panelboard doors shall be hinged and have pin tumbler cylinder locks operated by paracentric type keys. Panelboard locks shall be common keyed. Furnish two keys for each panelboard.

2.6.5.4. Where more than one door is mounted on a panelboard, arrange the trim so that a minimum 2-inch solid metal trim space is maintained between doors. Doors and trims shall be minimum 12-gauge steel.

2.6.5.5. Provide 12-inch high gutter where double lugs are required or where cable size exceeds bus size.

2.6.5.6. Wiring gutters on panelboards having through feeders shall be 5-inch minimum. Gutters shall be an integral part of the panelboard.

2.6.5.7. Provide barriered space for mounting contactors and control devices with a hinged door and lock, where shown or required.

2.6.6. Finish: Doors, trims and surface mounted back boxes located in areas exposed to public view shall be painted with one coat zinc chromate and one coat of primer sealer. Finish painting shall be in accordance with section, "Painting". Provide doors, trims and surface mounted back boxes located in custodian's rooms, mechanical rooms, electrical rooms and other areas not exposed to public view with one coat zinc chromate and a hammertone or light gray baked enamel finish.

2.6.7. Identification:

2.6.7.1. Provide neatly typed circuit index cards, clearly and correctly identifying all circuits, mounted in card holders, behind glass or heavy plastic on the inside of the panelboard doors. Indexes shall accurately record room numbers and load of each circuit.

2.6.7.2. Provide nameplates as specified under paragraph, "Nameplates", in Section 26 05 00. Designate the identifying nomenclature, voltage and phase of the panel as shown on the Drawings, for example:

PANEL "1LB"
100 A MAIN – 208Y/120 V, 3 PH, 4W
FED FM "1DSL" – 100A CB

2.6.8. Acceptable Manufacturers: Panelboard assembly, devices and major components shall be of the same manufacturer. Acceptable manufacturers are Square D; Eaton or General Electric.

2.7. DISTRIBUTION SWITCHBOARDS

2.7.1. General:

2.7.1.1. Provide distribution switchboards with ratings, components and features as indicated on the Drawings.

2.7.1.2. Switchboards shall consist of molded case thermal magnetic circuit breakers or externally operable quick-make, quick-break fused switch as indicated on the Drawings, in floor-standing, dead front, totally metal enclosed sections requiring front access only.

2.7.1.3. All sections shall be nominal 90-inch high, 15-inch deep and 38-inch or 42-inch wide and shall not exceed the physical spaces allowed for on the Drawings. Switchboards shall be constructed of Code gauge sheet steel.

2.7.1.4. In outdoor locations or where indicated, provide weatherproof enclosure having doors with padlocking facilities.

2.7.2. Bus bars:

2.7.2.1. Bus bars shall be rectangular in cross-section, constructed of copper with silver-plated joints and full-height in each vertical section with horizontal cross bus bars between sections. Short circuit bracing capabilities shall be in accordance with the minimum requirement as indicated for the circuit breakers.

2.7.2.2. Provide all lugs for sizes No. 6 AWG or larger suitable for copper conductors. Shop drawings must show lug sizes based on the actual conductors to be provided.

2.7.2.3. Neutral bar shall have terminals for all active, spare or inactive circuits.

2.7.3. Disconnect Devices:

2.7.3.1. Circuit breakers shall be of the bolted-on molded case type, with thermal magnetic trips and shall be rated at the voltage with frame sizes, number of poles, and trip settings as shown on the Drawings. Multi-pole circuit breakers shall have a common operating handle.

2.7.3.2. Provide circuit breakers with interrupting capacity as indicated on plans, minimum interrupting capacity shall be 14,000 symmetrical RMS amperes at 480/277-Volt and 10,000-Amp at 208/120-Volt.

2.7.3.3. Fusible switches shall be of the quick-made, quick-break, visible blade type and shall be UL listed and horsepower rated. Phase sequence and circuit numbering shall be uniform. Temperature rise and current carrying capacity of busses and parts shall be in accordance with NEMA Standards and NEC requirements. Provide fuses as specified under paragraph, "Fuses", in Section 26 05 00.

2.7.3.4. When indicated, provide circuit breakers and switches with shunt-trips, motor operators or other features as required for the application.

2.7.3.5. All circuit breakers shall be pad-lockable in the "OFF" position. All switches shall be pad-lockable in either the "OPEN" or "CLOSE" position.

2.7.4. Identification:

2.7.4.1. Nameplates: Provide nameplates and warning signs as specified, in Section 26 05 53.

2.7.4.2. Provide a nameplate for each circuit breaker or fusible switch with wording to indicate load served.

2.7.4.3. The main nameplate shall give the switchboard designation in ½-inch high letters. A second line in ¼-inch high letters shall indicate the Ampere, Voltage –Phase and Wire. The third line of same dimensions as the second line shall indicate where the equipment fed from.

2.7.5. Finish: Supporting framework, cover plates and other metal surface shall first be given a phosphate coating for superior paint adhesion and corrosion resistance. Alkyd amine standard gray enamel shall be electrostatically applied and baked thoroughly in a convection-type oven to ensure a long lasting, mark resistant finish.

2.7.6. Acceptable Manufacturers: Switchboard assembly, switches, circuit breakers, devices and major components shall be of the same manufacturer. Acceptable manufacturers are Square D, General Electric, or Cutler Hammer.

2.8. DISTRIBUTION PANELBOARDS

2.8.1. General: Distribution panelboards in general shall comply with the requirements of the distribution switchboards except that distribution panelboards shall be suitable for wall mounting instead of free floor standing.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

1. GENERAL

1.1. RELATED DOCUMENTS

1.1.1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

1.1.2. This Section is a Division 26 Basic Electrical Materials and Methods section, and is part of each Division 26 section making reference to wiring devices specified herein.

1.1.3. Related Sections:

1.1.3.1. Division 01 Section "General Commissioning Requirements", for commissioning procedures.

1.2. DESCRIPTION OF WORK

1.2.1. The extent of wiring device work is indicated by drawings and schedules. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electric energy.

1.2.2. Types of Decora Style electrical wiring devices in this Section include the following:

1.2.2.1. Receptacles.

1.2.2.2. Ground-fault circuit interrupters.

1.2.2.3. Switches.

1.2.2.4. Wallplates.

1.3. QUALITY ASSURANCE

1.3.1. Manufacturers: Firms regularly engaged in manufacture of electrical wiring devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than three years.

1.3.2. Installer's Qualifications: Firm with at least two years of successful installation experience on projects utilizing wiring devices similar to those required for this project.

1.3.3. CEC Compliance: Comply with CEC as applicable to installation and wiring of electrical wiring devices.

1.3.4. UL Compliance: UL498, UL Fed Spec WC-596, UL20, UL Fed Spec WS896E where available.

1.4. SUBMITTALS

1.4.1. Product Data: Submit manufacturer's data on electrical wiring devices.

2. PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

2.1.1. Manufacturers: Subject to compliance with requirements, manufacturers providing wiring devices which may be incorporated in the work include, but are not limited to, the following (for each type and rating of wiring device):

2.1.1.1. Leviton Manufacturing Co. Inc.

2.1.1.2. Arrow-Hart, Eaton.

2.1.1.3. Pass & Seymour (Legrand)

2.1.1.4. Harvey Hubbell Inc.

2.1.1.5. Intermatic (timer switches).

2.2. FABRICATED WIRING DEVICES

2.2.1. General: Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and which comply with NEMA Stds. Pub/No. WD 1. Provide W-C-596 rated wiring devices where available for the device listed below. Provide white color devices except as otherwise indicated.

2.2.2. Receptacles:

2.2.2.1. All receptacles shall be the grounding type with ground connection made through an extra pole which shall be permanently connected to the green grounding conductor.

2.2.2.2. Duplex receptacles for 20-Amp, 120-Volt service shall be 2-pole, 3-wire rated 20-Amp at 125-Volt.

2.2.2.3. Single receptacles for 20-Amp, 120-Volt service shall be 2-pole, 3-wire rated 20-Amp at 125-Volt.

2.2.2.4. Ground-fault Circuit Interrupters (GFCI) as required per-Code, shall be 2-pole, 3-wire rated 20-Amp at 125-Volt.

2.2.2.5. USB charging device shall be with the duplex receptacle for 20-Amp, 120-Volt service, 2-pole, 3-wire rated 20-Amp at 125-Volt.

2.2.2.6. Style: Receptacles shall be Decora style nylon.

2.2.2.7. Color: White (normal circuit) and Red (emergency circuit)

2.2.3. Switches:

2.2.3.1. Snap: Provide decorator rocker switches, rated 20-Amp at 120/277-Volt quiet type and shall be UL approved without derating for tungsten lamp loads or inductive loads.

2.2.3.2. Rotary spring wound timer switches: 0 to 60-minute 20-Amp. Inductive load rated.

2.2.3.3. Color: White unless otherwise noted.

2.3. WIRING DEVICE ACCESSORIES

2.3.1. Wall plates: Provide wall plates for single and combination wiring devices, of types, sizes, and with ganging and cutouts as indicated. Select plates which match wiring devices to which it attached. Wall plates shall be made of high-impact smooth nylon, or 304 stainless steel wall plate as indicated per-plan. Metal screws for securing plates to devices shall be as follows:

2.3.1.1. Screw heads colored to match finish of plates.

2.3.1.2. Finish: Brushed Stainless Steel.

2.3.2. Manufacturers: Subject to compliance with requirements, manufacturers providing wallplates may be incorporated in the work include, but are not limited to, the following (for each type and rating of wiring device):

2.3.2.1. Leviton Manufacturing Co. Inc.

2.3.2.2. Arrow Hart, Eaton.

2.3.2.3. Pass & Seymour (Legrand)

2.3.2.4. Lutron Electronics, Inc.

2.3.2.5. Harvey Hubbell Inc.

3. EXECUTION

3.1. INSTALLATION OF WIRING DEVICES

3.1.1. Install wiring devices as indicated, in accordance with manufacturer's written instructions, applicable requirements of CEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.

3.1.2. Where receptacles are shown to be mounted of above counter, refer to Architectural Drawings for cabinet locations and mount receptacle box to clear backsplash of all counters by a minimum of two inches.

3.1.3. Install device plates in full contact with wall surface or surface mounted box.

3.1.4. Install wiring devices only in electrical boxes which are clean; free from excess building materials, dirt, and debris.

3.1.5. Install wiring devices after wiring work is completed.

3.1.6. Install wall plates after painting work is completed.

3.1.7. Install GFCI receptacle as indicated per-plan, ground fault circuit interrupted duplex receptacle shall be individually ground fault protected unit (daisy chained installation of regular duplex receptacle protected by adjacent GFCI receptacle is not acceptable).

3.1.8. Installed switched receptacle controlled by occupancy sensor, as indicated per-plan – switched receptacle shall have factory identified marking.

3.2. PROTECTION OF WALLPLATES AND RECEPTACLES:

3.2.1. Upon installation of wall plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of substantial completion, replace those items which have been damaged, including those burned and scored by faulty plugs.

3.3. GROUNDING:

3.3.1. Provide equipment grounding connections for all wiring devices, unless otherwise indicated. Wiring device grounding shall be bonded to equipment ground wire of the branch circuit serving device in its outlet box.

3.4. TESTING:

3.4.1. Prior to energizing circuitry, test wiring for electrical continuity, and for short- circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements.

END OF SECTION

SECTION 26 51 00

LIGHTING SYSTEM

1. STANDARDS

1.1. DESCRIPTION

1.1.1. Principal Work Items are: Provide all labor, material, equipment, and testing necessary and complete the lighting system as shown on the Drawings and as specified herein.

1.2. QUALITY ASSURANCE

1.2.1. Standards:

1.2.1.1. Comply with standards listed in Section 26 05 00 and the following:

1.2.1.1.1. Electrical Testing Laboratories, Inc. (ETL);

1.2.1.1.2. Certified Ballast Manufacturer (CBM).

1.2.2. Qualifications of Installers: As specified in Section 26 05 00.

1.2.3. Qualifications of Manufacturers: As specified in Section 26 05 00.

2. MATERIALS

2.1. LIGHTING FIXTURES

2.1.1. Provide complete luminaire assemblies with features, options, and accessories as scheduled.

2.1.2. General: Provide recessed, surface, and pendant mounted lighting fixtures, complete with lamps, LED chips and driver, and ballasts where required, as shown, and as specified.

2.1.3. Exterior Light Fixtures: As detailed when not standard. Provide concrete bases for light poles and light bollards and accessible junction points as required.

2.1.4. Fixture Operating Voltages: 277-volt for fluorescent, LED and high intensity discharge lamps, unless otherwise indicated.

2.1.5. Ceiling Construction: Verify the ceiling construction at each fixture and provide the proper trim and mounting accessories with all required frame and finish moldings or escutcheons and hardware for the actual type of ceiling and the specific fixture to provide a neat professional finish.

2.1.6. Fixture catalog numbers:

2.1.6.1. Catalog numbers indicated for recessed fixtures are usually for lay-in type ceiling installation. Verify the ceiling condition for each recessed fixture and provide fixture complete with proper mounting accessories required for the ceiling condition in which the fixture is mounted.

2.1.6.2. For fluorescent fixtures, the catalog numbers indicated are those for individual units. Where continuous rows are indicated, provide all necessary mounting accessories.

2.1.6.3. Where both catalog number and description, either narrative or pictorial are indicated, the requirements of the description shall take precedence and prevail.

2.1.7. All fixtures of one type shall be of one manufacturer and of identical finish and appearance.

2.1.8. Complete units and all electrical components for fluorescent, incandescent, LED and special fixtures shall bear the UL and Electrical Testing Laboratory (ETL) labels. Labels shall not be place on fixtures at locations where installation of unit labels is visible.

2.2. FLUORESCENT LIGHT FIXTURES

2.2.1. Light distributing Medium:

2.2.1.1. Unless otherwise indicated, provide lens constructed of 100% virgin acrylic, 0.125-inch in thickness minimum, with female conical prisms having 3/16-inch square base. Minimum depth of prisms shall be 0.08-inch. Cones shall run 45-degree to the parallel and perpendicular axis of the lens panel. Lenses shall be de-staticized, and of the one piece type. Provide lenses as made by KSH Incorporated or approved equal. Where diffusers are indicated, provide one piece, translucent white, 100% virgin acrylic, mate-white finish diffuser, of 0.125-inch in thickness as manufactured by KSH Incorporated or approved equal.

2.2.1.2. Where light fixtures of the low-brightness type are indicated, provide parabolic shaped reflector cells of semi-specular anodized aluminum, formed from one piece brushed finished material. Parabolic blades shall be rigid, completely closed at the top by integral flanges designed for maximum reflectance.

2.2.2. Door Frames:

2.2.2.1. Provide door frames with miter corners, built-in light traps without gaskets.

2.2.2.2. Align miter corners precisely with internal die cast corner keys. Provide concealed hinges and snap action latches, invisible from below, opening lens housings from either side.

2.2.2.3. Provide frames of extruded aluminum with ½-inch regress and white finish unless indicated otherwise.

2.2.3. Fixture Housings: Construct of minimum 20-gage steel with swing-out lugs adjustable for precise leveling. Removable ballast cover shall protect the direct mounted ballast to achieve maximum heat dissipation. Exposed surfaces of the fixtures shall have white finishes except where indicated otherwise.

2.2.4. Plaster Frames: Provide for fixtures mounted in plaster ceilings.

2.3. HIGH-INTENSITY DISCHARGE FIXTURES

2.3.1. General: Provide high-intensity discharge fixtures as detailed, scheduled and for the service intended as shown and as specified.

2.3.2. Fixture Housings: Code gage material, with mounting frame for the fixture ballast and junction box.

2.3.3. Fixture noise level: Below perception range of occupants of area in which fixtures are installed, and in accordance with ASHRAE Guide and Data book recommendations.

2.3.4. Reversible Die-Cast Plaster Rings: Provide with fixture where required to suit ceiling construction.

2.3.4.1. Auxiliary Light System for quick start and restart: Furnish where called for.

2.4. BALLASTS

2.4.1. Electronic Dimmable Fluorescent Type:

2.4.1.1. UL listed, integrated circuit, high frequency operation type incorporating a silicon chip to control the overall ballast operation and capable of regulating the light output of fluorescent lamps between 20% and 100% of nominal in response to remotely activated signals. Unit shall be provided with integral protective circuitry.

2.4.1.2. ETL/CBM certification.

2.4.1.3. Power factor not less than 98%.

2.4.1.4. Quietest sound rating commercially available with a maximum of 2-dB above a 16-dB ambient.

2.4.1.5. Constant light output through input voltage ranges of 90 to 145-Volt for 120-Volt ballast and 200 to 320 volts for 277-Volt rated ballast.

2.4.1.6. Provides its own 0 to 10-vDC signal to control unit via auxiliary pair of Class 2, low voltage wiring isolated from ballast input power without necessitating any intermediate trimming controls.

2.4.1.7. Maintains continuous heating of lamp electrodes.

2.4.1.8. Input current Third Harmonic Content below 13% of the input current. Average crest Factor below 1.4.

2.4.1.9. Acceptable manufacturer: Advance Transformer Company, "Mark VII" series Controllable Integrated Circuit Ballast, General Electric Dimming Ballast or approved equal.

2.4.2. Electronic Non-dimmable Fluorescent Type:

2.4.2.1. UL listed, high frequency operation type with no detectale flicker and Class P thermally protected to operate with T-8 lamps in parallel.

2.4.2.2. ETL/CBM certification.

2.4.2.3. Power factor not less than 98%.

2.4.2.4. Quietest sound rating commercially available.

2.4.2.5. Constant light output through input voltage ranges of 108 to 132-Volt for 120-Volt ballast and 249 to 305-Volt for 277-Volt rated ballast.

2.4.2.6. Comply with FCC and NEMA limits governing electromagnetic and radio frequency interference. Average crest Factor below 1.6.

2.4.2.7. Acceptable manufacturer: General Electric Ultrastart or approved equal.

2.4.3. High Intensity Discharge Ballasts: Constant wattage (regulator) type.

2.4.3.1. Install ballasts and optical assemblies with safety chains.

2.4.3.2. Ballasts shall be capable of starting and operating the specified lamp within limits specified by the lamp manufacturer. The ballast shall limit lamp wattage variation to a maximum of plus or minus 5%, while ballast input voltage varies plus or minus 10% from nominal. At rated line voltage, the ballast shall have a minimum power factor of 0.98. Ballast primary current during lamp starting shall not exceed current requirement during normal operation. The ballast shall reliably start and operate the lamp in ambient temperatures down to 20°F.

2.4.3.3. The ballast shall be capable of maintaining operation of the lamp even when the incoming line voltage dips to 75% of the rated voltage.

2.5. LAMPS

2.5.1. General: Lamp shall be new and of wattage size and type indicated or as required for the particular fixture and or ballast installed.

2.5.2. Fluorescent lamps shall be "T8" type, 32-Watt, 3500°K (or specified color per-plan), CRI not less than 85, extended life, high lumen and low mercury content (RoHS compliant). Maximum length 48-inch, or as specified on the contract drawings.

2.5.3. Lamps shall be compatible with and as recommended by ballast manufacturer's printed literature.

2.5.4. Metal Halide Lamps to have color temperature of 3600°K and minimum color rendering index of 70.

2.6. LED FIXTURES

2.6.1. General requirements:

2.6.1.1. Product shall be in compliance with ANSI/UL 8750 Safety Standard for LED Lighting (NRTL Lab listed).

2.6.1.2. Product shall be tested and UL listed for dry, damp or wet locations as applicable.

2.6.1.3. Product shall be DesignLights Consortium qualified.

2.6.1.4. LED fixture shall be spectrally and photometrically tested to IESNA LM-79 Standards. Full LM-79 reports shall be included in the shop drawing submittal.

2.6.1.5. Performance warranty shall be minimum 5-year, covering Lumen maintenance and color shift.

2.6.1.6. The LED luminaires shall be lead-free, mercury-free and meet Restriction of Hazardous Substances (RoHS) regulations.

2.6.1.7. Outdoor LED luminaires are International Dark-Sky Association (IDA) approved and are measured for performance using IESNA standards and guidelines.

2.6.1.8. 0 to 10-Volt LED driver shall comply to NEMA 410 standard for mitigating inrush currents with solid state lighting sources.

2.6.2. Performance Criteria:

2.6.2.1. LED chip/package shall be manufactured by a well known industry leaders (Cree, Nichia, Osram-Opto, LumiLEDs, Philip or approved equal).

2.6.2.2. Product data shall include the delivered lumens, input wattage including driver, lumen per-watt/efficacy and optics, maximum ambient operating temperature, LM-80 lumen maintenance data, useful life to L70 (70% Lumen depreciation) and distribution characteristics.

2.6.2.3. Products shall have Energy Star Certified.

2.6.3. Manufacturer:

2.6.3.1. Bega, Cree, Eaton-Cooper Lighting, Canlet, Finelite, HE Williams, Isolite, Juno, Lithonia, Mark Architectural Lighting, NuLite, Phoenix, Prima, Rebelle, Spectrum, Visionaire, XAL Lighting and approved equal.

2.7. FIXTURE TYPES

2.7.1. Provide complete fixtures of the types scheduled on the Drawings and produced by a manufacturer with at least 5-years of successful experience in manufacturing fixtures of the type indicated.

2.7.1.1. Manufacturer's catalog numbers indicated are standard numbers only; for any modification and/or additional requirements, refer to Fixture Schedule and Drawings. Details shown on the Drawings are indicative of the general type desired and are not intended to restrict selection to fixtures of any particular manufacturer.

2.8. CLASSROOM CONTROLLER

2.8.1. Acceptable Manufacturer:

2.8.1.1. Cooper Controls

2.8.1.1.1. System: Room Controller QuicKit (RCQK)

2.8.1.2. Basis of design product: Cooper Controls Room Controller is subject to compliance and prior approval with specified requirements of this section, one of the following:

2.8.1.2.1. Cooper Controls Room Controller QuicKit (RCQK)

2.8.2. Wall Or Ceiling Mounted Occupancy Performance Requirements

2.8.2.1. Sensing mechanism:

2.8.2.1.1. Infrared: Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.

2.8.2.1.2. Ultrasonic:

2.8.2.1.2.1. Utilize an operating frequency of 32-kHz or 40-kHz that shall be crystal controlled to operate within plus or minus 0.005% tolerance.

2.8.2.1.2.2. Utilize Doppler shift ultrasonic detection technology.

2.8.2.2. Dual technology:

2.8.2.2.1. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.

2.8.2.2.2. Utilize an operating frequency of 32-kHz or 40-kHz that shall be crystal controlled to operate within plus or minus 0.005% tolerance.

2.8.2.2.3. Incorporate Doppler shift ultrasonic and passive infrared motion detection technologies. Products that react to noise or ambient sound shall not be considered.

2.8.2.3. Power failure memory:

2.8.2.3.1. Controls incorporate non-volatile memory. Should power be interrupted and subsequently restored, settings and parameters saved in protected memory shall not be lost.

2.8.2.4. Designed and tested to withstand discharges of 15,000-Volt per IEC 801-2 without impairment of performance.

2.8.2.5. Products tested in identical manner, complaint to NEMA WD 7 -2011 Occupancy Motion Sensors Standards.

2.8.2.6. Sensor shall have time delays from 10 to 30 minutes.

2.8.2.7. When specified, sensors shall automatically adjust time delay and sensitivity settings.

2.8.2.8. Sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.

2.8.2.9. Sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.

2.8.2.10. Where specified, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed, and Common outputs for use with HVAC control, Data Logging and other control options. Sensors utilizing separate components or specially modified units to achieve this function are not acceptable.

2.8.3. Ceiling Mounted Sensors

2.8.3.1. Product: [OAC-DT-2000], [OAC-DT-1000], [OAC-P-1500].

2.8.3.2. Provide necessary mounting hardware and instructions.

2.8.3.3. Sensors shall be Class 2 devices.

2.8.3.4. Connect to Room Controller via Click & Go cable to eliminate wiring errors.

2.8.3.4.1. OCC-RJ45 Room Controller accessory is used to allow any standard Occupancy / Vacancy Sensor to utilize Click & Go cable connections.

2.8.3.4.2. Two RJ45 connection ports for connection to Room Controller.

2.8.3.4.3. Occupancy Sensor and Daylight sensor shall be capable of a daisy chain connection to the Room Controller.

2.8.3.5. Device calibration and features:

2.8.3.5.1. Sensitivity: 0 to 100% in 10% increments.

2.8.3.5.2. Time delay: 1 to 30, self-adjusts to 10-min based on room occupancy.

2.8.3.5.3. Test mode: 15 second time delay.

2.8.3.5.4. Detection technology: PIR, Ultrasonic or Dual Technology activation and/or re-activation.

2.8.3.5.5. Walk-through mode.

2.8.3.5.6. Ultrasonic and Dual Technology Sensors utilize two independent sensor detection circuits simultaneously to ensure optimum performance, regardless of location or proximity to walls and structures.

2.8.3.5.7. Ultrasonic and Dual Technology Sensors utilize Variable Drive Circuitry (VDC) in cases of over saturation from misapplication, which automatically adjusts the volumetric output without reducing detection capability. Systems that reduce detection coverage area, shall not be acceptable.

2.8.3.5.8. Automatically and continually self-adjust ultrasonic frequency to ignore specific frequency, continuous noise from airflow to prevent detuning which can lead to inadvertent lights out. Sensors that require detuning shall not be acceptable.

2.8.3.5.9. All load parameters including Automatic On/Manual On, blink warning and daylight enable/disable when daylight sensors are pre-defined with the Room Controller local network.

2.8.3.6. Device Status LEDs including:

2.8.3.6.1. PIR Detection

2.8.3.6.2. Ultrasonic detection

2.8.3.7. Occupancy sensors are pre-defined to specific loads within the room without wiring or special tools for maximum energy savings.

2.8.3.8. Manual override of controlled loads.

2.8.3.9. Multiple occupancy sensors may be installed in a room by simply daisy chaining them together to the Room Controller via Click & Go cable. No additional configuration will be required

2.8.3.10. Where specified, sensor packaging shall be 100% recycled [made entirely from post-consumer waste (100% post-consumer fiber content) as well as, 100% recyclable].

2.8.3.11. Sensors shall be RoHS compliant.

2.8.4. Wall/Corner Mounted Sensors

2.8.4.1. Product: [OAWC-P-120W], [OAWC-P-009L-H], [OAWC-DT-120W],

2.8.4.2. Provide all necessary mounting hardware and instructions.

2.8.4.3. Sensors shall be Class 2 devices.

2.8.4.4. Connect to Room Controller via Click & Go cable to eliminate wiring errors.

2.8.4.4.1. OCC-RJ45 Room Controller accessory is used to allow any standard occupancy/ vacancy sensor to utilize Click & Go cable connections.

2.8.4.4.2. Two RJ45 connection ports for connection to Room Controller.

2.8.4.4.3. Occupancy Sensor and Daylight sensor shall be capable of a daisy chain connection to the Room Controller.

2.8.4.5. Device calibration and features:

2.8.4.5.1. Sensitivity: 0 to 100% in 10% increments.

2.8.4.5.2. Time delay: 1 to 30, self-adjusts to 10-min based on room occupancy.

2.8.4.5.3. Test mode: 15 second time delay.

2.8.4.5.4. Detection technology: PIR, Ultrasonic or Dual Technology activation and/or re-activation.

2.8.4.5.5. Walk-Through Mode.

2.8.4.5.6. Automatically and continually self-adjust ultrasonic frequency to ignore specific frequency continuous noise from airflow to prevent detuning which can lead to inadvertent lights out. Sensors that require detuning shall not be acceptable.

2.8.4.5.7. All load parameters including Automatic-On/Manual-ON, blink warning, and daylight enable/disable when daylight sensors are pre-defined with the Room Controller local network.

2.8.4.6. Device Status LEDs including:

2.8.4.6.1. PIR Detection

2.8.4.6.2. Ultrasonic detection

2.8.4.7. Occupancy sensors are pre-defined to specific loads within the room without wiring or special tools for maximum energy savings.

2.8.4.8. Manual override of controlled loads.

2.8.4.9. Multiple occupancy sensors may be installed in a room by simply daisy chaining them together to the Room Controller via Click & Go cable. No additional configuration will be required

2.8.4.10. Where specified, sensor packaging shall be 100% recycled [made entirely from post-consumer waste (100% post-consumer fiber content) as well as, 100% recyclable].

2.8.4.11. Sensors shall be RoHS compliant.

2.8.5. Room Controller Digital Wallstations

2.8.5.1. Low voltage momentary pushbutton switches in 2, 3, 4, 5 and 6 button configuration; available in white, ivory, grey and black; compatible with wall plates with decorator opening. Wallstations shall include the following features:

2.8.5.1.1. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

2.8.5.1.2. Intuitive button labeling to match application and load controls.

2.8.5.1.3. Two RJ-45 ports for connection to the Room Controller local network.

2.8.5.2. Multiple digital wallstations may be installed in a room by simply connecting them to the Room Controller local network. No additional configuration will be required to achieve multi-way switching.

2.8.5.3. Room Controller digital wallstations are delivered with pre-defined functions including, raise, lower, A/V mode, Quiet Time, manual and scene control. No additional configuration is required to provide a fully functional system. Systems that require configuration or load binding and do not deliver maximum energy savings out of the box shall not be acceptable.

2.8.5.4. Optional custom labeling is available for application or location specific wall-station button labels.

2.8.5.5. Cooper Controls catalog numbers:

RC-2TLB-ES1-*	Entry, All Off (2 large buttons *= W,V,B,G)
RC-6TSB-TS1-*	General, Whiteboard, Quiet Time, A/V Mode, Raise, Lower (6 small buttons *= W,V,B,G)

RC-6TSB-TS2-*	General, Whiteboard, Quiet Time, Raise, Lower, All Off (6 small buttons *= W,V,B,G)
RC-5TSB-TS3-*	General, Whiteboard, Quiet Time, A/V Mode, All Off (5 small buttons *= W,V,B,G)
RC-6TSB-TS4-*	General, Whiteboard, A/V Mode, Raise, Lower, All Off (6 small buttons *= W,V,B,G)
RC-4TSB-TS5-*	Entry, General, Whiteboard, All Off (4 small buttons *= W,V,B,G)
RC-6TSB-TS6-*	Entry, General, Whiteboard, Raise, Lower, All Off (6 small buttons *= W,V,B,G)
RC-6TSB-TS7-*	Row 1, Row 2, Row 3, Raise, Lower, All Off (6 small buttons *= W,V,B,G)
RC-6TSB-TS8-*	Uplights, Downlights, Accent, Raise, Lower, All Off (6 small buttons *= W,V,B,G)
RC-6TSB-CR1-*	General, Meeting, Whiteboard, Presentation, Raise, Lower (6 small buttons *= W,V,B,G)
RC-4TSB-HC1-*	General, Exam, Reading, All Off (4 small buttons *= W,V,B,G)
RC-6TSB-HC2-*	General, Exam, Reading, Raise, Lower, All Off (6 small buttons *= W,V,B,G)
RC-3TLB-OS1-*	Half Lights, Full Lights, All Off (3 large buttons *= W,V,B,G)
RC-5TSB-OS2-*	Half Lights, Full Lights, Raise, Lower, All Off (5 small buttons *= W,V,B,G)
RC-6TSB-OS3-*	Half Lights, Full Lights, Undercabinet, Raise, Lower, All Off (6 small buttons *= W,V,B,G)
RC-2TLB-OS4-*	All On, All Off (2 large buttons *= W,V,B,G)

2.8.6. Room Controller Slider Station

2.8.6.1. Low voltage slider station is available in white, ivory, grey and black; compatible with wall plates with decorator opening. Slider stations shall include the following features:

2.8.6.1.1. Automatic raise/lower control of dimming loads.

2.8.6.1.2. Intuitive user control of dimmable lighting.

2.8.6.2. One RJ-45 port for connection to the Room Controller local network.

2.8.6.3. Cooper Controls catalog numbers: [RC-SS1-W],[RC-SS1-G],[RC-SS1-B],[RC-SS1-V].

2.8.7. Handheld Remote Controls (Optional)

2.8.7.1. Battery-operated handheld 10 button configuration for remote daylight sensor configuration. Remote controls shall include the following features:

2.8.7.1.1. Two-way infrared (IR) transceiver for line of sight communication with the Room Controller daylight sensors within 30-foot.

2.8.7.1.2. Red communication LED on the daylight sensor confirms button press.

2.8.7.1.3. Inactivity timeout to save battery life.

2.8.7.2. Three intuitive daylight sensor range push buttons.

2.8.7.3. Intuitive daylight zone adjustment raise/lower pushbuttons.

2.8.7.4. Cooper Controls catalog numbers: [HHPRG-RC].

2.8.8. Room Controllers

2.8.8.1. Room Controllers are fully functional out-of-the-box to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and will include line voltage wiring space and will not require additional electrical junction boxes. The control units will include the following features:

2.8.8.2. Fully functional room configuration to the most energy-efficient sequence of operation based upon the connected devices in the room.

2.8.8.3. Simple replacement, Using the automatic configuration capabilities, a Room Controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.

2.8.8.4. Quick installation features including:

2.8.8.4.1. Included line voltage space to simplify wiring and eliminate the need for separate junction boxes.

2.8.8.4.2. Included emergency voltage space to simplify wiring of emergency luminaire connections.

2.8.8.4.3. Breakouts for direct conduit connection.

2.8.8.4.4. Line and low voltage sections include conduit connection points. Systems that require special accessories for direct conduit connections may not comply with local building codes and shall not be acceptable.

2.8.8.4.5. Quick low voltage connections using standard RJ-45 Quick Connect cable.

2.8.8.4.6. Dual voltage (120/277-VAC, 60-Hz).

2.8.8.4.7. Zero cross circuitry for each load.

2.8.8.4.8. Three relay configuration.

2.8.8.4.9. Efficient 150-mA switching power supply.

2.8.8.4.10. Six RJ-45 Click & Go local network ports.

2.8.8.4.11. All models support local network connections of wallstations, occupancy-based controls and receptacle controls.

