

SPECIFICATIONS

For:

Family Health Centers of San Diego

City Heights II

5454 El Cajon Blvd.
San Diego, CA 92115

Owner:

Family Health Centers of San Diego

823 Gateway Center Way
San Diego, CA 92102

Bid Set: 11/12/2010

Architect:

Hutson & Partners

305 N Coast Highway, Suite L

Laguna Beach, CA 92651

(949) 715-4062

2010-06

TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

011000	SUMMARY	
012000	PRICE AND PAYMENT PROCEDURES	8
013000	ADMINISTRATIVE REQUIREMENTS	3
014000	QUALITY REQUIREMENTS	2
014200	REFERENCES	10
015000	TEMPORARY FACILITIES AND CONTROLS	3
016000	PRODUCT REQUIREMENTS	2
017000	EXECUTION AND CLOSEOUT REQUIREMENTS	4

DIVISION 03 - CONCRETE

033000	CAST-IN-PLACE CONCRETE	3
--------	------------------------	---

DIVISION 04 - MASONRY

042000	UNIT MASONRY	4
047000	MANUFACTURED MASONRY VENEER	5

DIVISION 05 - METALS

051200	STRUCTURAL STEEL FRAMING	3
053100	STEEL DECKING	2
054000	COLD-FORMED METAL FRAMING	3
055000	METAL FABRICATIONS	3
057000	DECORATIVE METAL	2

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

061000	ROUGH CARPENTRY	3
062000	FINISH CARPENTRY	2
064023	INTERIOR ARCHITECTURAL WOODWORK	4

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

071400	FLUID APPLIED WATERPROOFING	5
072100	THERMAL INSULATION	2
074113	METAL ROOF PANELS	3
074213	METAL WALL PANELS	6
075700	COATED FOAM ROOF SYSTEM	7

075701	CEMENTITIOUS COATED FOAM ROOF SYSTEM	8
076200	SHEET METAL FLASHING AND TRIM	3
077100	ROOF SPECIALTIES	3
078100	APPLIED FIREPROOFING	2
078413	PENETRATION FIRESTOPPING	2
079200	JOINT SEALANTS	2

DIVISION 08 – OPENINGS

081113	HOLLOW METAL DOORS AND FRAMES	3
081416	FLUSH WOOD DOORS	4
083113	ACCESS DOORS AND FRAMES	2
083483	ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM	4
084113	ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS	3
087100	DOOR HARDWARE	11
087113	AUTOMATIC DOOR OPERATORS	2
088000	GLAZING	3

DIVISION 09 - FINISHES

092216	NON-STRUCTURAL METAL FRAMING	2
092400	PORTLAND CEMENT PLASTERING	3
092900	GYPSUM BOARD	3
093000	TILING	3
093850	DIMENSION STONE TILE	2
095123	ACOUSTICAL TILE CEILINGS	3
096513	RESILIENT BASE AND ACCESSORIES	2
096516	RESILIENT SHEET FLOORING	2
096519	RESILIENT TILE FLOORING	2
096816	SHEET CARPETING	2
097750	FIBERGLASS REINFORCED WALL PANELS	2
099100	PAINTING	5

DIVISION 10 - SPECIALTIES

101400	SIGNAGE	2
102113	TOILET COMPARTMENTS	2
102600	WALL AND DOOR PROTECTION	2
102800	TOILET ACCESSORIES	2
104413	FIRE EXTINGUISHER CABINETS	2
104416	FIRE EXTINGUISHERS	1

DIVISION 12 - FURNISHINGS

122113	VERTICAL LOUVER BLINDS	2
--------	------------------------	---

DIVISION 14 - CONVEYING EQUIPMENT

142400	HYDRAULIC ELEVATORS	4
--------	---------------------	---

DIVISION 22 - PLUMBING

220500	COMMON WORK RESULTS FOR PLUMBING	5
220523	GENERAL-DUTY VALVES FOR PLUMBING PIPING	2
220700	PLUMBING INSULATION	4
221116	DOMESTIC WATER PIPING	3
221119	DOMESTIC WATER PIPING SPECIALTIES	2
221123	DOMESTIC WATER PUMPS	3
221316	SANITARY WASTE AND VENT PIPING	2
221319	SANITARY WASTE PIPING SPECIALTIES	2
221413	FACILITY STORM DRAINAGE PIPING	2
221423	STORM DRAINAGE PIPING SPECIALTIES	2
223400	FUEL-FIRED DOMESTIC WATER HEATERS	2
224000	PLUMBING FIXTURES	5

DIVISION 23 - HEATING VENTILATING AND AIR CONDITIONING

230500	COMMON WORK RESULTS FOR HVAC	5
230523	GENERAL-DUTY VALVES FOR HVAC PIPING	2
230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC	3
230700	HVAC INSULATION	3
230900	INSTRUMENTATION AND CONTROL FOR HVAC	1
231123	FACILITY NATURAL-GAS PIPING	6
232113	HYDRONIC PIPING	4
232123	HYDRONIC PUMPS	2
232300	REFRIGERANT PIPING	3
232500	HVAC WATER TREATMENT	6
233100	HVAC DUCTS AND CASINGS	3
233423	HVAC POWER VENTILATORS	2
233713	DIFFUSERS, REGISTERS, AND GRILLES	2
235100	BREECHINGS, CHIMNEYS, AND STACKS	1
236513.16	CLOSED CIRCUIT FORCED DRAFT COOLING TOWER	10
238146	WATER-SOURCE UNITARY HEAT PUMPS	3

DIVISION 26 - ELECTRICAL

260100	GENERAL PROVISIONS FOR ELECTRICAL WORK	12
260519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES	3
260526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS	4
265600	EXTERIOR LIGHTING	5

DIVISION 27 - COMMUNICATIONS

271500 LOW-VOLTAGE VOICE, DATA 5

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

281600 INTRUSION DETECTION/ACCESS CONTROL/FIRE SYSTEM 15

283100 FIRE DETECTION AND ALARM 2

DIVISION 31 - EARTHWORK

311000 SITE CLEARING 3

312000 EARTH MOVING 4

DIVISION 32 - EXTERIOR IMPROVEMENTS

321216 ASPHALT PAVING 2

321313 CONCRETE PAVING 2

323119 DECORATIVE METAL FENCES AND GATES 2

328400 PLANTING IRRIGATION 10

329300 PLANTS 11

329700 LANDSCAPE MAINTENANCE 5

DIVISION 33 - UTILITIES

334100 STORM UTILITY DRAINAGE PIPING 3

END OF TABLE OF CONTENTS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 PROJECT INFORMATION

- A. Project: City Heights II
- B. Project Location: 5454 El Cajon Blvd., San Diego CA.
- C. Owner: Family Health Centers of San Diego.
- D. Architect: Hutson & Partners.
- E. Contractor: To Be Determined
- F. The Work consists of: The construction of a new three story community clinic with "tuck-under" parking. It shall be comprised of steel frame construction with cement plaster façade over metal studs. In addition to the parking the first floor of this facility includes a lobby/core area, as well as, associated utility spaces such as electrical & telephone rooms. The second floor of this facility is comprised of pediatrics & adult clinics, lab, medical record & associated administrative offices. The third floor is unfinished space which will be improved at a future date.
- G. The entire facility will be protected by an automatic fire suppression system.
- H. This project is to be reviewed as an OSHPD 3, Primary Care Community Clinic. Work by Owner: As described in documents.
- I. Work Under Separate Contracts:
Owner-Furnished Items: The following products will be furnished by Owner and shall be installed by Contractor as part of the Work:

- 1. Residential equipment: refrigerators, microwave, etc.

1.2 WORK RESTRICTIONS

- A. Contractor's Use of Premises: During construction, Contractor's use of premises is limited only by Owner's right to perform work or employ other contractors on portions of Project

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012000 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Obtain [three] proposals for each allowance and submit to Architect, in the form specified for Change Orders, with recommendations. Purchase products and systems selected by Architect.
- D. Advise Architect of the date when selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- E. Submit invoices to show cost and actual quantities of materials delivered.
- F. Allowances must be linked and tracked on procurement log.

1.2 UNIT PRICES

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.
- B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

1.3 ALTERNATES

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.

2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 SUBSTITUTION PROCEDURES

- A. Substitutions include changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor after award of the Contract.
 1. Substitution Request Form: Use CSI Form 13.1A
 2. Submit three copies of each request for product substitution.
 3. Submit requests within 10 days after the Notice of Award.
 4. Do not submit unapproved substitutions on Shop Drawings or other submittals.
 5. Identify product to be replaced and show compliance with requirements for substitutions. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified, a list of changes needed to other parts of the Work required to accommodate proposed substitution, and any proposed changes in the Contract Sum or the Contract Time should the substitution be accepted.
 6. Architect will review the proposed substitution and notify Contractor of its acceptance or rejection by Change Order.

1.5 CONTRACT MODIFICATION PROCEDURES

1.1 SUMMARY

- A. Section Includes: Administrative and procedural requirements governing Contract Modification Procedures.
- B. Related Requirements:
 - 1. Section 01300 Submittals
 - 2. Section 01630 Product Substitution Procedures

1.2 MINOR CHANGES IN WORK

- A. Architect will issue supplemental instructions authorizing minor changes in Work, not involving adjustment to Contract Sum or Contract Time, on AIA form G710, Architect's Supplemental Instructions.

1.3 CHANGE ORDER PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue detailed description of proposed changes in Work that require adjustment to Contract Sum or Contract Time. If necessary, description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal requests initiated by Architect are for information only. Do not consider change order proposal request as instruction to either stop work in progress or to execute proposed change.
 - 2. Within 10 days of receipt of a proposal request, submit estimate of cost necessary to execute change to Architect for Owner's review.
 - a. Include list of quantities of products required and unit costs, with total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental and amounts of trade discounts.
 - c. Include statement indicating effect of proposed change in Work will have on Contract Time.
- B. Contractor-Initiated Proposal Requests: When latent and unforeseen conditions require modifications to Contract, Contractor may propose changes by submitting a request for a change to Architect and Owner.
 - 1. Include statement of reasons for change and effect of change on Work. Provide a complete description of proposed change. Indicate effect on proposed change on Contract Sum and Contract Time.
 - 2. Include a list of quantities of products required and unit costs with total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental and amounts of trade discounts.
4. Comply with requirements in Section 01630 if proposed change requires substitution of unspecified product or system for specified product or system.

C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests; other substitute formats shall be submitted to Owner and Architect for approval.

1.4 ALLOWANCES

A. Allowance Adjustment: For Contract items bid based on allowance, submit Change Order Proposal on difference between actual purchase amount and allowance, based on work-in-place.

1. Include installation cost in purchase amount only where indicated as part of allowance.
2. When requested, prepare explanations and documentation to substantiate amounts claimed for work based on allowances.
3. Submit substantiation of change in Scope of Work claimed in Change Orders related to allowances.
4. Owner reserves right to establish actual quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increase costs because of a change in scope or nature of allowance described in Contract Documents, whether for purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Submit claims within 21 days of receipt of Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days.
2. Do not include Contractor's or subcontractor's indirect expense in Change Order cost amount unless it is clearly shown that nature or extent of work has changed from what could have been foreseen from information in Construction Documents.
3. No change to Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of same scope and nature as originally indicated.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When Owner and Contractor disagree on terms of Proposal Request, Architect may issue a Construction Change Directive per AIA Form G714.

1. Construction Change Directive instructs Contractor to proceed with change in Work, for subsequent inclusion in Change Order.
2. Construction Change Directive contains a complete description of change in Work. It also designates method to be followed to determine change in Contract Sum or Contract Time.

- B. Documentation: Maintain detailed records on a time and material basis of Work required by Construction Change Directive. Coordinate scheduling with Construction Manager to allow monitoring by Owner if desired.
 - 1. After completion of change, submit itemized account and supporting data necessary to substantiate cost and time adjustments to Contract.

1.6 CHANGE ORDER PROCEDURES

- A. Contractor shall be directed to proceed with Work upon Owner's approval of Proposal.
- B. Architect will issue Change Order for signatures of Owner and Contractor on AIA form G701, including approved Change Order proposals for that time period.
- C. Amounts of each Change Order shall be indicated in each Request for Payment including payment status for each individual Change Order.
- D. Family Health Centers of San Diego (FHCSD) Change Order forms shall be used on all Change Orders. Any requests for delays must be presented on the FHCSD Change Order form (included in this document). Change Order request and/or delay requests shall not be accepted nor considered to be binding if not submitted on FHCSD Change Order forms.
- E. Change Orders – Definition

A Change Order is a written instrument prepared by the Architect or Contractor. Change Orders must be submitted on the FHCSD Change Order Form and signed by the Owner, Contractor, and Architect, stating their agreement on the following:

- 1. Change in Work
- 2. Amount of the adjustment, if any, in the Contract Sum; and
- 3. The extent of the adjustment, if any, in the Contract Time.

Change Orders may be issued in the field when it is in the interest of the Owner to grant expeditious approvals of needed changes.

Field Orders must be initiated and authorized by FHCSD's Construction Manager, submitted on the FHCSD Field Order Form (included in this document) and approved by the Contractor and Architect.

A formal Change Order must be prepared by the Contractor and submitted to FHCSD for approval within five working days of the Field Order. Contract Time delay requests cannot be approved by a Field Order.



Family Health Centers of San Diego - Field Order

Field Order # _____ **Date:** _____

Project: _____ **Location:** _____ **Cost: \$** _____

Description of Change:

Justification of Change:

Field Order Approval Criteria

- 1.) **Approval of a field orders is not an approval for a delay request.**
- 2.) **Field Order approvals are authorized by the Construction Manager of FHCSD- NO EXCEPTIONS.**
- 3.) **Field Orders must be signed by all parties below.**
- 4.) **Field Order approvals are granted only in the field and when it is in the best interest of the owner to grant expeditious approvals of needed changes.**

The quoted price and need for the change(s) are in the best interests of the owner to have the work accomplished. A formal change order will be prepared by the contractor and submitted to FHCSD for signature within five (5) working days of the approval of the field order.

FHCSD – Construction Manager

Date

Contractor

Date

Architect

Date

1.6 PAYMENT PROCEDURES

- A. Submit a Schedule of Values at least seven days before the initial Application for Payment. Break down the Contract Sum into at least one line item for each Specification Section in the Project Manual table of contents. Coordinate the schedule of values with Contractor's construction schedule.
 - 1. Arrange schedule of values consistent with format of AIA Document G703.
 - 2. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - 3. Provide separate line items in the schedule of values for initial cost of materials and for total installed value of that part of the Work.
- B. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 forms provided by Owner as form for Applications for Payment.
- C. Submit [three] copies of each application for payment according to the schedule established in Owner/Contractor Agreement.
 - 1. With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 - 2. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 - a. Include insurance certificates, proof that taxes, fees, and similar obligations were paid, and evidence that claims have been settled.
 - b. Include consent of surety to final payment on AIA Document G707.
 - c. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES

3.2 SCHEDULE OF UNIT PRICES

3.3 SCHEDULE OF ALTERNATES

END OF SECTION 012000

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

- A. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.
- B. Requests for Information (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. All Requests for Information (RFIs) shall include a proposed solution, as well as, a list of possible costs and time delays. Use AIA Document G716-2004.
- C. Schedule and conduct progress meetings at Project site at weekly intervals. Notify Owner and Architect of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities.
 - 1. Record minutes and distribute to everyone concerned, including Owner and Architect.

1.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.
 - 2. Submit three copies of each action submittal. Architect will return two copies.
 - 3. Submit two copies of each informational submittal. Architect will not return copies.
 - 4. Architect will discard submittals received from sources other than Contractor.
- B. Place a permanent label or title block on each submittal for identification. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect. Include the following information on the label:
 - 1. Project name.
 - 2. Date.
 - 3. Name and address of Contractor.
 - 4. Name and address of subcontractor or supplier.
 - 5. Number and title of appropriate Specification Section.
- C. Identify deviations from the Contract Documents on submittals.
- D. Contractor's Construction Schedule Submittal Procedure: Submit 3 copies of schedule within 10 days after date established for Commencement of the Work.

- E. Contractor's schedule must be updated and submitted weekly using critical path method.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. Product Data: Mark each copy to show applicable products and options. Include the following:
 - 1. Manufacturer's written recommendations, product specifications, and installation instructions.
 - 2. Wiring diagrams showing factory-installed wiring.
 - 3. Printed performance curves and operational range diagrams.
 - 4. Testing by recognized testing agency.
 - 5. Compliance with specified standards and requirements.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Submit on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches. Include the following:
 - 1. Dimensions and identification of products.
 - 2. Fabrication and installation drawings and roughing-in and setting diagrams.
 - 3. Wiring diagrams showing field-installed wiring.
 - 4. Notation of coordination requirements.
 - 5. Notation of dimensions established by field measurement.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture and for a comparison of these characteristics between submittal and actual component as delivered and installed. Include name of manufacturer and product name on label.
 - 1. If variation is inherent in material or product, submit at least three sets of paired units that show variations.