2.8.8.5. On/Off/Dimming Room Controllers shall include:

2.8.8.5.1. Real time current metering (optional).

2.8.8.5.2. Three relay, two 0 to 10-Volt dimming zone configuration [RC3D2].

2.8.8.5.3. Three relay, three 0 to 10-Volt dimming zone configuration [RC3D].

2.8.8.5.3.1. Three relay, three 0 to 10-Volt dimming zone configuration for class rooms [RC3DEHC].

2.8.8.5.3.2. All models support local network connections of wallstations, occupancy-based controls and receptacle controls.

2.8.8.5.3.3. Up to three 0 to 10-Volt analog outputs per relay for control of compatible ballasts and LED drivers.

2.8.8.6. Cooper Controls catalog numbers: [RC3], [RC3D2], [RC3D], [RC3DE], [RC3DEHC].

2.8.9. Daylight Photosensors

2.8.9.1. Daylight photo-sensors work with Room Controllers to provide automatic daylight dimming capabilities for any load type connected to a room controller. Open loop daylight sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones. Daylight sensors shall be interchangeable without the need for rewiring. Daylight sensors shall be capable of daisy chaining with occupancy sensors in each room.

2.8.9.2. Digital daylight sensors include the following features:

2.8.9.2.1. An internal photodiode that measures only within the visible spectrum and has a response curve that closely matches the photopic curve.

2.8.9.2.2. The daylight sensor has three light level ranges: Low (3 to 300-lux), High (30 to 3000-lux), Direct Sun (300 to 30000-lux).

2.8.9.2.3. For dimming daylight harvesting, the daylight sensor shall provide the capability of controlling multiple (up to three) daylight zones immediately upon connection without programming.

2.8.9.2.4. Optional digital wallstations to allow occupants to reduce lighting level to increase energy savings and lower lighting levels for a selected period of time or cycle of occupancy.

2.8.9.2.5. Infrared (IR) transceiver for daylight sensor range and daylight zone gain adjustments via handheld remote programmer.

2.8.9.2.6. Red configuration LED that blinks to indicate data transmission.

2.8.9.2.7. One RJ-45 port for connection to Room Controller local network.

2.8.9.2.8. An adjustable head and an optional mounting bracket to accommodate multiple mounting methods and building materials. The daylight sensor may be mounted on a ceiling tile, skylight well, suspended lighting fixture or backbox.

2.8.9.3. Open loop digital daylight sensor includes the following additional features:

2.8.9.3.1. An internal photodiode that measures light in a 60 degree angle cutting off the unwanted light from the interior of the room.

2.8.9.3.2. Automatically establishes dimming set-points upon power up without any programming. Optional calibration using the wireless IR handheld programmer.

2.8.9.3.3. Cooper Controls Catalog Number: [DS-FMOIR].

2.8.10. Room Controller Local Network

2.8.10.1. The Room Controller local network is a physical connection and communication protocol designed to optimally control a space within a building. Room Controller devices connect to the local network using CAT 5e cables with RJ-45 Quick Connect cables which provide both data and power to room devices. Features of the Room Controller local network include:

2.8.10.1.1. Click & Go default functionality of occupancy sensors, wallstations, slider station, daylight sensors, receptacle controls, BMS status output and lighting loads to the most energy-efficient sequence of operation based upon the device attached.

2.8.10.1.2. Replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.

2.8.11. Emergency Lighting

2.8.11.1. Room Controller with emergency relay – The Room Controller is a UL 924 listed device that monitors normal power circuit to the Room Controller. The Room Controller has a dedicated UL 924 output which includes emergency power line in and emergency power load out connections. The UL 924 relay will track with output 1 (Yellow) during normal power operations. Upon loss of normal power the UL 924 output will force the emergency lighting On and full bright (if dimming) until normal power is restored. Features include:

2.8.11.1.1. 120/277-VAC, 50/60-hz, 3-Amp ballast rating.

2.8.11.1.2. Laddarless testing: Push the "All Off" button on any wall station four times [e-mer-gen-cy], will turn off normal lighting and force UL 924 emergency output On and full bright.

2.8.11.1.3. Auxiliary input for remote Alert Mode (All On, and full bright).

2.8.11.1.4. Cooper Catalog Number: RC3DE.

2.8.11.2. Cooper Emergency Power Control: A UL 924 listed device installs down line of an output that monitors a switched or dimmed circuit providing normal lighting to an area. The unit provides normal ON/OFF or 0 to 10-Volt dimming control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:

2.8.11.2.1. 120/277-Volt, 50/60-Hz, 20-Amp ballast rating.

2.8.11.2.2. Push to test button.

2.8.11.2.3. Cooper Catalog Numbers: CEPC-1 (switching), CEPC-DF-S-120 or CEPC-DF-S-277 (dimming).

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. The work of this section shall include excavation, unclassified cut, unclassified fill, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled, and all other work necessary to complete the grading of the site. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Geotechnical Engineer. Included with this Work are the following:

1. General exterior grading, cutting and filling, including grading for building area, paving, planting areas, banks and hillsides.

2. Excavating, filling, backfilling, and compacting for pavement, planting areas, buildings, and other structures.

3. Base course for walks and pavements.

4. Excavating and backfilling trenches within buildings lines.

5. Excavating and backfilling for underground mechanical and electrical utilities and appurtenances.

6. Shoring plan guidelines.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Section 01 71 23 - Field Engineering.

2. Section 32 12 16 - Asphaltic Concrete Paving.

3. Section 32 13 13 - Site Concrete Work.

4. Owner provided Geotechnical Report.

1.02 DEFINITIONS

A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.

B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

C. Borrow: Soil material obtained off site when sufficient approved soil material is not available from excavations.

D. Base Course: The layer placed between the subgrade and surface pavement in a paving system.

E. Drainage Fill: Course of washed granular material supporting slab on grade placed to cut off upward capillary flow of pore water.

F. Permeable Backfill: Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations.

G. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man made stationary features constructed above or below ground surface.

I. Utilities include underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.03 SUBMITTALS TO CONSTRUCTION MANAGER

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for the following:

1. Each type of plastic warning tape.

2. Filter fabric.

C. Samples of the following:

1. 12 by 12 inch sample of filter fabric.

D. Test Reports: In addition to test reports required under field quality control, submit the following:

1. One optimum moisture-maximum density curve for each soil sample.

2. Laboratory analysis of each soil material proposed for fill or backfill from borrow sources.

E. Excavation support & protection (shoring) shop drawings for informational purposes: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

1.04 QUALITY ASSURANCE

A. Codes and Standards:

1. 2013 California Building Code, Title 24, Part 2, Volume 2 of 2, Appendix J, Grading.

2. ASTM D422 - Method for Particle Size Analysis of Soils

3. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

4. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop.

5. ASTM D2216 - Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures.

6. ASTM D2922 - Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).

7. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).

8. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

9. AASHTO T217 - Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Meter.

10. ASTM D4829 - Expansion Index Test.

B. For off-site work, conform to all requirements of City of Long Beach and any other agencies having jurisdiction. Coordinate and obtain all required permits and inspections.

C. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), Latest Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

D. Comply with all requirements of permit for export of soil from site. Permit is to be obtained and paid for by Contractor. Furnish copies of all permits and licenses required by the City of Long Beach to the Owner's representative.

E. Professional Observation: A soils engineer will be retained by the Owner for purposes of inspection, testing and approval of all work under this section. Perform work of this Section under inspection and approval of the soils engineer. Give soils engineer not less than 48 hours advance notice of readiness for inspection.

F. The soils engineer will have the authority over all filling, grading, and compaction operations, including interruption of work if deemed necessary due to improper work

G. Pre-Grading Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1. Before commencing earthwork operations, meet with representatives of the governing authorities, Owner, Architect, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

1.05 CONSTRUCTION MONITORING

A. All earthwork and foundation construction should be monitored by a qualified engineer/technician under the supervision of a Geotechnical Engineer, including;

1. Observation of all site preparations;

2. Observation of shoring installation, if needed:

3. Observation of all site excavations;

4. Test and approval of all import soil;

5. Observation of placement of all compacted fills and backfills;

6. Observation of all surface and subsurface drainage systems;

7. Observation of all foundation and pile excavations;

8. Observation of subgrade preparation for paved and building areas.

B. The Geotechnical Engineer of Record should be notified at least three (3) days in advance of the start of construction. A joint meeting between the Contractor and Geotechnical Engineer is recommended prior to the start of construction to discuss specific procedures and scheduling. The Geotechnical Engineer should be present to observe the soil conditions

encountered during construction, to evaluate the applicability of the recommendations presented in the Soils Report to the soil conditions encountered, and to recommend appropriate changes in design or construction if conditions differ from those described herein. The Geotechnical Engineer of Record should inspect and approval all imported backfill material prior to its placement as backfill, approve the subgrade beneath all fills, fill placement and bottom of all foundation excavations before concrete or steel is placed.

C. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Civil Engineer at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.

1.06 IMPORT AND EXPORT OF EARTH MATERIALS

A. Fees: Pay as required by government authority having jurisdiction over the area.

B. Bonds: Post as required by government authority having jurisdiction over the area.

C. Hauling Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.07 TRUCK HAUL ROUTE

A. A proposed truck haul route is to be submitted to the City of Long Beach Public Works Department for review and approval. Upon approval, an approved copy shall be returned to the Contractor. The Contractor shall post an approved copy on the job site. All trucks working that project shall also carry a copy. If a truck(s) is found not to be carrying an approved copy, the Contractor shall be subject to a Notice of Noncompliance (stop work order)

B. All trucks must cover their dirt with an acceptable tarp during transport for dust containment. Provisions for street sweeping and watering will also be required unless an active wheel washing facility proves that they are un-necessary to the satisfaction of the Engineer.

C. All truck haul routes, as approved, are good only for the project time period, and trucks shall have to comply with the approved route only. If during the progress of the project an alternate route is needed, the Contractor shall submit a new plan. The haul route application shall contain the following information:

1. Map showing the proposed route
2. Project name
3. Grading Contractor's name, address and phone number
4. Type of material being hauled
5. Encroachment or construction permit number

1.08 DIG ALERT NOTIFICATION

A. Before any excavation in or near the public right-of-way, the Contractor must contact the Underground Service Alert of Southern California (Dig Alert) at **811** for information on buried utilities and pipelines.

B. Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.

C. Call at least Two (2) full working days prior to digging.

D. If the members (utility companies) have facilities within the work area, they will mark them prior to the start of your excavation and if not, they will let you know there is no conflict. A different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).

E. The Law requires you to hand expose to the point of no conflict 24" (inches) on either side of the underground facility, so you know its exact location before using power equipment.

F. If caught digging without a Dig Alert ticket you can be fined as much as $50,000 per California government code 4216.

1.09 SUBSURFACE CONDITIONS

A. Where investigations of subsurface conditions have been made by the Owner with respect to subsurface conditions, utilities, foundation, or other structural designs, and that information is shown in the Plans, it represents only a statement by the Owner as to the character of materials which have actually been encountered by the Owner's investigation. This information is only included for the convenience of Bidders.

B. Investigations of subsurface conditions are made for the purpose of design only. The Owner assumes no responsibility with respect to the sufficiency or accuracy of borings or of the log of test borings or other preliminary investigations or of the interpretation thereof. There is no guaranty, either expressed or implied, that the conditions indicated are representative of those existing throughout the Work, or any part of it, or that unanticipated conditions may not occur. When a log of test borings is included in the Plans, it is expressly understood and agreed that said log of test borings does not constitute a part of the Contract. The log of test borings represents only an opinion of the Owner as to the character of the materials to be encountered, and is included in the Plans only for the convenience of the Bidders. Making information available to Bidders is not to be construed in any way as a waiver of the provisions of the first paragraph of this Section, and Bidders must satisfy themselves through their own investigations as to conditions to be encountered.

1.10 GRADING

A. If the Contractor encounters any suspected cultural resource, or unique archaeological or paleontological resource, during the course of construction, the Contractor shall halt or divert work and notify the District Representative immediately. The District will evaluate the situation and if warranted, will consult with a qualified archeologist or paleontologist to determine further actions.

B. If human remains are encountered unexpectedly during construction excavation and grading activities, the State Health and Safety Code Section 7050.5 requires that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98, and the Contractor will notify the District Representative immediately. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the Native American Heritage Commission.

1.11 PROJECT CONDITIONS

A. Data: Maps, boring logs, geotechnical and foundation investigation reports, and like reference data, not included in Contract Documents but made available to Contractor by Architect or Owner are for information only, and the Architect and Owner assume no responsibility for any conclusions Contractor may draw from such information. Should questions or issues arise, contact Architect or Owner for clarification.

B. Contractor shall determine existing conditions under which the Contractor will operate in performing the Work.

C. A geotechnical investigation report, by GeoTek, Inc (Project No. 1529-CR), dated October 24, 2016, was prepared for this project. Prior to bidding or performing the work of this project, contractor shall obtain a copy of these reports, and shall thoroughly familiarize

himself/herself with their contents. Any information obtained from such reports, or any information given on any drawings as to subsurface soil conditions or to elevations of existing elevations or elevations of underlying rock, is approximate only, is not guaranteed, and does not form a part of the contract, unless specifically referenced in the Contract Documents. The Contractor is required to make a visual inspection of the Project Premises and must (and is permitted to) make whatever tests the Contractor deems appropriate to determine and assess the underground condition of the soil. No claims for allowances or damages because of the Contractor's negligence or failure in acquainting itself with the conditions of the Project Premises as described herein will be recognized by the District.

D. Up to 15 feet of undocumented fill was encountered in the test boring in the southeast quadrant of the property. Five feet of undocumented fill was encountered in the northeast portion and northwest of the central part of the site. The property is relatively planar and flat with a total relief of approximately one foot. The topography of the area generally slopes downward to the southwest at a gradient of less than five percent.

E. Groundwater: During field exploration, groundwater was encountered 50.5 feet below existing ground surface.

F. Information on Drawings does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.

G. Existing utilities: Locate existing underground utilities in all areas of work prior to excavation or commencement of work. If utilities are to remain in place provide adequate means of protection during earthwork operations.

1. Should uncharted, or incorrectly charted piping or other utilities be encountered during excavation, consult Utility Owner immediately for direction. Cooperate with Owner and Utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of Utility Company.

2. Do not interrupt existing utilities serving facilities occupied or used by Owner, or others, except when permitted in writing by Owner's Representative, and then only after acceptable temporary services have been provided.

3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut off of services if lines are active.

H. Noise and Dust Abatement: Exercise all reasonable and necessary means to abate dust, dirt rising and undue noise. Perform necessary sprinkling and wetting of construction site to allay dust as required by applicable codes and ordinances.

I. Water for Grading: Contractor shall obtain and pay for all water required for his grading operation. This may include, but is not limited to, payment of deposits to utility for construction meter, and payment of all monthly service and water charges. Construction meter shall be in place throughout construction period unless alternative arrangements are made with the Water Department to provide construction water for all purposes. Contractor shall be aware of water moratoriums and restrictions, and shall immediately advise Owner of effects on construction schedules.

J. Existing Conditions: Prior to commencing work at site, verify agreement of existing conditions with indicated conditions. Notify Owner's Representative in writing of discrepancies found. Start of work without notification constitutes acceptance of conditions, without cause for extra compensation.

K. Field obstructions, grade differences or differences in dimensions may exist that might not have been considered or observed during design of this project. Contractor shall promptly notify the Engineer and the Agency having jurisdiction by telephone and in writing upon discovery of and before disturbing, any physical conditions differing from those represented

by approved plans and specifications. In the event this notification is not performed, the Contractor shall assume full responsibility for necessary revisions.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. General: All soils materials to be used throughout the site shall be approved for use by the Geotechnical testing engineer. Provide approved borrow soil materials from off site when sufficient approved soil materials are not available from excavations.

B. No earthwork analysis has been completed with respect to the volumes of soils to be excavated, placed, or imported in order to provide the finished grades shown on the plans. The Contractor is solely responsible for verifying the earthwork quantities necessary to complete the project.

C. For earthwork volume estimating purposes, an average shrinkage volume of 10 to 15 percent and subsidence of 0.1 to 0.2 foot may be assumed for the surficial soils. These values are estimates only and exclude losses due to removal of vegetation and debris. Actual shrinkage and subsidence will depend on the types of earthmoving equipment used and should be determined during rough grading.

D. Satisfactory Soil Materials: Existing site soils at their present state and composition, unless indicated otherwise, are considered suitable for re-use as fill during site grading at designated areas within the footprint of the building and pavement, non-structural or landscape areas, and backfilling of utility trenches, provided they are 1) free of debris, particles greater than 4 inches in maximum dimension, organic matter or other deleterious materials, 2) are not environmentally contaminated, and 3) adequately moisture conditioned to permit achieving the required compaction. No nesting of large particles (2 to 4-inch size) should be permitted during backfilling operations.

E. Borrow / Imported Fill Material: Soil excavated from site or imported conforming to requirements for fill material.

1. Any soil re-used or imported as fill for the completion of subgrade preparation should consist of predominantly "Very Low" to "Low" expansive, granular material exhibiting an EI not greater than 35, and should be exhibiting a relatively uniform gradation, free of debris, particles greater than 4 inches in maximum dimension, organic matter or other deleterious materials.

2. All blended material and potential import material must be approved by the Geotechnical Consultant or his representative, prior to its use and arrival on site, and should be subjected to continuing verification testing during site grading.

F. Base Course Material For Use Under Asphalt Pavement: Crushed aggregate base material shall consist of materials that meet the provisions listed below.

1. Crushed Aggregate Base (CAB) per Section 200-2.2, 3/4" maximum of the Standard Specifications for Public Works Construction (Green Book).

2. Crushed Miscellaneous Base (CMB) per Section 200-2.4, fine sieve, of the Standard Specifications for Public Works Construction (Green Book).

G. Engineered Fill: Satisfactory Soil Materials, as described above, placed in lifts no greater than 8 inches thick (loose measurements), moisture conditioned to slightly above the laboratory optimum moisture content, and compacted to a minimum of 90% relative compaction per ASTM D1557.

H. Bedding Material for Trenches:

1. Bedding sand shall be as defined by Standard Specifications, Section 200-1.5, and shall be free of expansive material and organic matter. Bedding material for utility lines outside the property lines shall be as required by the agency having jurisdiction. On-site soils are not considered suitable for bedding or shading of utilities.

2. Sand providing a sand equivalent of at least 35. All of the sand bedding shall be compacted to a minimum 90 percent of maximum density as indicated in the Contract Documents by mechanical means. Flooding and jetting shall not be permitted without prior written approval from the Geotechnical Engineer. Where sheeting or shoring is used densification of the bedding shall be accomplished after the sheeting or shoring has been removed from the bedding zone, unless the sheeting or shoring is to be cut off or left in place. Pipe bedding material shall be placed in horizontal layers not exceeding (8) eight inches.

I. Backfill Material for Trenches:

1. The on-site soils have been determined to be suitable for being used for backfilling purposes in trenches. Utility trenches should be backfilled with granular materials (EI less then 35) and mechanically compacted to at least 90% of the maximum dry density of the soils.

2.02 ACCESSORIES

A. Detectable Warning Tape: Acid and alkali-resistant polyethylene film metallic warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.

1. Tape Colors: Provide tape colors to utilities as follows:

a. Red: Electric.

b. Yellow: Gas, oil, steam, and dangerous materials.

c. Orange: Telephone and other communications.

d. Blue: Water systems, with "Caution: Water Line Below."

e. Green: Sewer systems, with "Caution: Sewer Line Below."

f. Green: Storm systems, with "Caution; Storm Drain Line Below."

2.03 EXCAVATION SUPPORT & PROTECTION – SHORING PLAN

A. The CONTRACTOR shall have at the Worksite, copies or suitable extracts of: Construction Safety Orders, Tunnel Safety Orders and General Industry Safety Orders issued by the State Division of Industrial Safety. The CONTRACTOR shall comply with provisions of these and all other applicable laws, ordinances, and regulations.

B. Before excavating any trench 5 feet or more in depth, the CONTRACTOR shall submit a detailed plan to the Owner showing the design of shoring, bracing, sloping, or other revisions to be made for the Workers' protection from the hazard of caving ground during the excavation of such trench. If the plan varies from the shoring system standards, the plan shall be prepared by a registered Civil Engineer. No excavation shall start until the DISTRICT has accepted the plan and the CONTRACTOR has obtained a permit from the State Division of Industrial Safety. A copy of the permit shall be submitted to the DISTRICT.

C. The INSPECTOR will provide a competent person trench/excavation certification form to the CONTRACTOR. It shall be completely filled out before any worker has access to trench or

excavation and returned to the INSPECTOR before the end of the first working day. The CONTRACTOR shall certify by this form the name of the competent person administering the Work, the soil classification, and the type of excavation protective system provided and/or installed.

D. The CONTRACTOR shall completely fence all excavations to provided protection against anyone falling into the excavation and to the satisfaction of the INSPECTOR. The fencing shall be in place at all times except when workers are present and actual construction operations are in progress.

E. The fencing material shall be chain link fabric or welded wire fabric (6x6-W9xW9 minimum) and 6 feet high, constructed according to one of the following:

1. Tensioned fencing material and have top and bottom tension wires securely fastened to driven steel posts or other equally rigid elements at a maximum spacing of 12 feet; or

2. Untensioned fencing materials securely fastened to extended trench shoring elements at a maximum spacing of 8 feet and fastened to continuous top and bottom rails constructed of nominal 2 in x 4 in lumber or equally rigid material. Framed panels with suitable supporting elements fastened together to form a continuous fence may also be used.

F. Payment for performing all work necessary to provide safety measures shall be included in the prices bid for other items of work except where separate bid items for excavation safety are provided, or required by law.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect adjacent property and existing improvements and structures as necessary to prevent undermining, caving of cuts, and miscellaneous damage.

B. Provide cribbing, sheeting, and shoring necessary to safely retain the earth banks and protect excavations and adjoining grades from caving and other damage resulting from excavating together with suitable forms of protection against bodily injury to personnel employed on the work and the general public. Be responsible for the design, installation, and maintenance of required cribbing and shoring and shall meet the approval of the State Division of Industrial Safety and local governing agencies requirements.

C. Utility lines and structures shown shall be protected and treated as indicated. Where work not shown is encountered, report it to the Architect before proceeding with excavation. Encase active lines in sleeves where they pass through concrete; remove inactive lines as directed, and plug the remaining ends. Bear the costs for repairs to damaged or broken utilities and any damages related thereto.

D. Protect existing improvements and adjacent properties from storm damage and flood hazard originating on this project until final acceptance by the Owner. Prevent silt run-off from the limits of work in accordance with governmental requirements.

E. An 6 foot high, temporary chain link fence with visual screen and gates, (pair 26' wide, minimum) shall be erected prior to any grading operations at the construction limits perimeter. Coordinate the exact location with Architect and District.

3.02 DEWATERING

A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Any water entering an excavation shall be immediately pumped out and the exposed excavation allowed to ry.

B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

3.03 GRADE STAKES

A. The Contractor's Surveyor will set grade stakes. The Surveyor shall be a California registered land surveyor or licensed Civil Engineer. The Surveyor shall be hired and paid by the Contractor, and shall be subject to the approval of the District. Contractor shall notify the District at least 48 hours before staking is to be started. The District will determine if work is ready for staking.

B. All work shall conform to the lines, elevations, and grades shown on the Construction Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.

C. Protect and maintain stakes in place until their removal is approved by the District. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.

D. Grades for underground conduits will be set at the surface of the ground. The Contractor shall transfer them to the bottom of the trench.

3.04 TEMPORARY EXCAVATION

A. Refer to section 5.2.10 Temporary Excavations in the project geotechnical report.

3.05 HAZARDOUS MATERIALS

A. All import fill material shall be characterized, handled, and documented in accordance with applicable US EPA and State of California hazardous waste and hazardous materials regulations.

B. "Contaminated" shall mean any soil or geotechnical material at a concentration, which would require disposal at a regulated facility (i.e., California hazardous or RCRA hazardous).

C. Owner's Authorized Representative (OAR) must be notified at least 72 hours prior to the disposal of any hazardous waste or hazardous material. No material disposal or reuse can take place without prior written approval of the OAR.

D. Replacement of earth material, that has been removed due to hazardous waste reasons, shall be placed back to meet the requirements of Section 2.01G – Engineered Fill.

3.06 EXCAVATION FOR BUILDING FOOTINGS

A. Refer to section 5.2.2 of the project geotechnical report.

B. Shoring may be required in some areas along the property line so that all the undocumented fill can be safely removed and replaced as engineered fill.

3.07 EXCAVATION FOR CEMENT CONCRETE PAVEMENT & HOT-MIX ASPHALT PAVING

A. Refer to Site Concrete Work Specification 32 13 13 section 3.01 requirements.

B. Refer to Asphaltic Concrete Paving Specification 32 12 16 section 3.2 requirements.

C. The compacted surface shall be firm, hard and unyielding. The term "firm, hard and unyielding" as used in the Standard Specifications Section 301-1.3 shall mean that when the heaviest construction and hauling equipment used on the project drives over the subgrade, no permanent deformation shall occur either before or during pavement construction. On areas where the underlying material appears to be wet or soft, or where it deflects under

wheel loads, the Contractor shall employ excavation and work techniques which do not worsen the subgrade condition.

D. The above subgrade preparation recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. For this reason, the actual scarification depths will have to be determined on the basis of in-grading observations and testing performed by representatives of the Owner's geotechnical consultant.

E. Whenever batch trucks or other paving equipment cause rutting of the subgrade or subbase in asphalt or concrete placement areas, inspectors shall immediately stop construction. Construction shall not be allowed to resume until distorted subgrade or subbase is repaired. Contractors and inspectors should locate by proof rolling, any questionable unstable areas in advance to avoid distortion under equipment. Wet, unstable areas must be dried out or replaced before starting placement of asphalt. Locating wet or soft areas in advance can be accomplished by testing finished subgrade or subbase with a loaded truck. Construction of asphalt or concrete pavement should not proceed unless testing gives a reasonable indication that distortions will not occur during construction of overlying pavement. When repair, aeration, and recompaction are required to correct damage from Contractor's operation, all necessary repair will be done at Contractor's expense. However, if the Engineer determines that additional depth of aeration and recompaction are needed, that should be paid by change order.

F. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for asphalt concrete pavement structural sections, have been achieved prior to re-compaction.

G. Subgrade tolerances: Subgrade for pavement shall not vary more than 0.02' from the specified grade and cross section established by the Engineer. Subgrade for base material shall not vary more than 0.04' from the specified grade and cross section. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met.

3.08 TRENCH EXCAVATION, BACKFILL & COMPACTION FOR UTILITIES

A. Field conditions may require deviations from information indicated on Drawings. Such changes in work shall be covered by a Change Order, indicating an increase or decrease in the Contract sum.

B. Before excavation, Contractor shall contact the "Underground Service Alert of Southern California" (USASC) for information on buried utilities and pipelines.

C. When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit. The Engineer shall be given the opportunity to inspect the existing pipe or conduit before connection is made. Any adjustments in line or grade which may be necessary to accomplish the intent of the plans will be made, and the Contractor will be paid for any additional work resulting from such change in line or grade.

D. Trenches, ditches, pits, sumps, and similar items which are outside the barricaded working area shall be barricaded to conform to Cal OSHA standards.

E. Trenches over 5'-0" in depth shall conform to the Construction Safety Orders of the California Division of Industrial Safety, see Section 2.3 EXCAVATION SUPPORT & PROTECTION – SHORING PLAN.

F. Safe and suitable ladders which project 2 feet above the top of the trench shall be provided for all trenches over 4 feet in depth. One ladder shall be provided for each 50 feet of open

trench, or fraction thereof, and be so located that workers in the trench need not move more than 25 feet to a ladder.

G. Where indicated and/or required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.

H. All trenches should be backfilled with approved fill material compacted to relative compaction of not less than 90 percent of maximum density determined in accordance with ASTM D 1557. Backfill shall be placed in layers not exceeding 8" (inches) in thickness.

I. Backfill over excavations to the required elevations with earth, gravel, sand, or concrete and compact as required. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. Slope adjacent grades away from excavations to minimize entry of water.

J. Do not excavate trenches parallel to footings closer than 18" from the face of the footing or below a plane having a downward slope of 2 horizontal to one vertical, from a line 9" above bottom of footings.

K. If soft, spongy, unstable, or other unsuitable material is encountered upon which the bedding material or pipe is to be placed, this material shall be removed to a depth ordered by the Engineer and replaced with bedding material suitably densified. Additional bedding so ordered, over the amount required by the Plans or Specifications, will be paid for as provided in the Bid. If the necessity for such additional bedding material has been caused by an act of failure on the part of the Contractor or is required for control of groundwater, the Contractor shall bear the expense of the additional excavation and bedding.

L. Unless indicated otherwise on the plans are within this specification, excavate trenches to the required depths for utilities, such as pipes, conduit and tanks, with minimum allowances of 6 inches at the bottom and 6 inches at the sides for bedding of unprotected piping or as required for concrete encasement of conduits as indicated on Drawings. Maximum allowances at the sides for trenching shall be 12 inches. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before installing sand bedding or concrete encasement.

M. Where portions of existing structures, walks, paving, etc. must be removed or cut for pipe or conduit installation, replace the material with equal quality, finished to match adjacent work.

N. Provide a minimum clear dimension of 6 inches from sides of wall excavation to outer surfaces of buried pipes or conduits installed in the same trench or outside surfaces of containers and/or tanks.

O. **DO NOT** place backfill until the bedding and pipe work installed has been inspected, tested and approved by the Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.

P. Bedding material immediately around a utility line and to a point 12 inches above the top of pipe should consist of sand to support the line and protect it.

Q. Bedding zone shall be defined as the area containing the material specified that is supporting, surrounding, and extending to 12" (inches) above the top of pipe. Compaction requirements in this area must meet 90%.

R. Bedding material shall first be placed on a firm and unyielding subgrade so that the pipe is supported for the full length of the barrel. There shall be 6" (inch) minimum of bedding below the pipe barrel and 1" (inch) clearance below a projecting bell for sewer, storm drain and water pipe. The material in the bedding zone shall be placed and densified by mechanical compaction only.

S. Mechanically compacted backfill shall comply with section 306-1.3.2 of the Standard Specifications for Public Works Construction.

T. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.

U. Fill voids with approved backfill materials as shoring bracing and sheeting is removed.

3.09 INSPECTION & TESTING AT TRENCHES

A. Pipe will be inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection. Any corrective work shall be approved by the Engineer and shall be at NO cost to the Owner.

B. The Inspector or Geotechnical Engineer will inspect all subgrades and excavations prior to placing bedding & backfill materials.

C. **DO NOT** place backfill until the bedding and pipe work installed has been inspected, tested and approved by the Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.

D. Utility backfill compaction test shall be performed in accordance with ASTM D1557, method "C".

E. Utility backfill in place density test per ASTM D 1556 (sand cone) or other test method as considered appropriate by the Geotechnical Engineer.

F. Hydrostatic pressure tests shall be done only after backfill has been placed and final compaction has been achieved.

3.10 APPROVAL OF SUBGRADE

A. Notify Geotechnical Engineer when excavations have reached required over-excavation subgrade.

B. When Geotechnical Engineer determines that unforeseen unsatisfactory soil is present, continue work only after receiving direction from the Contracting Officer.

C. Reconstruct subgrades damaged by rain, accumulated water or construction activities as directed by the Soils Engineer.

3.11 UNAUTHORIZED EXCAVATION

A. Fill of unauthorized excavation below bottoms of foundations or wall footings will be engineered fill.

B. Fill unauthorized excavations under other construction as directed by the Soils Engineer.

C. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Geotechnical Engineer.

3.12 STORAGE OF SOIL MATERIALS

A. After the site has been stripped of all debris, vegetation and organic materials, excavated on site soils may be reused as engineered fill provided they meet the satisfactory soils material conditions in Section 2.01, part D. High in-site moisture contents will require aeration prior to placement as engineered fill.

B. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Stockpile soil materials away from edge of

excavations. Do not store within drip line of remaining trees. Cover to prevent wind-blown dust.

3.13 PLACEMENT OF ENGINEERED FILL

A. Preparation of the bottom of the excavation:

1. Soils exposed at excavation bottoms to a depth of 8-inches should be scarified, reworked and re-compacted to exhibit a minimum 90 percent relative compaction.

B. Spreading and Compacting Fill Material:

1. On-site soils and import materials approved for use as fill should be placed in horizontal lifts not exceeding 8 inches in loose thickness, moisture conditioned to a minimum of two (2) percentage points above optimum moisture content for "Low" expansive import or blended material, as well as for untreated site silty/clayey soils, and to a minimum of one (1) percentage point above optimum moisture content for "Very Low" expansive import material, and compacted to a minimum 90 percent relative compaction, per ASTM D1557-12 Test Method, unless otherwise stated.

2. After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to the specified density. Compaction shall be accomplished by sheepsfoot rollers; vibratory rollers; multiple-wheel, pneumatic-tired rollers; or other types of acceptable compacting equipment. Equipment shall be of such design that it will be able to compact the fill to the specified density. Compaction shall be continuous over the entire area, and the equipment shall make sufficient passes to obtain the desired density uniformly. Jetting, puddling and hydroconcolitation techniques shall not be used.

3. When backfilling and compacting behind retaining walls and flexible retaining structures, the Contractor shall use lightweight compaction equipment such as hand-operated equipment, shoring, or other means to avoid over-stressing structural walls. When using lightweight compaction equipment, the fill materials shall be spread in horizontal layers not greater than 6 inches thick, measured before compaction.

C. Compaction Testing:

1. The Geotechnical Engineer's representative shall observe the excavation, filling, and compacting operations and shall make density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or moisture content of any layer of fill or portion thereof does not meet the specified density or moisture content, the particular layer or portions shall be reworked until the specified density and moisture content have been obtained.

2. Sampling and testing of materials for determination of compliance with the specified compaction requirements will be conducted by the Geotechnical Engineer's representative at any location and time as the Owner may determine.

3. The Contractor shall be responsible for excavation of the test pits and for providing and installing any shoring, ladders, or other equipment necessary to protect the testing personnel. The Contractor shall also suspend operations as necessary and at no cost to the owner for the purpose of conducting such testing.

4. Test pits shall be excavated in the backfill by the Contractor as directed by the Engineer for the purpose of testing the backfill compaction. At the option of Engineer, density tests may be taken on a lift of compacted backfill immediately before placing the next lift.

5. Any settlement noted in backfill, fill, or in structures built over the backfill or fill within the one-year warranty period will be considered to be caused by improper compaction methods and shall be corrected at the Contractor's expense. Structures damaged by settlement shall be restored to their original condition by the Contractor at the Contractor's expense.

6. When initial compaction testing performed by the Engineer indicates the required density has not been obtained, the Contractor shall re-compact or replace the backfill as necessary to meet the specified minimum density.

7. The Contractor shall be responsible for rescheduling compaction testing with the Engineer and shall bear all costs for subsequent retesting in the areas of noncompliance. Costs associated with retesting and scheduling delays shall be the sole responsibility of the Contractor. The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Owner and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

3.14 BACKFILL - GENERAL

A. Backfill excavations promptly, but not before completing the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Surveying locations of underground utilities for record documents.

3. Testing, inspecting, and approval of underground utilities.

4. Concrete formwork removal.

5. Removal of trash and debris from excavation.

6. Removal of temporary shoring and bracing, and sheeting.

7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.15 GRADING

A. Rough & Fine Grading: Rough grade area sufficiently high to require cutting by fine grading.

B. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between existing adjacent grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
3. Grade area for paving to a depth below finish grades indicated, equal to base and pavement thickness to be constructed.
4. Cut banks neatly to required finish grades as cut progresses, or leave cuts full and finish grading by mechanical equipment, which will produce finish grades indicated on Drawings.
5. Grade filled banks full and compact beyond grade of finish bank so that when trimmed to finish grades, soil is compacted to density specified for final slope face.
6. Bring areas to be graded to approximate finish grades and then scarify, moisten and roll to obtain required density. Scarify, moisten and roll resulting high and low areas to obtain required finish grades by cutting and filling.
7. Grade future planting areas so that, upon cultivation and fertilization, they will conform to finish grades indicated for planting areas.

8. Protect all utilities.

C. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Building pad tolerance plus or minus ½ inch (0.05-foot).
2. Lawn or Unpaved Areas: Plus or minus (0.10-foot).
3. Walks: Plus or minus (0.04-foot).
4. Pavements: Plus or minus (0.04-foot).

D. Grading Inside Building Lines: Finish subgrade to a tolerance of ½ inch when tested with a 10-foot straightedge.

3.16 FIELD QUALITY CONTROL

A. The CONTRACTOR shall provide an independent approved California Department of Health Services certified testing laboratory, to perform sampling and testing of import/export fill materials in accordance with the terms as specified in Section 01 45 24 – Environmental Import/Export Materials Testing.

B. Backfill and compaction of trenches in traffic areas must be in the presence of the project inspector or geotechnical engineer.

C. A Geotechnical Engineer, designated by the Owner, will be engaged to perform continuous inspection of the placing and compacting of all fills and backfills within the limits of grading of this project. All work shall be done in accordance with the approved plans and these specifications and as recommended and approved by the Geotechnical Engineer. Revised recommendations relating to conditions differing from the approved soils engineering and engineering geology reports shall be submitted to the owner, inspector, architect and the civil engineer. Costs for all such inspections and tests shall be paid by the Owner. The Contractor shall be responsible for notifying the Geotechnical Engineer in advance so that he may be present to perform his services as needed.

D. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Architect at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.

E. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.

1. Perform field in-place density tests according to ASTM D 1556 (sand cone method) or other test method as considered appropriate by Geotechnical Engineer.

   a. Field in place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.

   b. When field in place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.

2. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2,000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.

3. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in place density test for each 100 feet or less of wall length, but no fewer than two tests along a wall face.

4. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in place density test for each 150 feet or less of trench, but no fewer than two tests.

F. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

G. Owner's inspector will inspect foundation excavations when completed and ready for forms, after forms are in place, and before first placement of concrete.

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and re establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.

C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.18 MAINTENANCE

A. Install and maintain all erosion control devices, including sandbag and gravel bag dikes, silt fences, de-silting basins, inlet barricades, vehicle wash traps, and other features called for on the Storm Water Pollution Prevention Plan (SWPPP) required per Section 01 74 16. Maintain a copy of the approved SWPPP on jobsite, and make it available for inspection by authorized individuals at all times

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape to required tolerances, and compact to required density prior to further construction.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION

SECTION 32 12 16

ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.1 REQUIREMENT

A. The Contractor shall furnish all tools, equipment, materials, and supplies and shall perform all labor required to complete the work as indicated in the Contract Documents and specified herein.

B. The following types of pavement shall be covered in this Section:
   1. Paving for utility trenching, parking lots, areas between buildings, adjacent to planting and turf areas and as indicated on Construction Documents.

C. Related Sections:
   1. Section 31 00 00: Earthwork.
   2. Section 32 12 36: Seal Coat.

1.2 QUALITY ASSURANCE

A. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2015 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

B. The Owner's inspector shall test the temperature of each batch of asphaltic concrete prior to placement. At the time of delivery to the work site, the temperature of mixture shall not be lower than 260 degrees F or higher than 320 degrees F, the lower limit to be approached in warm weather and the higher in cold weather. If asphaltic concrete temperature is not within these tolerances the affected batch shall be rejected. Any and all costs due to the rejected asphaltic concrete shall be the responsibility of the paving contractor.

1.3 ESTABLISHMENT OF GRADES

A. The Contractor's Surveyor will set grade stakes. The Surveyor shall be a California registered land surveyor or licensed Civil Engineer. The Surveyor shall be hired and paid by the Contractor, and shall be subject to the approval of the Owner. Contractor shall notify the Owner at least 48 hours before staking is to be started. The Owner will determine if work is ready for staking.

B. All work shall conform to the lines, elevations, and grades shown on the Construction Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.

C. Protect and maintain stakes in place until their removal is approved by the Owner. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.

D. Areas having drainage gradients of 2 percent or more shall have elevation stakes, set with instrument, at grid intervals of 25 feet. Intermediate stakes may be set by using a tightly-drawn string line over the tops of adjacent stakes. Grade stakes must be set at all grade breaks, grade changes, etc.

E. Areas having drainage gradients of less than 2 percent shall have elevation stakes, set with instrument, at 10 foot intervals. Grade stakes must be set at all grade breaks, grade changes, etc.

1.4 SUBMITTALS

A. Mix Designs: The CONTRACTOR shall formulate a job-mix formula using the Hveem method in accordance with Standard Specifications Section 203-6.2 and submit it to the ENGINEER for approval. The resultant mixture shall have Hveem properties conforming to Standard Specifications Section 203-6.4.3.

B. Samples:

1. Prior to the delivery of specified aggregate to the site, the CONTRACTOR shall submit samples of the material for the INSPECTOR's acceptance in accordance with Standard Specifications Section 4-1.4. Samples shall be typical of materials to be furnished from the proposed source and in conformance with the specified requirements.

2. Aggregate base gradation and quality certifications shall be dated within 30 days of the submittal.

C. Certificates

1. Ten days prior to the delivery of aggregates, asphalt materials, and paving mixes to the project site, the Contractor shall submit to the Engineer certificates and test results of compliance of such materials with these specifications.
2. Submit certificates of compliance from the supplier for bituminous materials for paint binder, asphaltic concrete, and seal coat.
3. Submit weigh master's certificates or certified delivery tickets for each truck load of asphaltic material delivered to the project site.
4. Upon completion of the weed control treatment, and as a condition for final acceptance, furnish a written certificate stating the brand name of the sterilant and the manufacturer, and that the sterilant used had at least the minimum required concentration, and that the rate and method of application complied in every respect with the conditions and standards contained herein.

1.5 QUALITY CONTROL

A. Asphaltic Concrete Producers Qualifications: Use only materials furnished by a bulk asphaltic concrete producer regularly engaged in production of hot mix, hot laid bituminous concrete.

B. Applicator Qualifications: Paving machine and roller operators shall be fully trained and experienced in the installation of asphaltic concrete paving on projects of similar size and complexity.

C. Regulatory Requirements: The quantity of volatile organic compounds (V.O.C.) used in weed killer, seal coat, primer and other materials shall not exceed the limits permitted under the current regulations of the local authorities having jurisdiction.

1.6 ENVIRONMENTAL LIMITATIONS

A. Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:

1. Tack Coats: Minimum surface temperature of 60 deg F.
2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Base Course Material: Crushed base material shall consist of materials that meet the provisions of Specifications Section 31 20 00 Earthwork, Part 1.09G.

B. Asphalt Surfacing Materials: Furnish asphalt surfacing meeting the following requirement, furnished from a commercial asphalt central mixing plant.

1. Paint Binder/Tack Coat: Asphalt emulsion shall be CSS-1 or CSS-1h and shall conform to the requirements of Standard Specifications Section 203-3 Emulsified Asphalt.
2. Asphalt Concrete Composition & Grading:
   a. Parking lots surface course asphalt concrete shall conform to Standard Specification Section 203-6.4.3, Type C2, with asphalt content of 4.6% to 6.0%.
   b. Base course asphalt concrete, in all areas, shall conform to Standard Specification Section 203-6.4.3, Type B, with asphalt content of 4.5% to 5.8%.
   c. Asphalt performance grade shall be PG-64-10.
   d. At least two courses of asphalt shall be laid when Type C2 asphalt pavement is greater then 3 inches. The surface course shall be a minimum thickness of one inch (1") and a maximum of two inches (2").

C. Weed Control:

1. The soils sterilant shall be in accordance with current EPA acceptable standard and the California Department of Pesticide Regulations for soils sterilant. Sterilant shall be selected as appropriate for the environment in which is it to be placed. Contractor shall be licensed with the State of California to apply sterilant. Sterilant shall be commercial grade for commercial application. Payment for soil sterilization will include full compensation for application and all materials and incidental work required.
2. Apply Dow Elanco Spike 80DF, or approved equal, to subgrade prior to asphalt paving. Spike 80DF weed control should be applied at the rate of seven pounds per acre. If another manufacturer is used follow their recommendations.

D. Headers and Stakes:

1. Headers: Redwood, Construction Heart Grade, size 2 x 6, unless otherwise indicated on construction drawings
2. Stakes: 2 x 4 redwood or 2 x 3 Douglas fir, Construction Grade.
3. Nails: Common, galvanized, 12d minimum.

PART 3 - EXECUTION

3.1 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

3.2 SUBGRADE PREPARATION

A. It is required that areas of asphalt pavement be underlain by a layer of aggregate base material which meets the requirements of Specification Section 31 00 00, Part 2.01F. Thickness of base layer is as shown on the Construction Documents.

1. It is required that the undocumented fill material, below crushed base material, be over excavated to the recommended minimum depth of 5 feet, brought to near optimum moisture content and rolled with heavy compaction equipment. Soil should be re-compacted to at least 90% of the maximum dry density obtainable by ASTM D1557 method of compaction.

2. It is required that the exposed bottom surface soils, below over-excavation, be scarified to the recommended depth of 8" (inches), brought to near optimum moisture content and rolled with heavy compaction equipment. Exposed soil should be compacted to at least 90% of the maximum dry density obtainable by ASTM D1557 method of compaction.

B. The above subgrade preparation recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. For this reason, the actual subgrade preparation will have to be determined on the basis of in-grading observations and testing performed by representatives of the project geotechnical consultant.

C. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for asphalt concrete pavement structural sections, have been achieved prior to re-compaction.

D. Subgrade tolerances: Subgrade for pavement shall not vary more than 0.02' from the specified grade and cross section established by the Engineer. Subgrade for subbase or base material shall not vary more than 0.04' from the specified grade and cross section. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met.

E. Correct irregularities by dressing down or filling as may be required, to bring areas to true subgrade elevations.

F. Where filling is required, scarify the subgrade to bond the new material to the in place material; use additional material as required, subject to the approval of the Architect, and provided by the Contractor.

G. Remove excess material from the site to a legal disposal area.

3.3 APPLICATION GENERAL

A. Finish elevations, extent of asphalt paving and locations of type of asphalt and class of base shall be as indicated and specified herein and on the Construction Documents. Bring subgrade elevations sufficiently below the finish elevations of the paving so as to accommodate the thickness of paving and base.

3.4 STERILANT APPLICATION

A. Place herbicide below base course in all areas of new asphalt pavement. Meet the applicable environmental control requirements. Apply as directed by the manufacturer's printed instructions just before application of the base course. Sterilant shall not be applied within two feet of planting areas.

3.5 APPLICATION OF BASE COURSE

A. Install base course material, encompassing spreading and compacting, in accordance with the S.S.P.W.C. Section 301-2, Untreated Base.

B. After preparing the subgrade as specified in 3.5.A, all traffic on the subgrade shall be avoided. Should it be necessary to haul over the prepared subgrade, the CONTRACTOR shall drag and roll the traveled way as frequently as may be necessary to remove ruts, cuts, and breaks in the surface. All cuts, ruts, and breaks in the surface of the subgrade that are not removed by the above operations shall be raked and hand tamped. All equipment used for transporting materials over the prepared subgrade shall be equipped with pneumatic tires.

C. Continued use of sections of prepared subgrade for hauling, so as to cut up or deform it from the true cross-section, will not be permitted. The CONTRACTOR shall protect the prepared subgrade from all traffic.

D. Maintain the surface in its finished condition until the succeeding layer is placed.

3.6 PLACING ASPHALT CONCRETE SURFACING:

A. Asphalt binder (tack coat) shall be applied to all existing pavement surfaces to be overlaid and/or joined per section 302-5.4 of the Standard Specifications. Asphalt binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer. A layer of asphalt binder (tack coat) shall be applied to all vertical-cut faces and between subsequent AC lifts.

B. Asphalt Concrete Pavement:

1. All work shall be in accordance with Section 302-5 of the Standard Specifications, except as noted herein. Asphalt concrete work shall include full-depth patching and variable thick asphalt concrete transition areas. The Contractor shall, on a daily basis, provide the Inspector with copies of certificates of weight for all materials delivered to the job site and/or incorporated in the work. At no time shall the coarse aggregate that has segregated from the mix be scattered across the paved mat.
2. Asphalt concrete shall not be placed on any surface, which contains ponded water or excessive moisture in the opinion of the Engineer. If paving operations are in progress and rain or fog forces a shut down, loaded trucks in transit shall return to the plant, and no compensation will be allowed therefore. The Contractor shall furnish and use canvas tarpaulins to cover all loads of asphalt from the time that the mixture is loaded until it is discharged from the delivery vehicle, unless otherwise directed in writing by the Engineer
3. The Inspector will examine the base before the paving has begun. The Contractor will correct any deficiencies before the paving is started.
4. Asphalt concrete of the class indicated in Section 2.B.2 shall be laid in courses conforming to S.S.P.W.C. Table 302-5.5(A) unless otherwise stated herein.
5. At least two courses of asphalt shall be laid when Type D2 asphalt pavement is greater then 1-1/2 inches. The surface course shall be a minimum thickness of one inch (1") and a maximum of 1-1/2 inches.
6. At least two courses shall be laid when Type C2 asphalt pavement is greater then 3 inches. The surface course shall be a minimum thickness of one inch (1") and a maximum of two inches (2").
7. Successive courses may be laid upon previously laid courses as soon as the previous course has cooled sufficiently to show no perceivable displacement under equipment or loaded material delivery trucks and a tack coat has been applied.

8. Wherever AC pavement does not terminate against a curb, gutter, or another pavement, the Contractor shall provide and install a redwood or pressure treated Douglas fir header at the line of termination.
9. Pavement at all longitudinal joints shall have a Field Density of 95%, as described in 302-5.6.2 of the Standard Specifications. When the test results of the field cores are less than 95% Relative Compaction, the Contractor shall remove a 1 foot wide section on each side of the longitudinal joint. The Contractor shall replace the removed pavement with an asphalt mix that meets the job specification at no additional cost to the Owner.
10. Pavement tolerances: within 1/8-inch of design thickness and 1/8-inch from design elevation.

3.7 SEAL COAT

A. Allow new asphalt pavement to cure 30 days before application of seal coat. See Project Specification Section 32 12 36: Seal Coats.

3.8 FLOOD TESTING

A. Flood Test: Before acceptance, all pavements shall be water tested to ensure proper drainage as directed by the Inspector. The Contractor shall provide water for this purpose. The flooding shall be done by water tank truck. Depressions where the water ponds to a depth of more than 1/8-inch shall be filled or the slope corrected to provide proper drainage. The edges of the fill shall be feathered and smoothed so that the joint between the fill and the original surface is invisible. No standing water shall remain 1-hour after test.

3.9 FIELD QUALITY CONTROL

A. Replace or repair deficient and damaged asphalt paving.

B. All paving shall drain properly before being accepted. Upon completion, the pavement shall be true to grade and cross section. When a 10 foot straightedge is laid on the finished surface parallel to the centerline of the roadway, the surface shall not vary from the edge of the straightedge more than 1/8 inch, except at intersections or at changes of grade. Any areas that are not within this tolerance shall be brought to grade immediately following the initial rolling. There shall be no variation greater than 1/4 inch plus or minus from a 10 foot straight edge, except at grade changes. The paving material in the area to be repaired shall be removed, by an approved method, to provide a minimum laying depth of 1 inch, or 2 times the maximum size aggregate, whichever is greater, of the new pavement at the join line. Repairs shall not be made to pavement surface by feather-edging at the join lines. All expenses for pavement repair up shall be borne by the Contractor at NO cost to the Owner.

3.10 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.11 CLEAN UP

A. Clean all debris and unused materials from the paving operation. Clean all surfaces that have been spattered or defaced as a result of the paving operation. Asphalt or asphalt stains which are noticeable upon surfaces of concrete, or materials which will be exposed to view, shall be promptly and completely removed. Cleaning shall be done in a manner that will not result in any discharge of contaminated materials into any catch basin. All expenses for clean up shall be borne by the Contractor at NO cost to the Owner.

END OF SECTION

SECTION 32 12 36

SEAL COAT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Surface sealer over new asphalt paved surfaces.

1.02 REFERENCES

A. Conform to Section 203 and 302 of the Standard Specifications for Public Works Construction.

B. Comply with International Slurry Surfacing Association (ISSA) performance guidelines.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product information and application procedures for bituminous surfacing.

1.04 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement: Standard Specifications Section 203-9, "SEALCOAT – ASPHALT BASED".

A. Obtain materials from same source throughout.

B. Schedule a pre-construction conference at jobsite in advance of beginning of Work. In existing areas to be seal coated and restriped, document existing striping to be duplicated before commencing seal coating work.

C. Review and resolve conflicts involving requirements of specifications. Record discussions and furnish copies to all attendees.

D. Beginning of Work means Contractor accepts all conditions.

E. Agitate bulk materials during transport.

1.05 REGULATORY REQUIREMENTS

A. Comply with local air quality management district regulations for emissions maximums.

B. Maintain control of vehicular and pedestrian traffic during seal coating operations as required for other construction activities and in accordance with local traffic authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Seal Coat: The materials for sealcoat shall conform to Section 203-9 – "Sealcoat – Asphalt Based" of the Standard Specifications. Before incorporation in the Work, the Contractor shall submit a 2 Liter (2-quart) sample of undiluted seal coat at no cost to the Owner.

1. Seal Coat: Provide one of the following surface seals:

Product Name	Manufacturer
GuardTop	Vulcan Materials Company
Over Kote	Diversified Asphalt Product
Park Top	Western Colloid Products
Sure Seal	Asphalt Coating Engineering
MasterSeal	SealMaster Pavement Products & Equipment

B. Crack Sealing: Crack sealant shall be CalSeal Modified Asphalt joint sealant as manufacturered by Henry Inc, Crafco Polyflex Type 3 or equal.

PART 3 - EXECUTION

3.01 REPAIRING AND SEALCOATING OF SURFACES

A. Preparation of Surfaces:

1. Before placing the sealcoat, the pavement surface shall be cleaned by sweeping, flushing or other means necessary to removal all loose particles of paving, all dirt, and all other extraneous material. This shall include vegetation in pavement cracks and between pavement and curb/gutter. Prior to removal an approved herbicide, which leaves behind a visible blue marker dye, shall be sprayed where vegetation exists. Surface contaminates, grease or oil spots shall be cleaned to allow for proper adhesion.

2. Prior to applying sealcoat material, cracks wider then 1/8 inch shall be cleaned, treated with weed killer, and filled with an asphalt-based crack filler (large cracks may require several applications). For best quality, it is recommended that all broken asphalt be removed and patched with new asphalt. It is also suggested that extreme low spots be filled with new asphalt. New asphalt must cure 30 days before application of sealcoat.

3. Immediately before commencing the sealcoat operations, all surface metal utility covers (including survey monuments) shall be protected by thoroughly covering the surface with an appropriate adhesive and oiled or plastic paper. No adhesive material shall be permitted to cover, seal or fill the joint between the frame and cover of the structure. A vertical tab shall be placed on each cover for locating after the seal application is complete. The tab shall extend at least 3" above the existing pavement surface. Covers are to be uncovered and cleaned of asphalt emulsion material by the end of the same work day. Inspector shall inspect surfaces before the installation of seal coat.

4. For best results, the asphalt, just prior to being sealed, should be sprayed with a mist of water in an amount that will leave the surface damp but with no puddles or visible water. This procedure is critical when ambient temperature is hot with bright sunlight or when the pavement is excessively aged or porous.

5. A prime or tack coat may be necessary on surfaces that have weathered excessively or are dusted. The primer should be diluted with three parts clean, potable water and one part SS-1h emulsion and shall be applied at the rate of 0.05 gallon per square yard.

6. Install barricades as required to divert traffic from operations. Install temporary "no parking" signs and similar notices.

B. Application:

1. Sealcoat may be mixed with water to obtain desired consistency for job requirements to a maximum of 20% of the total volume. Care should be taken not to over dilute. Material after dilution shall be mixed with a mechanical agitator to maintain consistency and ease of application. Note that as the pavement increases in roughness, the amount of dilution should be decreased.

2. Sealcoat shall only be applied when the atmospheric temperature is greater than 55 degrees F and if rain is not forecast for the period of 24 hours after application.

3. The sealcoat material shall be applied in two applications. Unless otherwise specified, the total quantity applied (before dilution) shall be 50 gallons per 1,000 square feet.

4. Sealcoat material shall be applied using a truck-mounted tank or wheeled container in continuous parallel lines and spread by means of brooms or rubber-faced squeegees either by hand or machine and in such a manner as to eliminate all ridges, lap marks, and air pockets.

5. Hand tools shall be available in order to remove spillage. Ridges or bumps in the finished surface will not be permitted. Sealcoat material shall be homogeneous prior to spreading, with no visible separation of solids and liquids.

6. When the first coat has completely dried to the touch, apply the second coat. While misting is not normally required before second coat, surface should be clean with no foreign materials on it.

C. Drying Time:

1. Sealcoat should be allowed to dry 24 – 48 hours before permitting traffic. When asphalt is cold or in shade, or air temperature is below 75 degrees F, based on general weather, humidity and temperature conditions, drying time may need to be extended.

3.02 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

B. Striping for parking or traffic flow should be done only after the sealcoat has thoroughly dried. It is recommended that a high quality water based Traffic Line Paint be used for best results.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 32 13 13

SITE CONCRETE WORK

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, in accordance with the requirements of the Contract Documents.

B. The following types of concrete shall be covered in this Section:

1. Portland cement concrete pavement, cement walks, flatwork, curbs, gutters, retaining curbs, swales, trash pick-up areas, ramps, fence post footings, sliding gate concrete, catch basins, pipe bedding and encasements, transition structures, flagpoles and light standard bases and footings, and equipment pads.

2. Portland cement concrete paving shall be stable, firm and slip resistant and shall comply with CBC sections 11B-302 and 11B-403.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Comply with the reference specifications of the GENERAL REQUIREMENTS.

B. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2015 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

C. Comply with the current provisions of the following Codes and Standards.

1. Federal Specifications:

a. UU-B-790A (Int.Amd. 1) Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant).

2. Standards:

a. ACI 214 Recommended Practice for Evaluation of Strength Test Results of Concrete.

b. ACI 301 Specifications for Structural Concrete for Buildings.

c. ACI 315 Details and Detailing of Concrete Reinforcement.

d. ACI 318 Building Code Requirements for Reinforced Concrete.

e. ACI 347 Recommended Practice for Concrete Formwork.

f. ACI 350 Recommended Practice for Sanitary Structure.

g. ASTM C 31 Practices for Making and Curing Concrete Test Specimens in the Field.

h. ASTM C 33 Specification for Concrete Aggregates.

i. ASTM C 39 Test Method for Compressive Strength of Cylindrical Concrete Specimens.

j. ASTM C 40 Test Method for Organic Impurities in Fine Aggregates for Concrete.

k. ASTM C 42 Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

l. ASTM C 78 Specification for Flexural Strength.

m. ASTM C 88 Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate.

n. ASTM C 94 Specification for Ready-Mixed Concrete.

o. ASTM C 114 Method for Chemical Analysis of Hydraulic Cement.

p. ASTM C 131 Test Method for Resistance to Degradation of Small-Sized Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

q. ASTM C 136 Method for Sieve Analysis of Fine and Coarse Aggregate.

r. ASTM C 143 Test Method for Slump of Portland Cement Concrete.

s. ASTM C 150 Specification for Portland Cement.

t. ASTM C 156 Test Method for Water Retention by Concrete Curing Materials.

u. ASTM C 157 Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete.

v. ASTM C 172 Specification for Sampling Fresh Concrete.

w. ASTM C 192 Method of Making and Curing Concrete Test Specimens in the Laboratory.

x. ASTM C 260 Specification for Air-Entraining Admixtures for Concrete.

y. ASTM C 289 Test Method for Potential Reactivity of Aggregates (Chemical Method).

z. ASTM C 311 Method for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.

aa. ASTM C 494 Specification for Chemical Admixtures for Concrete.

bb. ASTM C 618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

cc. ASTM D 1751 Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

dd. ASTM E 119 Method for Fire Tests of Building Construction and Materials.

1.03 CONTRACTOR SUBMITTALS

A. Submittals shall be made in accordance with GENERAL REQUIREMENTS.

B. The following submittals and specific information shall be provided.

1. Mix Designs: Prior to beginning the WORK, the CONTRACTOR shall submit to the ENGINEER, for review, and approval, preliminary concrete mix designs for each class and type of concrete specified herein. The mix designs shall be designed by an independent testing laboratory acceptable to the ENGINEER. All costs related to such mix design shall be borne by the CONTRACTOR.

   a. Each concrete mix submittal shall contain the following information:

      1) Slump on which the design is based.

      2) Total gallons of water per cubic yard.

      3) Brand, type, composition and quantity of cement.

      4) Brand type, composition and quantity of fly ash.

      5) Specific Gravity and gradation of each aggregate.

      6) Ratio of fine to total aggregate per cubic yard.

      7) Weight (surface dry) of each aggregate per cubic yard.

      8) Brand, type, and ASTM designation, active chemical ingredients and quantity of each admixture.

      9) Copy of the Building and Safety Research Report Approval for each concrete admixture.

      10) Air content.

      11) Compressive strength based on 7 day and 28 day compression tests, including standard deviation calculations, corroborative data (if applicable), and required average comprehensive strength per ACI 318, Section 5.

      12) Time of initial set.

      13) Certification stamp and signature by a Civil or Structural engineer registered in state of California.

      14) Certificate of Compliance for Cement.

2. Certified Delivery Tickets: Where ready-mix concrete is used, the CONTRACTOR shall provide certified weighmaster delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the public weighmaster's signature, and the total quantities, by weight of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.

3. When a water reducing admixture is to be used, the CONTRACTOR shall furnish mix designs for concrete both with and without the admixture.

4. The CONTRACTOR shall furnish a Certificate of Compliance signed by the supplier identifying the type of fly ash and stating that the fly ash complies with ASTM C 618

and these Specifications, together with all supporting test data prior to the use of the fly ash the sample represents. The supporting data shall also contain test results confirming that the fly ash in combination with the cement and water to be used meets all strength requirements and is compatible with air-entraining agents and other admixtures.

5. The CONTRACTOR shall submit to the ENGINEER for review the design mix for fly ash concrete together with the design mix for portland cement (non-fly ash) concrete as specified in this Section.

1.04 QUALITY ASSURANCE

A. Testing for Portland Cement Concrete shall be sampled and tested in accordance with the Standard Specifications for Public Works Construction, Latest Edition, Section 201-1.1.5.

B. Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.

C. Concrete for testing shall be supplied by the CONTRACTOR at no cost to the Owner, and the CONTRACTOR shall provide assistance and facilities to the INSPECTOR in obtaining samples, and disposal and cleanup of excess material.

D. Curbs and gutters shall be staked by a Land Surveyor licensed to practice in the State of California.

E. Job Mock-Up

1. General

a. Make samples on-site; revise as required; obtain Architect's approval, 10 days prior to casting finished work.

b. Finished work to match approved samples.

c. Approved sample may be incorporated into the work. Retain samples until completion of all concrete work.

d. Include typical tooled joint control in sample.

2. Broom Finished Concrete; Exterior Flatwork: Provide sample, 20 s.f. minimum area.

3. "Sacked" Vertical Surface; Exterior Wall: Provide sample, 5 sf. minimum area.

F. Construction Tolerances: The CONTRACTOR shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the specifications, permissible deviations will be in accordance with ACI 347.

G. Construction tolerances shall not violate dimensions, grades, slopes required by CBC for accessibility requirements. Adjust work accordingly to comply with requirements.

H. The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise shown:

Item	Tolerance

Variation of the constructed linear outline from the established position in plan.	In 10 feet: 1/4-inch;
Variation from the level or from the grades shown.	In 10 feet: 1/4-inch;
Variation from the plumb	In 10 feet: 1/4-inch;
Variation in the thickness of slabs and walls.	Minus 1/8-inch; Plus 1/4-inch
Variation in the locations and sizes of slabs and wall openings.	Plus or minus 1/8-inch

PART 2 - PRODUCTS

2.01 CONSTRUCTION MATERIALS

A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.

B. All materials furnished for the work shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.

C. Storage of materials shall conform to the requirements of Section 205 of ACI 301.

D. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Conform to Section 303-5.2 of the Standard Specifications.

1. Use flexible or curved forms for curves of a 100-foot or less radius.

E. Reinforcing Materials: As follows:

1. Steel Reinforcing Bars: ASTM A 615 deformed grade 40 billet steel, plain finish, unless otherwise specified on Construction Document. Fabrication, sampling and jobsite handling shall conform to the requirements in ASTM Designation: D 3963, except the 2 samples shall be 30 inches long.

2. Dowels:

a. Dowel bars shall be plain round smooth conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 40 except that the two samples required in ASTM Designation: D 3963/D 3963M shall be 18 inches long. Dowel bars shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete

b. Dowel bars shall be lubricated with a bond breaker over the entire bar. A bond breaker application of petroleum paraffin based lubricant or white-pigmented curing compound shall be used to coat the dowel bars completely prior to placement. Oil and asphalt based bond breakers shall not be used. Paraffin based lubricant shall be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal. Paraffin based lubricant shall be factory applied. White pigmented curing compound shall conform to the requirements of ASTM Designation: C 309, Type 2, Class A,

and shall contain 22 percent minimum nonvolatile vehicles consisting of at least 50 percent paraffin wax. Curing compound shall be applied in 2 separate applications, the last application not more than 8 hours prior to placement of the dowel bars. Each application of curing compound shall be applied at the approximate rate of one gallon per 15 square yards.

3. Epoxy for bonding tie bars and dowel bars to portland cement concrete shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging), Class B or C. The class used shall be dependent on the internal temperature of the hardened concrete at the time the epoxy is to be applied. Class B shall be used when the internal temperature is from 40 °F to 60 °F. Class C shall be used when the internal temperature is above 60 °F, but not higher than recommended by the manufacturer. A copy of the manufacturer's recommended installation procedure shall be provided to the Engineer at least 7 days prior to the start of work. Epoxy shall be applied in conformance with the manufacturer's recommendations.

   a. Simpson Strong-Tie Set-XP Epoxy Adhesive (or approved equal) ICC-ES ESR-2508.

F. Concrete Materials: As follows:

1. Cement shall be standard brand portland cement conforming to ASTM C 150 for Type II. Portland cement shall contain not more than 0.60 percent alkalies. The term "alkalies" referred to herein is defined as the sum of the percentage of sodium oxide and 0.658 times the percentage of potassium oxide (Na20 + 0.658 K20). These oxides shall be determined in accordance with ASTM C 114. A single brand of cement shall be used throughout the work, and prior to its use, the brand shall be acceptable to the ENGINEER. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports for each shipment of cement to be used shall be submitted to the INSPECTOR.

2. Concurrent with strength design criteria, concrete shall also be proportioned to provide the requisite durability to satisfy the exposure conditions imposed by either environment and/or service. Durability, in this context, refers to the ability of the concrete to resist deterioration from the environment or service in which it is placed. Concrete proportioned in accordance with ACI 318, chapter 4, Durability Requirements, will meet this criteria.

3. Combined Aggregate: 1" maximum coarse aggregate size conforming to Grading C of Standard Specifications Section 201-1.3.2(A). Aggregates shall be obtained from pits acceptable to the INSPECTOR, shall be non-reactive, and shall conform to ASTM C 33.

4. Water: Shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies.

5. "Pea gravel" mix is not acceptable, unless specifically approved in writing by the Civil Engineer of Record prior to construction.

G. Admixtures:

1. The ENGINEER may require the use of admixtures or the CONTRACTOR may propose to use admixtures to control the set, effect water reduction, and increase workability. In either case, the addition of an admixture shall be at the

CONTRACTOR's expense. The use and continued use of an admixture shall be approved by the ENGINEER. Admixtures specified herein, other than calcium chloride, shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used. Admixtures shall contain no free chloride ions, be non-toxic after 30 days, and shall be compatible with and made by the same manufacturer as the air entraining admixture.

2. These admixtures shall not be used in greater doses than those recommended by the manufacturer or permitted by the ENGINEER. The permitted dosage of the admixture shall not exceed that which will result in an increase in the driving shrinkage of the concrete in excess of 20 percent when used in precast or prestressed concrete, or 10 percent when used in any other structural concrete. The strength of concrete containing the admixture in the amount of proposed shall, at the age of 48 hours and longer be not less than that of similar concrete without the admixture. The admixture shall not adversely affect the specified air content, unless permitted by the ENGINEER.

3. Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80 degrees F, a set retarding admixture such as [Sika Chemical Corporation's Plastiment], [Master Builder's Pozzolith 300R], or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40 degrees F, a set accelerating admixture such as [Sika Chemical Corporation's Plastocrete 161FL], [Master Builder's Pozzolith 50C], or equal shall be used.

4. Low range water reducer shall conform to ASTM C 494, Type A. It shall be either a hydroxylated carboxylic acid type or a hydroxylated polymer type. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.

5. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type F or G.

    a. If the high range water reducing agent is added to the concrete at the batch plant, it shall be second generation type, [Daracem 100, as manufactured by W.R. Grace & Co.]; [Pozzolith 430R, as manufactured by Masterbuilders]; or equal. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified.

    b. If the high range water reducer is added to the concrete at the job site, it shall be used in conjunction with a low range water reducer and shall be [Pozzolith 400N and Pozzolith MBL82, as manufactured by Masterbuilders]; [WRDA 19 and WRDA 79, as manufactured by W.R. Grace & Co.]; or equal. Concrete shall have a slump of 3-inches ± 1/2-inch prior to adding the high range water reducing admixture at the job site. The high range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the job site system.

6. Air-entraining agent meeting the requirements of ASTM C 260, shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 4 percent; provided that, when the mean daily temperature in the vicinity of the worksite falls below 40 degrees F for more than one day, the total air content provided shall be 5 to 6 percent. The Owner reserves the right, at any time, to sample and test the air-entraining agent received on the job by the CONTRACTOR. The air-entraining agent shall be added to the batch in a portion of the mixing water.

The solution shall be batched by means of a mechanical batcher capable of accurate measurement.

7. Calcium Chloride: Except as otherwise provided herein, calcium chloride will not be permitted to be used in concrete.

8. Fly ash/pozzolan shall conform to ASTM C 618 and the following supplementary requirements:

   a. Class F fly ash

o Loss on ignition,	maximum 4 percent
o S03 content,	maximum 3 percent
o Moisture content,	maximum 1 percent

   b. Class F fly ash, as a percent by weight of total cementitious material, shall not exceed 15 percent

   c. When Sulfate Resistant or Special Exposure Concrete is specified, test results shall be submitted to the Engineer as specified in Section 2-5.3 of the Standard Specifications. The test result shall show that the fly ash to be used is effective in contributing to sulfate resistance in conformance with ASTM C618, Table 3 (optional physical requirements) as tested in accordance with ASTM C 1012. The data submitted shall be less than 6 months old.

H. Curing Materials:

1. Concrete curing compound shall conform to the requirements of ASTM C309 Type 1-D (clear or translucent with a fugitive dye), Class B (Resin Type Only), except the loss of water shall not exceed 0.15 kilograms per square meter in 24 hours nor 0.45 kilograms per square meter in 72 hours when tested in accordance with ASTM C 156. The CONTRACTOR shall provide, when requested by the ENGINEER, certified copies of vendor's test report showing compliance with ASTM C 309 and these specifications. The testing and the report shall be supplied without cost to the Agency. All compounds shall be furnished by the CONTRACTOR in sealed original containers labeled in accordance with ASTM C 309 and with the date of manufacture.

2. Polyethylene sheet for use as concrete curing blanket shall be white and conform to ASTM C 171. The loss of moisture when determined in accordance with the requirements of ASTM C 156 shall not exceed 0.055 grams per square centimeter of surface.

3. Polyethylene-coated burlap for use as concrete curing blanket shall conform to ASTM C 171. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 grams per square centimeter of surface.

I. Expansion Joint Filler Material

1. Curb & Gutter: Nonextruding and Resilient Filler: Celotex "Flexcell", or approved equal, 1/4-inch thick material conforming to ASTM D 1751.

2. Concrete Walk and Slab: Joint filler material shall be preformed expansion joint filler conforming to the requirements of ASTM D994. A Certificate of Compliance for the joint filler material shall be furnished to the Engineer. The certificate shall be accompanied with a certified test report of the results of the required tests performed on the joint filler material within the previous 12 months prior to proposed use. The

certificate and accompanying test report shall be provided for each lot of joint filler material prior to use on the project.

3. Silicone Joint Sealant: Premium-grade, high-performance, moisture-cured, single-component, polyurethane-based, non-sag elastomeric sealant. Meets Federal specification TT-S-00230C. Meets ASTM C-920, Type S, Class 25 or 35; Grade NS, Use T or NT, Shore A Hardness (21 day) 35-45. A Certificate of Compliance for the silicone sealant shall be furnished to the Engineer. The Certificate shall also be accompanied with a certified test report of the results of the required tests performed on the sealant material within the previous 12 months prior to proposed use. The Certificate and accompanying test report shall be provided for each lot of silicone joint sealant prior to use on the project.

   a. Sika Corporation, Sikaflex-1A.

   b. Tremco, Inc., Dymonic.

   c. Tremco, Inc., Vulkem 116.

   d. Bostik Construction Products Div., Chem-Calk 900.

4. Zip-Top Control Joints: NOT PERMITTED.

J. Related Materials: As follows:

1. Damp-proofing agent shall be an asphalt emulsion, Sonneborn Hydrocide 660, or approved equal.

2. Epoxy adhesives shall be the following products for the applications specified:

   a. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur Hi-Mod Epoxy Adhesive, as manufactured by Sika Chemical Corporation, or approved equal.

   b. For bonding hardened concrete or masonry to steel, Sikadur Hi-Mod Gel or approved equal.

K. Curbs / Curb & Gutter Mix Design: At a minimum, concrete for curbs and curbs & gutters shall conform to the Standard Specifications for Public Works Construction, Section 201-1.1.2, mix class 520-C-2500.

1. Compressive Strength: minimum of 2,500 psi at 28 days compressive strength.

2. Slump Limit: 4 inches at point of placement.

3. Cement per cu yard (sacks): 5.5 (minimum).

4. Air Content: 4% +/- 1% percent

L. Driveways, Flatwork & Swale Mix Design: At a minimum, concrete for driveways, flatwork areas, and swales shall conform to the Standard Specifications for Public Works Construction, Section 201-1.1.2, mix class 560-C-3250:

1. Compressive Strength: minimum of 3,250 psi at 28 days compressive strength.

2. Slump Limit: 4 inches at point of placement.

3. Cement per cu yard (sacks): 6.0 (minimum).

4. Air Content: 4% +/- 1% percent.

M. Slurry Mix Design:

1. Compressive Strength: 100 psi at min. 28 days compr. strength.

2. Slump Limit: 5 inches at point of placement.

3. Cement per cu yard (sacks): 1.0

4. Aggregate Gradation: "E" per S.S.P.W.C. table 201-1.3.2(A).

5. Air Content: 4% +/- 1% percent.

PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES FOR CONCRETING

A. General: Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. Subgrade Preparation:

1. It is required that the undocumented fill material, below the concrete pavement, be over excavated to the recommended minimum depth of 5 feet, brought to near optimum moisture content and rolled with heavy compaction equipment. Soil should be re-compacted to at least 90% of the maximum dry density obtainable by ASTM D1557 method of compaction.

2. It is required that the exposed bottom surface soils, below over-excavation, be scarified to the recommended depth of 8" (inches), brought to near optimum moisture content and rolled with heavy compaction equipment. Exposed soil should be compacted to at least 90% of the maximum dry density obtainable by ASTM D1557 method of compaction.

C. The compacted surface shall be firm, hard and unyielding. The term "firm, hard and unyielding" as used in S.S.P.W.C. Section 301-1.3 shall mean that when the heaviest construction and hauling equipment used on the project drives over the subgrade, no permanent deformation shall occur either before or during pavement construction. On areas where the underlying material appears to be wet or soft, or where it deflects under wheel loads, the Contractor shall employ excavation and work techniques which do not worsen the subgrade condition.

D. The above subgrade preparation recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. For this reason, the actual scarification depths will have to be determined on the basis of in-grading observations and testing performed by representatives of the project geotechnical consultant.

E. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for concrete pavement structural sections, have been achieved prior to re-compaction.

F. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the ENGINEER, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall

be given a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

G. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and ACCEPTED by the INSPECTOR at least 24 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.

H. All inserts or other embedded items shall conform to the requirements herein.

I. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown or by shop drawings and shall be acceptable to the INSPECTOR before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.

J. Where concrete is to be cast against old concrete, (greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by sand-blasting, exposing the aggregate. In concrete shear-walls, suspended slabs and roof slabs, the interface surface at construction joints shall be roughened to a full amplitude of one quarter inch. The hardened surface shall be cleaned of all latent foreign material and washed clean, prior to the application of an epoxy bonding agent.

K. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited underwater nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the ENGINEER.

L. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2-inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

M. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.

N. Anchor bolts shall be accurately set, and shall be maintained in position by templates while being embedded in concrete.

O. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.02 HANDLING, TRANSPORTING, AND PLACING

A. General: Placing of concrete shall conform to the applicable requirements of ACI 301 and the requirements of this Section.

B. The total elapsed time between the addition of water at the batch plant and the completion of the discharge of the P.C.C. from the mixer shall not exceed 90 minutes. All P.C.C. remaining

in the mixer after said 90-minute time limit shall be rejected and removed from the project site.

C. Non-Conforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the CONTRACTOR.

D. Whenever batch trucks or other paving equipment cause rutting of the subgrade or subbase in concrete placement areas, inspectors shall immediately stop construction. Construction shall not be allowed to resume until distorted subgrade or subbase is repaired. Contractors and inspectors should locate by proof rolling, any questionable unstable areas in advance to avoid distortion under equipment. Wet, unstable areas must be dried out or replaced before starting placement of asphalt. Locating wet or soft areas in advance can be accomplished by testing finished subgrade or subbase with a loaded truck. Construction of concrete pavement should not proceed unless testing gives a reasonable indication that distortions will not occur during construction of overlying pavement. When repair, aeration, and recompaction are required to correct damage from Contractor's operation, all necessary repair will be done at Contractor's expense. However, if the Engineer determines that additional depth of aeration and recompaction are needed, that should be paid by change order.

E. All pull boxes, meter boxes, valve covers and manholes shall be adjusted to proposed finish grade prior to placement of the P.C.C.

F. Concrete shall not be placed until the forms and reinforcement have been inspected, all preparations for the placement have been completed, and the preparations have been checked by the project inspector, all subject to the observation of the engineer or architect.

G. Casting New Concrete Against Old: An approved epoxy adhesive bonding agent shall be applied to the old surfaces according to the manufacturer's written recommendations. This provision shall not apply to joints where waterstop is installed.

H. Conveyor Belts and Chutes: All ends of chutes, hopper gates, and all other points of concrete discharge throughout the CONTRACTOR'S conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the INSPECTOR. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.

I. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

J. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in weather during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F.

The CONTRACTOR shall be entitled to no additional compensation on account of the foregoing requirements.

K. Cold Weather Placement: Earth foundations shall be free from frost or ice when concrete is placed upon or against them. Fly ash concrete shall not be placed when the air temperature falls below 50 degrees F.

L. A transverse construction joint shall be constructed, including dowel bars, at the end of each day's work or where concrete placement is interrupted for more than 30 minutes, to coincide with the next contraction joint location. If sufficient concrete has not been mixed to form a slab to match the next contraction joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of excess concrete shall be at the Contractor's expense. Excess material shall become the property of the Contractor and shall be disposed of. A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.

M. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. The finished surface shall be free from humps, sags, blemishes or other irregularities Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.

N. Broom Finish Type:

1. Surfaces Sloped Less than 6%: Provide a medium salt (medium broom) finish by drawing a soft bristle broom across concrete surface, perpendicular to line of traffic, to provide a uniform fine line texture.

2. Surfaces Sloped greater than 6%: Provide a slip resistant (heavy broom finish) by striating surface 1/16 inch to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

O. Joints:

1. Joints: Joints in concrete curb, gutter, and walk shall be designated as expansion joints and control joints. Joints for concrete flatwork shall be provided as shown on the plans. Expansion joints for swales, curbs / curb & gutter shall be placed at no greater than 30 feet on center or as indicated on construction drawings.

a. Expansion Joints: Provide 1/2" premolded joint filler, material meeting Section 2.01I herein. Construct expansion joints in conformance with Standard Specification Section 303-5.4.2 and the details on the construction documents.

1) Extend expansion joint fillers full-width and depth of joint, and 1/4" below finished surface where joint filler is indicated. If no joint sealer is called for, place top of premolded joint filler flush with top of concrete or curb.

2) Where silicone joint sealer is noted on the construction documents, the premolded joint filler strips shall be placed 1" below the surface of the concrete or curb, the full width of the expansion joint. The remainder of all joints shall be filled to within 1/4" below the surface of the concrete with the silicone joint sealant.

3) Provide expansion joint filler strips, with elastomeric sealer, between p.c.c. walk and curb, p.c.c. walk and buildings, & p.c.c. walk and

retaining walls and at locations noted on the construction documents. The depth of the filler strip shall be the depth of the p.c.c. walk plus 1 inch with the top set flush with the specified grade of the top of curb or walk.

b. Control Joints:

1) Control joints in site work concrete shall comply with Standard Specification Section 302-6.5.4, except that the configuration of the joint, shall be as indicated on the construction documents.

2) Control joints in concrete curbs, sidewalks and gutters shall comply with Standard Specification Section 303-5.4.3, except that the joint configuration shall be as indicated below.

3) Location: As shown on construction documents, but in any case not more than ten (10) feet O.C. both ways in concrete sidewalks. In swales and gutters, including gutter integral with curb, joints shall be at regular intervals not exceeding ten (10) feet. Where integral curb and gutter is adjacent to concrete pavement, the joint shall be aligned with the pavement joints where practical.

P. Protection: In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control film. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

3.03 LIGHT STANDARD BASES, FLAGPOLE BASES, POST BASES AND SIMILAR SITE STRUCTURES

A. Forms: Suitable material and type, size, shape, quality and strength to insure construction as designed, true to line and sufficiently rigid to resist deflection during placing of concrete. Clean forms of all dirt, mortar and foreign matter before use.

B. Reinforcement: Place accurately and hold in position, using metal chairs, spacers, metal hangers, supporting wires and other devices of sufficient strength to resist crushing under full load. Clean reinforcing steel of mortar, oil, dirt, loose mill scale loose or thick rust and coatings.

C. Coordinate installation of conduits, cast in place items and other inserts.

D. Finish: Grind or sack as required as determined by the Architect to produce a smooth, straight, plumb and acceptable finish without burrs or form marks. For horizontal surfaces: provide float finish.

E. Curing: Cure surfaces utilizing one of the following methods:

1. Spraying: Spray water over slab areas and maintain wet for 7 days.

2. Spread polyethylene film over slab areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for 7 days.

3. Apply liquid curing compound at rate of 200 square feet per gallon, using power sprayer equipped with agitator. Do not apply liquid curing compound to surfaces scheduled to receive paving units or finish of any kind.

3.04 TAMPING AND VIBRATING

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a

dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8000 to 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.

B. Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.

C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.05 CURING

A. Comply with 2013 California Building Code, Title 24, Part 2, Volume 2, Section 1905A.11.

1. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least seven (7) days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by curing as herein specified.

1. Provide moisture-curing by the following methods:

a. Keep concrete surface continuously wet by covering with water.

b. Continuous water-fog spray.

c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4 inch lap over adjacent absorptive covers.

2. Provide curing and sealing compound to exposed exterior slabs, walks, and curbs, as follows:

a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

b. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid, floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such

as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.

C. Concrete slabs and paving shall be properly cured and protected against damage and defacement of nature during construction operations. If weather is hot or surface has dried out, spray surface with fine mist of water starting not later than two hours after final troweling. Surface of finish shall be kept continuously wet for at least ten days. Wetting is considered emergency work and shall be performed on weekends and holidays if necessary.

D. Concrete Sealer Application: Apply specified concrete sealer in continuous operation in accordance with manufacturer's instructions and recommendations.

1. Prior to starting application, protect adjoining Work, including sealant bond surfaces, from spillage or blow-over of concrete sealer.

a. Cover adjoining and nearby surfaces of aluminum and glass where there is the possibility of the concrete sealer being deposited on surfaces.

b. Cover live plants and grass.

c. Immediately clean concrete sealer from adjoining surfaces, complying with manufacturer's cleaning recommendations.

2. Apply concrete sealer under temperature conditions according to manufacturer's instructions.

3. Apply concrete sealer in light, even coats using garden sprayer, airless sprayer or paint brush.

4. Apply concrete sealer at rate to suit porosity of portland cement concrete but not less than no more than coverage rates recommended by manufacturer for effective sealing of surface.

E. The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR'S expense. Exclude traffic from concrete paving for at least 7 days after placement.

F. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

3.06 PUMPING OF CONCRETE

A. General: If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment: The pumping equipment must have 2 cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the CONTRACTOR may have a standby pump on the site during pumping.

C. The minimum diameter of the hose (conduits) shall be 4-inches.

D. Pumping equipment and hoses (conduits) that are not functioning properly, shall be replaced.

E. Aluminum conduits for conveying the concrete will not be permitted.

F. Proportioning: Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified herein.

G. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible.

H. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand used shall not be over 3.00.

I. Water and slump requirements shall conform to the requirements of this Section.

J. Cement and admixtures shall conform to the requirements of this Section.

K. Field Control: Concrete samples for slump per ASTM C 143 and test cylinders per ASTM C 31 and C 39.

3.07 TREATMENT OF SURFACE DEFECTS

A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the ENGINEER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced.

1. All repairs and replacements herein specified shall be promptly executed by the CONTRACTOR at its own expense.

B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32-inch depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The material used for repair purposes shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white portland cement as is required to make the color of the patch match the color of the surrounding concrete.

C. Holes left by tie-rod cones shall be reamed so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with non-shrink grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with non-shrink grout.

D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this Section, as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said

repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

E. Prior to filling any structure with water, all cracks that may have developed shall be repaired to the satisfaction of the ENGINEER. This repair method shall be done on the water bearing face of members. Prior to backfilling, faces of members in contact with fill, which are not covered with a waterproofing membrane, shall also have cracks repaired as specified herein.

F. The finished surface shall be free from humps, sags, blemishes or other irregularities.

3.08 FIELD QUALITY CONTROL

A. Correction of Mix Design for Failed Concrete Tests: If the compressive cylinder strength test for in place PCC yields test results below the specified 28-day PCC compressive strength and the Engineer determines a corrective change is necessary, the Contractor shall, at its own expense, make corrective changes in the mix proportions. The Engineer shall approve the changes in the mix proportions or PCC placement procedures, before any additional PCC is placed on the job.

B. Flood Tests: Before final acceptance, and after concrete has thoroughly cured, all concrete pavement, including swales and curb & gutter, shall be water tested to ensure proper drainage as directed by the Inspector. The Contractor shall provide water for this purpose. The flooding shall be done by water tank truck. Concrete work where water ponds and does not run off in a reasonable amount of time (1-hour), shall be removed to the nearest score or joint line and replaced to provide proper drainage.

3.09 CARE AND REPAIR OF CONCRETE

A. General: The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR'S expense.

B. The contractor shall barricade and protect placed Portland Cement Concrete from all damage, marks, mars and/or graffiti. Any Portland Cement Concrete damaged, defaced, discolored or defective shall be replaced at the contractor's expense.

END OF SECTION

SECTION 32 14 13

PRECAST UNIT PAVING – TACTILE WARNING

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Exterior Detectable Warning Surface Tile

1.1.2. Mortar bed.

1.2. REFERENCES

1.2.1. ANSI/TCA A108.5 .Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.

1.2.2. ANSI/TCA A118.4 .Latex-Portland Cement Mortar.

1.2.3. ANSI/TCA A137.1 .Specifications for Ceramic Tile.

1.2.4. TCA (Tile Council of America) .Handbook for Ceramic Tile Installation.

1.3. SUBMITTALS

1.3.1. Samples

1.3.1.1. Submit samples of specified color and pattern of tile, grout, and accessorys.

1.3.2. Materials List/Samples:

1.3.2.1. Accompanying samples, submit complete list of all proposed materials, including details of all joints between tile and adjoining materials.

1.3.3. Certification

1.3.3.1. Prior to installation of tile in any one area, submit written certification to Architect certifying that surfaces are properly prepared for specified installation, and that all depressions and abutting edges are properly spaced and aligned to permit installation in pattern shown on drawings. See 3.1 below.

1.3.3.2. Submit certification that selected sealant specified in Section 07 90 00 will achieve manufacturers published adhesion values on specified tile.

1.3.4. Mock-up:

1.3.4.1. Prior to installing any paving, construct, at an approved location on-site, an individual mock-up showing each paving pattern specified. Size shall be 4' x 4' minimum. Obtain Architect's approval of mock-up.

1.3.4.2. All paving shall match approved mock-up.

1.3.4.3. Approved mock-up can be incorporated into the work.

1.4. QUALITY ASSURANCE

1.4.1. Conform to ANSI/TCA A137.1

1.4.2. Conform to TCA Handbook for Ceramic Tile Installation methods as defined in this Section.

1.5. WARRANTY

1.5.1. Detectable Warning Surface Tiles:

1.5.1.1. Comply with 2013 CCR, Title 24.

1.5.2. Provide warranty on manufacturer's letterhead stating that detectable warning surface tiles shall be free of defects and significant degradation including shape, color fastness confirmation, sound on cane acoustic quality, resilience, and attachment during warranty period of five (5) years. Warranty shall include materials and labor to replace tiles if deemed defective by Owner's representative.

1.6. QUALIFICATIONS

1.6.1. Manufacturer

1.6.1.1. Manufacturer shall have produced tile products of similar type for a period of ten (10) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.6.2. Staff

1.6.2.1. Use only personnel thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.7. DELIVERY, STORAGE, AND HANDLING

1.7.1. Deliver products to site under provisions of Division 01.

1.7.2. Store and protect products under provisions of Division 01.

1.8. ENVIRONMENTAL CONDITIONS

1.8.1. Do not install tiles during heavy rain or adverse weather conditions.

2. PART 2 - PRODUCTS

2.1. EXTERIOR DETECTABLE WARNING SURFACES

2.1.1. Product Characteristics: Exterior Detectable Warning Surface Tile

2.1.1.1. Manufacturer: Wasau tile, or equal.

2.1.1.2. Series: Detectable Warning Tile.

2.1.1.3. Color: Yellow, or as selected by Architect for contrasting color.

2.1.1.4. Finish: Unglazed Matte.

2.1.1.5. Size: Nominal 5.830 inch square, with domes raised 0.20 inches above tile surface.

2.1.1.6. Grout Joint: Nominal 1/4 inch, all joints equal.

2.2. PORTLAND CEMENT MORTAR BED

2.2.1. Portland Cement per ANSI A108.5 and A118.4.

2.3. PORTLAND CEMENT BOND COAT

2.3.1. Dry set mortar per ANSI Al 18.1.

2.4. GROUT

2.4.1. General

2.4.1.1. All grout is based on products manufactured by Custom or equal.

2.4.1.2. Architect shall select final color based on sample.

2.5. ACCESSORIES

2.5.1. Sealants: Per Section 07 90 00.

2.5.2. Reinforcing Mesh: 2 x 2 inch square x 16 gauge welded wire mesh, galvanized.

2.5.3. Cleavage Membrane: approved polyethylene sheeting. 10 mils thick or equivalent.

2.6. MORTAR AND GROUT MIXES

2.6.1. Mix and proportion cementitious materials for mortar and grout mixes in accordance with manufacturers requirements.

2.6.1.1. Do NOT mix more bond coat than can be used within one hour.

2.6.1.2. If bond coat mixture begins to skin, discard and make new batch.

2.6.2. Do NOT use water.

3. PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Verify that surfaces are ready to receive work.

3.1.2. Beginning of installation means installer accepts condition of existing substrate.

3.2. PREPARATION

3.2.1. Protect surrounding work from damage or disfiguration.

3.3. INSTALLATION .MORTAR BED

3.3.1. Substrate surface shall be clean, free of oily or waxy films, oil or curing compounds. Over prepared slab surface, install cleavage membrane.

3.3.1.1. Detail all joints as required by manufacturer and approved submittal.

3.3.2. Install specified lath over membrane at areas receiving mortar bed.

3.3.3. Install Portland cement mortar bed per mix requirements of ASTM C270 and as required to provide true surface. Cure for at least 20 hours. Install mortar bed in accordance with specified method and referenced ANSI standard. Surface for bonding with thin-set shall be level within 1/8 in. in 10 ft tolerance.

3.4. INSTALLATION - TILE

3.4.1. Install tile in accordance with manufacturer's instructions and TCA Handbook methods specified.

3.4.1.1. Tile to be set into depressed concrete slab area, flush with adjacent surface.

3.4.2. Cut and fit tile tight to penetrations. Form corners and bases neatly.

3.4.3. Do not use tile with chips, cracks, voids, discolorations, or other visible defects, or not in compliance with ASTM C 902.

3.4.4. Sound tile after setting. Replace hollow sounding units.

3.4.5. Set tile with uniform joints in pattern shown. All payers shall be installed in full or one-half length units. All half length units shall be the same dimension.

3.4.6. Install sealant under the provisions of Section 07 90 00 to joints at junction of tile and dissimilar materials and junction of dissimilar planes.

3.4.7. Tile Installation

3.4.7.1. Install tile using mortar per ANSI A108.5 and per tile manufacturer's criteria.

3.4.7.2. Float or trowel mortar over area that can be covered by paving before loss of plasticity. Cover evenly with no bare spots. Comb with notched trowel as recommended by the manufacturer.

3.4.7.3. Press tile into notched bed before it glazes over. Beat in and adjust tile immediately, before initial set takes place, with 100% contact with the bed with no voids in the mortar. Back butter if necessary to provide 100% contact.

3.4.7.4. Damp cure for 72 hours.

3.4.8. Joint Grouting

3.4.8.1. Install all grout per tile and grout manufacturer's recommendations, including damp curing methods.

3.4.8.2. Install expansion/control joints with backing rod per TCA EJ 711-92 and per products specified in Section 07 90 00.

3.4.9. Do not allow traffic on tile for a minimum of 72 hours after installation.

3.4.10. Provide damp cure of all installations per manufacturer's recommendations and per ANSI A108.

3.5. CLEANING

3.5.1. Clean work under provisions of 01 77 19.

3.5.2. Remove mortar or grout droppings before hardening.

3.6. PROTECTION

3.6.1. Protect finished installation under provisions of Section 01 50 00.

3.6.2. Provide non-staining protective coverings for all tile in traffic area.

3.6.3. Remove and replace tiles which have become loose, chipped, broken, stained, or otherwise damaged during installation.

3.7. FIELD QUALITY CONTROL

3.7.1. Tolerances

3.7.1.1. Tile surface true to plane within 1/8 in. in 10 ft, not cumulative.

3.7.1.2. Row and column alignment: 1/8" in 10 feet deviation.

3.7.1.3. Alignment with adjacent tile: 1/8" -plus or minus.

3.7.1.4. Level, plane and/or vertical: 1/8" in 10 feet deviation.

END OF SECTION

SECTION 32 17 13

PARKING BUMPERS

1. PART 1 - GENERAL

1.1. RELATED DOCUMENTS

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

1.2. SUMMARY

1.2.1. Section includes wheel stops.

1.3. ACTION SUBMITTALS

1.3.1. Product Data: For each type of product.

2. PART 2 - PRODUCTS

2.1.1. PARKING BUMPERS

2.1.1.1. Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete, 4000-psi (27.6-MPa) minimum compressive strength, 4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 48 inches (1800 mm) long. Provide chamfered corners, transverse drainage slots on underside, and a minimum of two factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.

3. PART 3 - EXECUTION

3.1. CONSTRUCTION WASTE MANAGEMENT

3.1.1.1. Manage construction waste in accordance with provisions of Section 01 74 19 Construction Waste Management and Disposal. Submit documentation to satisfy the requirements of that Section.

3.1.1.2. Set aside scrap material to be returned to manufacturer for recycling into new product.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Pavement marking for vehicular traffic control and direction on asphalt and concrete surfaces.

1.1.2. Pavement marking for pedestrian areas.

1.1.3. Pavement marking for play court markings and pedestrian areas.

1.1.4. Court striping.

1.2. REFERENCES

1.2.1. Standard Specifications for Public Works Construction, //State of California, Department of Transportation (CalTrans), Standard Specifications,// latest edition, as adopted by local jurisdictional authority, including all amendments.

1.2.2. California Department of Transportation, "Manual of Traffic Controls for Construction and Maintenance Work Zones" current edition.

1.2.3. Local jurisdictional and agency engineering and public works regulations and standards.

1.3. SUBMITTALS

1.3.1. Submit in accordance with Section 01 33 00.

1.3.2. Product Data: Provide complete list of proposed materials including manufacturer's technical literature for Architect's review.

1.3.3. Shops Drawings: Provide Shop Drawing diagrams of graphics proposed for use in pavement marking, including proposed size and location.

2. PART 2 - PRODUCTS

2.1. DESIGN CRITERIA

2.1.1. All improvements shall be constructed per the referenced standards, the improvement drawings, and as specified in this section.

2.1.2. Where criteria shown on drawings or specified in this specification exceed that of the referenced standards, the more stringent criteria shall apply.

2.2. PAVEMENT MARKING PAINT

2.2.1. Product Characteristics:

2.2.1.1. Provide paint specifically formulated for use as pavement marking in automobile, pedestrian traffic and play court areas, and as required by jurisdictional authority.

2.2.1.2. Provide striping in size and multiple colors as selected by Architect, and as follows:

2.2.1.2.1. At all pavement markings associated with accessibility for the disabled, provide Federal Blue 15090 per FS 595B color as defined in Title 24, Part 2, CCR, 4 inch width. Provide accessible aisle markings at 36 inches on center.

2.2.1.2.2. Provide red color at fire lane curbs and striping, with message "FIRE LANE - DO NOT BLOCK".

2.2.1.2.3. Provide white striping at parking space markings, 4 inch width.

2.2.1.2.4. Provide directional arrows, white color, size as shown on drawings.

2.2.1.2.5. Provide a minimum of four colors in deep saturated hues at play court paving graphics. Provide striping with 2 inch width, unless noted otherwise.

2.2.1.3. Paint products shall comply with Section 210-1.6 of the "Standard Specifications," //Section 91, CalTrans Standard Specifications,// for "rapid-dry" type paints. Paint manufacturer shall provide written certification of conformance to standard.

2.2.1.4. Reflectorized beading not required, except where required at public improvements.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection:

3.1.1.1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify pavement may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Secure the Architect's approval of graphics design and layout prior to start of application, including compliance with accessibility standards of Title 24.

3.2.2. Secure Fire Marshal approval of all striping and marking of curbs, pavement, and related signage.

3.2.3. Accessible parking spaces shall be marked according to CBC Section 1129B.4.

3.2.4. Verify that concrete curing compound and asphalt seal coat compound has become completely inert prior to painting. Remove by approved means for those areas where compound is still active.

3.3. INSTALLATION

3.3.1. Using proper masking, stencils, and application equipment recommended for the purpose by the manufacturer of the approved paint, apply the approved paint in strict accordance with its manufacturer's recommendations and Section 310-5.6 //Section XX, CalTrans Standard Specifications,// of the "Standard Specifications".

3.3.2. Provide minimum of two coats of paint at all striping, curbing, and related markings, in dry mil thickness as defined in Section 310-5.6. //Section XX, CalTrans Standard Specifications,// Vary color of first coat slightly.

3.3.3. Coatings installed on asphalt paving shall be applied in thin, light coats to avoid peeling.

3.3.4. A minimum of ten (10) days shall elapse between seal coat application and pavement marking on asphaltic concrete.

3.3.5. Repaint markings damaged by construction traffic.

3.3.6. Install fire lane curb markings at locations required by Fire Marshal or at 20 feet on center, whichever is more restrictive.

3.3.7. Install markings within 1/2 inch tolerance. Maintain width to a tolerance of plus/minus 1/4 inch.

3.3.8. Apply court markings in accordance with lay-out as shown on drawings, in colors as selected by Architect. Provide minimum of two coats.

END OF SECTION

SECTION 32 30 00

SITE IMPROVEMENTS

1. PART 1 - GENERAL

1.1. SECTION INCLUDES

1.1.1. Bike racks.

1.1.2. Splash Blocks.

1.1.3. Miscellaneous site furnishings.

1.2. SUBMITTALS

1.2.1. Refer to Section 01 33 00.

1.2.2. Materials List

1.2.2.1. Within 30 days, provide complete list of proposed materials.

1.2.3. Shop Drawings

1.2.3.1. Transmit complete shop drawings for all site furnishings, including support and footing details.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 25 00

2.2. BIKE RACK

2.2.1. Provide Dero or equal, Campus Rack, in-ground mounting. www.dero.com, or equal. Type "S4" 89-inches, 4 bike rack. Final color to be selected by architect from manufacturer's full color line.

2.3. SPLASHBLOCK

2.3.1. Provide QuickCrete, www.quickcrete.com, or equal, precast concrete sloped channel type, approximately 10 inches wide by 24 inches long.

2.4. OTHER MATERIALS

2.4.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

3.2.1. Install all site furnishings plumb and true in accord with approved submittal and manufacturer's printed directions.

3.2.2. Install in compliance with applicable dimensions and orientation required by accessibility requirements of Title 24, Part 2, CCR.