2.2 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type schedule within 30 days of date established for the Notice of Award.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

PART 3 - EXECUTION

3.1 SUBMITTAL REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Architect will review each action submittal, make marks to indicate corrections or modifications required, will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Updating: At weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting designated for schedule updates.
 - 1. As the Work progresses, indicate Actual Completion percentage for each activity.
 - 2. Use critical path method of scheduling
 - 3. Schedule must show predecessor/successor relationship with total float.
 - 4. Any delay to the approved schedule must be submitted with recovery schedule.
- B. Distribute copies of approved schedule to Owner, Architect, subcontractors, testing and inspecting agencies, and parties identified by Contractor with a need-to-know schedule responsibility. When revisions are made, distribute updated schedules to the same parties.

END OF SECTION 013000

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Testing and inspecting services shall be performed by independent testing agencies.
- B. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Architect for a decision.
- C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum. The actual installation may exceed the minimum within reasonable limits. Indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision.
- D. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 6. Names of individuals making tests and inspections.
 - 7. Description of the Work and test and inspection method.
 - 8. Complete test or inspection data, test and inspection results, an interpretation of test results, and comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 9. Name and signature of laboratory inspector.
 - 10. Recommendations on retesting and re-inspecting.
- E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, notices, receipts for fee payments, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- F. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated; and where required by authorities having jurisdiction, that is acceptable to authorities.

- G. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- H. Associated Services: Cooperate with testing agencies and provide reasonable auxiliary services as requested. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Security and protection for samples and for testing and inspecting equipment.
- I. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- J. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction, as indicated in Statement of Special Inspections attached to this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute

AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	Architectural Precast Association
APA	APA - The Engineered Wood Association
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems (See APA - The Engineered Wood Association)
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International (American Society of Mechanical Engineers International)
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	Association of the Wall and Ceiling Industry
AWCMA	American Window Covering Manufacturers Association

(Now WCMA)

AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association)
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	BICSI, Inc.
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
BWF	Badminton World Federation (Formerly: IBF - International Badminton Federation)
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association
CEA	Consumer Electronics Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CRRC	Cool Roof Rating Council
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association

CRI	Carpet and Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association (Electrostatic Discharge Association)
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA)
FIBA	Federation Internationale de Basketball (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FM Approvals	FM Approvals LLC
FM Global	FM Global (Formerly: FMG - FM Global)
FMRC	Factory Mutual Research (Now FM Global)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association

FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Part of GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation (Now BWF)
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization Available from ANSI

ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA (Now ETL SEMCO)
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association, Inc.
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association

NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NOMMA	National Ornamental & Miscellaneous Metals Association
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Now ITS)
PCI	Precast/Prestressed Concrete Institute

PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
SAE	SAE International
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry

SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc. (Now TCNA)
TCNA	Tile Council of North America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTECH	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California

(Now WI)

WMMPA Wood Moulding & Millwork Producers Association

WSRCA Western States Roofing Contractors Association

WWPA Western Wood Products Association

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Use Charges: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated.
- B. Temporary Water and Electric Power: Contractor shall provide all required temporary construction services Provide connections and extensions of services as required for construction operations.
- C. Erosion- and Sedimentation-Control Plan: Confirm that submitted plan showing compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, is appropriate and all costs associated with Erosion- and Sedimentation-Control are included and will be provided.
- D. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- E. Accessible Temporary Egress: Comply with applicable provisions in ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts and top and bottom rails.

2.2 TEMPORARY FACILITIES

- A. Provide field offices, storage and fabrication sheds, and other support facilities as necessary for construction operations. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
- C. Sanitary Facilities: Use of Owner's existing toilet facilities will not be permitted.
- D. Heating and Cooling: Provide temporary heating and cooling required for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

3.2 SUPPORT FACILITIES INSTALLATION

- A. Install project identification and other signs in locations approved by Owner to inform the public and persons seeking entrance to Project.
- B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- C. Elevator Use: Use of elevators is not permitted...

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

- B. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
- C. Furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
- F. Install and maintain temporary fire-protection facilities. Comply with NFPA 241.

3.4 MOISTURE AND MOLD CONTROL

- A. Before installation of weather barriers, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- B. After installation of weather barriers but before full enclosure and conditioning of building, protect as follows:
 - 1. Do not load or install drywall or porous materials into partially enclosed building.
 - 2. Discard water-damaged and wet material and material that begins to grow mold.
 - 3. Allow installed wet materials adequate time to dry before being enclosed.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- B. Comparable Product Requests:
 - 1. Submit request for consideration of each comparable product. Do not submit unapproved products on Shop Drawings or other submittals.
 - 2. Identify product to be replaced and show compliance with requirements for comparable product requests. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified.
 - 3. Architect will review the proposed product and notify Contractor of its acceptance or rejection.
- C. Basis-of-Design Product Specification Submittal: Show compliance with requirements.
- D. Compatibility of Options: If Contractor is given option of selecting between two or more products, select product compatible with products previously selected.
- E. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 - 4. Store materials in a manner that will not endanger Project structure.
 - 5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
- F. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. Provide products that comply with the Contract Documents, are undamaged, and are new at the time of installation.
 - 1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
 - 2. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
 - 1. Where Specifications name a single manufacturer and product, provide the named product that complies with requirements.
 - 2. Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
 - 3. include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - 4. Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
- C. Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
- D. Unless otherwise indicated, Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 CLOSEOUT SUBMITTALS

- A. Record Drawings: Maintain a set of prints of the Contract Drawings as record Drawings. Mark to show actual installation where installation varies from that shown originally.
1. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 2. Record drawings must be updated prior to monthly billing.
- B. Operation and Maintenance Data: Submit 2 copies of manual. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:
1. Manufacturer's operation and maintenance documentation.
 2. Maintenance and service schedules.
 3. Maintenance service contracts.
 4. Emergency instructions.
 5. Spare parts list.
 6. Wiring diagrams.
 7. Copies of warranties.

1.2 CLOSEOUT PROCEDURES

- A. Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.
 3. Submit specific warranties, maintenance service agreements, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Submit record Drawings and Specifications, operation and maintenance manuals, property surveys, and similar final record information.
 6. Deliver tools, spare parts, extra materials, and similar items.
 7. Make final changeover of permanent locks and deliver keys to Owner.
 8. Complete startup testing of systems.
 9. Remove temporary facilities and controls.
 10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 11. Complete final cleaning requirements, including touchup painting.

12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.
- C. Request inspection for Final Completion, once the following are complete:
 1. Submit a copy of Substantial Completion inspection list stating that each item has been completed or otherwise resolved for acceptance.
 2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- D. Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
- E. Submit a written request for final inspection for acceptance. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection and receipt of closeout documents or will advise Contractor of items that must be completed or corrected before certificate will be issued.

PART 2 - PRODUCTS

2.1 Warehouse stock:

- A. Provide a complete list of stock and quantities of warehouse stock that will be turned over to Owner upon project completion.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.
 1. Verify compatibility with and suitability of substrates.
 2. Examine roughing-in for mechanical and electrical systems.
 3. Examine walls, floors, and roofs for suitable conditions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

- D. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.2 CONSTRUCTION LAYOUT AND FIELD ENGINEERING

- A. Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks.
- B. Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.3 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated. Make vertical work plumb and make horizontal work level.
 - 1. Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections to form hairline joints.
 - 2. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 3. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces on the 2nd and 3rd floors.
 - 4. Maintain minimum vertical clearance of 8'-2" on the 1st floor parking area.
- B. Comply with manufacturer's written instructions and recommendations.
- C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- D. Use products, cleaners, and installation materials that are not considered hazardous.
- E. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.

3.4 CUTTING AND PATCHING

- A. Provide temporary support of work to be cut. Do not cut structural members or operational elements without prior written approval of Architect.
- B. Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- C. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.

2. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

3.5 CLEANING

- A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 3. Remove debris from concealed spaces before enclosing the space.
- B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:
 1. Remove labels that are not permanent.
 2. Clean transparent materials, including mirrors. Remove excess glazing compounds. Replace chipped or broken glass.
 3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
 4. Vacuum carpeted surfaces and wax resilient flooring.
 5. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.
 6. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

3.6 DEMONSTRATION AND TRAINING

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:
 1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION 017000

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data concrete mix designs and submittals required by ACI 301.
- B. Ready-Mixed Concrete Producer Qualifications: ASTM C 94/C 94M.
- C. Comply with ACI 301, "Specification for Structural Concrete"; ACI 117, "Specifications for Tolerances for Concrete Construction and Materials"; and CRSI's "Manual of Standard Practice."

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain Steel Wire: ASTM A 82, as drawn.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, as drawn, flat sheet.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- E. Portland Cement: ASTM C 150, Type I or II. Reference Plans
- F. Fly Ash: ASTM C 618, Type C or F.
- G. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- H. Silica Fume: ASTM C 1240, amorphous silica.
- I. Aggregates: ASTM C 33, uniformly graded.
 - 1. Maximum Aggregate Size for Concrete in Insulating Concrete Forms: 3/4 inch 1/2 inch 3/8 inch 1/4 inch. ICF not used reference plans for max aggregate size
- J. Synthetic Fiber: ASTM C 1116/C 1116M, Type III, polypropylene fibers, 1/2 to 1-1/2 inches long. Not used
- K. Air-Entraining Admixture: ASTM C 260.
- L. Chemical Admixtures: ASTM C 494, water reducing high-range water reducing water reducing and accelerating and water reducing and retarding. Do not use calcium chloride or admixtures containing calcium chloride.

- M. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures.
- N. Vapor Retarder: Reinforced sheet, ASTM E 1745, Class A.
- O. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.
- P. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- Q. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- R. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- S. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.2 MIXES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days. Reference Plans for specific minimum compressive strength
 - 2. Maximum Water-Cementitious Materials Ratio: 0.57 .
 - 3. Slump Limit: 4 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 - 4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of floor slabs to receive troweled finishes to exceed 3 percent.
 - 5. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - 6. For concrete exposed to deicing chemicals, limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; silica fume to 10 percent of portland cement by weight.
- C. Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116.
 - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 CONCRETING

- A. Construct formwork according to ACI 301 and maintain tolerances and surface irregularities within ACI 347R limits of Class A, 1/8 inch for concrete exposed to view and Class C, 1/2 inch for other concrete surfaces.
- B. Place vapor retarder on prepared subgrade, with joints lapped 6 inches and sealed.
- C. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- D. Install construction, isolation, and contraction joints where indicated. Install full-depth joint-filler strips at isolation joints. Joint locations must be submitted and approved by architect prior to installation.
- E. Place concrete in a continuous operation and consolidate using mechanical vibrating equipment.
- F. Protect concrete from physical damage, premature drying, and reduced strength due to hot or cold weather during mixing, placing, and curing.
- G. Laser Screed Formed Surface Finish: Smooth-formed laser screed finish for concrete exposed to view, coated, or covered by waterproofing or other direct-applied material; rough-formed finish elsewhere. Provide all areas with machine laser screed tolerances.
- H. Slab Finishes: Comply with ACI 302.1R for laser screeding, screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces. Provide the following finishes:
 - 1. Scratch finish for surfaces to receive mortar setting beds.
 - 2. Float finish for interior steps and ramps and surfaces to receive waterproofing, roofing, or other direct-applied material.
 - 3. Laser screed Troweled finish for floor surfaces and floors to receive floor coverings, paint, or other thin film-finish coatings.
 - 4. Trowel and fine-broom finish for surfaces to receive thin-set tile.
 - 5. Non-slip-broom finish to exterior concrete platforms, steps, and ramps.
- I. Cure formed surfaces by moist curing for at least seven days.
- J. Begin curing concrete slabs after finishing. Keep concrete continuously moist for at least seven days. Apply membrane-forming curing compound to concrete. Apply membrane-forming curing and sealing compound to concrete.
- K. Owner will engage a testing agency to perform field tests and to submit test reports.
- L. Protect concrete from damage. Repair surface defects in formed concrete and slabs.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. See Division 05 Section "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.
- B. Submittals:
 - 1. Samples for. Concrete Masonry units and pre-cast concrete caps (planter wall cap).
 - 2. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements.
- C. Comply with ACI 530.1/ASCE 6/TMS 602.
- D. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections required by authorities having jurisdiction.
 - 1. Inspections: Level 2 special inspections according to the IBC.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
- E. Sample Panels: Construct a sample wall panel approximately 48 inches long by 48 inches high to demonstrate aesthetic effects and set quality standards for materials and execution.

PART 2 - PRODUCTS

2.1 MASONRY UNITS

- A. Concrete Masonry Units: ASTM C 90; Density Classification, Medium Weight.
 - 1. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.
 - 2. Square-edged units for outside corners unless otherwise indicated.
- B. Decorative Concrete Masonry Units: ASTM C 90; Density Classification, Medium Weight.
 - 1. Finish: Exposed faces with ground finish.
 - 2. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.
- C. Concrete Lintels: Precast units matching concrete masonry units and with reinforcing bars indicated or required to support loads indicated.

2.2 MORTAR AND GROUT

- A. Mortar: ASTM C 270, proportion specification.
 - 1. Use portland cement-lime or masonry cement mortar.
 - 2. Do not use calcium chloride in mortar.
 - 3. For masonry below grade or in contact with earth, use Type S.
 - 4. For reinforced masonry, use Type S.
 - 5. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions, and for other applications where another type is not indicated, use Type N.
 - 6. Colored Mortar: For decorative concrete masonry units, use colored cement or cement-lime mix of color selected.
 - 7. Water-Repellent Additive: For mortar used with concrete masonry units made with integral water repellent, use product recommended by manufacturer of units.
- B. Grout: ASTM C 476 with a slump of 8 to 11 inches.
- C. Refractory Mortar: Ground fireclay mortar or other refractory mortar that passes ASTM C 199 test and is acceptable to authorities having jurisdiction.

2.3 REINFORCEMENT, TIES, AND ANCHORS

- A. Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

2.4 EMBEDDED FLASHING MATERIALS

- A. Rubberized Asphalt Sheet Flashing: Pliable, adhesive rubberized-asphalt compound, bonded to a polyethylene film to produce an overall thickness of 0.030 inch. Use only where flashing is fully concealed.
- B. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy, 0.025 inch thick, with a 0.015-inch-thick coating of adhesive. Use only where flashing is fully concealed.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded strips complying with ASTM D 1056, Grade 2A1.
- B. Preformed Control-Joint Gaskets: Designed to fit standard sash block and to maintain lateral stability in masonry wall; made from styrene-butadiene rubber or PVC.
- C. Weep Holes: Round polyethylene tubing, 3/8-inch OD Free-draining polyethylene mesh, full height and width of head joint.
- D. Cavity Drainage Material: Free-draining polymer mesh, full depth of cavity with dovetail shaped notches that prevent mortar clogging.
- E. Loose-Granular Perlite Insulation: ASTM C 549, Type II or IV.

- F. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV or X.
- G. Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 2; aluminum-foil faced.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cut masonry units with saw. Install with cut surfaces and, where possible, cut edges concealed.
- B. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.
- C. Stopping and Resuming Work: Rack back units; do not tooth.
- D. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- E. Build non-load-bearing interior partitions full height and install compressible filler in joint between top of partition and underside of structure above.
- F. Tool exposed joints slightly concave when thumbprint hard unless otherwise indicated.
- G. Keep cavities clean of mortar droppings and other materials during construction.

3.2 LINTELS

- A. Install lintels where indicated.
- B. Minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.3 FLASHING AND WEEP HOLES

- A. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing before covering with mortar.
 - 1. Extend flashing 4 inches into masonry at each end and turn up 2 inches to form a pan.
- C. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

3.4 PARGING

- A. Parge masonry walls, where indicated, in two uniform coats with a steel-trowel finish. Form a wash at top of parging and a cove at bottom. Damp cure parging for at least 24 hours.

3.5 CLEANING

- A. Clean masonry as work progresses. Remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly cured, clean exposed masonry.
 - 1. Wet wall surfaces with water before applying acidic cleaner, then remove cleaner promptly by rinsing thoroughly with clear water.
 - 2. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 042000

SECTION 047000 MANUFACTURED MASONRY VENEER

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Portland cement based manufactured stone veneer and trim.
- B. Related Sections:
 - 1. 07 60 00–Flashing and Sheet Metal.
 - 2. 07 92 00–Joint Sealants.
 - 3. 09 24 00–Portland Cement Plastering.
- C. Alternates:
 - 1. Reference Section 01 23 00–Alternates.

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI A118.4 Specifications for Latex-Portland Cement Mortar.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 2. ASTM C 67 – Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
 - 3. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar.
 - 4. ASTM C 177 – Standard Test Method for Steady-State Head Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 5. ASTM C 207 – Standard Specification for Hydrated Lime for Masonry Purposes.
 - 6. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
 - 7. ASTM C 482 – Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement.
 - 8. ASTM C 567 – Standard Test Method for Determining Density of Structural Lightweight Concrete.
 - 9. ASTM C 847 – Standard Specification for Metal Lath.
 - 10. ASTM C 932 – Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
 - 11. ASTM C 979 – Standard Specification for Pigments for Integrally Colored Concrete.
 - 12. ASTM C 1032 – Standard Specification for Woven Wire Plaster Base.
 - 13. ASTM C 1059 – Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.
 - 14. ASTM D 226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- C. City of Los Angeles: Research Report (LARR)
- D. International Code Council (ICC):
 - 1. ES Report.