END OF SECTION

SECTION 32 31 17

ORNAMENTAL METAL FENCES AND GATES

1. PART 1 - GENERAL

1.1. SECTION INCLUDE

1.1.1. Welded wire mesh panels, fixed metal louver panels, including tubular steel posts and gates.

1.2. PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

1.2.1. Section 03 30 00 - Cast-In-Place Concrete.

1.3. REFERENCES

1.3.1. ASTM A36 - Structural Steel.

1.3.2. ASTM A53 - Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless.

1.3.3. ASTM A123 - Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.

1.3.4. ASTM A283 – Low and Intermediate Tensile Strength Carbon Steel Plates.

1.3.5. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

1.3.6. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

1.3.7. ASTM A 653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy Coated (Galvannealed) by the Hot-Dip Process.

1.3.8. AWS A2.0 - Standard Welding Symbols.

1.3.9. AWS D1.1 - Structural Welding Code.

1.3.10. SSPC - Steel Structures Painting Council.

1.4. SUBMITTALS

1.4.1. Submit under provisions of Division 01.

1.4.2. Product Data: Provide data on fence material, finishes and attachment.

1.4.3. Manufacturer's Installation Instructions: Submit criteria for preparation and application.

1.4.4. Samples: Accompanying materials list, submit three samples of each fence type., showing panel connection to post. Grind and seal all edges.

1.4.5. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1.4.5.1. Ornamental fence gate manufacturer shall be responsible for fencing, post and gate hinge engineering and anchorage. Provide shop drawings and calculations for fence and gate assemblies, signed by a California registered structural engineer.

1.4.6. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.5. QUALITY ASSURANCE

1.5.1. Manufacturer: Manufacturer shall have produced the specified system or products for a period of one (1) year prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.5.2. Staff:

1.5.2.1. Use only personnel who are thoroughly trained and experienced in the skills required and have installed similar applications of the specified products within one year prior to beginning work of this section.

1.5.2.2. Use only staff who are completely familiar with the manufacturers' recommended methods of installation as well as the requirements of this work.

1.5.3. Welders' Certificates: Submit under provisions of Division 01., certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6. WARRANTY AND GUARANTEE

1.6.1. Manufacturers Warranty:

1.6.1.1. Provide, in Architect approved form, the Owner with manufacturers standard warranty against coating and fence system failure.

1.6.1.1.1. Factory finish: 20-year warranty against cracking, peeling, and blistering under normal use.

1.6.2. Contractors Guarantee:

1.6.2.1. Provide, in Architect approved form, the Owner with a guarantee against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

1.6.2.1.1. Panel failure not resulting from anchorage and attachments.

1.6.2.1.2. Rusting and coating failure resulting from field installation.

1.6.2.1.3. Settlement and alignment resulting from footing embedment and earthwork failure.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

2.1.1. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2. STEEL ORNAMENTAL FENCE SYSTEM

2.2.1. Manufacturer: Ametco Manufacturing Corp, 4326 Hamann Parkway, P.O. Box 1210, Willoughby, Ohio 44096, (800) 362-1360, or equal.

2.2.2. Material:

2.2.2.1. Wire: Galvanized steel wire.

2.2.2.2. Steel bar stock: ASTM A36.

2.2.2.3. Steel tubing: ASTM A500, Grade B.

2.2.2.4. Steel sheet: ASTM A526 galvanized or ASTM A792 Galvalume.

2.2.2.5. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, and water-reducing and plasticizing additives.

2.2.3. Fence Systems:

2.2.3.1. Type A: Ornamental steel fencing system consisting of welded wire mesh modular fence panels with formed reinforcing ribs, tubular steel posts, and strap-type panel fasteners and designed for security applications. Amopanel Design as manufactured by Ametco Corp, or equal.

2.2.3.1.1. Fence panels: Fabricated from 3/16 inch (5 mm) diameter galvanized wire welded to form open mesh. Vertical wire spacing: 2-inches. Horizontal wire spacing: 8-inches. Reinforcing ribs: V-shaped, horizontal ribs formed by bends in vertical wires and 3 welded horizontal wires. Locate at top and bottom of fence panel and at intermediate points as required by panel height. Pickets: Formed by extending vertical wires 1-inch above top of horizontal wire.

2.2.3.1.2. Posts: Steel tubes fabricated from ASTM A526 galvanized steel or ASTM A792 galvalume steel per manufacturer for type and size of fencing. Provide post faced with vertical, V-shaped, recessed channels to receive wire edge of fence panel. 2 x 2 inches for fence posts minimum, and 4 x 4 inches for gates minimum. Provide top and end caps typical.

2.2.3.1.3. Gates: Hinged swinging single or double gate per drawings. Welded frame fabricated from 2 x 2 inch steel tubing with welded wire panel to match fencing. Provide all gate hardware required for functional operation, including but not limited to heavy duty hinges and latch slide bolt to accommodate padlock. For double gates provide padlockable, center cane bolt assembly and strike.

2.2.3.1.4. Finish: All steel fence panels and posts shall be hot-dipped galvanized to 1.25 ounces per square foot minimum zinc coating per ASTM A123. Provide polyester powder coating, electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate. Architect to select from 15 standard colors.

2.2.3.2. Type B: Ornamental fixed steel louver modular fencing panels fabricated with extruded steel louvers and flat steel bars, including posts and gates.

2.2.3.2.1. Panels: Electro-forge welded steel fencing, Ametco Shadow design horizontal, 1 31/32" x 1/16" formed main bar, 5/32" round cross bar, 1 13/16" x 5 7/32" mesh. Galvanized to ASTM 123 and powder coated polyester.

2.2.3.2.2. Posts: Steel tubes fabricated from ASTM A526 galvanized steel or ASTM A792 galvalume steel per manufacturer for type and size of fencing. Provide post faced with vertical, V-shaped, recessed channels to receive wire edge of fence panel. 2 x 2 inches for fence posts minimum, and 4 x 4 inches for gates minimum. Provide top and end caps typical.

2.2.3.2.3. Gates: Hinged swinging single or double gate per drawings. Welded frame fabricated from 2 x 2 inch steel tubing with welded wire panel to match fencing. Provide all gate hardware required for functional operation, including but not limited to heavy duty hinges and latch slide bolt to accommodate padlock. For double gates provide padlockable, center cane bolt assembly and strike.

2.2.3.2.4. Finish: All steel fence panels and posts shall be hot-dipped galvanized to 1.25 ounces per square foot minimum zinc coating per ASTM A123. Provide polyester powder coating, electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate. Architect to select from 15 standard colors.

2.3. STEEL ROLLING GATES

2.3.1. Manufacturer: Ametco or equal.

2.3.2. Series: Ornamental roll gate system, louver panel to match fencing, complete with all components, including pickets or pales, rails, gate uprights, wheels and hardware required for complete operation.

2.3.3. Material:

2.3.3.1. Gate Components: Steel, minimum yield strength of 45,000 psi.

2.3.3.2. Panel: Electro-forge welded steel fencing, shadow design horizontal for 100% obstruction. Power coated to match other fencing.

2.3.3.3. Shadow design weight is 2.84 lbs per sq ft.

2.3.3.4. Completed gates shall be capable of supporting a 200 lb. load applied at midspan without permanent deformation.

2.3.3.5. Provide drilled and welded tab on gate frame and gate termination post to receive padlock provided by Owner.

2.3.4. Steel Roll Gate Fabrication:

2.3.4.1. Precut all components. Weld all frame materials. Face weld all pickets/pales to roll gate frame.

2.3.4.2. Fit and shop assemble in each item in largest practical sections, for delivery to site.

2.3.4.3. Fabricate items with joints tightly fitted and secured.

2.3.4.4. Continuously seal joined members by continuous welds.

2.3.4.5. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.3.4.6. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

2.3.4.7. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.4. GATE OPERATOR

2.4.1. Manufacturer: Tymetal Corporation www.tymetal.com, or equal

2.4.2. Series/Model: TYM 1000 Gate Operator.

2.4.3. Characteristics

2.4.3.1. Power: 1/2 HP, 115 V, single phase.

2.4.3.2. Rating: 1000 pound Maximum gate weight

2.4.3.3. Compliance: UL 325 and 991 compliant, with integrated entrapment sensing

2.4.3.4. Controls: Apex Controller with loop sensor, remote control devices, and delay functions.

2.5. OTHER MATERIALS

2.5.1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

3.1.1. Inspection

3.1.1.1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.1.2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.1.3. In the event of discrepancy, immediately notify the Architect.

3.1.1.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. PREPARATION

3.2.1. Clean and strip primed steel items to bare metal where site welding is required.

3.2.2. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3. INSTALLATION OF ORNAMENTAL FENCE SYSTEM

3.3.1. Install items plumb and level, accurately fitted, free from distortion or defects.

3.3.2. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

3.3.3. Perform field welding in accordance with AWS D1.1.

3.3.4. Fence Installation:

3.3.4.1. Space posts in compliance with Table 3, plus or minus 1/2 inch, measured along the line/slope of the grade.

3.3.4.2. Anchor panels to posts with manufacturer provided brackets.

3.3.4.3. Set posts in concrete footings, minimum depth of 36 inches or as shown on approved drawings, in accordance with Section 03 30 10.

3.3.5. Coating Repair

3.3.5.1. Seal penetrations of factory finish.

3.3.5.2. Remove all metal shavings from cut area

3.3.5.3. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole

3.3.5.4. Apply 2 coats of manufacturers custom finish paint matching fence color.

3.3.6. Swing Gate Installation:

3.3.6.1. Install gate posts based on manufacturers' shop drawings.

3.3.6.2. Install gate hinge type, number and capacity as engineered by gate manufacturer and as shown on manufacturers shop drawings.

3.4. ORNAMENTAL STEEL ROLLING GATES

3.4.1. Gate Installation:

3.4.1.1. Install gate posts as shown on drawings, in concrete footings per Section 03 30 10 .

3.4.1.2. Install in accordance with manufacturers shop drawings.

3.4.1.3. Incorporate all motor operator requirements, including clips, anchors and alignment.

3.4.1.4. Gate stops shall be welded to the end of the gate or track so gate cannot pass rollers in either direction.

3.4.1.5. Provide drilled and welded tab on gate frame and gate termination post to receive padlock provided by Owner.

3.5. ERECTION TOLERANCES

3.5.1. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

3.5.2. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 32 84 00

PLANTING IRRIGATION

1. PART 1 – GENERAL

1.1. SCOPE OF WORK:

1.1.1. Furnish all labor, materials, appliances, tools, equipment facilities, transportation, and services necessary for and incidental to performing all operations in connection with the installation of "Landscape Irrigation" complete, as shown on the drawings and/or described herein.

1.1.2. Related work In other sections:

1.1.2.1. Landscape Planting

1.1.2.2. Landscape Maintenance

1.2. QUALITY ASSURANCE AND REQUIREMENTS:

1.2.1. Permits and Fees:

1.2.1.1. At the time of the award and until completion of work, the Contractor shall possess a California Contractor's "A" or "C-27" license.

1.2.1.2. At the time of the award and until completion of work, the Contractor and all Sub-contractors shall possess a Business License issued by the City where the project is located.

1.2.1.3. The Contractor shall obtain and pay for any and all permits and all inspections as required.

1.2.2. Manufacturers Directions:

1.2.2.1. Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturers of articles used in the contract furnish directions covering points not shown in the drawings and specifications.

1.2.3. Ordinances and Regulations:

1.2.3.1. All local, municipal and state laws and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications and their provisions shall be carried out by the Contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations or requirements of the same. However, when these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the above rules and regulations, the provisions of these specifications and drawings shall take precedence.

1.2.4. Contractor Responsibilities:

1.2.4.1. A qualified superintendent shall be present on the site at all times during the progress of the work. The superintendent shall be fluent in the English language.

1.2.4.2. The Contractor shall train each person in techniques for making correct solvent joints prior to their performing work on the site.

1.2.4.3. The Contractor shall protect work and materials from damage during construction and storage. Polyvinyl chloride, (PVC) pipe and fittings shall be protected from dirt and sunlight.

1.2.4.4. The Contractor shall assume responsibility for damage to existing construction and shall restore damaged property to the original condition to the satisfaction of the Owner.

1.2.4.5. The Contractor shall handle plastic pipe and fittings carefully and store undercover to avoid UV or other damage.

1.2.4.6. Immediately notify the Owner in case of discrepancies.

1.2.4.7. Do not proceed with installation in areas of discrepancy until all such discrepancies have been resolved. If the Contractor provides and installs material or performs work without resolving such discrepancies, the Contractor shall be fully responsible for removing, restocking and re-installation of such areas until all discrepancies are resolved to the Owner's satisfaction.

1.2.5. Codes and Regulations:

1.2.5.1. Verify that landscape irrigation systems may be installed in accordance with all pertinent codes and regulations, the original design, the reference standards, and the manufacturer's recommendations. Any provision and installation of material not in accordance with the above shall be removed and returned at the contractor's expense.

1.2.6. Site Safety:

1.2.6.1. Erect and maintain barricades, warning signs, lights and/or guards as necessary or required to protect all persons on the site.

1.2.6.2. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during the performance of the work. The Contractor shall fully comply with all State, Federal and other laws, rules, regulations, and orders relating to the safety of the public and workers.

1.2.6.3. The right of the Landscape Architect to conduct construction review or observation of the Contractor's performance shall not include review or observations of the adequacy of the Contractor's safety measures in, on, or near the construction site.

1.2.7. Explanation of Drawings:

1.2.7.1. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc. which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are essentially diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and architectural features.

1.2.7.2. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications.

1.2.7.3. The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies exist that might not have been considered in the irrigation design. Such obstructions or differences should be brought to the attention of the Landscape Architect. In the event this notification is not performed, the irrigation contractor shall assume full responsibility for any revisions necessary to correct these discrepancies.

1.3. SUBMITTALS:

1.3.1. Material List:

1.3.1.1. The Contractor shall furnish the articles, equipment, materials, or processes specified by name in the drawings and specifications. No substitutions shall be allowed without prior written approval the Landscape Architect.

1.3.1.2. Submittals shall be provided within ten (10) working days from the award of the contract. The complete formal material list on Contractor's letterhead shall be submitted prior to the starting of any work. Cut sheets may be included as backup to the formal material list.

1.3.1.3. Catalog data and full descriptive literature may be submitted. Although equipment on the plans may be different from the examples below, the following is a guide for proper formal submittal list format:

Item	Description	Manufacturer	Model	Size(s)
a.	Backflow Preventer	Febco	860 2"	
b.	Pop-up Spray Head	Rainbird	1806	NA

1.3.1.4. Material list must include all irrigation materials utilized on the project including fittings, glue, primer, etc.

1.3.2. Substitutions:

1.3.2.1. The contractor may submit proposed substitutions for equipment and materials listed on the irrigation plans in the following manner. The landscape contractor shall submit to the Landscape Architect for approval on a separate sheet of contractor's letterhead paper the following:

1.3.2.1.1. A statement indicating the reason for making each individual proposed substitution(s).

1.3.2.1.2. Provide descriptive catalog literature, performance charts and flow charts as required for each item the contractor proposes to substitute, including the sales/manufacturer's regional telephone number.

1.3.2.1.3. Provide the amount of cost savings or overage if the proposed substitute item is approved.

1.3.2.2. Substituted equipment of materials installed or furnished without prior approval of the Landscape Architect may be rejected and the Contractor required to remove such materials from the site at his own expense. The Owner shall have the sole discretion in accepting or rejecting any proposed substitution.

1.3.2.3. No exception taken to any item, alternate or substitute indicates only that the product apparently meets the requirements of the drawings and specifications on the basis of the information or samples submitted. All items must meet or exceed these specifications.

1.3.2.4. Manufacturer's warranties shall not relieve the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.

1.3.2.5. Manufacturer's warranty is required on any product offered.

1.3.2.6. If, in the opinion of the Owner, an unapproved substitution proves to be unsatisfactory, the Contractor shall remove such work and replace it with the originally specified item at the Contractor's own cost.

1.3.3. Record Drawings:

1.3.3.1. The Contractor shall provide and keep up to date a complete "record" set of heavy presentation bond (at least #30 weight) prints which shall be corrected daily and show every change from the original drawings and specifications and the exact locations, sizes and kinds of equipment. These drawings may also serve as work progress sheets and shall be the basis for measurement and payment for work completed. This set of drawings shall be kept on the site and shall be used only as an on-going record set.

1.3.3.2. The Contractor shall make neat and legible annotations thereon daily as the work proceeds, showing the work progress as actually installed. These drawings shall be available at all times for inspection and shall be kept in a location approved by the Owner.

1.3.3.3. The project irrigation plans may be procured from the Landscape Architect in PDF format via email. All printing of the PDF format drawings shall be paid to a reprographics firm directly from the Contractor. The plans shall be printed onto bond and all information from the field set shall be applied to the bond plans in a neat and orderly manner. Upon approval by the owner, the contractor may then provide photo mylars of these plans for record, either by City, Owner or both. The cost of all these prints shall be paid to a reprographics firm directly from the Contractor.

1.3.3.4. All additional markings on the mylar plans shall be neat, drawn in waterproof ink by a technical ink pen designed specifically for use on mylar material. Work completed in felt tip pen or ballpoint pen shall be rejected because of the non-permanent nature of both devices. All work shall be subject to the approval of the Owner.

1.3.3.5. The Contractor shall verify the needs of the City Inspector or Local City Planning Department as to any requirements for city-required record drawings. The Contractor shall be responsible for providing all drafting and required plans on the required medium to the City Inspector as required. All costs for drafting services shall be borne by the Contractor. This includes all microfilm or other processes the city may deem necessary for record purposes to the satisfaction of the City. The Landscape Architect is not responsible, nor contracted for drafting Contractor record drawings.

1.3.3.6. The Contractor shall dimension from two (2) points of reference the location of the following items. If buried, the depth shall also be indicated. Buried lineal items ie, wire and pipe mainline shall be dimensioned every 20' unless uniformly buried behind a curb or hardscape where a note will suffice. The minimum height of dimensions and/or notes shall be 1/8" unless otherwise directed by the City Inspector. All printing must be readable and clearly denoted. Provide a "bar scale" on the plan.

1.3.3.6.1. Water Point of Connection, (POC)

1.3.3.6.2. Electrical Point of Connection

1.3.3.6.3. Backflow preventers

1.3.3.6.4. Master valve

1.3.3.6.5. Flow sensor

1.3.3.6.6. Ball valves

1.3.3.6.7. Quick coupling valves

1.3.3.6.8. Remote control valves

1.3.3.6.9. Routing of pressure main line piping, (dimension max. 100' along routing)

1.3.3.6.10. Routing of control and common wire

1.3.3.6.11. Pull Boxes

1.3.3.6.12. Flush Valves

1.3.3.6.13. Other related equipment

1.3.3.7. On or before the date of the final inspection at the end of the Maintenance Phase, the Contractor shall deliver the corrected and completed mylar to the Owner and/or City Inspector. Delivery of the mylar will not relieve the contractor of the responsibility of furnishing required information that might have been omitted from the prints compiled at the site. The Contractor shall be fully responsible for correct record drawings.

1.3.4. Controller Charts:

1.3.4.1. Record drawings shall be evaluated by the Landscape Architect and/or City Inspector before controller charts are prepared.

1.3.4.2. Provide one controller chart for each controller, unless otherwise directed by the City Inspector.

1.3.4.3. The chart shall show the area controlled by each automatic controller and shall be sized ½" smaller than the controller door on all sides.

1.3.4.4. The chart is to be a reduced drawing of the actual record drawings. However, in the event the controller sequence is not legible when the drawing is reduced, it shall be revised and made readable when the final controller chart is completed.

1.3.4.5. The chart shall be at least a 30# presentation bond copy. A differing color shall be used to indicate each valve and the same color used to identify the area of coverage for that valve.

1.3.4.6. When completed and approved, the chart shall be hermetically sealed by a plastic lamination process. The plastic laminating sheets shall each be a minimum of 20 mil. thick.

1.3.4.7. The charts shall be mounted using Velcro tape.

1.3.4.8. Controller charts shall be completed and approved prior to final inspection of the irrigation system.

1.3.5. Operation and Maintenance Manuals:

1.3.5.1. Prepare and deliver to the Owner within ten calendar days prior to completion of construction, hard-covered three rings binders containing the following information:

1.3.5.1.1. Index sheet stating Contractor's name, address and telephone number, list of equipment with name and addresses of local manufacturer's representatives.

1.3.5.1.2. Catalog and parts sheets on every material and equipment installed under this contract.

1.3.5.1.3. Guarantee statement

1.3.5.1.4. Complete operating and maintenance instructions on all major pieces of equipment.

1.3.5.1.5. Equipment list providing the following for each item:

1.3.5.1.5.1. Manufacturer's name

1.3.5.1.5.2. Make and model number

1.3.5.1.5.3. Name and address of local manufacturer's representatives

1.3.5.1.5.4. Spare parts list in detail

1.3.5.2. Provide two (2) manuals, unless otherwise directed by the Owner or City Inspector.

1.3.6. Equipment to be furnished:

1.3.6.1. Supply as a part of this contract the following tools and equipment:

1.3.6.1.1. Two (2) sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve installed under this contract.

1.3.6.1.2. Two (2) five foot valve keys for operation of ball/gate valves (as required).

1.3.6.1.3. Two (2) keys for each automatic controller enclosure

1.3.6.1.4. Two (2) keys for each automatic controller

1.3.6.1.5. Two (2) keys for each backflow preventer enclosure.

1.3.6.1.6. Two (2) quick coupling valve keys.

1.3.6.1.7. Drip Components:

1.3.6.1.7.1. Xeri-Bug single emitter units, of each gph type – (20)

1.3.6.1.7.2. Flex-Risers – (25)

1.3.6.1.8. The above-mentioned equipment shall be turned over to the Owner at the end of the Maintenance Phase.

1.4. PRODUCT DELIVERY, STORAGE AND HANDLING:

1.4.1. Handling of PVC Pipe and Fittings:

1.4.1.1. The Contractor is cautioned to exercise care in handling, loading, unloading, and storing of PVC pipe and fittings. All PVC pipe shall be transported in a vehicle which allows the length of pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point. Any section of pipe that has been dented or damaged will be discarded and, if installed, shall be replaced with new pipe.

1.5. GUARANTEE:

1.5.1. The guarantee for the irrigation system shall be made in accordance with the attached form. The general conditions and supplementary conditions of these specifications, if any, shall be filed with the Owner or his representative prior to acceptance of the irrigation system.

1.5.2. A copy of the guarantee form shall be included in the Operations and Maintenance Manual.

1.5.3. The beginning date of the one year guarantee shall be from the written final acceptance date established by the Owner at the end of the Maintenance Phase. If no Maintenance Phase is included in the contract, the beginning date shall be from the acceptance date established by the Owner at the end of the Construction Phase.

1.5.4. The guarantee form shown below shall be re-typed onto the Contractor's letterhead and contain the following information:

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the irrigation system we have furnished and installed is free from defects in materials, equipment and workmanship, and the work has been completed in accordance with the drawings and specifications. We agree to repair or replace any defects in material equipment or workmanship which may develop during the period of one year from the date of acceptance. We also guarantee to repair or replace any damage resulting from the defects, or the repairing or replacing of such defects at no additional cost to the Owner. We shall make such repairs or replacements within a reasonable time as determined by the Owner after receipt of written notice form the Owner. All repair work shall completed to the satisfaction of the Owner. In the event of our failure to make such repairs or replacements within a reasonable time after receipt of written notice from the Owner, we authorize the Owner to proceed to have said repairs or replacements made at our expense. We will pay the costs and charges therefore upon demand. Any temporary repairs made by others to keep the irrigation system operable, does not void or relieve the Contractor of his responsibilities during the guarantee period.

PROJECT: _____

ADDRESS: _____

_____

LOCATION: _____

SIGNED: _____

ACCEPTANCE: _____

SIGNED: _____

PHONE: _____

2. PART 2 – PRODUCTS

2.1. MATERIALS:

2.1.1. General:

2.1.1.1. Use only new materials of brands and types noted on the drawings, specified herein, or approved equivalents.

2.1.2. High Voltage Wiring:

2.1.2.1. Electrical work shall conform to all applicable codes, ordinances and union authorities having jurisdiction. Only qualified electricians shall work with high voltage design, equipment or wiring.

2.1.3. Automatic Controller:

2.1.3.1. The automatic controller shall be of the size and type shown on the drawings.

2.1.3.2. The Owner prior to installation shall approve final location of automatic controllers.

2.1.3.3. Unless otherwise noted on the plans. The 120-volt electrical power to the automatic controller location shall be furnished by the Owner. The final hook-up of the automatic controller to the 120-volt power source shall be the responsibility of the irrigation contractor.

2.1.3.4. The controller shall not receive an enclosure unless otherwise specified on the drawings.

2.1.4. Controller Enclosure:

2.1.4.1. The enclosure shall be vandal and weather resistant by nature and be manufactured entirely of stainless steel. Louvers shall be spaced and at different heights to ensure cross ventilation. Louvers shall be covered with vent screens. Doors and lids shall have a hemmed edge providing strength and smooth surfaces. Top opening shall have two gas springs for supports during lifting. Lids and doors shall have piano style hinges with three point locking mechanisms to provide security. The heavy duty enclosure line shall be manufactured with 14 gauge steel with doors providing provisions for concealed padlocks. All enclosures shall be UL listed and rated NEMA type 3R weather proof. Enclosures shall have removable back panels and templates for new installations.

2.1.5. Control Wiring:

2.1.5.1. Connections between the automatic controllers and the electric control valves shall be made with insulated direct burial copper wire AWG-UF 600 volt. Pilot wires sharing the same automatic controller shall be the same color. Common wire shall be white in color. Provide different colors for each controller installed on the same project. Install wire in accordance with valve manufacturer's specifications and wire chart. In no case shall wire size be less than #14. Wire sizes shall be 14 ga. up to 750', 12 ga. up to1200', 10 ga. up to 2,000' from valve to controller.

2.1.5.2. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines wherever possible

2.1.5.3. Where more than one wire is placed in a trench, the wiring shall be secured together with vinyl cable ties at intervals of ten (10) feet, and placed under the pipe for protection from shovels.

2.1.5.4. An expansion curl shall be provided within three (3) feet of each wire connection. The expansion curl shall be of sufficient length at each splice connection at each electric control valve so that in case of repairs, the valve bonnet may be brought to the surface without disconnection of the control wires. Control wires shall be laid loosely in the trench without stress or stretching of control wire conductors.

2.1.5.5. All splices shall be made with 3M Direct Bury Splice Kit DBY/DBR-6. Use one wire connector per wire splice. An expansion loop of 18 inches shall be provided at each wire connection and/or directional turn.

2.1.5.6. Field splices between the automatic controller and electric control valves will not be permitted without prior approval of the Landscape Architect.

2.1.5.7. All extra valve wires and the common wire, shall extend from the controller to a pull box at the farthest valve location for future or spare wires. If more than one route is available for extra wires, contact the Landscape Architect for the number of extra wires to be run in differing directions.

2.1.6. Pressure Regulating Valves:

2.1.6.1. Pressure Regulating Valves shall be placed either in a valve box or on the upstream riser to the backflow preventer per plan.

2.1.6.2. The system pressure at the system pressure regulating valve shall be set to 25% over the highest pressure required by the system.

2.1.7. Backflow Prevention Devices::

2.1.7.1. Backflow Prevention Units shall be of the size and type indicated on the drawings. Install backflow prevention units in accordance with irrigation construction details and all local applicable codes and ordinances.

2.1.7.2. Wye strainers at backflow prevention units shall have a bronzed screwed body and shall be the type as specified on the plans.

2.1.7.3. Provide enclosure only if denoted on plans.

2.1.8. Normally-Closed Master Valves:

2.1.8.1. Master valves shall be the size and type as shown on the drawings.

2.1.8.2. Solenoid, if different from that normally supplied, shall be as specified on the drawings.

2.1.8.3. The remote control valve shall be a normally closed, 24VAC-50/60 cycle solenoid actuated globe pattern design capable of having a flow rate specified on the drawings and a pressure loss not to exceed manufacturer's specifications. The valve pressure rating shall not be less than 2,000 PSI, (13.8 bars, metric).

2.1.8.4. The valve body and bonnet shall be constructed of heavy cast brass, diaphragm shall be of nylon reinforced buna-n rubber. All other internal parts shall be made of bronze, brass, and stainless steel to ensure corrosion resistance.

2.1.8.5. The valve shall have both internal and external manual open/close control, (internal and external bleed), for manually opening and closing the valve without electrically energizing the solenoid. The valve shall have internal manual bleed to prevent flooding of the valve box. The valve shall house a fully encapsulated, one-piece solenoid. The solenoid shall have a captured plunger with a removable retainer for easy servicing, and a leverage handle for easy turning. This 24VAC 50/60 Hz solenoid shall open with 19.6 VDC minimum at 200 PSI, (13.8 bars metric). At 24VAC average inrush current, it shall not exceed .41 amps. Average holding current shall not exceed .23 amps.

2.1.8.6. The valve shall have a contamination-proof (CP) self-flushing nylon filter screen located a the valve inlet to filter out debris and prevent clogging of the hydraulic control ports and assure reliable operation.

2.1.8.7. The valve shall have a stainless steel flow control stem and cross handle for regulating or shutting off the flow of water. The valve must open or close in less than one minute at 200 PSI, (13.8 bars metric), and less than 30 seconds at 20 PSI, (1.4 bars metric).

2.1.8.8. The valve construction shall be such as to provide for all internal parts to be removable from the top of the valve without disturbing the valve installation.

2.1.8.9. The controller assembly shall be provided with a Master Valve Power assembly for the purpose of powering the master valve circuit independent of controller operation to pressurize the mainline for supplemental watering. This assembly shall consist of a timing module (with variable timing in thirty minute increments for up to three hours) mounted to the face of the backboard and pre-wired to a terminal interface board.

2.1.9. Flow Sensors:

2.1.9.1. Flow sensing equipment shall be an insertion type with a non-magnetic, spinning impeller, (paddle wheel) as the only moving part. The sensor sleeve will be brass or 316 stainless steel with the impeller and sensor housing being glass-filled PPS. A Pinion bearing shall be inserted through the impeller and the shaft material shall be tungsten carbide. The sensor will be supplied with a 2" NPT adapter for installation into any commercially available weld-on fitting or pipe saddle. The adapter shall have two (2) ethylenepropylene O-rings. The sensor electronics will be potted in an epoxy compound designed for prolonged immersion. Electrical connections shall be two (2) single conductor 18AWG leads eighteen (18) inches long. Insulation shall be direct burial "UF" type, colored red for the positive lead and black for the negative lead. Insertion of the sensor into any pipe size shall be 1-1/2 inches from the inside wall to the end of the sensor housing. The sensor shall operate in line pressures up to 400 PSI and liquid temperatures up to 22- degrees Fahrenheit, and operate in flows of one (1) foot per second up to thirty (30) feet per second. This flow sensor shall be manufactured by Rainbird, model number as specified on the drawings.

2.1.9.2. Flow sensors shall be of the type and size specified on the irrigation drawings. Where flows vary dramatically from low to high, a manifold with low and high flow sensing capabilities may be necessary that can be read flows separately depending on the stations attached to each.

2.1.10. Communication Cable

2.1.10.1. All data communications wire connecting flow sensors to the electronics that are buried below grade, with conduit, shall be constructed to direct burial specifications similar to Telecommunications Exchange Cable (REA PE-89).

2.1.10.2. The cable shall be constructed of 20AWG or larger copper conductors twisted into pairs of varying lengths to prevent cross talk. Conductors shall be insulated with polyethylene or propylene with a suggested working voltage of 350 volts. The cable shall feature an aluminum-polyester shield and be finished with a black high-density polyethylene jacket. The cable should be equivalent to Belden No. 9883 or Anxiter E-000319DFC. Refer to manufacturer for their recommendations.

2.1.10.3. It is important that all wire connections be absolutely watertight with no leakage to ground or shorting from one conductor to another. Epoxy type wire connector kits such as 3M Series 3500 Scotch-LOK connector packs or 3M Series 7000 Epoxy Wire Connector Kits shall be used. If one connector is used for both wire connections, the splices shall be staggered to prevent shorting. Install per manufacturer's specifications.

2.1.11. Ball Valves:

2.1.11.1. Shall be as specified on plans.

2.1.12. Quick Coupling Valves:

2.1.12.1. Quick coupling valves shall have a brass two-piece body designed for working pressure of 150 PSI operable with quick coupler key. Key size and type shall be as shown on plans.

2.1.12.2. Hinge cover shall be of heavy duty brass construction with a durable high quality locking yellow, (potable) or purple, (reclaimed) thermoplastic rubber cover bonded to it in such a manner that it becomes a permanent-type cover.

2.1.12.3. Locate valves within 12 inches of hardscape edge unless otherwise noted on plans.

2.1.12.4. Normally closed master valve systems shall either have a master valve over-ride device within the controller to manually open the master valve during quick coupler use, or connect the master valve to a designated control valve station to open the master valve during quick coupler operation. Refer to the irrigation drawings.

2.1.13. Electric Remote Control Valves:

2.1.13.1. Electric control valves shall be of the size and type shown on the drawings.

2.1.13.2. Unless otherwise noted on plan or construction details, all electric control valves shall have a manual flow adjustment.

2.1.13.3. Provide and install one control valve box for each electric control valve.

2.1.13.4. Provide and install Christy tags with valve sequence for each valve.

2.1.14. Drip Remote Control Zone Kit Valve Assemblys:

2.1.14.1. The assembly shall be consist of all equipment necessary for on/off control, filtration, and pressure regulation in a single package.

2.1.14.2. Valves shall be of the size and type shown on the drawings.

2.1.14.3. Each kit shall provide a low flow valve capable of flows from 0.2 gpm to 40 gpm depending on the kit.

2.1.14.4. Each kit shall provide a pressure-regulating filter, either in wye or basket format.

2.1.14.5. Provide and install Christy tags with valve sequence for each valve.

2.1.15. Valve Boxes:

2.1.15.1. Ball Valves: Use 10" diameter x 10" deep round boxes, Carson industries #910-10-Green Blank with green bolt down cover or approved equal. Extension sleeve shall be PVC-6" minimum size. Brand top as indicated below.

2.1.15.2. Electric Remote Control Valves: Use 12"x17"x12" deep rectangular boxes, Carson Industries #1419A-12 Green Blank HBlt with green bolt down cover or approved equivalent. Brand top as indicated below.

2.1.15.3. Drip Kit Assemblys: Use 12"x17"x12" deep rectangular boxes, Carson Industries #1419A-12 Green Purple Blank HBlt with green purple bolt down cover or approved equivalent. Brand top as indicated below.