2. NES Report.
3. UBC Standard No. 14-1, Kraft Waterproof Building Paper.
4. UBC Standard 15-5–Roof Tile.

E. Underwriter's Laboratory (UL): Building Materials Directory.

F. US Department of Housing and Urban Development (HUD): Material Release Numbers.

1.03 SUBMITTALS

A. Reference Section 01 33 00–Submittal Procedures; submit following items:

1. Product Data.
2. Samples:
 - a. Standard sample board consisting of small-scale pieces of veneer units showing full range of textures and colors.
 - b. Full range of mortar colors.
3. Verification Samples: Following initial sample selection submit “laid-up” sample board using the selected stone and mortar materials and showing the full range of colors expected in the finished Work; minimum sample size: 3 by 3 feet (1 by 1 m).
4. Quality Assurance/Control Submittals:
 - a. Qualifications:
 - 1) Proof of manufacturer qualifications.
 - 2) Proof of installer qualifications.
 - b. Regulatory Requirements: Evaluation reports.
 - c. Veneer manufacturer’s installation instructions.
 - d. Installation instructions for other materials.

B. Closeout Submittals: Reference Section 01 78 00–Closeout Submittals; submit following items:

1. Maintenance Instructions.
2. Special Warranties.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Licensee of Truestone.
2. Installer Qualifications: Experienced mason familiar with installation procedures for manufactured veneer.

B. Certifications:

1. ICC Evaluation Service – ESR-1215.
2. LARR – Research Report RR25589
3. HUD – Material Release Number 910
4. UL – Classification listing in Building Materials Directory: UL 546T (F8002).

C. Field Sample:

1. Prepare 4 by 4 foot sample at a location on the structure as selected by the Architect. Use approved selection sample materials and colors.
2. Obtain Architect’s approval.

3. Protect and retain sample as a basis for approval of completed manufactured stone work. Approved sample may be incorporated into completed work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Reference Section 01 66 00–Product Storage and Handling Requirements.
- B. Follow manufacturer’s instructions.

1.06 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: When air temperature is 40 degrees F (4.5 degrees C) or below, consult local building code for Cold-Weather Construction requirements.

1.07 WARRANTY

- A. Special Warranty: Manufacturer’s standard warranty coverage against defects in materials when installed in accordance with manufacturer’s installation instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURER/SUPPLIER

- | | |
|--|---|
| A. RCP Block & Brick
8240 Broadway
Lemon Grove, CA 91945 | Tel: (619) 460-7250
Fax: (619) 460-3926
E-Mail: email@rcpblock.com
Website: www.rcpblock.com |
|--|---|

- B. Product: Stone Veneer
- C. Substitutions: None Allowed.

2.02 MATERIALS

- A. Truestone Stone Veneer:
 1. Profile: Stacked Stone. Include matching corner pieces.
 - a. Color: “Natural Honey Wheat”.
 - b. Style: Natural Ledge
- B. Veneer Unit properties: Precast veneer units consisting of portland cement, lightweight aggregates, and mineral oxide pigments.
 1. Compressive Strength: ASTM C 192 and ASTM C 39, 5 sample average: greater than 1,800 psi (12.4MPa).
 2. Shear Bond: ASTM C 482: 50 psi (345kPa).
 3. Water Absorption: UBC Standard 15-5: Less than 22 percent.
 4. Freeze-Thaw Test: ASTM C 67: Less than 3 percent weight loss and no disintegration.
 5. Thermal Resistance: ASTM C 177: 0.473 at 1.387 inches thick
- C. Moisture Barrier: ASTM D 226, Type 1, No. 15, non-perforated asphalt-saturated felt paper.

D. Reinforcing: ASTM C 847, 2.5lb/yd² (1.4kg/m²) galvanized expanded metal lath complying with code agency requirements for the type of substrate over which stone veneer is installed.

E. Mortar:

1. Cement: Any cement complying with ASTM C 270.
2. Lime: ASTM C 207.
3. Sand: ASTM C 144, natural or manufactured sand.
4. Color Pigment: ASTM C 979, mineral oxide pigments.
5. Water: Potable.
6. Pre-Packaged Latex-Portland Cement Mortar: ANSI A118.4.

F. Bonding Agent: Exterior integral bonding agent meeting ASTM C 932

G. Sealer: Graffiti Resistant Sealer,

1. Dunn Edwards ULTRASHIELD Aliphatic Polyurethane Enamel
2. Clear no. IP 631

2.03 MORTAR MIXES

A. Jointless/Dry-Stacked Installation:

1. Mix mortar in accordance with mfg. required. "Suggested Mix mortar preparation instructions.
 - a. Add color pigment in accordance with pigment manufacturer's instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates upon which work will be installed.
- B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- C. Commencement of work by installer is acceptance of substrate.

3.02 PREPARATION

- A. Protection: Protect adjacent work from contact with mortar.
- B. Surface Preparation: Prepare substrate in accordance with manufacturer's installation instructions for the type of substrate being covered.

3.03 INSTALLATION

- A. Install and clean stone in accordance with manufacturer's installation instructions for Standard Installation (Grouted Joint) or Jointless/Dry-Stacked installation as specified above.
- B. Apply sealer in accordance with sealer manufacturer's installation instructions.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Manufacturer's Field Service Representative shall make two periodic site visits for installation consultation and inspection as requested by Owner.

3.05 CLEANING

- A. Reference Section 01 74 00—Cleaning and Waste Management.
- B. Remove protective coverings from adjacent work.
- C. Cleaning Veneer Units:
 - 1. Wash with soft bristle brush and water/granulated detergent solution.
 - 2. Rinse immediately with clean water.
- D. Removing Efflorescence:
 - 1. Allow veneer to dry thoroughly.
 - 2. Scrub with soft bristle brush and clean water.
 - 3. Rinse immediately with clean water; allow to dry
 - 4. If efflorescence is still visible, repeat above procedure using a solution of 1 part household vinegar and 5 parts water.
 - 5. Rinse immediately with clean water.

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data Shop Drawings Welding Procedure Specifications (WPSs) and mill test reports.
- B. Comply with applicable provisions of the following:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 5. STEEL AND BOLTS MUST BE MADE IN THE USA AND STAMPED "MADE IN USA"

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

- A. W-Shapes: ASTM A 992/A 992M
- B. Channels, Angles, M , S-Shapes: ASTM A 36/A 36M
- C. Plate and Bar: ASTM A 36/A 36M ASTM A 572/A 572M, Grade 50.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B structural tubing.
- E. Steel Pipe: ASTM A 53, Grade B.

2.2 ACCESSORIES

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
- B. Anchor Rods: ASTM F 1554, Grade 105.
 - 1. Configuration: Straight
 - 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel. ASTM A 572/A 572M, Grade 50.
 - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
- C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

- D. Grout: ASTM C 1107, nonmetallic, shrinkage resistant, factory packaged.

2.3 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
- C. Shop Priming: Prepare surfaces according to SSPC-SP 2, "Hand Tool Cleaning"; or SSPC-SP 3, "Power Tool Cleaning." Shop prime steel to a dry film thickness of at least 1.5 mils. Do not prime surfaces to be embedded in concrete or mortar or to be field welded.

PART 3 - EXECUTION

3.1 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of base plate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.
- C. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- D. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- E. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened Slip critical.

- F. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

END OF SECTION 051200

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data Shop Drawings and product certificates.
- B. Comply with SDI Publication No. 30.
- C. Comply with AWS D1.3, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum; shop primed.
- B. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, zinc coating.

2.2 DECKING

- A. Roof Deck: Fabricate panels from prime-painted galvanized- steel sheet, without top-flange stiffening grooves, to comply with the following:
 - 1. Deck Profile: BDeck
 - 2. Profile Depth: As indicated on structural plans.
 - 3. Design Uncoated-Steel Thickness; As indicated on structural plans..
- B. Composite Steel Floor Deck: Fabricate panels from prime-painted galvanized- steel sheet with integrally embossed or raised pattern ribs and interlocking side laps, to comply with the following:
 - 1. Deck Profile: Type W2
 - 2. Profile Depth: As indicated on structural plans.
 - 3. Design Uncoated-Steel Thickness: As indicated on structural plans.

2.3 MISCELLANEOUS

- A. Accessories: Manufacturer's recommended roof deck accessory materials and floor deck pour stops and closures. Sheet metal accessories of same material and finish as deck.

PART 3 - EXECUTION

3.1 DECK INSTALLATION

- A. Place, adjust, align, and bear deck panels on structure. Do not stretch or contract side-lap interlocks.
- B. Place deck panels flat and square and weld mechanically fasten weld or mechanically fasten to structure without warp or deflection.
- C. Cut, reinforce, and fit deck panels and accessories around openings and projections.
- D. Roof Deck Accessories: Install sump pans, sump plates, ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels. Weld to substrate.
- E. Floor Pour Stops and Girder Fillers: Weld pour stops and girder fillers to structure.
- F. Floor Deck Closures: Weld steel sheet closures to deck to provide tight-fitting closures at open ends of ribs and sides of decking. Weld cover plates at changes in direction of floor deck panels.
- G. Prepare and repair damaged galvanized coatings on both surfaces with galvanized repair paint according to ASTM A 780.
- H. Wire brush, clean, and paint scarred areas, welds, and rust spots on both surfaces of painted deck panels.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data Shop Drawings and material certificates.
- B. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.
- C. Comply with HUD's "Prescriptive Method for Residential Cold-Formed Metal Framing."
- D. Comply with AWS D1.3, "Structural Welding Code - Sheet Steel."
- E. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 zinc coated; Structural Steel (SS); Grade 33 50, Class 1 or 2.
- B. Steel Studs: C-shaped, with flange width of not less than 1-5/8 inches, minimum uncoated steel thickness of 0.0329 inch 0.0428 inch 0.538 inch 0.0677 inch 0.0966 inch, and of depths indicated. As referenced on plans
- C. Steel Joists: C-shaped, with flange width of not less than 1-5/8 inches, minimum uncoated steel design thickness of 0.538 inch 0.0677 inch 0.0966 inch, and of depths indicated.
- D. Steel Track: U-shaped, minimum uncoated metal thickness same as studs or joists used with track, with flange widths of 1-1/4 inches for studs and 1-5/8 inches for joists, of web depths indicated. As referenced on plans
- E. Slip Track: U-shaped, minimum uncoated metal thickness same as studs or joists used with track, with flange widths as required for stud thickness.

2.2 ACCESSORIES

- A. Accessories: Fabricate from the same material and finish used for framing members, of manufacturer's standard thickness and configuration, unless otherwise indicated.

- B. Cast-in-Place Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws.
- D. Insulation: ASTM C 665, Type I, unfaced mineral-fiber blankets.
- E. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

PART 3 - EXECUTION

3.1 FRAMING

- A. Install framing and accessories level, plumb, square, and true to line, and securely fastened, according to ASTM C 1007. Temporarily brace framing until entire integrated supporting structure has been completed and permanent connections are secured.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten framing members by welding or screw fastening.
 - 3. Install insulation in built-up exterior framing members.
 - 4. Fasten reinforcement plates over web penetrations larger than standard punched openings.
- B. Erection Tolerances: Install cold-formed metal framing with a maximum variation of 1/8 inch in 10 feet and with individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- C. Studs: Install continuous top and bottom tracks securely anchored at corners and ends. Squarely seat studs against webs of top and bottom tracks. Space studs as indicated, set plumb, align, and fasten both flanges of studs to top and bottom tracks.
 - 1. Install and fasten horizontal bridging in stud system, spaced in rows not more than 48 inches apart.
 - 2. Install steel-sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom track and anchor to structure.
 - 3. Install miscellaneous framing and connections to provide a complete and stable wall-framing system.
 - 4. Isolate non-load-bearing, curtain-wall framing from building structure using vertical slide clips or deflection track to prevent transfer of vertical loads while providing lateral support.
- D. Joists: Install and securely anchor perimeter joist track sized to match joists. Install joists bearing on supporting framing, brace and reinforce, and fasten to both flanges of joist track.
 - 1. Install bridging and fasten bridging at each joist intersection.
 - 2. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners.

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings showing details of fabrication and installation.

PART 2 - PRODUCTS

2.1 METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 240/A 240M or ASTM A 666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Rolled Steel Floor Plate: ASTM A 786/A 786M.
- E. Steel Tubing: ASTM A 500.
- F. Steel Pipe: ASTM A 53, standard weight (Schedule 40), black finish.
- G. Cast Iron: ASTM A 48/A 48M or ASTM A 47/A 47M.
- H. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- I. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- J. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.2 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107; recommended by manufacturer for exterior applications.

2.3 FABRICATION

- A. General: Shear and punch metals cleanly and accurately. Remove burrs and ease exposed edges. Form bent-metal corners to smallest radius possible without impairing work.
- B. Welding: Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. At exposed

connections, finish welds and surfaces smooth with contour of welded surface matching those adjacent.

- C. On units indicated to be cast into concrete or built into masonry, provide welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c.
- D. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
- E. Fabricate steel pipe columns with 1/2-inch steel base plates and 1/4-inch steel top plates welded to pipe with continuous fillet weld same size as pipe wall thickness. Drill top plates for connection bolts and base plates for 5/8-inch anchor bolts. Reference structural plans
- F. Fabricate structural-steel door frames from structural shapes and bars fully welded together, with 5/8-by-1-1/2-inch steel channel stops. Plug-weld built-up members and continuously weld exposed joints.
- G. Fabricate ladders for locations shown, complying with ANSI A14.3, [welded steel] aluminum construction.
 - 1. For elevator pit ladders, comply with ASME A17.1.
- H. Fabricate pipe bollards from Schedule 40 steel pipe.
- I. Fabricate pipe guards from 3/8-inch- thick by 12-inch- wide steel plate, bent to fit flat against the wall or column at ends and to fit around pipe with 2-inch clearance between pipe and pipe guard. Drill each end for two 3/4-inch anchor bolts.
- J. Fabricate nosings from cast iron aluminum with an integral abrasive finish.
 - 1. Apply bituminous paint to concealed surfaces of units set into concrete.
- K. Fabricate nosings and treads from extruded aluminum with abrasive filler consisting of aluminum-oxide or silicon-carbide grits, or a combination of both, in an epoxy-resin binder.
 - 1. Ribbed Solid-abrasive-type units.
 - 2. Apply clear lacquer to concealed surfaces of units set into concrete.

2.4 STEEL AND IRON FINISHES

- A. Hot-dip galvanize steel fabrications at exterior locations.
- B. Prepare uncoated ferrous metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning," and paint with a fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack.
- B. Fit exposed connections accurately together to form hairline joints.
- C. Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- D. Install pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other barriers. Install by bolting to wall or column with drilled-in expansion anchors.
- E. Anchor bollards in concrete and fill solidly with concrete, mounding top surface.

END OF SECTION 055000

SECTION 057000 - DECORATIVE METAL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings showing details of fabrication and installation.

PART 2 - PRODUCTS

2.1 STEEL AND IRON

- A. Tubing: ASTM A 500 (cold formed).
- B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- C. Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M.
- E. Steel Sheet, Cold Rolled: ASTM A 1008/A 1008M, either commercial steel or structural steel, exposed.

2.2 FABRICATION

- A. General: Shear and punch metals cleanly and accurately. Remove burrs and ease exposed edges. Form bent-metal corners to smallest radius possible without impairing work.
- B. Comply with AWS for recommended practices in shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.
 - 1. Where welding cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

2.3 SKATEBOARD DETERRENTS

- A. Provide aluminum skateboard deterrents on exposed horizontal planter areas as shown on the landscape drawings. Attach at 4'-0" on center on all pre-cast concrete cap areas.
 - 1. Products: "Skatestopper" Model No. FR-0.5" radius aluminum skateboard deterrent for 1/2" radius concrete bench caps.
 - 2. Finish: Clear anodized Aluminum

3. Install with 2 Blind SMART PINS PLUS anchor pins set with two part epoxy.

2.4 COLUMN COVERS

- A. Welded-Seam Type: Form column covers from steel, rolled to 24" diameter as indicated on plans. Taper edges of adjoining pieces of column covers, for finish grinding and painting.
 1. Form returns at vertical joints to provide hairline V-joints.
 2. Form returns at vertical joints to provide 1/2-inch- wide reveal at joints. Provide snap-in metal filler strips at reveals that leave reveals flush.
 3. Fill column covers with 3/8" concrete aggregate mix.
 4. Paint column cover "Traffic Yellow"

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.
- B. Perform cutting, drilling, and fitting required for installing decorative metal. Set decorative metal accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack.
- C. Fit exposed connections accurately together to form hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers.
- D. Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

END OF SECTION 057000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for wood-preservative treated wood fire-retardant treated wood and metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.

2.2 TREATED MATERIALS

- A. Preservative-Treated Materials: AWWA C2, except that lumber not in ground contact and not exposed to the weather may be treated according to AWWA C31 with inorganic boron (SBX).
 - 1. Use treatment containing no arsenic or chromium.
 - 2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - 3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- B. Provide preservative-treated materials for all rough carpentry unless otherwise indicated.
 - 1. Wood members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Concealed members in contact with masonry or concrete.
 - 3. Wood framing members that are less than 18 inches above the ground.
 - 4. Wood floor plates that are installed over concrete slabs-on-grade.
- C. Fire-Retardant-Treated Materials: Comply with performance requirements in AWWA C20.
 - 1. Use Exterior type for exterior locations and where indicated.
 - 2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
 - 3. Use Interior Type A unless otherwise indicated.
 - 4. Identify with appropriate classification marking of a testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Provide fire-retardant treated materials for items indicated on Drawings.