2.1.15.4. Flow Sensors: Use 10" diameter x 10" deep round boxes, Carson industries #910-10-Green Blank with green bolt down cover or approved equal. Extension sleeve shall be PVC-6" minimum size. Brand top as indicated below.

2.1.15.5. Pull Boxes: Use 10" diameter x 10" deep round boxes, Carson industries #910-10-Green Blank with green bolt down cover or approved equal. Extension sleeve shall be PVC-6" minimum size. Brand top as indicated below.

2.1.15.6. Identification numbers shall be branded onto the box lids in 2 inch high letters and numbers as follows:

2.1.15.6.1. BV: Ball Valve

2.1.15.6.2. WM: Water Meter

2.1.15.6.3. FS: Flow Sensor

2.1.15.6.4. MV: Master Valve

2.1.15.6.5. PB: Pull Box

2.1.15.6.6. QC: Quick Coupling Valve

2.1.15.6.7. RCV-#: Remote Control Valve and Station Number

2.1.15.7. Vehicle traffic area boxes shall be concrete with cast-iron lid designed for vehicle traffic use.

2.1.16. Buried Potable PVC Pressure Main Line Pipe and Fittings:

2.1.16.1. Pressure main line piping shall be PVC schedule 40 for all mainline piping 1-1/2" and smaller with solvent-welded joints, PVC Class 315 for all mainline piping 2" through 3" with solvent-welded joints, and Class 200 rubber-gasketed piping for 4" and larger with ductile iron fittings.

2.1.16.2. Pipe shall be made from NSF approved Type 1, Grade 1 PVC compound conforming to ASTM resin specification D 1784 or D 2241. All pipe must meet requirements as set forth in Federal Specification PS-21-70 (Solvent-Weld Pipe) and meet requirements of Cell Classification 12454B. This compound shall have a 2,000-PSI hydrostatic design stress rating.

2.1.16.3. Install blue colored warning tape 12" over all potable water main lines.

2.1.17. Potable PVC solvent-weld fittings

2.1.17.1. PVC solvent-weld fittings shall be Schedule 40, 1-2, 11-1 NSF approved conforming to ASTM test procedure D 2466.

2.1.17.2. Solvent cement and primer for PVC solvent-weld pipe and fittings shall be of the type and installation methods prescribed by the manufacturer.

2.1.17.3. All PVC pipe must bear the following markings:

2.1.17.3.1. Manufacturer's name

2.1.17.3.2. Nominal pipe size

2.1.17.3.3. Schedule or Class

2.1.17.3.4. Pressure rating in PSI

2.1.17.3.5. NSF (National Sanitation Foundation) approval

2.1.17.3.6. Date of extrusion

2.1.17.4. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable IPS schedule and NSF seal of approval. Fittings shall be standard weight Schedule 40, injection molded of PVC fitting compound which meets current ASTM D 1784-69 and requirements described in Cell Classification 13454B. Threads required in plastic fittings shall be injection molded. Tees and ells shall be side gated.

2.1.18. Buried Potable PVC Non-Pressure Lateral Line Pipe:

2.1.18.1. Non-Pressure buried lateral line pipe shall be PVC Schedule 40 with solvent-weld joints, ½" shall be Class 315.

2.1.18.2. Pipe shall be made from NSF approved, Type 1, Grade II PVC compound conforming to ASTM resin specification D1784. All pipe must meet requirements set forth in Federal Specification PS-22-70 with an appropriate standard dimension ratio.

2.1.18.3. Except as noted in paragraphs 1 and 2 of this section, all requirements for non-pressure lateral line pipe and fittings shall be the same as that for solvent-weld pressure main line pipe and fittings.

2.1.19. Threaded Nipples:

2.1.19.1. Threaded nipples shall be standard weight, schedule 80, grey, with molded threads.

2.1.19.2. Assemble threaded fittings using teflon tape applied to male threads only.

2.1.20. Joint Primer:

2.1.20.1. Type as recommended by manufacturer of pipe.

2.1.20.2. Type IPS-P-70 or equivalent for Flex hose to PVC fittings.

2.1.21. Joint Cement:

2.1.21.1. Solvent type as recommended by manufacturer.

2.1.22. Brass Pipe and Fittings:

2.1.22.1. Where indicated on the drawings, use 85% red brass, schedule 40 screwed pipe conforming to Federal Specification #WW-P-351.

2.1.22.2. Fittings shall be medium red brass, screwed, 125 pound class conforming to Federal Specification #WW-P-460.

2.1.22.3. Assemble using teflon tape applied to male threads only.

2.1.23. Sleeves:

2.1.23.1. Pipe sleeves for potable water and wires shall be white Schedule 40 PVC pipe a minimum of two times the diameter of the interior irrigation pipe. Sleeve pipes shall me a minimum of 1-1/2" for water lines. Oversized sleeves are acceptable at no additional cost to Owner.

2.1.23.2. Sleeves shall be of a minimum size to accept pipe "bell joints".

2.1.23.3. Multiple non-pressure lateral water pipes may be placed within a single sleeve if approved by the Landscape Architect.

2.1.23.4. Mainline sleeves shall consist of only one pipe per sleeve.

2.1.23.5. In no cases shall wires be placed within the same sleeve as water pipes. Wires shall be encased within a separate sleeve.

2.1.23.6. Size of sleeves for wires shall meet or exceed the following minimum sizes. Oversized sleeves for wires are acceptable at no additional cost to Owner should the sleeve path be difficult to pull multiple wires.

2.1.23.6.1. 1-1/2" sleeve – maximum 10 wires

2.1.23.6.2. 2" sleeve – maximum 17 wires

2.1.23.6.3. 3" sleeve – maximum 25 wires

2.1.23.6.4. 4" sleeve – maximum 40 wires

2.1.23.6.5. 6" sleeve – maximum 50 wires

2.1.24. Warning Tape (Detectable):

2.1.24.1. All PVC mainline pipelines shall have a detectable warning tape placed in the trench 12 inches above the pipe.

2.1.24.2. Plastic warning tape (detectable) shall be five-ply composition of ultra-high molecular weight, 100 percent virgin polyethylene or an inert plastic film specifically formulated for prolonged underground us and shll include a metallic substance that can be registered by a magnetic field location device. The minimum thickness shall be 4 mils and the overall width of the tape shall be three (3) inches. Warning tape (detectable) shall be as supplied by T. Christy Enterprises, Thor Enterprises, Inc. Griffolyn Co., Terra Tape, Division of Reef Industries, or approved equal. The color of the tape shall be in accordance with the above requirements and the Recycled Water Urban Irrigation User's Manual. Do not provide location tape over lateral non-pressure lines.

2.1.24.3. Potable Water Mainline Pipelines shall receive blue colored warning tape (detectable) with Black lettering identifying the potable pressure water pipeline. Lettering shall be a minimum of one (1) inch high letters with the wording: "CAUTION: BURIED POTABLE WATER LINE BURIED BELOW". Christy's Part Number TA-DT-3-BW

2.1.25. Bubbler Heads:

2.1.25.1. All bubbler heads shall be of the size, type and deliver the same rate of precipitation with the diameter (or radius) of spray, pressure and discharge in GPM as shown on the drawings.

2.1.25.2. All bubbler heads shall have a screw adjustment.

2.1.25.3. Riser/swing joint assemblies shall be fabricated in accordance with the irrigation construction details shown on the drawings.

2.1.25.4. Riser nipples for all sprinkler heads shall be the same size as the base opening in the sprinkler body.

2.1.26. Pressure Compensating Drip Emitters:

2.1.26.1. The pressure compensated emitter body shall be constructed of UV and chemical resistant, non-corrosive delrin material. The emitter diaphragm shall be constructed of a silicone elastomer material.

2.1.26.2. The emitter shall deliver a nominal flow rate of one (1) to 2 (two) gallons per hour, (GPH) as specified on the drawings. The emitters shall have a pressure range from 15 to 50 PSI. The inlet shall be a 1032 threaded fitting to screw into the top of the flex-riser..

2.1.26.3. The emitter inlet barb shall be color coded to identify the flow rate of the unit. The emitter outlet shall be of a threaded configuration in which a vinyl tubing flex riser as specified on the drawings with an inside diameter of .16" (4mm), can be attached. A series of baffles shall be molded into the outlet barb of the emitter. Rainbird Xeri-bug PC modules, and multi-outlet emitters as manufactured by Rainbird Sprinkler Mfg. Corporation or approved equivalent.

2.1.26.4. Emitters to be installed in flex-risers shall have the 10-32 threads for installation into the flex-riser.

3. PART 3 – EXECUTION

3.1. INSPECTION:

3.1.1. Site Conditions:

3.1.1.1. All scaled dimensions are approximate. The Contractor shall check and verify all site dimensions.

3.1.1.2. Exercise extreme care in excavating and working near existing utilities. Contractor shall be responsible for damage to utilities that are caused by his operations or neglect. Check existing utility drawings or call utility companies for existing utility locations.

3.1.1.3. Coordinate installation of irrigation materials, including pipe, so there shall be no interference with utilities, other construction or planting or trees, shrubs and ground covers.

3.1.1.4. The Contractor shall carefully check all grades to satisfy him that he may safely proceed before starting work on the sprinkler irrigation system. Verify that the specified depths for buried materials and equipment can be maintained.

3.2. PREPARATION:

3.2.1. Physical Layout:

3.2.1.1. The irrigation lines as indicated on the drawings are diagrammatic. All piping and equipment shall be installed within the project boundaries, even if shown outside the boundaries on the drawings. Equipment or piping shown outside the boundaries on the drawings is for design clarity only. Install all piping and equipment within planting areas.

3.2.1.2. Prior to installation, the Contractor shall stake out all pressure supply lines, routing and location of sprinkler heads. Install all materials and piping to avoid conflict with trees, shrubs, and all underground utility services. Contact the Landscape Architect immediately if obstructions prevent routing as denoted on plans.

3.2.1.3. Lay out irrigation emitters/heads and make any minor adjustments required due to differences between actual site conditions and the drawings. Adjustments shall be maintained within the original design intent and only after receiving approval from the Landscape Architect. Do not exceed the maximum or minimum spacing indicated by the manufacturer.

3.2.2. Water Supply:

3.2.2.1. Sprinkler irrigation system shall be connected to water supply points of connection as shown on drawings.

3.2.2.2. Connections shall be made at approximate locations as shown on the drawings. Contractor is responsible for minor changes caused by actual site conditions.

3.2.2.3. The water source for the point of connection shall either be existing or brought to the location by the General Contractor or others for connection by the Landscape Contractor.

3.2.3. Electrical Supply:

3.2.3.1. An electrical connection for automatic controller shall be made to electrical points of connection as shown on the drawings.

3.2.3.2. Connections shall be made at approximate locations as shown on the drawings. Contractor is responsible for minor changes caused by actual site conditions.

3.2.3.3. The electrical source for the point of connection of the controller shall either be existing or brought to the location by the General Contractor or Owner for connection by the Landscape Contractor.

3.3. INSTALLATION:

3.3.1. Trenching:

3.3.1.1. Dig trenches straight to support pipe continuously on bottom of the trench. Lay pipe to an even grade. Trenching excavation shall follow layout indicated on the drawings or as noted.

3.3.1.1.1. Provide for a minimum of eighteen- (18) inches cover for all buried pressure supply lines.

3.3.1.1.2. Provide for a minimum of twelve- (12) inches cover for all buried non-pressure lateral lines, PVC or flexable Polyvinyl ½" tubing..

3.3.1.1.3. Provide for a minimum of eighteen- (18) inches cover for all buried control wiring.

3.3.2. Backfilling:

3.3.2.1. The trenches shall not be backfilled until all required tests are performed. Trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand or other approved materials, free from large clods of earth, stones, asphalt, concrete or other construction or organic debris such as plant refuse.. Backfill shall be mechanically compacted in landscaped areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill will conform to adjacent grades without dips, sunken areas, humps or other surface irregularities.

3.3.2.2. A fine granular material backfill will be initially placed on all lines. No foreign matter larger than one-half (1/2) inch in size will be permitted in the initial backfill.

3.3.2.3. If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, lawn or planting, or other construction are necessary, the Contractor shall make all required adjustments without cost to the Owner.

3.3.2.4. Flooding may be accepted in lieu of tamping only upon written approval of the Owner.

3.3.2.5. Truck wheels shall not be used for compacting soil.

3.3.3. Assemblies:

3.3.3.1. Routing of irrigation lines as indicated on the drawings is diagrammatic. Install lines (and various assemblies), in such a manner as to conform to the details on the drawings.

3.3.3.2. Install no multiple assemblies on plastic lines. Provide each assembly with it's own outlet.

3.3.3.3. Install all assemblies specified herein in accordance with respective detail. In the absence of detail drawings or specifications pertaining to specific items required to complete work, perform such work in accordance with the best standard practice and with the manufacturer's specifications. PVC pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture before installation. Installation and solvent welding methods shall be as recommended by the pipe and fitting manufacturer.

3.3.3.4. On PVC to metal connections, the Contractor shall work the metal connections first. Teflon tape shall be used on male threads on all threaded PVC to PVC, and on all threaded PVC to brass pipe connections. Red lead and boiled linseed oil shall be applied to male threads on all galvanized pipe connections. Light wrench pressure is all that is required. Where threaded PVC connections are required, use threaded PVC adapters into which the pipe may be welded.

3.3.3.5. Open pipe or tubing ends shall be taped closed during installation to prevent any foreign matter from entering the system.

3.3.4. Line Clearance:

3.3.4.1. 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. In case of reclaimed water crossings, refer to local cross connection details and codes.

3.3.4.2. Place location tape above all mainline piping per irrigation drawings.

3.3.5. Automatic Controller:

3.3.5.1. Install controller per manufacturer's instructions. Remote control valves shall be connected to controller in numerical sequence as shown on the drawings.

3.3.5.2. The controller shall be a pre-assembled controller within as stainless steel enclosure per irrigation drawings.

3.3.6. High voltage wiring for Automatic Controller:

3.3.6.1. The Contractor or Owner shall provide 120-volt power connection to the automatic controller location. The Landscape Contractor shall make the final hookup to the controller.

3.3.6.2. All work on high voltage electrical systems shall be done by a licensed electrician.

3.3.6.3. All electrical work shall conform to local codes, ordinances and union authorities having jurisdiction.

3.3.7. Low Voltage Wiring:

3.3.7.1. Place wiring in the same trench and route as the pressure supply lines.

3.3.7.2. Install wiring prior to main line installation.

3.3.7.3. Secure wire(s) together at 10 feet on-center maximum, with vinyl cable ties attached to the mainline. If mainline is not present. Bundle and secure wires with vinyl cable ties at 10 feet o.c.

3.3.7.4. Provide an 24-inch expansion loop at each connection and at each directional change.

3.3.7.5. Use a continuous wire between controller and remote control valves. Should splicing be required, make splices in an approved box.

3.3.7.6. Use white for all ground wire circuits.

3.3.7.7. Provide wires of differing color, from controller to each furthest termination point of mainline location as shown on the irrigation drawings, to be used as required as spare.

3.3.8. Remote Control Valves:

3.3.8.1. Install valves where shown on the drawings and per details. When grouped together, allow at least twelve (12) inches between valve boxes. Install each remote control valve in a separate valve box. Align boxes with adjacent paving in a neat manner, squared to the walk and each other.

3.3.9. Valve Box Installation:

3.3.9.1. Provide at all locations indicated.

3.3.9.2. Fill below box with a minimum of 6" layer of pea gravel. Compact prior to installation of box.

3.3.9.3. "Brand" identification number on each valve box in 2-inch-high characters (letters and numbers) indicating controller letter and valve number within the sequence. See drawings for numbering method.

3.3.9.4. Provide and install Christy tags with valve sequence for each valve.

3.3.10. Flushing of System:

3.3.10.1. After all new sprinkler pipe lines and risers are in place and connected, and all necessary diversion work has been completed, and prior to installation of sprinkler heads, the control valves shall be opened and a full head of water used to flush out the system.

3.3.10.2. Heads/emitters shall be installed only after flushing of the system has been accomplished.

3.3.11. Bubbler / Emitter Heads:

3.3.11.1. Install the bubbler heads or emitters as designated on the drawings. Sprinkler heads and/or emitters to be installed in this work shall be equivalent in all respects to those itemized on the drawings.

3.3.11.2. Spacing of bubbler heads and/or emitters shall not exceed the maximum as indicated on the drawings. In no case shall the spacing exceed the maximum recommended by the manufacturer.

3.3.12. Adjusting system:

3.3.12.1. Adjust valves alignment and coverage of irrigation heads/emitters.

3.3.12.2. These changes or adjustments shall be made at no additional cost to the Owner.

3.3.12.3. The entire system shall be operating properly before any planting operations commence.

3.4. TEMPORARY REPAIRS:

3.4.1. The Owner reserves the right to make temporary repairs as necessary to keep the irrigation system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibilities under the terms of the guarantee as herein specified.

3.5. EXISTING TREES:

3.5.1. Where it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and tree roots. Excavation in areas where two (2) inch and larger roots occur shall be done by hand. All roots two (2) inches and larger in diameter, except directly in the path of pipe or conduit, shall be tunneled under and shall be heavily wrapped with burlap, to prevent scarring or excessive drying. Where a ditching machine is run close to trees having roots smaller than two (2) inches in diameter, the wall of the trench adjacent to the tree shall be hand trimmed, making clean cuts through roots. Roots one-half (1/2) inch and larger in diameter shall be painted with two coats of tree seal, or equivalent. Trenches adjacent to trees should be closed within twenty-four (24) hours; and where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas.

3.6. FIELD QUALITY CONTROL:

3.6.1. Adjustment of the System:

3.6.1.1. The Contractor shall flush clean and adjust all sprinkler heads / emitters for optimum performance and to prevent overspray or runoff onto walks, roadways and buildings as much as possible.

3.6.1.2. If it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage, the Contractor shall make such adjustments prior to planting at the contractor's cost. Adjustments may also include changes in emitter flows as required.

3.6.1.3. Lowering or raising of sprinkler heads by the Contractor shall be accomplished within five (5) days after notification by the Landscape Architect.

3.6.1.4. All flex-risers shall be set perpendicular to finished grade unless otherwise designated on the drawings.

3.6.1.5. To provide adequate water to the plants to prevent under or over-watering of plants and trees, the Contractor may be required to change emitters for higher or lower rates of flow at the emitter locations, or reduce or increase the number of emitters at each location as necessary. Verify with the Landscape Architect prior to any changes to the irrigation system.

3.6.2. Testing of Irrigation System:

3.6.2.1. The Contractor shall request the presence of the Landscape Architect at the intervals listed below in advance of any testing.

3.6.2.2. The Contractor shall provide current record drawings at each review.

3.6.2.3. Before testing mainlines, fill the lines with water for a period of at least 24 hours.

3.6.2.4. All hydrostatic mainline testing shall be completed prior to the installation of remote control valves, quick couplers, or other valve assemblies.

3.6.2.5. Test all pressure mainline pipes under hydrostatic pressure of 125 PSI and prove watertight. Testing of pressure main line piping shall occur prior to installation of electric control valves or quick coupling valves.

3.6.2.6. All piping under paved areas shall be tested under hydrostatic pressure of 125 PSI and proved water tight, prior to paving.

3.6.2.7. Sustain pressure in tested lines for not less than two (2) hours. If leaks develop, replace joints and repeat test until entire system is proven watertight.

3.6.2.8. All hydrostatic tests shall be made in the presence of the Architect. The test may be made in the presence of the General Contractor's superintendent only if written acceptance of the test is forwarded to the Owner and Landscape Architect immediately after testing. No pipe shall be backfilled until it has been observed, tested with all couplings exposed and all pipe sections center loaded, and approved in writing.

3.6.2.9. The Contractor shall furnish the force pump and all other test equipment necessary for the testing of the irrigation system.

3.6.2.10. The Contractor shall make all necessary provisions for thoroughly bleeding the line of air and debris.

3.6.2.11. When the irrigation system is completed, perform a coverage test in the presence of the Landscape Architect, to determine if the water coverage for the planting areas is complete and adequate. Furnish all materials and perform all work required to correct any inadequacies of coverage due to deviation from plans, or where the system has been willfully installed as indicated on the drawings when it is obviously inadequate for field conditions. This test shall be accomplished before any groundcover or shrub material is planted.

3.6.2.12. Upon completion of each phase of work, the entire system shall be tested and adjusted to meet site requirements to the satisfaction of the Landscape Architect.

3.7. MAINTENANCE:

3.7.1. The entire sprinkler irrigation system shall be under full automatic operation prior to any planting.

3.7.2. The Contractor shall keep the irrigation system completely operational for the entire length of the Construction and Maintenance Phases or work.

3.8. CLEAN-UP:

3.8.1. Clean up shall be made as each portion of work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed or washed down, and any damage sustained on the work or others shall be repaired to original conditions.

3.9. FINAL OBSERVATION PRIOR TO ACCEPTANCE:

3.9.1. The Contractor shall operate each system in its entirety for the Landscape Architect at the time of final observation at the end of the Maintenance Phase. Any items deemed not acceptable by the Landscape Architect shall be reworked to the complete satisfaction of the Landscape Architect.

3.9.2. The Contractor shall show evidence to the Landscape Architect that the Owner has received all accessories, charts, record drawings and equipment as required before the final observation can occur.

3.10. OBSERVATION SCHEDULE:

3.10.1. The Contractor shall be responsible for notifying the Landscape Architect in advance for the following observations, according to the following time schedule. The number of site visits may vary with the contract between the Landscape Architect and the Owner. The Contractor shall be familiar with the number and type of irrigation observations necessary prior to work. Typical observations may consist of , but not be limited to the following:

3.10.1.1. Pre-job conference - 7 days

3.10.1.2. Pressure supply line installation and testing - 48 hours

3.10.1.3. Automatic controller installation - 48 hours

3.10.1.4. Control wire installation - 48 hours

3.10.1.5. Lateral line and sprinkler / emitter installation - 48 hours

3.10.1.6. Coverage / Performance test - 48 hours

3.10.1.7. Observation to begin Maintenance Phase - 7 days

3.10.1.8. Final observation at the end of the Maintenance Phase - 7 days

3.10.2. When persons other than the Landscape Architect have conducted observations, show evidence of when and by whom these observations were made.

3.10.3. In the event the Contractor calls for an observation without record drawings, without completing previously noted corrections, or without preparing the system for proper observation to the satisfaction of the Landscape Architect, the observation shall be postponed. The Contractor shall then be responsible for reimbursing the Landscape Architect at his current rate per hour (portal-to-portal). No further observations will be scheduled until this charge has been paid current.

END OF SECTION

SECTION 32 90 00

LANDSCAPE PLANTING

1. PART 1 – GENERAL

1.1. SCOPE OF WORK

1.1.1. Landscape planting work includes, but is not limited to, operations and furnishing of all labor, materials, tools and equipment necessary to complete all soil preparation, fine grading, weed control, erosion control, planting, watering, plant establishment and incidental work which may be required to complete "Landscape Planting" and as shown on the drawings and as described hereinafter.

1.1.2. Related Work Specified In Other Sections:

1.1.2.1. Landscape Irrigation

1.1.2.2. Landscape Maintenance

1.2. QUALITY ASSURANCE AND REQUIREMENTS

1.2.1. Permits and Fees:

1.2.1.1. At the time of the award and until completion of work, the Contractor shall possess a California Contractor's "A" or "C-27" license.

1.2.1.2. At the time of the award and until completion of work, the Contractor and all Sub-contractors shall possess a Business License issued by the City of the project location.

1.2.1.3. The Contractor shall obtain and pay for all permits and all inspections as required.

1.2.2. Manufacturer's Directions:

1.2.2.1. Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturers of articles used in the contract furnish directions covering points not shown in the drawings and specifications.

1.2.3. Ordinances and Regulations:

1.2.3.1. All local, municipal and state laws and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications and their provisions shall be carried out by the Contractor. Anything contained in these specifications shall not be construed to conflict with any of the above rules and regulations or requirements of the same. However, when these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the above rules and regulations, the provisions of these specifications and drawings shall take precedence.

1.2.4. Contractor Responsibilities:

1.2.4.1. A qualified superintendent shall be present on the site at all times during the progress of the work. The superintendent shall be fluent in the English language.

1.2.4.2. The Contractor shall assume responsibility for damage to existing construction and shall restore damaged property to the original condition to the satisfaction of the Owner.

1.2.4.3. Immediately notify the Landscape Architect in case of discrepancies with these plans.

1.2.4.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been resolved. If the Contractor provides and installs material or performs work without fully resolving such discrepancies, the Contractor shall be fully responsible for removing, restocking and re-installation of such areas until all discrepancies are resolved to the Owner's satisfaction.

1.2.5. Source Quality Control:

1.2.5.1. Arrange procedure for inspection of plant material with Landscape Architect prior to work. Should the contractor desire the Landscape Architect to inspect the plant material at the nursery prior to delivery, the Contractor shall notify the Landscape Architect seven (7) days prior to this requested inspection. The Landscape Architect shall invoice the Contractor for the inspection on an hourly basis, portal to portal, including any other expenses incurred. All such invoices shall be paid to the Landscape Architect prior to any other inspections by the Landscape Architect to the project site.

1.2.5.2. Submittal of pictures shall not be considered as a final inspection of plant material. Final acceptance or rejection of plant material shall only be considered on-site with the actual plant material being observed.

1.3. SUBMITTALS

1.3.1. The following submittals will be required:

1.3.1.1. Agronomic soils test and report.

1.3.1.2. Materials List noting product name and supplier on Contractor's letterhead. Cut sheets may be included as backup to the listing.

1.3.1.3. Plant Materials List on Contractor's letterhead denoting supplier and including photographs of each plant material including both trees and shrubs. List trees with caliber, height, and spread. Shrubs with height and spread.

1.3.1.4. Samples of each soil amendment (1 quart minimum) with laboratory analysis.

1.3.1.5. Guarantees, Warranties, and written certifications on Contractor's letterhead submitted to the Owner.

1.3.1.6. Certificate of Inspection of plant material by State or Federal Authority shall be presented if requested to the Owner.

1.3.1.7. Submittals shall be provided within ten working days from the time of award of contract.

1.4. PRODUCT DELIVERY, STORAGE AND HANDLING

1.4.1. Delivery:

1.4.1.1. Deliver fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trademark, and conformance to state law.

1.4.1.2. Deliver all plants with legible identification labels for easy identification.

1.4.1.2.1. Label trees, evergreens, bundles of containers of like shrubs, or groundcover plants. Place plants in lots of similar material, spread apart for ease of viewing individual plants prior to the observation. Contractor shall leave enough room around lots and individual plants for ease of viewing and movement between lots for observation.

1.4.1.2.2. Use durable waterproof labels with water-resistant ink which will remain legible for at least 60 days.

1.4.1.3. Protect plant material during delivery to prevent damage to root ball or desiccation of leaves.

1.4.1.4. The Contractor shall notify the Landscape Architect forty eight (48) hours in advance of delivery of all plant materials and shall submit an itemized list of the plants.

1.4.1.5. The Landscape Architect shall make suggestions for any rejections to the Owner. The Owner shall have sole discretion regarding acceptability of plant material.

1.4.2. Storage:

1.4.2.1. Store plant material in the shade and protect from the weather.

1.4.2.2. Maintain and protect plant material not to be planted within four (4) hours.

1.4.3. Handling:

1.4.3.1. Do not drop plant materials.

1.4.3.2. Do not pick up container plant material by stems or trunks.

1.5. JOB CONDITIONS

1.5.1. Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted industry practice.

1.6. SITE SAFETY

1.6.1. Erect and maintain barricades, warning signs, lights and/or guards as necessary or required to protect all persons on the site.

1.6.2. The Contractor shall be solely and completely responsible for conditions of the job-site, including safety of all persons and property during the performance of the work, and the Contractor shall fully comply with all State, Federal and other laws, rules, regulations, and orders relating to the safety of the public and workers.

1.6.3. The right of the Landscape Architect to conduct construction review or observation of the Contractor's performance shall not include review or observations of the adequacy of the Contractor's safety measures in, on or near the construction site.

1.7. SAMPLES AND TESTS

1.7.1. The Owner reserves the right to take and analyze samples of materials for conformity to specifications at any time. Rejected materials shall be immediately removed from the site at the Contractor's own expense. The cost of testing of materials not meeting specifications shall be paid by the Contractor.

1.7.2. The Contractor shall have soil samples tested after finish grades have been established prior to addition of conditioners Take samples to best represent the site soil conditions. Surface samples shall be taken with a trowel at 6" to 12" deep into finish grade. Should sub-surface samples be requested for trees, these shall be taken at a depth of 24" to 36" into finish grade. All samples shall be tested by an established soils laboratory for soil fertility and agricultural suitability. Each sample shall contain approximately one quart, but no less.

1.7.3. Copies of the laboratory's final recommendations shall be sent to the Owner and the Landscape Architect upon receipt by the Contractor with a statement denoting any additional or deductive costs. The Contractor shall then install soil amendments and backfill to conform to the soil laboratory's recommendations by first requesting and receiving a written change order from the Owner. This report shall also contain recommendations for palm tree pits, backfill and sub-soil drainage, import soil and/or any other special soil conditions particular to the project site and design. This report shall include plant establishment maintenance recommendations and on-going maintenance recommendations. The Owner may request additional testing of finish grades to determine actual amendment rates per 1.07 A above. The contractor shall include the plant list from the Planting Plans along with the soil samples for compatibility comparison by the soils laboratory.

1.8. GUARANTEE AND REPLACEMENT

1.8.1. All plant material installed under the contract shall be guaranteed against any and all poor, inadequate or inferior materials and/or workmanship for a period of one (1) year for trees, and ninety (90) days for shrubs, vines and groundcovers from the effective date of completion of the Maintenance Phase of the project as established by the Owner. Any plant found to be dead or in poor condition due to faulty materials or workmanship, as determined by the Landscape Architect, shall be replaced by the Contractor at his expense. Material to be replaced within this guarantee period shall be replaced by the Contractor within seven (7) days of written notification by the Owner.

1.8.2. Any materials found to be dead, missing or in poor condition during the Maintenance Period shall be replaced immediately. The Landscape Architect shall be the sole judge as to the condition of the material.

1.8.3. A written guarantee shall be submitted at the completion of the Maintenance Phase showing the date of final acceptance by the Owner and the date of the end of the guarantee period, or periods for phased work, for shrubs and trees.

1.8.4. The guarantee periods shall not be extended for any individual shrub or tree, or groups, replaced at any time during the guarantee period. The guarantee for all project shrubs and trees shall end at the stated guarantee time lengths as bid and agreed upon, even if shrubs or trees planted during that time have a reduced guarantee period.

1.9. OBSERVATIONS:

1.9.1. All observations are to be initiated by the Owner. The Contractor shall request observations at least to the times noted below for each observation required.

1.9.2. Observation schedule:

1.9.2.1. Pre-job conference: 72 hrs.

1.9.2.2. Review of plant material at nurseries or field locations: 7 day notice.

1.9.2.3. Layout of plant material prior to excavating planting pits: 72 hours.

1.9.2.4. In progress planting: 72 hours.

1.9.2.5. Final walk-through for completion of improvements: 7 days notice.

1.9.2.6. Final walk-through for acceptance: 7 days notice.

1.9.3. Provisions:

1.9.3.1. In the event Contractor schedules any review and planting is not fully ready, if record drawings are not current, or if the required corrective work has not been completed, the Contractor shall be responsible for reimbursement at the current rate of the Landscape Architect per hour for time expended, as well as all lodging and meal expenses etc, and portal-to-portal travel time. Payment of reimbursement shall be made prior to scheduling of any additional site observations.

2. PART 2 – PRODUCTS

2.1. MATERIALS

2.1.1. The following organic and soil amendments and fertilizer are to be used for bidding purposes only. Specific amendments and fertilizer specification will be made after grading operations are complete and soil samples are tested by a qualified agronomic soils laboratory at the Contractor's cost.

2.1.2. All materials shall be of standard, approved and first grade quality and shall be in prime condition when installed and accepted. Any commercially processed or packaged material shall be delivered to the site in the original unopened container bearing the manufacturer's guaranteed analysis. Contractor shall supply the Landscape Architect with a sample of all supplied materials accompanied by analytical data from an approved agronomic laboratory source illustrating compliance or bearing the manufacturer's guaranteed analysis upon request.

2.1.3. Organic Material for backfill or pre-planting mixes:

2.1.3.1. Nitrogen Stabilized: 0.56 to 0.84% N based on dry weight for redwood sawdust.

2.1.3.2. Particle Size: 95%-100% passing 6.35mm standard sieve; 80%-100% passing 2.33mm standard sieve.

2.1.3.3. Salinity: The saturation extract conductivity shall not exceed 3.5 millimhos/centimeter at 25 degrees centigrade as determined by saturation extract method.

2.1.3.4. Iron Content: Minimum 0.08% dilute acid soluble Fe on dry weight basis.

2.1.3.5. Ash: 0-6.0% (dry weight).

2.1.4. Soil Amendments:

2.1.4.1. Gypsum: Agricultural grade produce containing 98% minimum calcium sulfate.

2.1.4.2. Iron Sulphate, (not to be used near hardscape elements as it can stain surfaces)

2.1.5. Fertilizer:

2.1.5.1. For bidding purposes only, install commercial pre-planting fertilizer for tree and shrub backfill as shown below. Fertilizer shall consist of the following percentages by weight and shall be mixed by a commercial fertilizer supplier.

2.1.5.1.1. Commercial Fertilizer 12-12-12

2.1.5.2. For bidding purposes only, install commercial pre-planting fertilizer for general planting beds as shown below. Fertilizer shall consist of the following percentages by weight and shall be mixed by a commercial fertilizer supplier:

2.1.5.2.1. Commercial Fertilizer 12-12-12

2.1.5.3. Planting tablets:

2.1.5.3.1. Slow-release type, containing the following percentages of nutrients by weight: 20-10-5

2.1.5.3.2. 21 gram tablets as manufactured by Agriform or approved equivalent, applied per manufacturer's recommendations.

2.1.6. Soil Conditioner

2.1.6.1. As recommended by the agronomic soils laboratory report.

2.1.7. Top Soil:

2.1.7.1. Top soil, as required, shall be obtained from on-site planting excavations if at all possible.

2.1.7.2. Topsoil shall consist of a natural, fertile, friable, sandy loam soil possessing the characteristics of representative soils in the vicinity which produce heavy growth of crops, grasses, or other vegetation and shall be obtained from natural well drained areas. Before removal of the topsoil, the surface at the source of supply is to be stripped to a depth of two inches in order to remove weed seeds, roots, etc. Imported topsoil shall consist of either fine sand or loamy sand textured soil meeting the following specifications:

2.1.7.3. Silt plus clay content of the soil shall not exceed 30% by weight with a minimum 95% passing the 2.0 millimeter sieve. The sodium absorption ratio (SAR) shall not exceed 6 and the electrical conductivity (ECe) of the saturation extract of the soil shall not exceed 3.0 millimhos/centimeter at 25 degrees Centigrade. The boron content of this soil shall be no greater that 1 ppm as measured on the saturation extract. The pH shall not exceed 7.0 and be not less than 6.0. In order to insure conformance, samples of the import soil shall be submitted to a qualified soil laboratory for analysis prior to shipping.

2.1.7.4. This specification applies to import soil to be used for backfill purposes in problem soil areas. In landscape areas where no soil problems exist, the textural characteristics shall be similar to native soil.

2.1.7.5. The source of soil shall be free from Bermuda grass and other noxious weeds or grasses. Topsoil shall be free from refuse, heavy roots, clay lumps, stones larger than one inch in size, noxious weeds, sticks, brush, litter and other deleterious substances. In no case shall there be more than five percent by volume of the following: stones larger than one inch, coarse sand, and small clay lumps.

2.1.7.6. The Contractor shall furnish the Owner with the proposed source or sources of topsoil to be used at least fifteen (15) working days prior to delivery. The Contractor at his own expense, shall obtain soil samples from his intended top soil source and have a soil analysis performed by a soil testing laboratory to ensure conformity with the preceding specifications. Topsoil shall not be delivered to the work site prior to approval by the Owner. Any delay caused by the failure of soil tests to meet these specifications shall be the sole responsibility of the Contractor.

2.1.8. Plant Material:

2.1.8.1. Plant material shall be obtained from one source nursery if possible to avoid alternative varieties and/or species of plants, and plants that may have been grown under non-similar conditions with non-similar materials and/or non-similar care.

2.1.8.2. Plants shall be in conformance with the California State Department of Agriculture's regulation for nursery inspections, rules and rating. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous and free of insect infestations, plant diseases, sunscalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements. Tree trunks shall be sturdy and well "hardened" off. All plants shall have normally well-developed branch systems, not sparse, irregularly spaced, thin branched or having off-balanced head. All shall have vigorous and fibrous root systems that are not root or pot-bound. The root conditions of the plants furnished by the Contractor in containers will be determined by removal of earth from the roots of not less than two plants of each species or variety. Where container-grown plants are from several sources, the roots of not less than two plants of each species or variety from each source will be inspected. In case the sample plants inspected are found to be defective, the Landscape Architect reserves the right to reject the entire lot or lots of plants represented by the defective samples. The Owner is the final judge of acceptability. Any plants rendered unsuitable for planting because of this inspection will be considered as samples and will be provided at the expense of the Contractor.

2.1.8.3. The size of the plants will correspond with that normally expected for species and variety of commercially available nursery stock or as specified in the drawings. The minimum acceptable size of all plants, measured before pruning with the branches in normal position, shall conform to the measurements, specified on the drawings. Plants larger in container size than specified may be used with the approval of the Landscape Architect. But the use of larger plants will make no change in contract price. If the use of larger plants is approved, the ball of earth or spread of roots for each plant will be increased proportionately.

2.1.8.4. Rejection or substitutions:

2.1.8.4.1. All plants not conforming to the requirements herein specified, shall be considered defective and such plants, whether in place or not, shall be marked as rejected and immediately removed from the site of the work and replaced with new plants at the Contractor's expense. The plants shall be of the species, variety, size and condition specified herein or as shown on the drawings. Under no conditions will there be any substitution of plants or sizes listed on the accompanying plans, except with the expressed written consent of the Landscape Architect.

2.1.8.5. Pruning:

2.1.8.5.1. At no time shall trees or plant materials be pruned, trimmed or topped prior to delivery. Any alteration of their shape shall be conducted only with the approval and when in the presence of the Landscape Architect.

2.1.8.6. Plant material shall be true to botanical and common name and variety as specified in, "A Checklist of Woody Ornamental Plants in California," Manual 32, published by the University of California School of Agriculture (1963).

2.1.8.7. Nursery Grown and Collected Stock:

2.1.8.7.1. Grown under climatic conditions similar to those in locality of the project.

2.1.8.7.2. Container-grown stock in vigorous, healthy condition not root-bound or with root system hardened off.

2.1.8.7.3. Use only liner stock plant material that is well-established in removable containers or formed homogeneous soil sections.

2.1.8.8. Substitute plant material will not be permitted without specific written approval by the Landscape Architect.

2.1.9. Tree Staking Material:

2.1.9.1. Stakes for Tree Support:

2.1.9.1.1. Wood Stakes

2.1.9.1.1.1. Stakes shall be straight grained lodgepole pine. Stakes shall be free from knots, checks, splits, bends, or disfigurements. Minimum nominal size for 15 gallon and 24" box trees shall be 2" in diameter x 10' and/or 12' long, pointed at one end. Minimum size for 36" box and larger shall be 3" diameter x 12' and/or 14' long, pointed at one end. Adjust to fit tree size. Treat all stakes with copper naphthanate.

2.1.9.2. Tree supports shall be rubber "Cinch-Tie" tree ties available at V.I.T. products, (800) 729-1314, allowing limited trunk movement.

2.1.10. Mulch Cover:

2.1.10.1. All shrub planting areas shall receive a surface layer of nitrogen fortified shredded tree and plant material mulch. The mulch shall consist of "Forest Floor 0'-4"" mulch as manufactured by Aguinaga Fertilizer Company, Irvine, California, (949) 786-9558. Provide depth of 2" minimum over finish grade in general planting areas, and 1" depth within watering berm around plant base. No bare earth shall be showing through mulch cover. Curbs, walks, or other paving shall be located 1" over the top of the mulch cover. Move mulch away from the tree or shrub root crown to prevent constant moisture at the base of the tree or shrub.

2.1.11. Miscellaneous Materials:

2.1.11.1. Sand:

2.1.11.1.1. Washed plaster sand or equivalent.

2.1.11.2. Herbicides:

2.1.11.2.1. Pre-emergent herbicide: Ronstar or equivalent

2.1.11.2.2. Post-emergent herbicide: Round-up or equivalent

3. PART 3 – EXECUTION

3.1. INSPECTION

3.1.1. Verify that final grades have been established prior to beginning planting operations.

3.1.2. Inspect trees, shrubs, and liner stock plant material for injury, insect infestation and trees and shrubs for improper pruning.

3.1.3. Do not begin planting until irrigation mainline pressure test and irrigation coverage tests are accepted.

3.2. INSTALLATION

3.2.1. Preparation of Planting Beds

3.2.1.1. The area to be planted shall be deep-ripped to a minimum depth of twelve (12) inches. Slopes shall not be deep-ripped. The deep ripping shall be done in a cross pattern, after the site has been rough graded, and prior to spreading soil amendments and conditioners. All rocks which are greater than one inch in diameter, measured at their largest diameter, shall be removed from the top two (2) inches of the ripped area. At the completion of the deep-ripping operations, the areas to receive top soil and/or soil conditioners shall be brought to a smooth, uniform surface free of ruts, furrows and other irregularities. Accidental swales and mounds shall be removed. Do not condition shrub and tree planting areas on slopes.

3.2.1.2. After approximate finished grades have been established, soil shall be conditioned and fertilized. Actual materials and rates shall be determined by the soil laboratory recommendations. The following materials and rates are included for bidding purposes only. Once the soils report has been reviewed and bid costs adjusted accordingly, the Owner shall issue a field notification for the actual amendments, rates, and manner of installation. For bidding purposes only, uniformly spread and cultivate thoroughly by means of mechanical tiller into the top 6" of soil.

3.2.1.2.1. Planting Beds

3.2.1.2.1.1. Nitrogen stabilized organic amendment:

4 cu. yds. per 1,000 sq. ft.

3.2.1.2.1.2. Commercial fertilizer 12-12-12:

15 lbs. per 1,000 sq. ft.

3.2.1.2.1.3. Agricultural gypsum:

200 lbs. per 1,000 sq. ft.

3.2.1.3. All soil areas shall be compacted and settled by application of heavy irrigation to a minimum depth of twelve (12) inches.

3.2.2. Final Grades:

3.2.2.1. After the foregoing specified deep watering, minor modification to grade may be required to establish the final grade. These areas shall not be worked until the moisture content has been reduced to a point where working it will not destroy soil structure.

3.2.2.1.1. Finish grading shall insure proper drainage of the site.

3.2.2.1.2. All areas shall be graded so that the final grades will be 1" below adjacent paved areas, sidewalks, and valve boxes in turf areas, and 2" in groundcover areas.

3.2.2.1.3. Surface drainage shall be away from all building foundations.

3.2.2.1.4. Eliminate all erosion scars.

3.2.2.1.5. At time of planting, the top two (2) inches of all areas to be planted or seeded shall be free of stones, stumps, or other deleterious matter one (1) inch in diameter or larger, and shall be free from all wire, plaster, or similar objects that would be a hindrance to planting or maintenance.

3.2.2.1.6. Finish grading shall be consistent and free from undulations, irregularities or depressions. Areas filled by floating loose soil into depressions shall be thoroughly watered to ensure compaction.

3.2.2.1.7. Rake surface to a smooth finish surface.

3.2.3. Dispose of Excess Soil:

3.2.3.1. Dispose of unacceptable or unused excess soil off-site in a manner consistent with local codes. Soil previously located under AC paving shall be removed to a depth of 30 inches and be replaced with clean soil per agronomist recommendations.

3.2.4. Maintenance of Final Grades:

3.2.4.1. It shall be the responsibility of the Contractor to maintain the final grades throughout the Construction Phase. All erosion shall be properly repaired at the Contractor's own cost to the Owner's satisfaction. Any slope soil run-off onto adjacent paving areas or concrete swales shall be cleaned regularly by the Contractor.

3.3. PLANTING INSTALLATION

3.3.1. General:

3.3.1.1. Actual planting shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice, as approved by the Landscape Architect.

3.3.1.2. Only as many plants as can be planted and watered on that same day shall be distributed in a planting area.

3.3.1.3. Containers shall be opened and plants shall be removed in such a manner that the ball of earth surrounding the roots is not broken. The plants shall be planted and watered as herein specified immediately after removal from the containers. Containers shall not be opened prior to placing the plants in the planting area.

3.3.2. Weed Control:

3.3.2.1. After soil preparation and establishment of final grades prior to any planting, the Contractor shall irrigate thoroughly for a period of time, two to three weeks, until the weed seeds have germinated. When there is sufficient weed seed germination, the Contractor shall apply a post-emergent contact herbicide according to the directions of the manufacturer, conforming to any and all codes affecting herbicide handling and use.

3.3.2.2. The contractor shall then wait an additional two (2) weeks to allow the herbicide to dissipate, then plant as indicated in the plans and specifications.

3.3.2.3. The Contractor shall remove any residual foliage.

3.3.3. Lay-out of Major Plantings:

3.3.3.1. Once finish grade is established, the Contractor shall place all shrubs and trees on the ground in their original containers in the locations and in the quantities as shown on plan. These locations shall be approved by the Landscape Architect. Failure to get approval prior to installation may result in the post-planting changing of locations, plant facing direction, or the addition or deletion of new plant material to achieve the desired visual effect at the Contractor's cost.

3.3.3.2. Do not begin any excavation until plant locations and plant beds are acceptable to the Landscape Architect.

3.3.4. Excavation for Planting:

3.3.4.1. Pits and Trenches:

3.3.4.1.1. Dig vertical sides and flat bottom on all pits and trenches.

3.3.4.1.2. Plant pits shall be square for box material, and circular for container material.

3.3.4.1.3. All plant pits for shrubs shall be dug twice the diameter and the depth of the root ball, allowing for the root crown to be approximately ½ inch to 1 inch above finish grade.

3.3.4.1.4. Refer to plans for the size of tree and shrub plant pits.

3.3.5. Tree and Shrub Backfill

3.3.5.1. The following material and rates are for bidding purposes only. Actual materials and rates shall be determined by the soil laboratory agronomic recommendations.

3.3.5.1.1. 4 parts by volume nitrogen stabilized organic amendment

3.3.5.1.2. 6 parts by volume on–site soil

3.3.5.1.3. 1 lb. 12-12-12 fertilizer per cu. yd.

3.3.5.1.4. 10 lbs. agricultural gypsum per cu.yd.

3.3.5.1.5. 2 lbs. Iron Sulfate per cy.yd.,(keep from all hard surfaces, as iron sulfate will stain).

3.3.6. Planting of Trees and Shrubs:

3.3.6.1. Excavation for planting shall include the stripping and stacking of all acceptable topsoil encountered within the areas to be excavated for trenches, tree holes, plant pits and planting beds.

3.3.6.2. Excess soil generated from the planting holes and not used as backfill or in establishing the final grades shall be removed from the site in a manner consistent with all local codes.

3.3.6.3. Protect all areas from excessive compaction when trucking plants or other materials to the planting site.

3.3.6.4. All excavated holes shall have vertical sides with roughened surfaces.

3.3.6.5. Planting tablets shall be set with each plant on the top of the root ball while the plants are still in their containers so the required number of tablets to be used in each hole can be easily verified.

3.3.6.5.1. One tablet per 1 gallon container

3.3.6.5.2. Two tablets per 5 gallon container

3.3.6.5.3. Fifteen tablets per 24" box container

3.3.6.6. Can Removal:

3.3.6.6.1. Cut cans on two sides with an acceptable can cutter

3.3.6.6.2. Do not injure root ball

3.3.6.6.3. Do not cut cans with a spade or ax

3.3.6.6.4. Carefully remove plants without injury of damage to the root ball

3.3.6.6.5. After removing the plant, superficially cut edge-roots with a knife on three sides

3.3.6.7. Box removal:

3.3.6.7.1. Remove bottoms of plant boxes before planting

3.3.6.7.2. Remove sides of box without damage to root ball after positioning plant and partially backfilling

3.3.6.8. Center plant in pit or trench.

3.3.6.9. Face plants with fullest growth into prevailing wind, unless other wise directed by the Landscape Architect

3.3.6.10. Set plants plumb allowing root crown to extend 1" above surrounding finish grade and hold rigidly in position until soil has been tamped firmly around base of the root ball.

3.3.6.11. All plants which settle deeper than 1" above finish grade shall be raised to the correct level. After the plant has been properly placed, backfill shall be added to the hole to cover approximately one-half of the height of the root ball or per soils laboratory recommendations if available. At this stage, water shall be added to the top of the partly filled hole to thoroughly saturate the root ball and adjacent soil.

3.3.6.12. After the water has completely drained, planting tablets shall be placed as indicated on the product labels.

3.3.6.13. Backfill the remainder of the hole per the soils laboratory recommendations.

3.3.6.14. Hand backfill and hand tamp leaving a slight depression around bases of plants, and leaving the root crown 1" above finish grade. In no way shall the root crown be installed below surrounding finish grade.

3.3.6.15. Once finish grade has been established, an earthen basin shall be constructed around the plant using amended soil if amendments have been specified in the backfill mix. The basins shall be of a sufficient depth to hold 2" depth of water for shrubs and 4" depth of water for trees.

3.3.6.16. Earthen basins shall be constructed around plants as follows. Shrub basins may encroach into tree basins, but all basins must meet the following sizes.

3.3.6.16.1. One-gallon plants - min. 1' diameter

3.3.6.16.2. Five-gallon plants – min. 1'-6" diameter

3.3.6.16.3. Twenty four inch (24") box – min. 4' diameter

3.3.6.17. Pruning:

3.3.6.17.1. Pruning shall be limited to the minimum necessary to remove injured twigs and branches and to compensate for loss of roots during transplanting, but never to exceed one-third of the branching structure.

3.3.6.18. Staking:

3.3.6.18.1. Staking of all trees shall conform to tree staking details.

3.3.6.18.2. One tree of each size shall be staked and approved by the Owner's representative prior to continued staking.

3.4. FERTILIZATION

3.4.1. Contractor shall fertilize all planting areas as denoted in the agronomic soils laboratory report for the Establishment period and for on-going Maintenance.

3.5. CLEAN-UP

3.5.1. After all planting operations have been completed; remove all trash, excess soil, empty plant containers and rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site. The Contractor shall pick up all trash resulting from this work no less frequently than each Friday before leaving the site, once a week, and/or the last working day each week throughout the Construction Phase. All trash shall be removed completely from the site.

3.5.2. The Contractor shall leave the site area broom-clean and shall wash down all paved areas within the contract area, leaving the premises in a clean condition throughout the Construction Phase.

END OF SECTION

SECTION 32 97 00

LANDSCAPE MAINTENANCE

1. PART 1 - GENERAL

1.1. SCOPE OF WORK:

1.1.1. Furnish all labor, materials, transportation, and services necessary to provide landscape maintenance to the project as described herein.

1.1.2. Related Work Specified In Other Sections:

1.1.2.1. Landscape Irrigation

1.1.2.2. Landscape Planting

1.2. GENERAL MAINTENANCE:

1.2.1. The length of the maintenance period shall be ninety (90) days. .

1.2.2. Maintenance of plant materials shall include, but not be limited to trimming, pruning, watering, fertilization, weed control, cultivation, pest control and clean up. The Contractor shall keep the site in a state of perpetual growth and repair.

1.2.3. All hardscape shall be kept clear of debris from the maintenance operations, erosion run-off, irrigation water, or wind blown debris. Clean up of walks shall be the Contractor's responsibility. Street gutters shall be included within the debris/siltation removal program.

1.2.4. The Contractor shall provide a general clean-up operation at least once a week for the purpose of removing trash or debris which may accumulate from the use of the area, wind blown debris, or other refuse.

1.2.5. All personnel on the project shall be well trained, clean, neat at all times, and be conversant with these specifications.

1.2.6. All work shall be performed in accordance with the best landscape maintenance practices and in keeping with the high aesthetic level of the facilities being maintained.

1.2.7. Contractor shall be responsible for removing all weeds in joints of sidewalks, curbs, and hardscape throughout the project.

1.2.8. All landscape areas shall be patrolled weekly to check for vandalism damage, broken tree branches, rodents, insects, pests, and diseases.

1.2.9. Water management:

1.2.9.1. Water only as required to allow penetration into the soil and avoid excess run-off. Once plant material is established, water only as needed to maintain healthy plant material.

1.2.9.2. Avoid water waste by setting controllers appropriately for the current season and weather. Soak and Cycle methods are preferred. Contractor shall be certain that "smart" controllers are properly set and connected to correct weather station signals.

1.2.10. Avoid blocking the clear view of signs, illumination of light fixtures, the airflow out of vents and conflict with pedestrians and vehicles or their views.

1.2.11. Safety of users shall be a prime goal of maintenance especially in regard to pruning of trees and trimming of ground covers away from walkways and/or structures. Maintain a minimum of eight (8) feet clearance below trees in walkway areas..

1.2.12. The Contractor, at his own expense, shall replace all plant material that has failed during the maintenance phase.

1.3. QUALITY ASSURANCE:

1.3.1. Work Force:

1.3.1.1. The Contractor's representative shall be experienced in landscape maintenance and shall have received an education in ornamental horticulture. The Contractor shall give his personal supervision to the work or shall have a competent foreman on the job site at all times during progress of the work.

1.3.1.2. The Contractor shall provide and maintain a current list of emergency telephone numbers for 24-hour emergency response. The Contractor shall initiate remedial action within two (2) hours from the time of notification.

1.4. SUBMITTALS:

1.4.1. Submittals shall be provided within ten working days from the time of award of contract.

1.4.2. The following submittals will be required:

1.4.2.1. Materials List noting product (generic) name on Contractor's letterhead, supplier and contact information. Include fertilizer schedule. Product cut sheets may be included for backup to formal listing of materials on Contractor's letterhead.

1.5. MAINTENANCE PHASE:

1.5.1. The Contractor shall continuously maintain all areas involved in this contract during the progress of the work and during the Maintenance Phase until final acceptance of the work by the Owner.

1.5.2. Improper maintenance or poor condition of any plantings as determined by the Landscape Architect, during or at the end of the scheduled maintenance period may cause postponement of the final completion date of the contract. Project maintenance shall be continued by the Contractor until all work is acceptable to the Owner.

1.5.3. Projects will not be segmented into separate Maintenance Phases unless specific work phases are indicated with the contract documents.

1.5.4. Any period of time the Contractor fails to adequately maintain plantings, replace unsuitable plants, perform weed control or other work, as determined by the Owner, that time will not be credited to the plant maintenance period, and shall be added on the end of the Maintenance Phase.

1.5.5. The Contractor's maintenance period shall be extended to the Owner's satisfaction should the provisions within these plans and specifications not be fulfilled to the Owner's satisfaction. See Section 2.09 for further information regarding Landscape Architect's responsibility with Notice of Substantial Compliance.

1.6. START OF MAINTENANCE PHASE:

1.6.1. The Maintenance Phase shall not start until all elements of construction, planting, and irrigation for the entire project are complete.

1.6.2. The Contractor shall request an observation to begin the Maintenance Phase after all planting and related work has been completed in accordance with the contract documents. If such criteria are met to the satisfaction of the Owner, a field notification shall be issued to the Contractor from the Owner, to establish the effective beginning date of the Maintenance Phase. The Owner has the ultimate authority in setting the beginning date for the Maintenance Phase.

1.7. GUARANTEE AND REPLACEMENT:

1.7.1. All plant material installed under this contract shall be guaranteed against any and all poor, inadequate or inferior materials and/or workmanship for a period of one year for trees and 90 days for shrubs. This guarantee shall begin from the date of final acceptance at the end of the Maintenance Phase as established by the Owner. Any plant material found to be dead, missing or in poor condition as determined by the Landscape Architect, shall be replaced by the Contractor at his expense.

1.7.2. Any materials found to be dead, missing, or in poor condition as determined by the Landscape Architect, shall be replaced. The Landscape Architect shall be the sole judge as to the condition of material. Material to be replaced within the guarantee period shall be replaced by the Contractor within seven (7) days of written notification, not just prior to inspection.

1.7.3. The installing Contractor and the on-going Maintenance Contractor shall walk the site at the end of the Maintenance Phase prior to turn-over of Maintenance to the on-going Maintenance Contractor. The on-going Maintenance Contractor shall document any and all on-going maintenance issues or concerns that he believes he may be liable for after the turn-over of maintenance responsibilities. This shall include any and all plant materials which appear to be dead, missing or in poor condition, and any irrigation equipment installation or materials that may appear suspect to malfunction during the guarantee period. This shall include all plants which were planted towards the end of the Maintenance Phase and which have not had the benefit of 90 day minimum growth. Documentation may include flagging, photographs, written report or combination of such. Only items noted as suspect by the on-going Maintenance Contractor and reviewed and agreed to by the installing Contractor and Owner shall be covered during the guarantee period by the installing Contractor. In case of disagreement, the Owner shall be the sole judge as to the determination of any suspect materials or installations.

1.7.4. Plants installed near the end of the Guarantee period shall be guaranteed by the installing Contractor only until the final acceptance of the Guarantee period by the Owner.

1.8. FINAL PROJECT SUBMITTALS:

1.8.1. Prior to the date of the final inspection at the end of the Maintenance Phase, the Contractor shall acquire from the Landscape Architect mylar prints at the Contractor's expense, and record from the job record set all changes made during construction, label as "Record Drawings", and deliver to the Owner. Prior to the date of final inspection at the end of the Maintenance Phase, the Contractor shall deliver to the Owner the "Landscape and Irrigation Guarantee" as required. All other submittals as incorporated in the Irrigation and Planting Specifications shall also be completed prior to the final acceptance by the Owner.

2. PART 2 – EXECUTION

2.1. MAINTENANCE:

2.1.1. Maintenance shall conform to the following standards:

2.1.1.1. All areas shall be kept free of debris and all planted areas shall be weeded and cultivated at intervals of not more than seven (7) days. Watering, mowing, rolling, edging, trimming, fertilization, spraying and pest control, as may be required, shall be included in the maintenance period.

2.1.1.2. The Contractor shall be responsible for maintaining adequate protection of the entire project area. Damaged areas caused by erosion, tire damage, grafitti, pests or other damage as deemed by the Owner shall be repaired at the Contractor's expense.

2.1.1.3. All sidewalks, paved areas and other areas adjacent to the planting areas shall be cleaned of all debris, soil, or other materials at intervals of not more than seven (7) days.

2.2. TREE AND SHRUB CARE:

2.2.1. Watering:

2.2.1.1. Maintain a large enough water basin around plants in groundcover areas so that enough water can be applied to establish moisture through the major root zone. When hand-watering, use a water wand to break the water force. Use mulches to reduce evaporation and frequency of watering.

2.2.2. Pruning:

2.2.2.1. Trees:

2.2.2.1.1. Prune trees to select and develop permanent scaffold branches that are smaller in diameter than the trunk or branch to which they are attached that have vertical spacing of from 18" to 48" and radial orientation. Other pruning shall be performed to correct the following:

2.2.2.1.1.1. so permanent scaffold branches do not overlay one another

2.2.2.1.1.2. to eliminate diseased or damaged growth

2.2.2.1.1.3. to eliminate narrow V-shaped branch forks that lack strength

2.2.2.1.1.4. to reduce toppling and wind damage by thinning out crowns

2.2.2.1.1.5. to maintain growth within space limitations

2.2.2.1.1.6. to maintain a natural appearance

2.2.2.1.1.7. to balance crown with roots

2.2.2.1.2. No stripping of lower branches, (raising up), of young trees be permitted unless trees are in conflict with walkways, driveways, views or care of building facilities. Lower branches shall be retained in a pinched back condition with as much foliage as possible to promote caliper trunk growth, (tapered trunk). Lower branches can be cut flush with the trunk only after the tree is able to stand erect without staking or other support. No stubbing of major branches will be accepted.

2.2.2.1.3. Evergreen trees shall be thinned out and shaped when necessary to prevent wind and storm damage. The primary pruning of deciduous trees shall be done during the dormant season. Damaged trees or those that constitute health or safety problems shall be pruned at any time of the year as required.

2.2.2.1.4. All tree pruning shall be done with hand equipment operated from the ground. If trees are larger than able to be pruned in such a manner, the condition will be brought to the attention of the Owner.

2.2.2.1.5. Remove no more than 50% of a plant's foliage during pruning operations.

2.2.2.1.6. Lower branches on established street trees shall be pruned 8' up for pedestrian clearance and 12' up for vehicular clearance.

2.2.2.1.7. Topping of trees will not be tolerated unless approved by the Owner.

2.2.2.2. Shrubs:

2.2.2.2.1. The objectives of shrub pruning are the same as for trees. Shrubs shall not be clipped in balled or boxed forms unless such is required by the design.

2.2.2.2.2. Remove any spent blossoms or flower stalks after flowering.

2.2.2.2.3. Hedges and most plant masses shall be pruned into a mass form, not individual plant balls or boxes.

2.2.3. Staking:

2.2.3.1. Remove stakes as soon as they are no longer needed. Stakes and guys are to be inspected to prevent girdling of trunks or branches and to prevent rubbing that causes bark abrasions. Trees found damaged shall be replaced at the Contractor's expense.

2.2.4. Weed Control:

2.2.4.1. Keep basins and areas between plants free of weeds. Use recommended legally approved pre-emergent and post-emergent herbicides and removal by hand methods. Avoid frequent soil cultivation that destroys shall roots. Use mulches to help prevent weed seed germination. Avoid post-emergent herbicides in groundcover areas where overspray may kill young rooted cuttings.

2.2.4.2. Use of chemical spraying may be necessary to rid turf areas of noxious weeds.

2.2.4.3. Weed control is on-going and shall be consistently performed until the end of the Maintenance Phase. Just prior to the end of the Maintenance Phase, the Contractor shall perform a final weed spraying and removal through the entire project. Should the project meet "industry standard" as determined by the Landscape Architect at the end of the Maintenance Phase, the Owner shall be responsible for weed control from that point forward. The weed control program shall be extended if the weed control program does not meet "industry standard" as determined by the Landscape Architect, until substantial compliance is determined by the Landscape Architect.

2.2.5. Mulch

2.2.5.1. Replace mulch in planting areas and basins to meet original requirements of details and specifications. Replacement mulch shall be considered a part of the maintenance and provided and installed at the cost of the contractor's maintenance program.

2.2.6. Insect Control:

2.2.6.1. Maintain a reasonable control with approved materials and methods that are legally accepted in the area.

2.2.7. Disease and Pest Control:

2.2.7.1. The Contractor shall be responsible to control all diseases and pests during the Maintenance Phase. All disease and pest control materials and methods shall be at the direction of a licensed pest control operator. The Owner shall be made aware of all methods and materials to be used for disease and pest control. The Contractor shall implement the control measures exercising extreme caution in using pesticides and taking all necessary steps to ensure the safety of the public.

2.2.8. Fertilization:

2.2.8.1. Fertilize planting areas with the following materials. These materials and schedules are intended for bidding purposes only. Actual materials and rates shall be specified in the project soil fertility and agricultural suitability report. Any changes in cost from these specifications shall be approved in writing from the Owner prior to any work.

2.2.8.1.1. Beginning of Maintenance Phase:

Ammonium sulfate	5 lbs./1,000 sq.ft.

2.2.8.1.2. End of first 30 days:

Ammonium sulfate	5 lbs./1,000 sq.ft.

2.2.8.1.3. At additional 60 day periods:

Granular Fertilizer 16-6-8 6 lbs./1,000 sq.ft.

2.2.8.2. Avoid applying fertilizer to the root ball and base of main stem; rather spread evenly under plant to the drip line. Rates will vary from about a cup of nitrate fertilizer, (depending on nitrogen percentage) around a newly planted small plant, to about one-half (1/2) lb. of actual nitrogen per inch of trunk diameter measured four feet from the ground for mature trees.

2.3. MULCH

2.3.1. Maintain original mulch depth by providing and installing approved project mulch in all specified planting areas on a regular basis and at the end of the Maintenance Period.

2.4. IRRIGATION SYSTEM

2.4.1. The Contractor shall check all systems for proper operation a minimum of once a month.

2.4.2. Conventional systems, bubblers, shall be flushed out after removing the last sprinkler head at each end of the lateral. All conventional heads are to be adjusted as necessary for 100%, head-to-head coverage.

2.4.3. Drip systems shall be flushed out after opening up the flush valve at the end of the lateral lines, pulling out the hose and operating the system. The water shall not be flushed into an area where slipping by pedestrians or vehicles may occur, cause ponding for mosquito growth, or cause any damage to structures, walls, drainage systems, etc.

2.4.4. Set and program automatic controllers for ET input or for seasonal water requirements. The Contractor shall adjust his watering schedule equal to the application rate each area is capable of receiving based on topography, soil type, plant material, solar exposure, and weather. Give Owner a key to controllers/enclosures and instructions on how to turn off the system in case of emergency.

2.4.5. Repair all damage to the irrigation system at the Contractor's expense. Repairs shall be made within one watering cycle. All replaced equipment shall match the equipment specified on the plans and specifications.

2.4.6. Check all drip systems for clogged emitters and clean strainer filter screens on a regular basis and as necessary.

2.4.7. Replace irrigation equipment with same type and size as originally designed. Replacements by other manufacturers are not acceptable unless no longer available. All substitutions shall be approved prior to installation.

2.5. FINAL ACCEPTANCE

2.5.1. The Contractor shall be aware that the landscape shall be in a vigorous and thriving condition prior to final acceptance. All plant material which may still be under stress from the Construction Phase shall at this time be rejected and replaced by healthy and vigorous plant material prior to final acceptance.

2.5.2. All plant material shall have new growth trimmed neatly, turf shall be mowed, and all hardscape shall be cleaned prior to final acceptance.

2.5.3. Should the project meet substantial compliance to the plans and specifications in the Landscape Architect's opinion, the Landscape Architect shall provide a notice of substantial compliance to the Owner.

2.5.4. This notice will be sent after the final site visit at the end of the Maintenance Phase. This notice will indicate that the intent of the plans and specifications has been fulfilled to "industry standard" in the opinion of the Landscape Architect. Industry standard is being defined herein as work that has reached a normal or reasonable point of completion normally expected and consistent with that degree of care and skill ordinarily exercised by contractors under similar circumstances within the local region. This will relieve the landscape architect from any and all further work relative to this project. Should substantial compliance not be met, a punch list of sub-standard items not meeting "industry standard" in the opinion of the Landscape Architect shall be generated and sent to the Owner. These items will need to be addressed and completed prior to the final letter of substantial compliance being sent.

2.5.5. Upon final acceptance of the project by the Owner, a date shall be agreed upon and set in writing verifying the final date of the ninety (90) day shrub and one (1) year tree guarantee periods.

2.5.6. Any on-going conflicts which may exist between the Contractor and the Owner regarding maintenance issues may be resolved per further agreement extensions, new agreements, or other legal means available outside this contract.

END OF SECTION

SECTION 33 11 00

WATER DISTRIBUTION

NOTE TO CONTRACTOR: 48 HOURS NOTICE IS REQUIRED PRIOR TO THE START OF ANY WORK TO BE PERFORMED IN THE PUBLIC RIGHT-OF-WAY. CONTACT THE LONG BEACH WATER DEPARTMENT DIVISION ENGINEER AT 562-570-2353.

WATER SERVICE NOTE: WATER SERVICE MUST BE MAINTAINED TO ALL USERS WITHIN THE CONSTRUCTION AREA AT ALL TIMES. IF THE PRIMARY SOURCE OF WATER IS INTERRUPTED, A TEMPORARY SECONDARY SOURCE SHALL BE SUPPLIED BY THE CONTRACTOR, APPROVED BY THE LOCAL WATER DEPARTMENT. ANY EXPENDITURES INCIDENTAL THERETO SHALL BE BORNE BY THE CONTRACTOR. THE WATER SHALL BE SAFE FOR DRINKING IN ACCORDANCE WITH PUBLIC HEALTH SERVICE DRINKING WATER STANDARDS.