2.3 LUMBER

A. Dimension Lumber:

1. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness 19 percent for 2-inch nominal thickness or less, no limit for more than 2-inch nominal thickness.
2. Non-Load-Bearing Interior Partitions: Construction or No. 2: Western woods: WCLIB or WWPA.
3. Framing Other Than Non-Load-Bearing Interior Partitions: Construction or No. 2: Douglas fir-larch: WCLIB, or WWPA; Douglas fir south: WWPA; Hem-fir: WCLIB, or WWPA; Douglas fir-larch (north): NLGA;.
4. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 - a. Species: As specified for framing other than non-load-bearing interior partitions.
 - b. Grade: Select Structural.

B. Timbers 5-Inch Nominal Size and Thicker: No. 1: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south: NLGA, WCLIB, or WWPA;;.

1. Maximum Moisture Content: 20 percent.

C. Exposed Boards: Hem-fir, Select Merchantable or No. 1 Common: NLGA, WCLIB, or WWPA; with 19 percent maximum moisture content.

D. Concealed Boards: Western woods, Standard: WCLIB; or No. 3 Common: WWPA; with 19 percent maximum moisture content.

E. Miscellaneous Lumber: Construction, or No. 2 grade with 19 percent maximum moisture content of any species. Provide for nailers, blocking, and similar members.

2.4 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: Plywood, Exposure 1, C-D Plugged, fire-retardant treated, not less than 1/2-inch nominal thickness.

2.5 MISCELLANEOUS PRODUCTS

A. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

1. Power-Driven Fasteners: CABO NER-272.
2. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

B. Metal Framing Anchors: Structural capacity, type, and size indicated.

1. Use anchors made from hot-dip galvanized steel complying with ASTM A 653/A 653M, G60 coating designation for interior locations where stainless steel is not indicated.
 2. Use anchors made from stainless steel complying with ASTM A 666, Type 304 for exterior locations and where indicated.
- C. Sill Sealer: Glass-fiber insulation, 1 inch thick, compressible to 1/32 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Securely attach rough carpentry to substrates, complying with the following:
 1. CABO NER-272 for power-driven fasteners.
 2. Published requirements of metal framing anchor manufacturer.
 3. Table 2304.9.1, "Fastening Schedule," in the IBC.

END OF SECTION 061000

SECTION 062000 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Samples for hardwood veneer plywood paneling and hardboard paneling.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.
- B. Softwood Plywood: DOC PS 1.
- C. Hardwood Plywood: HPVA HP-1.
- D. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.
- E. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea-formaldehyde resin.
- F. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

2.2 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: hot-dip galvanized steel.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer.
 - 1. Use waterproof resorcinol glue for exterior applications.
- C. Adhesive for Cellular PVC Trim: Product recommended by trim manufacturer.
- D. Installation Adhesive for Foam Plastic Moldings: Product recommended for indicated use by foam plastic molding manufacturer.
- E. Insect Screening for Soffit Vents: Stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Condition finishes carpentry in installation areas for 24 hours before installing.
- B. Prime and back prime lumber for painted finish exposed on the exterior.
- C. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Scribe and cut to fit adjoining work. Refinish and seal cuts.
- D. Install standing and running trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Stagger joints in adjacent and related trim. Cope at returns and miter at corners. No length shorter than 2'-0".
- E. Nail siding at each stud. Do not allow nails to penetrate more than one thickness of siding, unless otherwise recommended by siding manufacturer. Seal joints at inside and outside corners and at trim locations.
- F. Select and arrange paneling for best match of adjacent units. Install with uniform tight joints.
- G. Exterior Stairs: Secure treads and risers by gluing and nailing to carriages. Countersink nail heads, fill flush, and sand filler. Extend treads over carriages and finish with bullnose edge.
- H. Interior Stairs: Secure treads and risers by gluing and nailing to rough carriages.
 - 1. Closed Stringers: House treads and risers into wall stringers, glue, and wedge into place.
 - 2. Open Stringers: Miter risers and stringer at open stringers. Extend tread over open stringers and finish with bullnose edge.

END OF SECTION 062000

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for solid-surfacing materials Shop Drawings and Samples showing the full range of colors, textures, and patterns available for each type of finish.
- B. Quality Standard: Woodwork Institute's "Manual of Millwork."
- C. Provide WI Certification. REQUIRED.
- D. Forest Certification: Provide woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- E. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is completed, and HVAC system is operating.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hardboard: AHA A135.4.
- B. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
- C. Particleboard: ANSI A208.1, Grade M-2.
- D. Softwood Plywood: DOC PS 1.
- E. Hardwood Plywood and Face Veneers: HPVA HP-1, made with adhesive containing no urea formaldehyde.
- F. Thermoset Decorative Panels: Comply with LMA SAT - 1.
- G. High-Pressure Decorative Laminate: NEMA LD 3.
 - 1. Products:
 - a. Wilsonart International Inc.
 - 1) Cabinets: #4674-60 "Evening Tigris"
 - 2) Countertops: #3673-60 "Saffron Tigris"

2.2 CABINET HARDWARE AND ACCESSORY MATERIALS

- A. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing. Julius Blum Inc. 91.650
- B. Wire Pulls: Back mounted, solid metal, 4 inches long center to center, 5/16 inch in diameter. Dull Chrome EPCO MC 402
- C. Catches: Magnetic catches, BHMA A156.9, B03141. Hafele America Co. or Julius Blum Inc.
- D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081. Flush mounted in cabinet. Knappe & Vogt No 255 with No. 256 support.
- E. Drawer Slides: BHMA A156.9, B05091. Full extension, rail mounted type with ball bearing rollers. Knappe & Vogt or Accuride
- F. Drawer Locks/Cabinet Locks: BHMA A156.11, E07041 Pin and tumbler slide bolt lock , two keys each. Schlage Lock Co. 46-002 Cabinet Locks. Each clinic area to receive the same keyways.
 - 1. Box Drawer Slides: Grade 1HD-100.
 - 2. File Drawer Slides: Grade 1HD-200.
 - 3. Pencil Drawer Slides: Grade 1.
 - 4. Keyboard Slides: Grade 1HD-100.
 - 5. Trash Bin Slides: Grade 1HD-200.
- G. Grommets for Cable Passage through Countertops: 2-3/4-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage. Color :Black
- H. Exposed Hardware Finishes: Comply with BHMA A156.18 for BHMA code number indicated.
- I. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to 15 percent moisture content.

2.3 INTERIOR WOODWORK

- A. Complete fabrication to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- B. Plastic-Laminate Cabinets: Custom grade. Provide WIC Certification REQUIRED
 - 1. AWI Type of Cabinet Construction: Flush overlay.
 - 2. WIC Construction Style: Style A, Frameless.
 - 3. WIC Door and Drawer Front Style: Flush overlay.
 - 4. Laminate Cladding: Horizontal surfaces other than tops, HGS; postformed surfaces, HGP; vertical surfaces, HGS; Edges, HGS; semiexposed surfaces,.
 - 5. Drawer Sides and Backs: Solid hardwood.

6. Drawer Bottoms: Hardwood plywood.

C. Plastic-Laminate Countertops: Premium grade.

1. Laminate Grade: HGS for flat countertops, HGP for post-formed countertops.
2. Grain Direction: Parallel to cabinet fronts.
3. Edge Treatment: Same as laminate cladding on horizontal surfaces.

2.4 SHOP FINISHING OF INTERIOR ARCHITECTURAL WOODWORK

A. Finishes: Same grades as items to be finished.

B. Finish architectural woodwork at the fabrication shop; defer only final touch up until after installation.

1. Apply one coat of sealer or primer to concealed surfaces of woodwork.
2. Apply a vinyl wash coat to woodwork made from closed-grain wood before staining and finishing.
3. After staining, if any, apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.

C. Transparent Finish: AWI finish system synthetic penetrating oil.

D. Transparent Finish: WI finish System 4, conversion varnish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Install woodwork to comply with referenced quality standard for grade specified.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Fasten with countersunk concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed nailing, countersunk and filled flush with woodwork.

F. Undercut cabinets as required to complete flush and level finish installation.

G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use

pieces less than 36 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.

- H. Anchor paneling to supports with concealed panel-hanger clips and by blind nailing on back-up strips, splined-connection strips, and similar associated trim and framing.
- I. Stairs: Securely anchor carriages to supporting substrates. Install stairs with treads and risers no more than 1/8 inch from indicated position.
- J. Railings:
 - 1. Stair Rails: Glue and dowel or pin balusters to treads and railings, and railings to newel posts.
 - 2. Wall Rails: Support rails on indicated metal brackets securely fastened to wall framing.
- K. Cabinets: Install so doors and drawers are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
 - 1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- L. Anchor countertops securely to base units. Seal space between backsplash and wall.

END OF SECTION 064023

SECTION 071400 FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Fluid-Applied Waterproofing.

B. Related Sections:

1. Section 033000 – Cast in Place Concrete
2. Section 312310 – Building Excavation and Fill
3. Section 334616 – Subdrainage
4. Section 334619 – Underslab Drainage
5. Section 042200 – Masonry
6. Section 072113 – Board Insulation
7. Section 076000 – Flashing & Sheet Metal

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C-719 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
2. ASTM C-836 Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
3. ASTM D-2939 Standard Test Methods for Emulsified Bitumens Used as Protective Coatings.
4. ASTM E-96 Standard Test Method for Water Vapor Transmission of Materials.
5. ASTM D-466 Standard Test Method for Films Deposited from Bituminous Emulsions
6. ASTM D-412 Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers-Tension
7. ASTM D-3274 Standard Test Method for Emulsified Bitumens Used as Protective Coatings
8. ASTM D-2196 Standard Test Method for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield type) Viscometer

1.03 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data and installation instructions.
- C. Quality Assurance/Control Submittals: Submit the following:
 1. Certificates: Submit certificate that applicator complies with requirements of this section

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Utilize an applicator trained and approved by the

waterproofing Mfg.

- B. Regulatory Requirements and Approvals: Comply with requirements of the following:
 - 1. ICC Evaluation Service, Inc. (ICC-ES)
 - a. Legacy Report NER-658

1.05 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.06 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Comply with application temperature range of 0 - 130°F (- 18 - 55°C).

1.07 WARRANTY

- A. Manufacturer's Material Only 15 year minimum warranty.

PART 2 PRODUCTS

2.01 FLUID-APPLIED WATERPROOFING

- A. Manufacturer: Marflex Building Solutions
 - 1. Contact: 6866 Chrisman Lane, Middletown, OH 45042;
Telephone: (800) 498- 1411
 - 2. E-mail: technicalsupport@mar-flex.com;
Website: www.MarflexBuildingSolutions.com
- B. Proprietary Products/Systems should be purchased through an Authorized Dealer of Marflex
- C. Fluid-Applied Waterproofing and related products, including the following:

- 1. Marflex 5000™ WB Waterproofing Membrane:

- a. Material: Emulsion
 - b. Color: Black
 - c. Total Solids: 60-70%
 - d. Application Method: Spray
 - e. Coverage Rate: 5-gal/100 ft²
 - f. Film Thickness, Dry: 60 mil (1.5 mm) min.
 - g. Total Cure Time: 24 hours
 - h. Weight/Gallon: 7.6 lb (3.4 kg)

- i. Elongation at 70°F (21°C) (ASTM D-412 Die C): 1725%
- j. Tensile Strength (ASTM C-719): 48 psi (331 kPa)
- k. Low Temperature Flexibility at -15°F(ASTM C 719): No cracking
- l. Crack Bridging (ASTM C-836): 10 cycles without bond failure
- m. Viscosity/Centipoise: (ASTM D-2196): 3600 centipoise
- n. Resistance to Water Flow (ASTM D-466): Bond strength not affected
- o. Water Solubility (ASTM D-2939): No blistering or re-emulsion
- p. Resistance to Hydrostatic Pressure (Federal Spec TT-C-555B, Par.4.4.7.):

- i. Water Leaks: None
- ii. Weight Gain: None
- iii. Permeability: 0.23 perms (13 ng/(Pa × s × m²).

q. Water Vapor (ASTM E-96):

- i. Transmission: 0.11 grains/sf/h.
- ii. Permeability: 0.23 perms (13 ng/(Pa × s × m²).

2. Geo Mat Plus Drainage Roll:

- a. Material: High density Polyethylene (HDPE) drainage rolls with attached polypropylene geotextile mat.
- b. Foundation Drainage Rate: 30.1 gal/min/sf.

2.02 PRODUCT SUBSTITUTIONS

- A. Substitutions: No substitutions permitted.

2.03 ACCESSORY MATERIALS

- A. Provide proprietary accessory materials, including the following:
- 1. Marflex's 362 Mastic: Patch cracks, voids and holes in the concrete or masonry walls
 - a. Material: Plastic or resin material compatible with the waterproofing membrane.
 - 2. Marflex's 12/ 523 DrainAway
 - 3. Marflex's 12" Connectors

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Comply with the most current written installation instructions and recommendations of the waterproofing manufacturer.

3.02 EXAMINATION

- A. Site Verification of Condition:
- 1. Verify that site conditions are acceptable for application of the waterproofing

system.

2. Do not proceed with application until unacceptable conditions are corrected.

3.03 PREPARATION

A. Surface Preparation:

1. Ensure that the surfaces to receive waterproofing are structurally sound and free of moisture, dust, mud, loose mortar, fins, metal projections or any substances that would be detrimental to the bonding of the membrane to the surface.
2. Remove wall ties.
3. Patch cracks, voids and holes with nonshrink grout or mastic.

3.04 APPLICATION

- A. For vertical application apply a uniform coat of waterproofing to entire wall area. Obtain a seamless membrane free of entrapped gasses, with a minimum dry film thickness of 80 mil (2 mm) at 10 feet (3.1 m) below-grade wall application, 100 mil (2.5 mm) at 20 feet (6.1 m) below-grade wall application and 120 mil (3 mm) at 30 feet (9.2 m) or more for below-grade wall application.
 1. Apply fluid membrane onto footing area a minimum of 4 inches (102 mm) to prevent water pooling.
 2. Allow membrane to cure for 24 hours before placing any backfill against the wall.
 3. Follow the current installation instructions.
- B. For horizontal application apply a uniform coat of waterproofing to entire wall area. Obtain a seamless membrane free of entrapped gasses, with a minimum dry film thickness of 100 mil (2.5 mm) for Above/At grade application.
 1. Allow the fluid membrane to cure out approximately 3-4 hours.
 2. Fluid membrane will still be tacky.
 3. Install Type III DrainCore following current installation instructions.

3.05 INSULATING/DRAINAGE PANEL INSTALLATION

- A. When using the Geo-Mat Plus, install after membrane has been applied. Place and secure to substrate according to manufacturer's current written instructions.
 1. While the membrane is still tacky, begin installation at a corner. Install horizontally against the waterproofing membrane with the polypropylene geotextile mat side facing out-ward.
 2. Install panels from top of footing extending to finish grade level. If there is overlapping off the membrane once you have reached the grade line, a utility knife or similar tool can be used to cut the rolls to the correct height.
 3. For good adherence, apply uniform pressure throughout the surface area, not just the edges and corners.
 4. When two edges come together from two separate pieces, overlap the dimples to create a continuous coverage of the wall.
 5. Secure the Geo-Mat Plus to the wall with Geo-Mat accessories.
 6. If the board overlaps the membrane once you have reached the grade line, a utility knife or similar tool can be used to cut the boards to the correct height.
- B. Protect installed insulation/drainage panels during subsequent construction until backfilled.
- C. Backfill and Drainage
 1. #57 Gravel or equivalent must go no less than 2' high at the base of the foundation

and 1' in depth away from the foundation walls.

2. Adequate interior and exterior foundation drainage at the base of the foundation walls, across any floors or adjacent flower beds must be properly installed and functioning properly.
3. Backfilling should begin no sooner than 24 hours after the installation of the board, but must be backfilled within 15 days.

D. 12" 523 DrainAway Vertical Collection System Installation

1. Unroll material along foundation base; adhere to partially cured waterproofing material; use adhesive acceptable to waterproofing material manufacturer for cured waterproofing or other sheet waterproofing not requiring curing.
2. Install preformed corner fittings at foundation interior and exterior corners.
3. Install outlet fittings where indicated; connect to corrugated drainage pipe if present at time of modular system installation; leave ready for connection to corrugated drainage pipe if not present.

3.06 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071400

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 INSULATION PRODUCTS

- A. Surface-Burning Characteristics: ASTM E 84, and as follows:
 - 1. Flame-Spread Index: 25 or less where exposed; otherwise, as indicated in Part 2 "Insulation Products" Article.
 - 2. Smoked-Developed Index: 450 or less.
- B. Mineral-Fiber-Blanket Insulation: ASTM C 665, Type III, Class A, foil faced on 1 side with fibers manufactured from glass, with flame-spread index of 25 or less.
 - 1. R-Value; Minimum R-13 at walls, R-19 at horizontal surfaces, unless otherwise noted.

2.2 ACCESSORIES

- A. As required by installation by mfg. recommendations for complete installation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install insulation in areas and in thicknesses indicated or required to produce R-values indicated. Cut and fit tightly around obstructions and fill voids with insulation.
- B. Except for loose-fill insulation and insulation that is friction fitted in stud cavities, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- C. Place loose-fill insulation to comply with ASTM C 1015.
- D. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage. Locate seams at framing members, overlap, and seal with tape.

END OF SECTION 072100

SECTION 074113 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Factory-formed metal roof and soffit panels, fascia, and trim.
- B. Submittals: Product Data, Shop Drawings, and color Samples.
- C. Warranties: Provide manufacturer's standard written warranty, without monetary limitation, signed by manufacturer agreeing to promptly repair or replace metal roof panels that fail to remain weather tight within five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL ROOF PANELS

- A. Available Products:
 - 1. MBCI Metal roof and wall systems
- B. Wind-Uplift Resistance of Roof Assemblies: UL 580, Class 30.
- C. Roof Panel Type: standing-seam metal roof panels.
- D. Metallic-Coated Steel Roof Panels: Fabricated from galvanized structural-steel sheet, ASTM A 653/A 653M, G90, or aluminum-zinc alloy-coated structural-steel sheet, ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40.
 - 1. Nominal Metal Thickness: 0.022 inch.
 - 2. Finish: Manufacturer's standard two-coat fluoropolymer system with color coat containing not less than 70 percent PVDF resin by weight.

2.2 ACCESSORIES

- A. Provide components required for a complete roof panel assembly including trim, fascia clips, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Formed from 0.025-inch nominal thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal roof panels.

- C. Self-Adhering Sheet Underlayment, High Temperature: Butyl or SBS-modified asphalt; slip-resisting-polyethylene surfaced; with release paper backing; cold applied. Stable after testing at 240 deg F and passes after testing at minus 20 deg F; ASTM D 1970.
- D. Felt Underlayment: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.
- E. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.
- F. Thermal Spacer Blocks: Fabricated from extruded polystyrene, 1 inch thick.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Apply self-adhering sheet underlayment at eaves and rakes from edges of roof to at least 24 inches inside exterior wall line.
- B. Apply self-adhering sheet underlayment at valleys extending 18 inches on each side.
- C. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment.
- D. Apply slip sheet over underlayment before installing metal roof panels.
- E. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."
- F. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.
 - 1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.
 - 2. Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 - 3. Provide metal closures at rake edges and each side of ridge and hip caps.
 - 4. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
 - 5. Install ridge and hip caps as metal roof panel work proceeds.
- G. Install gaskets, joint fillers, and sealants where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants recommended by metal roof panel manufacturer.
- H. Separate dissimilar metals with a bituminous coating or self-adhering sheet underlayment.

- I. Coat back side of aluminum panels with bituminous coating where they will contact wood, ferrous metal, or cementitious construction.

END OF SECTION 074113

SECTION 074213 METAL WALL PANELS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Composite Metal panels.
 - 1. Applications of composite metal panels include:
 - a. Exterior installation of composite metal panels.
 - b. Interior installation of composite metal panels.
- B. Related Sections: Section(s) related to this section include:
 - 1. Cold-Formed Metal Framing: Division 05 Cold-Formed Metal Framing Sections.
 - 2. Sheet Metal Flashing and Trim: Division 07 Flashing and Sheet Metal Sections.
 - 3. Joint Sealers: Division 07 Joint Sealers Sections.
 - 4. Aluminum Windows: Division 08 Windows Sections.
 - 5. Glazing: Division 08 Glass and Glazing Section.
 - 6. Metal Framed Curtain Wall: Division 08 Glazed Curtain Wall Sections.

1.02 REFERENCES

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. ASTM International:
 - 1. ASTM C297 Standard Test Method for Tensile Strength on Flat Sandwich Constructions in Flatwise Plane.
 - 2. ASTM D1781 Standard Test Method for Climbing Drum Peel for Adhesives.
 - 3. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. ASTM E108 (Modified) Standard Test Methods for Fire Tests of Roof Coverings.
 - 5. ASTM E283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen.
 - 6. ASTM E330 Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors By Uniform Static Air Pressure Difference.
 - 7. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors By Uniform Static Air Pressure Difference.
- C. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- D. Underwriters Laboratories Inc. (UL):
 - 1. UL 94 Standard for Flammability of Plastic Materials for Parts in Devices and Appliances.
- E. International Organization for Standardization (ISO):
 - 1. ISO 9001-2000 Quality Management Systems - Requirements.

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide composite metal panels which have been manufactured, fabricated and installed to withstand loads from deflection and thermal movement and to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.04 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 01 Submittal Procedures Section.
- B. Product Data: Submit product data, including manufacturer's product sheet, for specified products.
- C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors and textures.
 - 1. Include details showing thickness and dimensions of the various system parts, fastening and anchoring methods, locations of joints and gaskets and location and configuration of joints necessary to accommodate thermal movement.
- D. Samples: Submit selection and verification samples for finishes, colors and textures.
 - 1. Selected Samples: Manufacturer's color charts or chips illustrating full range of colors, finishes and patterns available for composite metal panels with factory-applied finishes.
 - 2. Verification Samples:
 - a. Structural: 12 inch \times 12 inch (305 \times 305 mm) sample composite panels in thickness specified, from an available stock color, including clips, anchors, supports, fasteners, closures and other panel accessories, for assembly approval. Include panel assembly samples not less than 24 inches \times 24 inches (610 \times 610 mm), showing 4-way joint.
 - b. Include separate sets of draw down samples on aluminum substrate, not less than 3 inches \times 5 inches (76 \times 127 mm), of each color and finish selected, for color approval. Larger samples of standard colors are available with production applied coatings.
- E. Quality Assurance Submittals: Submit the following:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements.
 - 3. Manufacturer's Instructions: Manufacturer's installation instructions.
 - 4. Manufacturer's Field Reports: Manufacturer's field reports.
- F. Closeout Submittals: Submit the following:
 - 1. Warranty: Warranty documents specified herein.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in the installation of work similar to that required for this project.
 - a. Certificate: When requested, submit certificate indicating qualification.
 - 2. Manufacturer Qualifications: Company with a minimum of 5 years of continuous experience manufacturing panel material of the type specified:
 - a. Able to provide specified warranty on finish.
 - b. Able to provide a list of 5 other projects of similar size, including approximate date of installation and the name of the Architect for each.
 - c. Able to produce the composite material without outsourcing of coating or lamination process.

- d. Able to provide certificate of registration of ISO 9001-2000.
- 3. Fabricator Qualifications: Company with at least 3 years of experience on similar sized metal panel projects and qualified by the panel material manufacturer. Capable of providing field service representation during construction.
- B. Preinstallation Meetings: Conduct preinstallation meeting to verify project requirements, substrate conditions, installation instructions and warranty requirements. Comply with Division 01 Project Management and Coordination, Project Meetings Section.
- C. Field Quality Control: Comply with panel system manufacturer's recommendations and guidelines for field forming of panels.

1.06 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 01 Product Requirements Sections.
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
 - 1. Protection: Protect finish of panels by applying heavy duty removable plastic film during production.
 - 2. Delivery: Package composite wall panels for protection against transportation damage. Provide markings to identify components consistently with drawings.
 - 3. Handling: Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.
- D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Storage: Store panels in well-ventilated space out of direct sunlight.
 - a. Protect panels from moisture and condensation with tarpaulins or other suitable weathertight covering installed to provide ventilation.
 - b. Slope panels to ensure positive drainage of any accumulated water.
 - c. Do not store panels in any enclosed space where ambient temperature can exceed 120 degrees F (49 degrees C).
 - 2. Damage: Avoid contact with any other materials that might cause staining, denting or other surface damage.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

1.08 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. 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 not a limitation of, other rights Owner may have under the Contract Documents. Warranty Period:
 - a. Panel Integrity: 10 years commencing on Date of Substantial Completion.
 - b. Finish: [Specify number of years] commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 COMPOSITE METAL PANELS MANUFACTURERS

- A. Alpolic

ETAL WALL PANELS

- B. Alucobond
- C. Alcoa

2.02 COMPOSITE METAL PANEL MATERIALS

A. Composite Metal Panels:

1. Core: Thermoplastic material that meets performance characteristics specified when fabricated into composite assembly.
2. Face Sheets: Aluminum alloy 3105 H14, 0.020 inch (0.51 mm) thick and as follows: [Choose coil or spray as applicable to quantity].
 - a. Thermally bonded in a continuous process, under tension, to the core material.
3. Bond Integrity: Tested for resistance to delamination as follows:
 - a. Bond Strength (ASTM C297): 1500 psi (10.3 MPa) minimum.
 - b. Peel Strength (ASTM D1781): 22.5 in-lb/in (100 N-m/m) minimum.
 - c. No degradation in bond performance after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
4. Fire Performance:
 - a. Flamespread (ASTM E84): 25 maximum (4 and 6 mm).
 - b. Smoke Developed (ASTM E84): 450 maximum (4 and 6 mm).
 - c. Surface Flammability (Modified ASTM E108): Pass (4 and 6 mm).
 - d. V-O Rating (4 mm): Comply with UL 94.

B. Production Tolerances:

1. Width: +/- 2 mm.
2. Length: +/- 4 mm.
3. Thickness (4 mm Panel): +/- 0.008 inch (0.2 mm).
4. Thickness (6 mm Panel): +/- 0.012 inch (0.3 mm).
5. Bow: Maximum 0.5% length or width.
6. Squareness: Maximum 0.2 inch (5 mm).
7. Edges of sheets shall be square and trimmed.

C. Panel Thickness: 4 mm.

2.03 ACCESSORIES

- A. General: Provide fabricator's standard accessories, including fasteners, clips, anchorage devices and attachments.

2.04 RELATED MATERIALS

- A. General: Refer to other related sections for related materials, including cold-formed metal framing, flashing and trim, joint sealers, aluminum windows, glass and glazing and curtain walls.

2.05 FABRICATION

- A. General: Shop fabricate to sizes and joint configurations indicated on the drawings.
 1. Where final dimensions cannot be established by field measurements, provide allowance for field adjustment as recommended by the fabricator.
 2. Form panel lines, breaks and angles to be sharp and true, with surfaces that are free from warp or buckle.

3. Fabricate with sharply cut edges, with no displacement of aluminum sheet or protrusion of core.

2.06 FINISHES

- A. Factory Finish: A fluoropolymer paint finish that meets or exceeds values expressed in AAMA 2605 where relevant to coil coatings.

2.07 SOURCE QUALITY

- A. Source Quality: Obtain composite panel products from a single manufacturer.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify that substrate conditions are acceptable for product installation.

3.03 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

3.04 INSTALLATION

- A. General:

1. Install panels plumb, level and true, in compliance with fabricator's recommendations.
2. Anchor panels securely in place, in accordance with fabricator's approved shop drawings.
3. Comply with fabricator's instructions for installation of concealed fasteners and with provisions of Section 0790 00 for installation of joint sealers.
4. Installation Tolerances: Maximum deviation from horizontal and vertical alignment of installed panels: 0.25 inch (6.4 mm) in 20 feet (6.1 m), non-cumulative.

3.05 FIELD QUALITY REQUIREMENTS

- A. Fabricator's Field Services: Upon Owner's request, provide fabricator's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with fabricator's instructions.

3.06 ADJUSTING

- A. Adjusting:

1. Repair panels with minor damage such that repairs are not discernible at a distance of 10 feet (3.1 m).
2. Remove and replace panels damaged beyond repair.
3. Remove protective film immediately after installation of joint sealers and immediately prior to completion of composite metal panel work.
4. Remove from project site damaged panels, protective film and other debris attributable to work of this section.

3.07 CLEANING

- A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

3.08 PROTECTION

- A. Protection: Protect installed product's finish surfaces from damage during construction.

ETAL WALL PANELS

1. Institute protective measures as required to ensure that installed panels will not be damaged by work of other trades.

END OF SECTION

SECTION 075700 COATED FOAM ROOF SYSTEM

Part 1 GENERAL SUMMARY

Section Includes: Coated foam roofing, as shown on drawings and specified herein.

1.01 SYSTEM DESCRIPTION:

- A. Roof System shall be UL-790 (ASTM E-108) Class A roof system and conform to UBC Sections 1501-1510 and UBC Code Standard 15-2. System shall meet UL-1256 Construction Methods #136, #181 and #206. Roof System shall meet UL-1897 Standard for Wind Uplift and UL-2218 Standard for Impact Resistance. Roof System shall meet required ICC Revised AC-12/ASTM C-1029 and ASTM D-6083 acrylic coating criteria, and "Energy Star" Guidelines and CRRC requirements.
- B. Roof System shall be Class A Roof System on non-combustible deck that conforms to ASTM Test Standards, ICC, UBC, CRRC AND California Title 24, Energy Code requirements; and may provide LEED credits depending upon use.
- C. 1. 10 Year Warranty System
 - a. 2.75" (minimum) of sprayed polyurethane foam on the deck surface with (25) mil thickness of white, reflective 100% acrylic roof coating with #9 white limestone granules imbedded into or on top of the wet coating at (30) pounds per 100 square feet. The roof system will provide a 10-year, no-leak warranty.
 - b. Low cost sustainable foam roof system is easily maintained, repaired and upon inspection, may be re-coated with elastomeric protective coating after ten (10) years.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's material specifications, installation instructions and evidence of UL, ICC, CRRC, "Energy Star," CRRC, California Title 24, and Bureau of Home Furnishings and Thermal Insulation in California.
- B. Provide specimen copy of the applicable warranty for this project, as specified herein.
- C. Submit evidence that Coated Foam Insulated Roof System is approved in accordance with UL-1256 Class A Testing.
- D. Submit evidence that Coated Foam Insulated Roof System is approved in accordance with UL-2218 Impact Resistance Testing.
- E. Submit evidence that Coated Foam Insulated Roof System is approved in accordance with UL Reports P-733, P-826 or P-904 for Hourly Fire Resistance Design Ratings on specific decks where applicable.
- F. Submit evidence that polyurethane foam with HFC 245fa blowing agent in Coated Foam Roof System is approved in accordance with Montreal Protocol and U.S. EPA non-depleting ozone requirement.
- G. Submit evidence that top coatings on Coated Foam Insulated Roof Systems are approved in accordance with "Energy Star" and CRRC Solar Reflectance and Thermal Emittance Testing.
- H. Submit evidence of Applicator's IPP (Injury and Illness Protection Plan) and Site Specific Fall Protection Plan.

1.03 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing products, specified with minimum

- (5) years documented experience.
 2. Applicator: Roofing applicator with 5 years experience in work of similar scope and nature to that specified and approved by manufacturer of roofing material and certified or licensed by the manufacturer.
 3. Applicator: Must have documented Injury & Illness prevention program (IPP) as part of submittals, prior to awarding contract and invitation to Pre-Installation Conference.
- B. Pre-Installation Conference:
1. Convene a pre-construction conference to review roofing specifications and procedures with the architect, contractor, roofer and other trades relative to the work, prior to ordering materials.
 2. Applicator's truck foreman (Competent person on the job) must conduct survey of the roof's condition regarding the site specific fall protection plan and conduct Tail-Gate meeting on the first day on any new job site.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
1. Deliver materials to site intact with labels showing UL, ICC and CRRC listings, when in drums.
 2. Deliver so that stocks of materials on the site will permit un-interrupted progress of the work.
- B. Storage and Handling:
1. Adequately protect product against damage while stored at the job-site.
 2. Comply with manufacturer's instructions.

1.05 PROJECT/SITE CONDITIONS

- A. Polyurethane foam shall not be sprayed during inclement weather and when the following conditions exist:
1. If surface temperature is above 160 degrees F or below 40 degrees F or when the dew point is less than (5) degrees F above the surface temperature.
 2. If surface moisture is present.
 3. If wind velocity is above (12) miles per hour, windscreens are required.
 4. If wind velocity is at/or above (25) miles per hour, work shall be suspended.

1.06 WARRANTY

- A. Warranty: Furnish written Thirty (30) Year No Leak Warranty on Coated Foam Insulated Roof System. Warranty shall cover repairs necessary to maintain roofing work in a water-tight condition during the warranty period. Warranty is to cover workmanship and materials to maintain necessary repair work on a timely basis to ensure warranty term roof performance during the period covered, warranty shall cover all components of the Coated Foam Roof system only.

Part 2. PRODUCTS

2.01 MANUFACTURERS

- A. US approved Coated Foam Roof System shall be manufactured by the following accepted manufacturer:
1. SWD Urethane Company, Mesa, Arizona

2.02 MATERIALS

A. Primer/Sealer - Optional:

1. Neoprene based primer formulated to be airless sprayed and designed expressly to enhance adhesion of SWD Urethane foam to various surfaces.
2. SWD – 2000 Primer / Sealer is acceptable in California.

B. Polyurethane Foam Roofing/Insulation:

1. Two component rigid foam, designed to be applied with foam dispensing equipment, meeting the following Minimum Physical Properties:

a. Primer/Sealer is required on metal deck and metal roof penetrations

PHYSICAL PROPERTIES

Property	ASTM Procedure	Values
Core Density, pcf nominal *	D- 1622	2.5 - 3.0
Compressive Strength, psi	D-2621	40.1
Tensile Strength, psi	D-1623	85.5
Open Cell Content, %	D-2856	17.7
Closed Cell Content %	D-2856	82.3
Water vapor transmission, per/inch	E-96	1.0
R Value	C- 177	6.8
k-Factor (initial)	C- 177	0.148

2. SWD 125 “Quik-Shield” polyurethane foam is acceptable.

- a. Polyurethane Foam Density and Compressive Strength shall be uniform and consistent with specification. Minimum Physical Properties shall not allow for multiple foam densities or compressive strengths to be spray-applied within multiple inches of specified foam.
- b. Polyurethane Foam shall contain EPA-approved 245fa blowing agent and meet U.S. non-ozone depleting requirements of the U.S. EPA mandate and International Montreal Protocol. No polyurethane foam with phased-out HCFC 141b blowing agent is acceptable.
- c. SWD Urethane Company, SWD 125 Polyurethane Foam with HFC 245fa “Enovate” blowing agent is acceptable

C. Protective Coating:

1. 100% acrylic elastomeric, UL 723, Class I rated, white coating meets EPA “Energy Star” and CRRC requirements for Solar Reflectance and Thermal Emittance and can be applied by brush, roller or convention airless spray equipment with the following Minimum Physical Properties.

PHYSICAL PROPERTIES

a. Property	ASTM Procedure	Values
Fire Resistance	E-84	
Flame Spread	E-84	15
Smoke Developed	E-84	10
Solids Content		
By Weight	D-1353	70%
By Volume	D-2697	60%
Solar Reflectance	E-903	82%
Thermal Emittance	E-408	91%
Solar Reflectance Index, SRI	E-1980	103%

Tensile Strength: psi	D-412	280
Elongation psi	D-412	355
Water Vapor Transmission, ppi (Perms @ 20 mils)	E-96	1
Hardness: Shore A Durometer	D-2240	60
Colors:	Grey, Buff, White	

ASTM D-6083 – Standard Specification for Liquid-Applied Acrylic Coating
– Used in Roofing

(ALL FOLLOWING TESTS PASSED)

Liquid requirements/Film Properties:

Viscosity, Volume Solids, Weight Solids, Initial Tensile Strength, Initial Elongation, Premeance, Water Swelling, Wet Adhesion, Tear Resistance, Fungi Resistance

Note: SWD Urethane Company is an original "Energy Star" partner and approved by CRRC.

- a. Dry film thickness shall be (25) mils application with #9 limestone granules embedded at 30 lbs per 100 square feet.
- b. Base coat and top coat should be contrasting colors to ensure adequate thickness and coverage.
- c. SWD Urethane Company "Kool-Kote"™ 1929F Acrylic Elastomeric Coatings are acceptable.

Part 3. EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Roofing contractor shall examine the roof deck, flashings and other surfaces that are to receive roofing materials, prior to the application, to ensure that surfaces are dry, clean and in proper condition to receive the roofing system.
2. All penetrations through roofing including drains, scuppers, miscellaneous pipe and vent penetrations and electrical conduits shall be completed prior to starting of work. Post-installation of penetrations after roofing section is completed requiring repairs, shall constitute costs added above contracted scope of work.

B. Application of roofing material shall constitute the roofing contractor's acceptance of surfaces and flashings to receive the materials.

C. Coordinate roof application with other work and trades which affect, connects with or will be concealed by this work.

3.02 PREPARATION

A. General Area:

1. Notify the owner's representative and visitors to the job-site of potential fugitive overspray.
2. Cars, etc. should be moved or covered to prevent inadvertent spraying. Contractor shall coordinate traffic with subcontractor during roof operations.
3. Use appropriate barricading methods to shelter walking traffic from the work area's equipment and overspray.
4. Mask work area as necessary to protect building walls, adjacent structures and vegetation,

etc. from possible overspray.

B. Surface Preparation for Roof Decks:

1. Metal Deck:

- a. The metal roof deck shall be constructed of minimum 22-gauge steel. Construction shall conform to local building codes.
- b. Ferrous Metal: Sandblast iron and steel surfaces, which are not primed, shop-painted, or otherwise protected. Remove loose rust and primer from shop-primed iron and steel surfaces by scraping or wire brushing.
- c. Non-Ferrous Metal : Clean galvanized metal, aluminum and stainless steel surfaces, as recommended by the manufacturer issuing the warranty.
- d. If the metal surface is free of loose scale, rust, weathered or chalking paint, it can be cleaned using compressed air-jet, vacuum equipment, hand or power broom to remove loose dirt. Grease, oil or other contaminants shall be removed with proper cleaning solutions.
- e. Fluted metal decks require a suitable method of covering or filling the flute prior to polyurethane foam application. Flutes may be covered with a suitable board stock, or quality (4) inch tape prior to spray-application of the polyurethane foam. Where a fire barrier is required, apply Type X gypsum board, mechanically-fastened to the metal surface, to meet local building code requirements.
- f. Metal flutes 2 3/4 inches up to (3) in width, may be taped with 4" adhesive tape then sprayed with a minimum of 1 1/2 inches of foam.

2. Concrete Deck:

- a. Remove loose dirt, dust and debris by using compressed air, vacuum equipment or broom. Oil and grease from release agents or other contaminants shall be removed with proper cleaning solutions.
- b. All joint openings in concrete decks that exceed 1/4 inch shall be grouted or caulked by others, prior to application of polyurethane foam.
- c. Priming is required on concrete surfaces and it is recommended that due to hydration usually present in new concrete, poured concrete decks be permitted to cure for twenty-eight (28) days prior to the application of sprayed polyurethane foam. Cutting time off of (4) weeks is not a short cut SWD recommends.
- d. Sprayed polyurethane foam is not recommended for application over lightweight or insulating concrete materials unless underlayment and/or vent pans are installed. (Check with manufacturer prior to installation of PUF roof system over lightweight concrete).

3.03 INSTALLATION - GENERAL

- A. Install all materials in strict compliance with all published safety, weather or applicable instructions from the manufacturer and/or regulations of local, state and/or federal agencies, which have jurisdiction.
- B. No work shall be commenced over defective area until advised in writing by architect of the action to be taken in such areas.
- C. Spray polyurethane foam for new construction projects, shall be installed when the deck, parapet walls, rough openings and curbs are completed. Plumbing vents (no lead), drains and electrical penetrations shall be in place prior to foam installation. No trades-people shall be allowed to work on the roof when the spray polyurethane foam and coatings are being installed- HVAC units shall not be installed until after the foam and coating roof system is in place.
- D. Substrate shall have sufficient structural strength and integrity without substrate deformation, and sufficient slope-to-drain per code requirements of 1/4 inch/foot to eliminate excessive ponding water. Excessive ponding is defined as "an area of 100 square feet or more which holds in excess

of 1/2" of water, as measured 48 hours after a rainfall" per The NRCA Roofing and Waterproofing Manual - Fourth Edition. Note: J-Bar and other metal counter-flashings are no longer required at the top foam edge on parapet walls.

- E. Metal: Install metal foam-stop at all roof edges, as required. J-Bar and other counter-flashings are no longer required at the top horizontal foam edge across the parapet walls.
- F. Crickets and Cants:
 - 1. Required drainage slope gradients are required to meet the various drainage sources.
 - 2. Crickets may be constructed as follows:
 - a. Using 1/2 inch CDX plywood and structural lumber adhered mechanically to the substrate and vertical walls installed by others.
 - b. Using spray polyurethane foam (within certain sloping requirements).
 - c. Using tapered insulation board which shall be secured to the substrate with an adhesive recommended by the tapered board manufacturer or with mechanical fasteners.
 - 3. Cants formed with spray polyurethane foam shall transition from the deck surface up the parapet wall.
- G. Parapets:
 - 1. Polyurethane foam shall extend a minimum of (4) inches up to (12) inches up the vertical parapet wall at a thickness of 3/4 to 1 1/2 inches at the cant.
 - 2. If it is required that polyurethane foam extend all the way up the parapet wall then foam termination shall be detailed via straight line and tapered foam or optional sheet metal flashing that is acceptable to architectural standards.

3.04 INSTALLATION – PRIMER/SEALER

- A. All surfaces should be clean and free from moisture, oil, grease, loose particles, dust, debris and any other materials that shall prevent maximum adhesion.
- B. Spray primer/sealer to decking at a rate of 1/2 gallon per 100 square feet.

3.05 INSTALLATION - POLYURETHANE FOAM

- A. SWD 125 "Quik-Shield"® foam shall be applied in minimum 1/2 to 1 inch thick lifts to achieve the specified thickness $\pm 1/4$ inch per thickness.
- B. Spray only the area each day that can be completed to the specified thickness that same day. Before resuming spraying operations on subsequent days, inspect the exposed leading edge of the foam for possible surface moisture that could cause blistering. The foam edge shall be considered dry when there is no indication of moisture when blotted with an absorptive material.
- C. "Surface texture and quality-cured polyurethane foam shall range from a smooth to heavy orange peel" finish. Textures described as "popcorn or tree bark" surfaces, which exhibit crevices, voids and widespread defects, are not acceptable.

3.06 INSTALLATION - PROTECTIVE ELASTOMERIC COATING

- A. Preparation:
 - 1. Foam surface and adjacent surfaces to be coated, shall be dry and completely free of degraded foam, foam over-spray, grease, oil, dirt or other contaminants which interfere with proper coating adhesion, dry and free of contaminants.
 - 2. Do not apply coating materials when surface temperature is less than 50 degrees F.
 - 3. Any physical damage to the polyurethane foam shall be repaired before coating.
 - 4. Operator should wear soft-soled shoes to avoid damaging the skin of the foam.
 - 5. An additional application of base coat shall be applied where foam surface has been sanded,

planed or trimmed.

B. Application

1. Base Coat:

- a. Shall be a contrasting color from the top coat to insure adequate coverage.
- b. Shall be applied on the same day, as the polyurethane foam application, when possible.
- c. The polyurethane foam shall be inspected for UV oxidation if more than (72) hours has elapsed prior to application of base coat.
- d. Spray-apply elastomeric base coat over insulation at the rate of (1) gallon per 100 square feet in one application.

2. Top Coat:

- a. Coating shall be a contrasting color from the base coat to ensure adequate coverage.
- b. Do not apply top coat until base coat has cured properly. Normally, 24 hours is sufficient time for the base coat to properly cure.
- c. Spray-apply acrylic elastomeric top coat over the base coat at the rate of two gallons per 100 square feet in one application.
- d. Coating passes shall be applied in cross-hatch pattern at right angles to base coat passes to ensure more uniform coverage.
- e. Coating shall extend up and over all polyurethane foam on vent pipes, parapets and other penetrations and shall terminate a minimum of (4) inches above the foam. All top coat termination points shall be straight-lined on parapet walls, vent pipes and other penetrations for effective use and uniform appearance.

3. Granules:

- a. Granules when specified, shall be broadcast into or on top of the wet top coating while it is being applied at the rate of 30 pounds per 100 square feet.
- b. Shall consist #9 limestone granules.

3.07 CLEANING

- A. Remove and dispose of excess materials, equipment and debris from premises during work and/or upon completion of work.
- B. Leave work in clean condition in accordance with company policy and pride in a job well done.

SECTION 075701 - CEMENTITIOUS COATED FOAM ROOF SYSTEM

Part 1 GENERAL SUMMARY

Section Includes: Cementitious Topped Coated foam roofing, as shown on drawings and specified herein.

1.01 SYSTEM DESCRIPTION:

- A. Roof System shall be UL-790 (ASTM E-108) Class A roof system and conform to UBC Sections 1501-1510 and UBC Code Standard 15-2. System shall meet UL-1256 Construction Methods #136, #181 and #206. Roof System shall meet UL-1897 Standard for Wind Uplift and UL-2218 Standard for Impact Resistance. Roof System shall meet required ICC Revised AC-12/ASTM C-1029 and ASTM D-6083 acrylic coating criteria, and "Energy Star" Guidelines and CRRC requirements.
- B. Roof System shall be Class A Roof System on non-combustible deck that conforms to ASTM Test Standards, ICC, UBC, CRRC AND California Title 24, Energy Code requirements; and may provide LEED credits depending upon use. This cementitious specification is drafted from the SWD Ever-Gard U.L. Classified Roof System.
- C. 1. 10 Year Warranty System
 - a. 2.75" (minimum) of sprayed polyurethane foam (additional inches may be added and /or sloped depending upon desired insulation value) on the deck surface with (25) mil thickness of white, reflective 100% acrylic roof coating and 1/8' to 1/4' of cementitious coating with embedded aggregate for the final surface.
 - b. The low cost sustainable foam roof system is easily maintained, repaired and upon inspection, may be re-coated with a "Ever-Gard" cementitious protective coating after ten (10) years.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's material specifications, installation instructions and evidence of UL, ICC, CRRC, "Energy Star," CRRC, California Title 24, and Bureau of Home Furnishings and Thermal Insulation in California.
- B. Provide specimen copy of the applicable warranty for this project, as specified herein.
- C. Submit evidence that Cemented Coated Foam Insulated Roof System is approved in accordance with UL 790 and UL-1256 Class A Testing.
- D. Submit evidence that Cementitious Coated Foam Insulated Roof System is approved in accordance with UL-2218 Impact Resistance Testing.
- E. Submit evidence that Cementitious Coated Foam Insulated Roof System is approved in accordance with UL Reports P-733, P-826 or P-904 for Hourly Fire Resistance Design Ratings on specific decks where applicable.
- F. Submit evidence that polyurethane foam with HFC 245fa blowing agent in Cementitious Coated Foam Roof System is approved in accordance with Montreal Protocol and U.S. EPA non-depleting ozone requirement.
- G. Submit evidence that top coatings in Cementitious Coated Foam Insulated Roof System are approved in accordance with "Energy Star" and CRRC, California Title 24, Solar Reflectance and Thermal Emittance Testing.
- H. Submit evidence of Applicator's IPP (Injury and Illness Protection Plan) and Site Specific Fall Protection Plan.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing Cementitious and Coated Foam Roof System products, specified with minimum (5) years documented experience.
2. Applicator: Roofing applicator with 5 years Cementitious and foam roof experience in work of similar scope and nature to that specified and approved by manufacturer of roofing material and certified or licensed by the manufacturer of Cementitious Coated Foam Roof System and approved Cementitious Coated Foam Roof System applicator
3. Applicator: Must have documented Injury & Illness Prevention Program (IPP) as part of submittals, prior to awarding contract and invitation to Pre-Installation Conference.

B. Pre-Installation Conference:

1. Convene a pre-construction conference to review roofing specifications and procedures with the architect, contractor, roofer and other trades relative to the work, prior to ordering materials.
2. Applicator's truck foreman (Competent person on the job) must conduct survey of the roof's condition regarding the site specific fall protection plan and conduct Tail-Gate meeting on the first day on any new job site.

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Deliver materials to site intact with labels showing UL, ICC and CRRC listings, when in drums.
2. Deliver so that stocks of materials on the site will permit un-interrupted progress of the work.

B. Storage and Handling:

1. Adequately protect product against damage while stored at the job-site.
2. Comply with manufacturer's instructions.

1.05 PROJECT/SITE CONDITIONS

A. Polyurethane foam shall not be sprayed during inclement weather and when the following conditions exist:

1. If surface temperature is above 160 degrees F or below 40 degrees F or when the dew point is less than (5) degrees F above the surface temperature.
2. If surface moisture is present.
3. If wind velocity is above (12) miles per hour, windscreens are required.
4. If wind velocity is at/or above (25) miles per hour, work shall be suspended.

1.06 WARRANTY

- A. Warranty: Furnish written Thirty (30) Year No Leak Warranty on Cementitious Coated Foam Insulated Roof System. Warranty shall cover repairs necessary to maintain roofing work in a water-tight condition during the warranty period. Warranty is to cover workmanship and materials to maintain necessary repair work on a timely basis to ensure warranty term roof performance during the period covered, warranty shall cover all components of the Cementitious Coated Foam Roof system only.

Part 2. PRODUCTS

2.01 MANUFACTURERS

- A. US approved Cementitious Coated Foam Roof System shall be manufactured by the following accepted manufacturer:
 - 1. SWD Urethane Company, Mesa, Arizona

2.02 MATERIALS

- A. Primer/Sealer - Optional:
 - 1. Neoprene based primer formulated to be airless sprayed and designed expressly to enhance adhesion of SWD Urethane foam to various surfaces.
 - 2. SWD – 2000 Primer / Sealer is acceptable in California.
- B. Polyurethane Foam Roofing/Insulation:
 - 1. Two component rigid foam, designed to be applied with foam dispensing equipment, meeting the following Minimum Physical Properties:
 - a. Primer/Sealer is required on metal deck.
 - 2. Polyurethane Foam Roofing/Insulation
 - a. Fire hazard classification: This material meets UL 1256 requirements as a class A roof system when used with SWD Ever-Gard System over combustible deck.
 - b. Polyurethane foam density and compressive strength shall be uniform and consistent with specification. Minimal physical properties shall not allow for multiple foam densities or compressive strengths to be applied within multiple inches of specific foam.
 - c. SWD Polyurethane foam shall contain EPA-approved 245fa blowing agent and meet U.S. non-ozone depleting requirements of the U.S. EPA mandate and international Montreal Protocol.
 - d. SWD Urethane Company, SWD 125 polyurethane foam with HFC 245fa blowing agent is acceptable.
 - 3. Cementitious top coat is applied as top coat over Coated Foam Roof System

PHYSICAL PROPERTIES

Property	ASTM Procedure	Values
Core Density, pcf nominal *	D- 1622	2.5 - 3.0
Compressive Strength, psi	D-2621	40.1
Tensile Strength, psi	D-1623	85.5
Open Cell Content, %	D-2856	17.7
Closed Cell Content %	D-2856	82.3
Water Vapor Transmission, ppi	E-96	1.0
R Value	C- 177	6.8
k-Factor (initial)	C- 177	0.148

- 4. SWD 125 “Quik-Shield” polyurethane foam is acceptable.
 - a. Polyurethane Foam Density and Compressive Strength shall be uniform and consistent with specification. Minimum Physical Properties shall not allow for multiple foam densities or compressive strengths to be spray-applied within multiple inches of specified foam.
 - b. Polyurethane Foam shall contain EPA-approved 245fa blowing agent and meet U.S. non-ozone depleting requirements of the U.S. EPA mandate and International Montreal Protocol. No polyurethane foam with phased-out HCFC 141b blowing agent is acceptable.
 - c. SWD Urethane Company, SWD 125 Polyurethane Foam with HFC 245fa “Enovate” blowing agent is acceptable

- C. Protective Coatings:

1. 100% elastomeric, ASTM D-6083, UL-723, Class 1 rated 1929F Kool-Kote TM white, acrylic coating meets EPA Energy star and CRRC requirements and is listed for Solar Reflectance and Thermal Emittance. The coating can be applied by brush, roller or conventional airless spray equipment with exceptional Physical Properties test results.
2. One Gallon acrylic, elastomeric base coat and two gallons acrylic, elastomeric top coat applied per 100 square feet (Dry mill thickness 30 mils).
3. SWD 1929F Kool-Kote TM acrylic, elastomeric coating is acceptable. Note: SWD Urethane Company is an original Energy Star Charter partner and is CRRC listed and approved. In addition: SWD Urethane Company coatings are California Title 24 Compliant.
4. Cementitious white coating with 64 lbs of #6 white limestone granules is spread on top of the coated Foam Roof system at 1/8 to inch per 100 square feet.
5. SWD Ever-Gard Cementitious coating is acceptable over the acrylic coating, as the top coating of the SWD Cementitious Coated Foam Roof System.

PHYSICAL PROPERTIES

a. Property	ASTM Procedure	Values
Fire Resistance	E-84	
Flame Spread	E-84	15
Smoke Developed	E-84	10
Solids Content		
By Weight	D-1353	70%
By Volume	D-2697	60%
Solar Reflectance	E-903	82%
Thermal Emittance	E-408	91%
Tensile Strength: psi	D-412	280
Elongation psi	D-412	355
Water Vapor Transmission, ppi	E-96	1
Hardness – Shore A Durometer	D-2240	60
Colors:		Grey, Buff, White

ASTM D-6083 – Standard Specification for Liquid-Applied Acrylic Coating – Used in Roofing

(ALL FOLLOWING TESTS PASSED)

Liquid requirements/ Film Properties:

Viscosity, Volume Solids, Weight Solids, Initial Tensile Strength, Initial Elongation, Permeance, Water Swelling, Wet Adhesion, Tear Resistance, Fungi Resistance

D. SWD Urethane Company “Kool-Kote” TM 1929F acrylic, elastomeric coatings are acceptable.

Note: SWD Urethane Company is an original "Energy Star" partner and is CRRC approved.

E. Cementitious Protective-Reflective Coating

- 1 Shall be manufactured specifically for use with SWD 125 polyurethane foam and 1929F ‘Kool-Kote acrylic elastomeric coating and SWD 1000 or SWD 2000 primer/ sealer.
- 2 Part A shall consist of Cementitious dry-mix asbestos-free powder compound
- 3 Part B shall be 100% acrylic, emulsion containing no styrene or Styrene Butadiene
4. The Cementitious coating shall be applied in two separate passes resulting in 1/8” to ¼” total (7-8 gallons per 100 square feet) thickness.

CEMENTITIOUS COATED FOAM ROOF SYSTEM

5. Aggregate topcoat shall include #6 crushed limestone at 64 lbs. per 100 square feet, embedded in the wet coating.
6. Fire hazard classification: This system meets UL-790 requirements as a Class A roof covering when used with SWD Ever-Gard Coated Foam Roof System.

PHYSICAL PROPERTIES

<u>Property</u>	<u>ASTM Procedure</u>	<u>Values</u>
Solar Reflectance	E-903	81%
Thermal Emittance	E-408	87%
UV Resistance	D-822	2,000 hr/ No Effect
High Temperature Stability	D-794	No Effect

Part 3. EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 1. Roofing contractor shall examine the roof deck, flashings and other surfaces that are to receive roofing materials, prior to the application, to ensure that surfaces are true, dry, clean and in proper condition to receive the roofing system.
 2. All penetrations through roofing including drains, scuppers, miscellaneous pipe and vent penetrations and electrical conduits shall be completed prior to starting of work. Post-installation of penetrations after roofing section is completed, requiring repairs, shall constitute costs added above contracted scope of work.
- B. Application of roofing material shall constitute the roofing contractor's acceptance of surfaces and flashings to receive the materials.
- C. Coordinate roof application with other work and trades which affect, connects with or will be concealed by this work.

3.02 PREPARATION

- A. General Area:
 1. Notify the owner's representative and visitors to the job-site of potential fugitive overspray.
 2. Cars, etc. should be moved or covered to prevent inadvertent spraying. Contractor shall coordinate traffic with subcontractor during roof operations.
 3. Provide all barricades as required so there is no doubt that the area is completely barricaded. Use appropriate barricading methods to shelter walking traffic from the work area's equipment and overspray.
 4. Mask work area as necessary to protect building walls, adjacent structures and vegetation, etc. from possible overspray.
- B. Surface Preparation for Roof Decks:
 1. Metal Deck:
 - a. The metal roof deck shall be constructed of minimum 22-gauge steel. Construction shall conform to local building codes.
 - b. Ferrous Metal: Sandblast iron and steel surfaces, which are not primed, shop-painted, or otherwise protected. Remove loose rust and primer from shop-primed iron and steel surfaces by scraping or wire brushing.
 - c. Non-Ferrous Metal : Clean galvanized metal, aluminum and stainless steel

- surfaces, as recommended by the manufacturer issuing the warranty.
- d. If the metal surface is free of loose scale, rust, weathered or chalking paint, it can be cleaned using compressed air-jet, vacuum equipment, hand or powerbroom to remove loose dirt. Grease, oil or other contaminants shall be removed with proper cleaning solutions.
 - e. Fluted metal decks require a suitable method of covering or filling the flute prior to polyurethane foam application. Flutes may be covered with a suitable board stock, or quality (4) inch tape prior to spray-application of the polyurethane foam. Where a fire barrier is required, apply Type X gypsum board, mechanically-fastened to the metal surface, to meet local building code requirements.
 - f. Metal flutes 2 3/4 inches up to (3) in width, may be taped with 4" adhesive tape then sprayed with a minimum of 1 1/2 inches of foam.
2. Concrete Deck:
- a. Remove loose dirt, dust and debris by using compressed air, vacuum equipment or broom. Oil and grease from release agents or other contaminants shall be removed with proper cleaning solutions.
 - b. All joint openings in concrete decks that exceed 1/4 inch shall be grouted or caulked by others, prior to application of polyurethane foam.
 - c. Priming is required on concrete surfaces and it is recommended that due to hydration usually present in new concrete, poured concrete decks be permitted to cure for twenty-eight (28) days prior to the application of sprayed polyurethane foam. Cutting time off of (4) weeks is not a short cut SWD recommends.
 - d. Sprayed polyurethane foam is not recommended for application over lightweight or insulating concrete materials unless underlayment and/or vent pans are installed. (Check with manufacturer prior to installation of PUF roof system over lightweight concrete).

3.03 INSTALLATION - GENERAL

- A. Install all materials in strict compliance with all published safety, weather or applicable instructions from the manufacturer and/or regulations of local, state and/or federal agencies, which have jurisdiction.
- B. No work shall be commenced over defective area until advised in writing by architect of the action to be taken in such areas.
- C. Spray polyurethane foam for new construction projects, shall be installed when the deck, parapet walls, rough openings and curbs are completed. The type of skylight used will determine when skylights should be installed. Plumbing vents (no lead), drains and electrical penetrations shall be in place prior to foam installation. No trades-people shall be allowed to work on the roof when the spray polyurethane foam and coatings are being installed- HVAC units shall not be installed until after the foam and coating roof system is in place.
- D. Substrate shall have sufficient structural strength and integrity without substrate deformation, and sufficient slope-to-drain per code requirements of 1/4 inch/foot to eliminate excessive ponding water. Excessive ponding is defined as "an area of 100 square feet or more which holds in excess of 1/2" of water, as measured 48 hours after a rainfall" per The NRCA Roofing and Waterproofing Manual - Fourth Edition. Note: J-Bar and other metal counter-flashings are no longer required at the top foam edge on parapet walls.
- E. Metal: Install metal foam-stop at all roof edges, as required. J-Bar and other counter-flashings are no longer required at the top horizontal foam edge across the parapet walls.
- F. Crickets and Cants:
 1. Required drainage slope gradients are required to meet the various drainage sources.

2. Crickets may be constructed as follows:
 - a. Using 1/2 inch CDX plywood and structural lumber adhered mechanically to the substrate and vertical walls installed by others.
 - b. Using spray polyurethane foam (within certain sloping requirements).
 - c. Using tapered insulation board which shall be secured to the substrate with an adhesive recommended by the tapered board manufacturer or with mechanical fasteners.
 3. Cants formed with spray polyurethane foam shall transition from the deck surface up the parapet wall.
- G. Parapets:
1. Polyurethane foam shall extend a minimum of (4) inches up to (12) inches up the vertical parapet wall at a thickness of 3/4 to 1 1/2 inches at the cant.
 2. If it is required that polyurethane foam extend all the way up the parapet wall then foam termination shall be detailed via straight line and tapered foam or optional sheet metal flashing that is acceptable to architectural standards.

3.04 INSTALLATION – PRIMER/SEALER

- A. All surfaces should be clean and free from moisture, oil, grease, loose particles, dust, debris and any other materials that shall prevent maximum adhesion.
- B. Spray primer/sealer to concrete, metal or existing deck at a rate of 1/2 gallon per 100 square feet.

3.05 INSTALLATION - POLYURETHANE FOAM

- A. SWD 125 foam shall be applied in minimum 1/2 to 1 inch thick lifts to achieve the specified thickness $\pm 1/4$ inch per thickness.
- B. Spray only the area each day that can be completed to the specified thickness that same day. Before resuming spraying operations on subsequent days, inspect the exposed leading edge of the foam for possible surface moisture that could cause blistering. The foam edge shall be considered dry when there is no indication of moisture when blotted with an absorptive material.
- C. "Surface texture and quality-cured polyurethane foam shall range from a smooth to heavy orange peel" finish. Textures described as "popcorn or tree bark" surfaces, which exhibit crevices, voids and widespread defects, are not acceptable.

3.06 INSTALLATION - PROTECTIVE ELASTOMERIC COATING

- A. Preparation:
 1. Foam surface and adjacent surfaces to be coated, shall be dry and completely free of degraded foam, foam over-spray, grease, oil, dirt or other contaminants which interfere with proper coating adhesion, dry and free of contaminants.
 2. Do not apply coating materials when surface temperature is less than 50 degrees F.
 3. Any physical damage to the polyurethane foam shall be repaired before coating.
 4. Operator should wear soft-soled shoes to avoid damaging the skin of the foam.
 5. An additional application of base coat shall be applied where foam surface has been sanded, planed or trimmed.
- B. Application
 1. Acrylic Base Coat:
 - a. Shall be a contrasting color from the top coat to insure adequate coverage.
 - b. Shall be applied on the same day, as the polyurethane foam application, when possible.
 - c. The polyurethane foam shall be inspected for UV oxidation if more than (72) hours

- has elapsed prior to application of base coat.
- d. Spray-apply elastomeric base coat over insulation at the rate of (1) gallon per 100 square feet in one application.
2. Acrylic Top Coat:
 - a. Acrylic coating shall be a contrasting color from the base coat to ensure adequate coverage.
 - b. Do not apply top coat until base coat has cured properly. Normally, 12-24 hours is more than sufficient time for the base coat to properly cure.
 - c. Spray-apply acrylic elastomeric top coat over the base coat at the rate of (1 1/2) gallons per 100 square feet in one application.
 - d. Coating passes shall be applied in cross-hatch pattern at right angles to base coat passes to ensure more uniform coverage.
 - e. Coating shall extend up and over all polyurethane foam on vent pipes, parapets and other penetrations and shall terminate a minimum of (4) up to 12 inches above the foam. All top coat termination points shall be straight-lined on parapet walls, vent pipes and other penetrations for effective use and uniform appearance.
 3. Cementitious Coating:
 - a. Cementitious coating with #6 limestone granules, shall be applied as a wet final coating at the rate of 64 lbs. per 100 square feet.
 - b. Cementitious coating including #6 limestone granules, shall cover all acrylic coating and terminate just under acrylic top coating termination points, preserving straight-lines of acrylic top coat on parapets, walls, vent pipes and other penetrations, as the final straight-line appearance of the roof.

3.07 CLEANING

- A. Remove and dispose of excess materials, equipment and debris from premises during work and/or upon completion of work.
- B. Leave work in clean condition in accordance with company policy and pride in a job well done.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and Samples.
- B. Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- C. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leak proof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METAL

- A. Manufactured Reglets. Snap-on type, for two piece flashing. Metal to match flashing and sheet metal.
 - 1. Fry Reglet Corp.: Springlok System
- B. Copper: ASTM B 370; Temper H00 or H01, cold rolled, not less than 16 oz./sq. ft..
- C. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, not less than 0.032 inch thick; and with mill finish.
- D. Zinc-Tin Alloy-Coated Stainless Steel: ASTM A 240/A 240M, Type 304, fully annealed stainless-steel sheet, not less than 0.015 inch thick, with 0.787-mil thickness zinc-tin alloy coating applied to each side.
- E. Metallic-Coated Steel Sheet: Galvanized structural-steel sheet, ASTM A 653/A 653M, G90, or aluminum-zinc alloy-coated structural-steel sheet, ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; 0.022-inch nominal thickness.
 - 1. Finish: Manufacturer's standard two-coat fluoropolymer system with color coat containing not less than 70 percent PVDF resin by weight.
 - 2. Concealed Finish: Manufacturer's standard white or light-colored acrylic or polyester backer finish.

2.2 ACCESSORIES

- A. Felt Underlayment: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.

- B. Jiffy Seal Self-Adhering Sheet Underlayment, High Temperature: Butyl; slip-resisting-polyethylene surfaced; with release paper backing; cold applied. Stable after testing at 240 deg F and passes after testing at minus 20 deg F; ASTM D 1970.
- C. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.
- D. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners.
 - 1. Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
 - 2. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 3. Fasteners for Copper: Copper, hardware bronze, or Series 300 stainless steel.
 - 4. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 5. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 6. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.
 - 7. Fasteners for Metallic-Coated Steel Sheet: Hot-dip galvanized steel or Series 300 stainless steel.
- E. Solder for Copper: ASTM B 32, Grade Sn50.
- F. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- G. Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.
- H. Butyl Sealant: ASTM C 1311, solvent-release butyl rubber sealant.
- I. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 FABRICATION

- A. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Manufactured Reglets.
 - 1. Fry Reglet Corp.: Springlok System

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with SMACNA's "Architectural Sheet Metal Manual." Allow for thermal expansion; set true to line and level. Install Work with laps, joints, and seams permanently watertight and weatherproof; conceal fasteners where possible.
- B. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- C. Fabricate nonmoving seams in sheet metal with flat-lock seams.
- D. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except where pre-tinned surface would show in finished Work.
 - 1. Do not solder metallic-coated steel and aluminum sheet.
 - 2. Do not pre-tin zinc-tin alloy-coated stainless steel.
 - 3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- E. Aluminum Flashing and Trim: Coat back side of aluminum flashing and trim with bituminous coating where it will contact wood, ferrous metal, or cementitious construction.
- F. Separate dissimilar metals with a bituminous coating or polymer-modified, bituminous sheet underlayment.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings
- B. Warranties: Provide manufacturer's standard written warranty, signed by manufacturer agreeing to promptly repair or replace roof specialties that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Copper Sheet: ASTM B 370, Temper H00 or H01, cold rolled, mill finish.
- B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required.
- C. Aluminum Extrusions: ASTM B 221, alloy and temper as recommended by manufacturer for use and finish indicated.
- D. Aluminum Finish: Mill finish.
- E. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, No. 3 (directional satin) finish.
- F. Prepainted, Zinc-Coated Steel Sheet: ASTM A 653/A 653M, G90 coating designation, structural quality, and coil coated prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Finish: Manufacturer's standard two-coat fluoropolymer system with color coat containing not less than 70 percent PVDF resin by weight; complying with AAMA 621.
- G. Felt Underlayment: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.
- H. Self-Adhering Sheet Underlayment, High Temperature: Butyl or SBS-modified asphalt; slip-resisting-polyethylene surfaced; with release paper backing; cold applied. Stable after testing at 240 deg F and passes after testing at minus 20 deg F; ASTM D 1970.
- I. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements.
 - 1. Exposed Penetrating Fasteners: Gasketed screws with heads matching color of metal.
 - 2. Fasteners for Copper Sheet: Copper, hardware bronze, or Series 300 stainless steel.
 - 3. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
 - 4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel.

J. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 ROOF SPECIALTIES

A. SPRI Wind Design Standard: Provide copings roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: Per City of San Diego requirements.

B. Gutters, Downspouts and Filters:

1. Available Products:

a. Kristar

2. Downspouts: Plain round with mitered elbows. Furnish wall brackets of same material and finish as downspouts, with anchors.

a. Prepainted, Zinc-Coated Steel: 0.028 inch thick.

C. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counter flashing pieces. Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

1. Zinc-Coated Steel: Nominal 0.022-inch thickness.

D. Counter flashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped.

1. Zinc-Coated Steel: Nominal 0.022-inch thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement.

B. Coat back side of aluminum roof specialties with bituminous coating where they will contact wood, ferrous metal, or cementitious construction.

C. Separate dissimilar metals with a bituminous coating or polymer-modified, bituminous sheet underlayment.

D. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless indicated.
- E. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Prein edges of sheets to be soldered to a width of 1-1/2 inches, except where pretinned surface would show in finished Work.
- G. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.
- H. Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counter flashings overlap 4 inches over top edge of base flashings.

END OF SECTION 077100

SECTION 078100 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and research/evaluation reports.
- B. Provide products identical to those tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.
- C. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."

PART 2 - PRODUCTS

2.1 SPRAY –ON APPLIED FIREPROOFING

- A. Products:
 - 1. W.R. Grace/Monokote MK-6
 - 2. Isolatek International/Cafco 300
 - 3. Southwest Vermiculite Co., Inc./Type 5 Cementitious Fireproofing
 - 4. Albi Manufacturing Division, Stanchem, inc./Duraspray
 - 5. Carbolite Corp./Pyrolite I
- B. Material Composition: As follows:
 - 1. Cementitious fireproofing consisting of factory-mixed, dry formulation of gypsum or portland cement binders, additives, and lightweight mineral or synthetic aggregates mixed with water at Project site.
 - 2. Sprayed-fiber fireproofing consisting of factory-mixed, dry formulation of inorganic binders, mineral fibers, fillers, and additives mixed with water at spray nozzle.
- C. Physical Properties: Minimum values unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, as follows:
 - 1. Dry Density: 15 lb/cu. ft., or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."
 - 2. Bond Strength: 150 lbf/sq. ft. per ASTM E 736.
 - 3. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
 - 4. Effect of Impact on Bonding: No cracking, spalling, or delamination per ASTM E 760.

5. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours per ASTM E 859.
- D. Auxiliary Materials: Provide auxiliary materials that are compatible with applied fireproofing and substrates and are approved by a testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
 1. Sealer/Topcoat for Sprayed-Fiber Fireproofing: Protective coating recommended in writing by fireproofing manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Clean substrates of substances that could impair bond of fireproofing, including dirt, oil, grease, release agents, rolling compounds, loose mill scale, and incompatible primers, paints, and encapsulants.
- B. Extend fireproofing in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by fireproofing manufacturer, install body of fireproofing in a single course. Spray apply fireproofing to maximum extent possible.
- C. Apply fireproofing in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition, but not less than 0.375-inch thickness, and 15-lb/cu. ft. dry density.
- D. Apply sealer/topcoat to sprayed-fiber fireproofing.
- E. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 078100

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Installer certificates signed by Installer certifying that products have been installed in compliance with requirements.

PART 2 - PRODUCTS

2.1 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping materials that are compatible with one another, substrates, and penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls and Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating at Fire-Resistance-Rated Walls: Not less than that of construction penetrated.
 - 2. F-Rating at Horizontal Assemblies: At least 1 hour, but not less than that of construction penetrated.
 - 3. T-Rating at Horizontal Assemblies: At least 1 hour, but not less than the fire-resistance rating of construction penetrated except for penetrations within the cavity of a wall.
- C. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.
- D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

- B. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Include the following information on labels:
1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Designation of applicable testing and inspecting agency.
 3. Manufacturer's name.
 4. Installer's name.
- C. Owner will engage a qualified testing agency to perform tests and inspections.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and color Samples.
- B. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions.
- B. Sealant for Use in Building Expansion Joints:
 - 1. Single-component, neutral-curing silicone sealant, ASTM C 920, Type S; Grade NS; Class 50; for Use NT.
- C. Sealant for General Exterior Use Where Another Type Is Not Specified, One of the Following:
 - 1. Single-component, nonsag polysulfide sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT.
- D. Sealant for Exterior Traffic-Bearing Joints, Where Slope Precludes Use of Pourable Sealant:
 - 1. Single-component, nonsag urethane sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use T.
- E. Sealant for Exterior Traffic-Bearing Joints, Where Slope Allows Use of Pourable Sealant:
 - 1. Single-component, pourable urethane sealant, ASTM C 920, Type S; Grade P; Class 25; for Use T.
- F. Sealant for Use in Interior Joints in Ceramic Tile and Other Hard Surfaces in Kitchens and Toilet Rooms and Around Plumbing Fixtures:
 - 1. Single-component, mildew-resistant silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT; formulated with fungicide.
- G. Sealant for Interior Use at Perimeters of Door and Window Frames:

1. Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

H. Acoustical Sealant:

1. Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission as demonstrated by testing according to ASTM E 90.

2.2 MISCELLANEOUS MATERIALS

- A. Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.
- D. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with ASTM C 1193.
- B. Install sealant backings to support sealants during application and to produce cross-sectional shapes and depths of installed sealants that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal perimeters, control joints, openings, and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions. Comply with ASTM C 919.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheets: ASTM A 1008/A 1008M, suitable for exposed applications.
- B. Hot-Rolled Steel Sheets: ASTM A 1011/A 1011M, free of scale, pitting, or surface defects.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, G60 or A60.
- D. Frame Anchors: ASTM A 591/A 591M, 40Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, sheet steel complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

2.2 HOLLOW METAL DOORS AND FRAMES

- A. Products:
 - 1. Steelcraft Manufacturing Co., Cincinnati, Ohio
 - 2. Curries Co., Mason City, Iowa
 - 3. Ceco Corp., Oakbrook, Illinois.
- B. Fire-Rated Doors and Frames: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, based on testing at positive pressure according to NFPA 252.
 - 1. At vertical exit enclosures and exit passageways, provide doors that that have a temperature rise rating of 450 deg F.
- C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.
- D. Doors: Complying with ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level indicated, 1-3/4 inches thick unless otherwise indicated.

1. Interior Doors: Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush). 18 Ga.
 2. Exterior Doors: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush), metallic-coated steel sheet faces. 16 Ga.
 - a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors with thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 3. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as door face sheets.
- E. Frames: ANSI A250.8; conceal fastenings unless otherwise indicated.
1. Steel Sheet Thickness for Interior Doors: 16 Ga.
 2. Steel Sheet Thickness for Exterior Doors: 12 Ga.
 3. Fabricate interior frames with mitered or coped and continuously welded corners.
 4. Fabricate exterior frames from metallic-coated steel sheet, with mitered or coped and continuously welded corners.
 5. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
 6. Frame Anchors: Not less than 0.042 inch thick.
- F. Glazing Stops: Nonremovable stops on outside of exterior doors and on secure side of interior doors; screw-applied, removable, glazing stops on inside, fabricated from same material as door face sheet in which they are installed.
- G. Door Louvers: Light proof per SDI 111C.
1. Fire-Rated Automatic Louvers: Actuated by fusible links and listed and labeled.
- H. Door Silencers: Three on strike jambs of single-door frames and two on heads of double-door frames.
- I. Grout Guards: Provide where mortar might obstruct hardware operation.
- J. Prepare doors and frames to receive mortised and concealed hardware according to ANSI A250.6 and ANSI A115 Series standards.
- K. Reinforce doors and frames to receive surface-applied hardware.
- L. Prime Finish: Manufacturer's standard, factory-applied coat of lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install hollow metal frames to comply with ANSI/SDI A250.11.

1. Fire-Rated Frames: Install according to NFPA 80.
- B. Install doors to provide clearances between doors and frames as indicated in ANSI/SDI A250.11.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying rust-inhibitive primer.

3.2 PROTECTION

- A. Protection: Protect frames as recommended by frames manufacturer to ensure frames are without damage at time of substantial completion.
 1. Shop finished frames: Refinish or replace damaged frames.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Samples for factory-finished doors.
 - 1. Product Data: Submit manufacturer's literature
 - 2. Shop Drawings: Indicate general construction, jointing methods, hardware locations and locations of cut outs.
 - 3. Samples: Furnish samples of wood door corner section.
 - a. Shop finished wood door section where doors are furnished shop finished.
 - b.
 - 4. Certificates: Submit manufacturer certification indicating compliance to applicable requirements of WDMA and Woodwork Institute Standards.
- B. Project Conditions:
 - 1. Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized in accordance with referenced standards requirements applicable to project location.
- C. Warranty:
 - 1. Special warranty: Provide for replacing, re-hanging and refinishing wood doors exhibiting defects in materials or workmanship including warp and delaminating.
 - a. Special warranty period: Two (2) years.

PART 2 - PRODUCTS

2.1 DOOR CONSTRUCTION, GENERAL

- A. Quality Standard: WDMA I.S.1-A.
- B. Fire-Rated Wood Doors: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at positive pressure according to NFPA 252 or UL 10B .
 - 1. At vertical exit enclosures and exit passageways, provide doors that have a temperature rise rating of 450 deg F.
- C. Forest Certification: Provide doors made with cores not less than 70 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

- D. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- E. WDMA I.S.1-A Performance Grade:
 - 1. Heavy Duty unless otherwise indicated.
 - 2. Extra Heavy Duty: Public toilets Janitor's closets Assembly spaces Exits Patient rooms.
- F. Particleboard-Core Doors: Provide blocking in particleboard cores or provide structural composite lumber cores instead of particleboard cores for doors with exit devices or protection plates.
- G. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated. Provide the following for mineral-core doors:
 - 1. Composite blocking where required to eliminate through-bolting hardware.
 - 2. Laminated-edge construction.
 - 3. Formed-steel edges and astragals for pairs of doors.

2.2 FLUSH WOOD DOORS

- A. Products:
 - 1. Algoma Hardwoods, Inc.
 - 2. Eggers Industries Architectural Door Division.
 - 3. Marshfield Door Systems, Inc.
- B. Doors for Opaque Finish:
 - 1. Interior Solid-Core Doors: WI MoM/Premium Grade Hot press, 1-3/4" thick solid wood framed glued block construction of particleboard core five ply construction.
 - a. WDMA: In addition to WI MoM/Premium Grade, conform to requirements of WDMA; where conflicts occur, comply with the most restrictive requirement.
 - b. Face Veneers: WI MoM/Premium Grade medium density overlay for painted finish.
 - c. Edges: Stile edges to match face veneer, minimum 1-1/8" thick after trim.
 - d. Core: Bond stiles and rails to core and sand prior to assembly of face veneers.
 - e. Bond Type: Type II bond, interior.

2.3 LOUVERS AND LIGHT FRAMES

- A. Louvers: Primed steel louvers.

2.4 FABRICATION AND FINISHING

- A. Factory fit doors to suit frame-opening sizes indicated and to comply with clearances specified.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3.
- C. Cut and trim openings to comply with referenced standards.
 - 1. Trim light openings with moldings indicated.
 - 2. Factory install glazing in doors indicated to be factory finished.
 - 3. Factory install louvers in prepared openings.
- D. Factory finish doors indicated for opaque finish with manufacturer's standard finish complying with WDMA OP-4.
 - 1. Sheen: See Section 09900 Paint.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install doors to comply with manufacturer's written instructions and WDMA I.S.1-A, and as indicated.
 - 1. Install fire-rated doors to comply with NFPA 80.
- B. Align and fit doors in frames with uniform clearances and bevels. Machine doors for hardware. Seal cut surfaces after fitting and machining.
- C. Clearances: As follows unless otherwise indicated:
 - 1. 1/8 inch at heads, jambs, and between pairs of doors.
 - 2. 1/8 inch from bottom of door to top of decorative floor finish or covering.
 - 3. 1/4 inch from bottom of door to top of threshold.
 - 4. Comply with NFPA 80 for fire-rated doors.
- D. Repair, refinish, or replace factory-finished doors damaged during installation, as directed by Architect.
- E. Maximum diagonal distortion of 1/16".
- F. Re-hang or replace doors which do not swing or operate freely.

3.2 PROTECTION

- A. Protection: Protect doors as recommended by door manufacturer to ensure doors are without damage at time of substantial completion.

- 1. Shop finished doors: Refinish or replace damaged doors.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Fire-Rated Access Doors and Frames: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing per the following:
 - 1. Vertical Access Doors: .
 - 2. Horizontal Access Doors and Frames: .

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel Sheets: ASTM A 1008/A 1008M or ASTM A 591/A 591M.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, with A60 or G60 coating.
- C. Stainless-Steel Sheets: ASTM A 666, Type 304, with No. 4 directional satin finish.

2.2 ACCESS DOORS AND PANELS

- A. Products:
 - 1. Milcor, inc.
 - 2. J.L. Industries
 - 3. Karp Associates, Inc.
- B. Flush Access Doors and Frames with Exposed Trim: Prime-painted steel units.
- C. Flush Access Doors and Trimless Frames: Prime-painted steel units with drywall bead flange.
- D. Recessed Access Doors and Trimless Frames: Prime-painted steel units with drywall bead for gypsum board surfaces with plaster bead for plaster surfaces.
- E. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Prime-painted steel, self-latching units with automatic closer.
- F. Fire-Rated, Insulated, Flush Access Doors and Trimless Frames: Prime-painted steel, self-latching units with automatic closer.

- G. Fire-Rated, Uninsulated, Flush Access Doors and Frames with Exposed Trim: Prime-painted steel, self-latching units with automatic closer.
- H. Locks: Flush to finished surface, key operated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install access doors and panels accurately in position. Adjust hardware and door and panels for proper operation.
- B. Install fire-rated access doors and panels according to NFPA 80.

END OF SECTION 083113

SECTION 083483 ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Smoke detector activated elevator door smoke containment screen and control system designed to provide a tight-fitting, smoke- and draft-control assembly.
- B. Products Supplied But Not Installed Under This Section:
 - 1. End-of-line diode (3.9V, 2W). Installed at smoke detector to monitor the circuit.
- C. Related Sections:
 - 1. 09 2200–Non-Load Bearing Wall Framing: Metal backing in housing mounting area.
 - 2. 09 9100–Paints: Field painting of specified components.
 - 3. 28 3000–Detection and Alarm: Provision of smoke detectors.
 - 4. 14 2400–Hydraulic Elevators.
 - 5. Division 26 Sections for 120VAC and control circuit power including conduit, boxes, conductors, wiring devices, and emergency power.

1.02 REFERENCES

- A. ASTM A240/240M – Standard Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.
- B. ICC Evaluation Service ES-AC77 – Acceptance Criteria for Smoke-Containment Systems Used With Fire-Resistive Elevator Hoistway Doors and Frames.
- C. ICC Evaluation Service report ESR-1136
- D. NFPA Codes and Standards:
 - 1. 70 – National Electrical Code.
 - 2. 105 – Recommended Practice for the Installation of Smoke-Control Door Assemblies.
 - 3. 72-2002 and 2007 – National Fire Alarm Code
- E. International Building Code
 - 1. 2003 – Sections 715.3 and 715.3.3.
 - 2. 2006 – Sections 715.4.3.1 and 715.4.
- F. UL Standards:
 - 1. 268 – Smoke Detectors for Fire Protective Signaling Systems.
 - 2. 508 – Industrial Control Equipment.
 - 3. 864 – Control Units for Fire Protective Signaling Systems.
 - 4. 1784 – Air Leakage Tests for Door Assemblies.

1.03 SUBMITTALS

- A. Reference Section 01 3300–Submittal Procedures; submit following items:
 - 1. Product Data.
 - 2. Shop Drawings: Include door width and height, jamb width, jamb and head projection, screen width, mounting height, and housing width. Show and identify related work performed under other sections of the specifications.

3. Quality Assurance/Control Submittals:
 - a. Qualifications:
 - 1) Proof of manufacturer qualifications.
 - 2) Proof of Installer qualifications.
 - b. Certifications: Copy of specified items.
 - c. Manufacturer's installation instructions and testing procedures

1.04 CLOSEOUT SUBMITTALS

- A. Comply with Section 01 7700–Closeout Submittals; submit following items:
 1. Operation and Maintenance Manual and Video.
 2. Manufacturer's Warranties

1.05 QUALITY ASSURANCE

- A. Overall Standards:
 1. Manufacturer shall maintain a quality control program in accordance with ICC-ES Acceptance Criteria 77.
- B. Qualifications:
 1. Manufacturer Qualifications: Minimum seven years experience in producing smoke containment systems of the type specified.
 2. Installer Qualifications: Factory trained by manufacturer.
- C. Certifications:
 1. Manufacturer's ICC Evaluation Service report ESR-1136.
 