PART 1 - GENERAL

1.01 SUMMARY

A. This section describes general requirements, products, and methods of execution relating to domestic water and fire water systems. Unless otherwise noted, this section does not apply to irrigation water systems and water systems inside of buildings.

B. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing and piping and including the demolition and removal of certain equipment, piping and appurtenances all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

C. Section Includes:

1. Piping and specialties for underground domestic water outside the building.

2. Trenching Requirements: Conform to the requirements of Section 31 00 00 Earthwork.

3. Hydrostatic Pressure, Leakage & Disinfection Testing.

1.02 SUBMITTALS

A. Product Data: Manufacturer's catalog data for materials. Include technical data for piping, gaskets, joints and couplings, backflow devices, ball valves and valve boxes.

B. Certificates: Certificates attesting that tests set forth in referenced publications have been performed and the performance requirements have been satisfied.

1.03 LICENSES, PERMITS & FEES

A. The Contractor installing the water lines shall have a Class "C-34", "C-36" or Engineering "A" Contractors license valid in the State of California.

B. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency, pay for all fees and give all necessary notices required for the construction of the work.

1.04 QUALITY ASSURANCE

A. California Plumbing Code, CPC, 2013 Edition.

1.05 SEQUENCING AND SCHEDULING

A. Coordinate with other utility work.

1.06 PRODUCT HANDLING

A. Store items above ground on platforms, skids or other approved supports.

B. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

C. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

D. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use hand wheels or stems as lifting or rigging pongs.

E. Protect coating and linings on pipes, fittings and accessories from damage. Do not drag pipe to trench. Repair coatings or linings damaged.

1.07 DISPOSAL OF REMOVED MATERIALS INCLUDING ASBESTOS-CEMENT PIPE

A. All removed materials, except those indicated on the plans or described herein to remain the property of the Owner, shall become the property of the Contractor and shall be disposed in accordance with local, state, and federal laws. Should any of those materials be considered as hazardous the Contractor shall provide the Owners Inspector with paper custody trail documentation of the disposal.

B. Asbestos – Cement (A-C) Pipe Removal and Disposal: The plans for the project may indicate that existing asbestos-cement pipe is to be removed from the ground. The Contractor shall excavate, expose the pipeline and remove the A-C pipe to the nearest joint. Should the plans not call out the removal of the A-C pipe and A-C pipe is encountered, the Contractor shall obtain approval from the Inspector as to whether or not the A-C pipe is to be removed or can be left in place. Cutting of the pipe shall only be done if absolutely there is no other way to expose the length of pipe to the nearest joint that be separated and the Inspector approves the cutting of the pipe. Cutting of the pipe shall be done with a mechanical saw with a pressure water source to dampen the pipe and the dust from the cutting. To remove a coupling, the coupling may have to be broken in the trench. The pipe once removed from the trench may be broken for handling. The breaking shall be done within a plastic bagging or sheeting material to minimize the release of asbestos fibers into the atmosphere. Once removed and broken, if necessary, the A-C material shall be bagged and disposed of legally with the Inspector to be given a copy of all Contractor paperwork as to the legal disposal of the material. If the A-C pipe section(s) are removed intact the pipe can be removed by the Contractor from the project site and become the property and responsibility of the Contractor.

1.08 DRAWINGS

A. Because of the small scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings prior to installation of piping fixtures and equipment to verify adequate space available for installation

of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his acceptance. Only when Architect's acceptance is given, in writing, shall Contractor proceed with installation of the work.

C. In case of a difference in the specifications or drawings, or between the specifications and the drawings or in the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.09 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid confliction and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

1.11 INSPECTION

A. All work shall be subject to inspection by the Owner and shall be left uncovered until approved by the Owner.

B. Notice shall be given to the Owner's Inspector at least 48 hours before starting construction.

C. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Owner, Architect or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.

D. Inspection of the work shall not relieve the contractor of any obligations to complete the work as prescribed by the standard specifications. Any known defective work shall be corrected before testing or final inspection will be permitted. Unsuitable materials may be rejected even if these materials have been previously overlooked by the Inspector.

E. The Owner shall have the authority to suspend the work completely or in part for such time as it may deem necessary if the contractor fails to carry out instructions given by the Owner, or to perform any required provisions of the plans and specifications. The contractor shall

immediately comply with a written order of the Owner to suspend the work completely or in part. The work shall be resumed when improper methods or defective work are corrected as ordered and approved in writing by the Owner.

1.12 SUBSTITUTIONS

A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.

B. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

C. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

1.13 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of redline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe:

1. Domestic Water Pipe Schedule 80 PVC: Poly Vinyl Chloride (PVC) Plastic Pipe, Schedule 80, meeting ASTM D 1785 standards.

B. Fittings:

1. Domestic Water Pipe Poly Vinyl Chloride (PVC) Water fittings shall conform to ASTM D 2467 "Socket-Type" PVC Plastic Type Fittings, Schedule 80.

C. Ball Valves:

1. Ball valves 2" or smaller: Ball valves shall be silicon performance bronze alloy, Lead-Free, rated 600 psi, two-piece, threaded ends, full port, manufactured in accordance with MSS SP-110.

   a. Approved ball valve manufacturer / model: Nibco T-585-66-LF.

D. Valve Boxes, Risers and Lids for Buried Valves:

1. Valve boxes and cover shall be as shown on the plans.

2. Valve riser material, where applicable, shall be 10-inch Schedule 80 PVC, or 10-inch SDR 35 PVC pipe

3. Valve boxes shall be marked "WATER" embossed above surface.

E. Backflow Protection Device:

1. Provide backflow preventers as shown on the Construction Documents. Subject to Long Beach Water Department approval.

2. All devices must be approved by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USC Foundation).

3. Reduced Pressure Principle Assemblies (RPPA): Provide a cast-iron body RPPA consisting of two independently operating check valves with a pressure differential relief valve located between the two check valves, two shut-off valves and four test cocks. RPPA shall be tamper-proof and conform to AWWA C511.

4. 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 IOR.

PART 3 - EXECUTION

3.01 CLEARANCES OF WATER LINE

A. Buildings: 3 feet.

B. Parallel to Sewer Line:

1. Water lines 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 larger than 4 inches 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, Human and Welfare Agency, Department of Health Services.

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 greater than 4 inches in diameter, crossing under a 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 greater than 4 inches in diameter, crossing over a sanitary sewer line, shall be installed with all their joints located at least 5 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.

3.02 CONNECTIONS TO EXISTING UTILITIES

A. All tie-in locations shall be excavated a minimum of TWO (2) working days in advance of final connection to expose the affected portions of existing pipelines and to allow time for the necessary measurements, assembling of materials and equipment, and assuring that all pre-assembled piping and fittings will be compatible with the existing main.

B. Changes or delays caused by the Contractor's failure to perform "Potholing" and interference location work shall not be eligible for extra work, compensation, or time extension.

C. The Contractor shall immediately notify the Owner's Inspector in writing, upon learning of the existence or location of any utility facility omitted from or shown incorrectly on the contract drawings, or improperly marked or otherwise indicated. The Contractor shall provide full details as to depth, location, size and function of the utility in writing to the Inspector and note it on the "as-built" plans.

D. The Contractor shall not interrupt or disturb any utility facility in the public right-of-way without authority from the utility company or order from the Inglewood Water Department.

E. The Contractor shall furnish and place the necessary protection around a utility when protection is called for on the contract drawings, visible to the Contractor, or marked as such. The Contractor shall install the utility protection at no additional expense to the Owner.

F. Shutdown of Public Water Mains: All work necessary to shut down an existing public water main for the benefit of a Contractor shall be by the Long Beach Water Department personnel and shall require prior approval by the Long Beach Water Department. Unless at the direct supervision of the Utility Inspector, under no circumstances shall the Contractor operate valves, hydrants, and other appurtenant equipment on the existing public system. It shall be the Contractor's responsibility to coordinate the necessary shutdown schedules through the Utility Inspector assigned to the project. Scheduled shutdowns shall require sufficient time to allow operations personnel to review, approve, and develop an appropriate Operation Program. The Contractor shall be responsible for maintaining all schedules current and coordinating all deviations which may occur from time to time with the Utility Inspector.

3.03 PROTECTION OF METAL SURFACES

A. All exposed surfaces of the valves, flanges, bolts, nuts, tie-rods, turn buckles, etc. in contact with the earth and backfill materials shall be coated with a minimum of 30 mils of bitumastic coating prior to backfilling. In addition to this bitumastic coating, all iron or steel surfaces such as valves, flanges, bolts, nuts, couplings, shall be encased in 8 mil polyethylene wrapping in accordance with AWWA C105 "American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems".

3.04 ELECTROLYSIS PREVENTION

A. Insulating (dielectric) couplings or 6-inch long brass nipples shall be installed at locations specified or as required. Dielectric insulators shall be provided to insulate dissimilar metal to metal contact. 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.

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 dielectric connections shall be in accessible yard boxes.

D. Above ground dielectric connections shall be exposed.

3.05 PIPELINE FLUSHING & HYDROSTATIC TESTING

A. General Requirements

1. Hydrostatic testing and disinfecting (chlorination and flushing) of newly laid or repaired pipelines and appurtenances must be completed before the pipelines can be connected to the existing water distribution system. Pipelines and appurtenances shall remain isolated from the existing water distribution system during hydrostatic testing and disinfecting.

2. All services, air release valves, and other appurtenances connected to the newly laid pipeline shall be pressure tested and disinfected at the same time as that of the pipeline. Care shall be taken to expel all air from the pipeline and services during any filling operation.

B. Temporary Piping and Appurtenances for Flushing, Testing, and Disinfecting

1. The Contractor and/or subcontractor shall supply all temporary piping, corporation and curb stops, test plates, bulkheads, plugs, pipe end caps, valves, fittings, calibrated meters, equipment, labor and method necessary for pressure testing, chlorinating, and flushing of the newly laid pipeline. The Contractor shall also provide any temporary piping, backflow devices, and appurtenances needed to carry potable water to the section of pipeline being flushed, pressure tested, or disinfected.

2. Corporation and curb stop taps used for flushing, pressure testing, and disinfecting shall comply with service tap requirements for ductile iron pipe. Unless specified otherwise, the tap shall be made at the top of pipe.

3.06 HYDROSTATIC (PRESSURE) TESTING FOR DOMESTIC WATER

A. After completion of the hydrostatic testing, the subcontractor shall provide a signed copy of all test results to the Inspector. The Contractor and Inspector shall be present during the testing.

B. 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.

C. Test water service lines in accordance with applicable requirements of AWWA C 600. No leakage is permitted

D. Pressure testing: Before pressure test, fill portion of piping being tested with water for a minimum of 24 hours. Provide hydrostatic pressure of 50 psi greater than the maximum working pressure of tested system. 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.

E. Repetition of Hydrostatic Test: If the leakage in the section of pipeline being tested exceeds the maximum allowable rate specified above, such section will be considered defective. The Contractor shall determine the points of leakage and make the necessary repairs at his expense. The subcontractor will then conduct another hydrostatic test. This procedure shall be continued until the leakage falls below the allowed maximum.

F. After Satisfactory Hydrostatic Test:

1. All valves shall be tested for leak proof tightness after the pipeline hydrostatic test with the test pressure on one side of the valve and atmospheric pressure on the other side.

2. After test sections have successfully met the hydrostatic test requirements to the satisfaction of the Inspector, the entire pipeline or each test section shall be filled or shall remain filled with potable water until the pipeline is disinfected. Test plates, corporation stops, and other test facilities shall remain in place if needed for disinfecting or removed as directed by Inspector.

3. Regardless of the hydrostatic test results, the Contractor shall repair all detectable leaks.

3.07 DISINFECTION PROCEDURES

A. All potable water lines MUST be disinfected per the following requirements.

B. The Contractor shall supply all materials, labor, equipment and methods necessary to disinfect the water main. The Contractor shall hire a State certified laboratory to perform the required bacteriological tests for the newly laid pipelines.

C. Preparation for Disinfecting Pipelines: Contractor shall tightly shut off every service connection served by the pipeline being disinfected at the curb stop before water is applied to the pipeline. Care should be taken to expel all air from the main and services during the filling operation.

D. 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.

E. 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.

3.08 CONNECTING TO EXISTING DISTRIBUTION SYSTEM

A. After all hydrostatic tests and disinfecting has been completed and demonstrated to comply with the Specifications, the Contractor shall connect newly laid pipeline to the existing distribution system.

B. Where connections are to be made to an existing potable water system, swab or spray the interior surfaces of all pipe and fittings used in making the connections with a five (5) percent or greater hypochlorite solution as directed by the Inspector.

C. As soon as the connection is completed, thorough flushing is required until all discolored water is removed.

3.09 REMOVAL OF TEMPORARY PIPING AND APPURTENANCES

A. After the newly laid section of pipeline has been approved by the Inspector for connection to the existing distribution system, the Contractor shall disconnect and remove all temporary piping, fittings, test plates, backflow devices, and other appurtenances used for pressure testing, chlorinating, and flushing.

B. Contractor shall remove and replace all stops used for testing and disinfecting of the pipeline with stainless steel repair clamps.

3.10 CLEANING

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.11 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 33 30 00

SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Supply and installation of sanitary sewer system outside the building as shown on the drawings.

B. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all piping and including the demolition and removal of certain equipment, piping and appurtenances all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.2 RELATED SECTIONS

A. Trenching Requirements: Conform to the requirements of Section 31 00 00 – Earthwork.

1.3 SUBMITTALS

A. Product Data: Manufacturer's Catalog data for materials. Include technical data for pipe, gaskets, joints, couplings and cleanout valve box with lid.

B. Certificates: Submit manufacturer's certified statement that the pipe has been manufactured and tested in accordance with the applicable requirements of the California Plumbing Code, ASTM, & The Standard Specifications for Public Works Construction.

C. Contractor is responsible for providing shoring plans to the Inspector for approval prior to construction. Excavation shall have sheeting, shoring and bracing conforming to CAL / OSHA requirements. Lateral pressures for design of sheeting, shoring and bracing shall be based on type of soil exposed, groundwater conditions, surcharge loads adjacent to the excavation and type of shoring that will be used.

1.4 DISPOSAL OF REMOVED MATERIALS

A. All removed materials, except those indicated on the plans or described herein to remain the property of the Owner, shall become the property of the Contractor and shall be disposed in accordance with local, state, and federal laws. Should any of those materials be considered as hazardous the Contractor shall provide the Owners Inspector with paper custody trail (Hazardous Waste Manifest) documentation of the disposal.

1.5 DRAWINGS

A. Because of the small scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings prior to

installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his acceptance. Only when Architect's acceptance is given, in writing, shall Contractor proceed with installation of the work.

C. In case of a difference in the specifications or drawings, or between the specifications and the drawings or in the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.6 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.7 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid confliction and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

1.8 SUBSTITUTIONS

A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.

B. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

C. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

1.9 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of redline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.10 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. System Description: Grades and elevations are to be established with reference to the benchmarks referenced on the Plans.
2. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("Green Book"), 2015 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".
3. California Plumbing Code, CPC, 2013 Edition, Chapter 7.
4. California Administrative Code, Title 22, Section 64630(e)(2).
5. Underwriters Laboratories.
6. American Society of Testing Materials.

1.11 INSPECTION

A. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Owner, Architect or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.

B. Inspection of the work shall not relieve the contractor of any obligations to complete the work as prescribed by the standard specifications. Any known defective work shall be corrected before testing or final inspection will be permitted. Unsuitable materials may be rejected even if these materials have been previously overlooked by the Inspector.

C. The Owner shall have the authority to suspend the work completely or in part for such time as it may deem necessary if the contractor fails to carry out instructions given by the Owner, or to perform any required provisions of the plans and specifications. The contractor shall immediately comply with a written order of the Owner to suspend the work completely or in part. The work shall be resumed when improper methods or defective work are corrected as ordered and approved in writing by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipeline:

1. PVC Sewer Pipe, ASTM D-3034, SDR-35. The pipe will have a permanently installed reinforced rubber ring gasket in an integral bell joint. PVC Sewer Fittings SDR-35 shall be

manufactured in accordance with ASTM Standards D-3034 and F-1336 or F-679. The PVC material shall have a minimum cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM D-1784. Manufactured by J-M, Certainteed, Vinyl Tech, Diamond Plastics Corp, Pacific Western Plastics or approved equal.

2. Acrylonitrile-Butadiene-Styrene Schedule 40 plastic drainpipe and fittings meeting the requirements of ASTM D 2661 and D 3311. Provide ABS solvent cement for piping and joint connections and install in accordance with IAMPO Standards IS 5, 9, and UPC Section 718.

3. Cast iron soil, hubless, service weight, with stainless steel-banded hubless coupling. FS WW-P-401, conforms to CISPI 310 and IAPMO IS 6. Manufactured by American Foundry, Tyler, or equal.

B. Cleanout Assemblies: Cleanout plug shall be line size.

1. See Construction Documents for details.

C. Concrete, Mortar and Related Materials: Conform to Section 32 13 13: Site Concrete Work.

D. Manhole Brick Mortar, Grout, and Plaster: Conform to Standard Specifications for Public Works Construction, Section 202 - Masonry Materials.

E. Metal Covers, Frames and Accessories:

1. Conform to Section 206 – Miscellaneous Metal Items of the Standard Specifications for Public Works Construction.
2. Metal Covers and Frames: Vandal-resistant design.
3. Hot-dip galvanize all steel parts after fabrication and prior to assembly in accordance with Section 210 – Paint and Protective Coating of the Standard Specifications for Public Works Construction.

F. Yard Boxes:

1. As noted on construction documents.

G. Bedding Materials: Conform to the requirements of Section 31 00 00 – Earthwork.

PART 3 - EXECUTION

3.1 PIPELINE INSTALLATION

A. Install pipeline in a practical alignment and uniform slope to the point of connection as indicated on the plans. No trenches shall be sawcut or excavated, nor shall any pipe be laid prior to excavating the point of connection (POC) location to verify the depth is adequate and line size is correct to install the system per the design plans. If deviations occur, report them to the Owner's Representative through a written RFI before commencing.

B. No pipe shall be laid until the Geotechnical Project Manager inspects and approves the conditions of the bottom of the trench.

C. Pipe laying shall proceed "up grade" with the spigot section of the bell-and-spigot pipe pointing in the direction of the flow.

D. Each section of pipe shall be laid true to line and grade and in such a manner as to form an close concentric joint with the adjoining pipe and to prevent sudden offsets in the flow line.

E. Where invert elevations are indicated, run pipe at a uniform slope between inverts shown.

F. Join pipes and fittings as recommended by the manufacturer.

G. All sewer lines & cleanouts shall be staked by a licensed surveyor if slope of grade is less than 2% and a complete set of cut sheets shall be supplied to the Inspector. All construction staking shall be installed and verified for grade and alignment prior to the start of construction.

H. Pipe shall not be laid when the condition of the trench or the weather is unsuitable.

I. The interior of the sewer pipe shall be kept clean of dirt and debris at all times. When work is not in progress, open ends of pipe and fittings shall be plugged.

J. Where clearing after laying is difficult because of small pipe size, a suitable swab or squeegee shall be kept in the pipe and bulled forward past every joint immediately after joining has been completed.

3.2 CLEARANCES OF SANITARY PIPELINE

A. Buildings or Structures - 5 feet.

B. Parallel to Water Line:

1. Building sanitary drain, (that which starts from the building perimeter to existing site sewer) shall not be laid in a common trench with the water line unless the bottom of the water line shall be at least 12 inch above the top of the sewer pipeline.
2. In addition, the water pipe shall be placed on a solid shelf excavated on one side of the common trench with a minimum clear horizontal distance of 12 inch sewer or drain line.
3. Site sanitary sewer (receiving more than one building sanitary drain or acid pipeline) shall be separated from the water line in accordance with the requirements of the State of California, Human and Welfare Agency, Department of Health Services.

C. Crossing Water Line:

1. Building sanitary drain shall be installed a minimum of 12 inches below the potable water line

2. Site sanitary sewer shall be separated from the water main in accordance with the requirements of the State of California Administrative Code, Title 22, Section 64630(e)(2).

3.3 CLEANOUTS

A. Install required cleanouts before horizontal pipelines are covered.

B. In paved areas, extend cleanouts flush with finish grade.

C. In unpaved areas, install cleanouts in yard boxes 4 inches below the yard box cover. Gravel fill yard boxes around cleanouts.

D. In traffic areas, install countersunk cleanout plugs where raised heads protrude.

3.4 PIPE REMOVAL

A. Contractor shall leave the existing campus sewer lines in place during construction except at service laterals to buildings where they shall be removed and disposed.

B. Sewer lines which are to remain as abandoned, but have had pipe cut and removed, shall be capped.

3.5 PROTECTION

A. Where new building sewers are to be connected into a sewer line which is in active use, the CONTRACTOR shall call for such protection as is necessary to prevent construction debris from being washed into the active sewers. Plugged inlets or other suitable protection shall be called for in the active manhole before beginning manhole modifications or tract sewer cleaning.

3.6 FIELD INSPECTION FOR PLASTIC PIPE & FITTINGS

A. Inspect interior of sewer piping to determine whether line displacement or other damage has occurred. Inspect with the use of closed circuit television (cctv). The video inspection shall be performed after the successful completion of the air or water pressure test and prior to the certificate of occupancy by the Owner for the new building. All mains and sewer laterals shall be video inspected. The Contractor shall give the Inspector a minimum of 48 hours notice prior to this video inspection. A video tape of the inspected pipeline shall be delivered to the Inspector for approval.

1. Defects requiring correction include the following:

   a. Alignment: Less than full diameter of inside of pipe is visible between structures.
   b. Crushed, broken, cracked, or otherwise damaged piping.
   c. Infiltration: Water leakage into piping.
   d. Exfiltration: Water leakage from or around piping.

2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
3. Re-inspect and repeat procedure until results are satisfactory.

B. Television Inspection: The entire length of all new sewer pipe shall be inspected using Closed-Circuit Television (CCTV) equipment. The inspection shall be conducted after the line has been successfully installed, covered with bedding material, cleaned (balled) and prior to paving. The inspection shall be conducted in the presence of the City Inspector. All labor and equipment necessary to conduct the CCTV inspection shall be furnished by the Contractor. CCTV inspection shall be per the following.

1. Record the inspection using a four-head, VHS format, video cassette recorder in standard play mode. Deliver the original videotapes, audio commentary, log sheets, and reports to the City Inspector at the close of the each working day. As desired, the Contractor may produce duplicates for his own use. At the option of the Contractor, or request of the Owner, the video recordings may be converted to MPEG format and copied unto a DVD compatible with Microsoft software.

2. CCTV Equipment: Camera: Remote-controlled, focus from 6" to infinity. Resolution at 450 lines per inch, minimum. During the reinstatement of laterals, only use "rotating lens" or "pan and tilt" cameras. Footage counter: Accurate within ±1%. Include the real time counter measurement as a caption on the recorded tape. Use maintenance hole stations and maintenance hole numbers as references. Television monitor: Color, minimum 460 lines per inch resolution. Lighting: Adequate to fully illuminate the pipeline and positioned to not produce glare. Mobility: Capable of steadily traveling with or against the flow. The maximum speed while inspecting and recording is 9 m per minute (30 feet per minute).

3. Quality of CCTV Inspection Record: The recorded video image must clearly show the full circumference of the pipeline, in focus, with adequate lighting to see detail, with uniform and

steady travel, and depicting the date and time of inspection, footage of travel, street, project title and pipe size. At laterals, service connections and pipe defects, provide a closer, more detailed examination and document the orientation, location and size. The written records must further describe those laterals, service connections and pipe defects and index them to their location on the video record.

4. Introduce water into the upstream end of the pipe for the required length of time such that the water flow leaving the pipe at the downstream end equals the flow entering the upstream end of the pipe. Discontinue water flow and perform the CCTV inspection of the pipe.

5. If debris is encountered, retrieve the CCTV unit, re-clean the pipeline and resume CCTV inspection. Pipe will be considered acceptable when the video camera records no ponding of water (except in joint recesses) within the pipe, no breaks in the pipe and no openings or breaks at the joints, and the pipe is clean and free of dirt and debris. Remove and replace, or readjust to grade, any pipe failing to meet the acceptable video requirements.

6. At the completion of the video inspection, one copy of the tapes shall be turned over to the I.O.R.

3.7 TESTING OF SEWER PIPE

A. After installation of sewer pipe testing shall be performed. The piping of the sewer system shall be tested with water or air except that plastic pipe shall not be tested with air. Contractor to follow guidelines set forth California Plumbing Code section 712.0 Testing.

3.8 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all piping and including the demolition and removal of certain equipment, piping and appurtenances all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

B. Supply and installation of the storm drain system from building wall perimeter, unless otherwise noted, to a point on private property.

1.2 SUBMITTALS

A. Product Data: Manufacturer's catalog data for all required materials. Include technical data for pipe, drain inlets, catch basins, grates, gaskets, joints and couplings.

B. Contractor is responsible for providing shoring plans to the inspector for approval prior to construction. Excavation shall have sheeting, shoring and bracing conforming to CAL/OSHA requirements. Lateral pressures for design of sheeting, shoring and bracing shall be based on type of soil exposed, groundwater conditions, surcharge loads adjacent to the excavation and type of shoring that will be used.

1.3 RELATED SECTIONS

A. Trenching Requirements: Conform to the requirements of Section 31 00 00 – Earthwork.

1.4 LICENSES, PERMITS & FEES

A. The Contractor shall have a Class "C-34", "C-36", "C-42" or Engineering "A" Contractors license valid in the State of California.

B. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency, pay for all fees and give all necessary notices required for the construction of the work.

1.5 QUALITY ASSURANCE

A. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("Green Book"), 2015 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

1.6 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate with other utility work.

1.8 DISPOSAL OF REMOVED MATERIALS

A. All removed materials, except those indicated on the plans or described herein to remain the property of the Owner, shall become the property of the Contractor and shall be disposed in accordance with local, state, and federal laws. Should any of those materials be considered as hazardous the Contractor shall provide the Owners Inspector with paper custody trail documentation of the disposal.

1.9 SUBSTITUTIONS

A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.

B. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

C. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

1.10 RECORD DRAWINGS

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of redline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, pipe invert locations, drain basins, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.11 INSPECTION OF WORK

A. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Owner or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.

B. Inspection of the work shall not relieve the contractor of any obligations to complete the work as prescribed by the standard specifications. Any known defective work shall be corrected before testing or final inspection will be permitted. Unsuitable materials may be rejected even if these materials have been previously overlooked by the Inspector.

C. The Owner shall have the authority to suspend the work completely or in part for such time as it may deem necessary if the contractor fails to carry out instructions given by the Owner, or to perform any required provisions of the plans and specifications. The contractor shall immediately comply with a written order of the Owner to suspend the work completely or in part. The work shall be resumed when improper methods or defective work are corrected as ordered and approved in writing by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Solid Wall Piping Materials

1. Poly Vinyl Chloride (PVC) Sewer Pipe, ASTM D-3034, SDR-35. The pipe will have a permanently installed reinforced rubber ring gasket in an integral bell joint. PVC Sewer Fittings SDR-35 shall be manufactured in accordance with ASTM Standards D-3034 and F-1336 or F-679. The PVC material shall have a minimum cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM D-1784.

2. Cast iron soil, hubless, with stainless steel-banded hubless couplings. No-hub cast iron soil pipe and fittings shall conform to ASTM A 888 and/or standard specifications 301 of the Cast Iron Soil Pipe Institute. No-hub joints shall conform to specification 310 of the Cast Iron Soil Pipe Institute and/or ASTM C 1277. Joints shall be installed according to manufacturer's recommendations. Manufactured by American Foundry, Tyler, or equal.

3. Poly Vinyl Chloride (PVC) Plastic Pipe, Schedule 40, meeting ASTM D 1785 standards. Fittings shall conform to ASTM D 2467 "Socket-Type PVC Plastic Type Fittings, Schedule 40.

B. Pre-Cast Concrete Catch Basins:

1. Christy Concrete Products, Inc.: 44100 Christy Street, Freemont, CA. 94538. Phone: (800) 486-7070, Fax: (800) 486-6804.
2. Brooks Products, Inc.: 1850 Parco Avenue, Ontario, CA. 91761. Phone: (909) 947-7470, Toll Free: (888) 307-7470, Fax: (909) 947-7741.
3. Eisel Enterprises Inc: 714 Fee Ana Street, Placentia, CA. 92870. Phone: (714) 993-1706.

C. Grates & Covers:
1. All grates and covers must be vandal proof / bolt down type.
2. A.D.A. - Where noted on the plans install A.D.A. grates on catch basins. A maximum spacing between grating bars in accessible path of travel is 1/2 inch in the direction of travel, or 1/2 inch in either direction when the path of travel is not limited to one direction.
3. Heel Proof - Where noted on the plans install heel proof grates on catch basins requiring a maximum ¼ inch opening.

D. Steel Reinforcing Bars: ASTM A 615 deformed grade 40 billet steel, plain finish, unless otherwise specified on Construction Document.

E. Concrete, Mortar and Related Materials: Conform to Section 32 13 13 Site Concrete Work.

F. Paint and Protective Coatings

1. All storm drain hardware, including frames and covers, grates, protection bars, steps, etc., shall be protected from corrosion. Storm drain hardware made of cast iron shall be protected by painting with, or dipping in, a commercial grade asphalt paint. Storm drain hardware made of steel shall be galvanized.

2. Hot-dip galvanize steel parts after fabrication and before installation, in accordance with Section 210 - Paint and Protective Coating of the Standard Specifications for Public Works Construction.

PART 3 - EXECUTION

3.1 PIPELINE INSTALLATION

A. Existing utilities: Locate existing underground utilities in all areas of work prior to excavation or commencement of work. If utilities are to remain in place provide adequate means of protection during trenching operations.

B. Install pipeline in a practical alignment and uniform slope to the point of connection as indicated on Construction Document. Prior to trench excavation, verify size, material, depth, and location of the point of connection. Notify Civil Engineer if point of connection elevation is different then that shown on construction drawing as it may affect the design of the system.

C. Excavating, trenching, and backfilling are specified in Section 31 20 00 – Earthwork.

D. No pipe shall be laid until the Geotechnical Project Manager inspects and approves the conditions of the bottom of the trench.

E. All storm drain pipelines, trench drains, catch basins and drain inlets shall be staked by a licensed surveyor if slope of grade is less than 2% and a complete set of cut sheets shall be supplied to the Inspector. All construction staking shall be installed and verified for grade and alignment prior to the start of construction.

F. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.

G. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

H. Make connections to existing piping and underground structures so finished work complies as nearly as practical with requirements specified for new work.

I. The cutting of pipe for inserting tees, fittings or closure pieces shall be done in a neat workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe. No pipe shall be laid in water or when, in the option of the Engineer trench conditions are unsuitable.

J. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting soil into it, the Engineer may require that before lowering the pipe into the trench, a temporary plug be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing or other materials shall be left in the pipe.

K. At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means approved by the Engineer. This provision shall apply during the lunch-hour breaks as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

L. All grates, frames and covers for drain inlets, catch basins & trench drains shall be locked down to prevent theft after final construction by the contractor.

3.2 FIELD INSPECTION FOR PIPE & FITTINGS

A. Television Inspection: The entire length of all new storm drain pipe 6" AND GREATER shall be inspected using Closed-Circuit Television (CCTV) equipment. The inspection shall be conducted after the line has been successfully installed, covered with bedding material, and prior to paving. The inspection shall be conducted in the presence of the Inspector. All labor and equipment necessary to conduct the CCTV inspection shall be furnished by the Contractor. CCTV inspection shall be per the following.

1. Record the inspection using a four-head, VHS format, video cassette recorder in standard play mode. Deliver the original videotapes, audio commentary, log sheets, and reports to the I.O.R. at the close of the each working day. As desired, the Contractor may produce duplicates for his

own use. At the option of the Contractor, or request of the Owner, the video recordings may be converted to MPEG format and copied unto a DVD compatible with Microsoft software.

2. CCTV Equipment: Camera: Remote-controlled, focus from 6" to infinity. Resolution at 450 lines per inch, minimum. During the reinstatement of laterals, only use "rotating lens" or "pan and tilt" cameras. Footage counter: Accurate within ±1%. Include the real time counter measurement as a caption on the recorded tape. Use maintenance hole stations and maintenance hole numbers as references. Television monitor: Color, minimum 460 lines per inch resolution. Lighting: Adequate to fully illuminate the pipeline and positioned to not produce glare. Mobility: Capable of steadily traveling with or against the flow. The maximum speed while inspecting and recording is 9 m per minute (30 feet per minute).
3. Quality of CCTV Inspection Record: The recorded video image must clearly show the full circumference of the pipeline, in focus, with adequate lighting to see detail, with uniform and steady travel, and depicting the date and time of inspection, footage of travel, street, project title and pipe size. At laterals, service connections and pipe defects, provide a closer, more detailed examination and document the orientation, location and size. The written records must further describe those laterals, service connections and pipe defects and index them to their location on the video record.
4. Introduce water into the upstream end of the pipe for the required length of time such that the water flow leaving the pipe at the downstream end equals the flow entering the upstream end of the pipe. Discontinue water flow and perform the CCTV inspection of the pipe.
5. If debris is encountered, retrieve the CCTV unit, re-clean the pipeline and resume CCTV inspection. Pipe will be considered acceptable when the video camera records no ponding of water (except in joint recesses) within the pipe, no breaks in the pipe and no openings or breaks at the joints, and the pipe is clean and free of dirt and debris. Remove and replace, or readjust to grade, any pipe failing to meet the acceptable video requirements.
6. At the completion of the video inspection, one copy of the tapes shall be turned over to the I.O.R.
7. Defects requiring correction include the following:
    1) Alignment: Less than full diameter of inside of pipe is visible between structures.
    2) Crushed, broken, cracked, or otherwise damaged piping.
    3) Exfiltration: Water leakage from or around piping.
    4) Infiltration: Water leakage into piping.

    b. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

    c. Re-inspect and repeat procedure until results are satisfactory.

3.3 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION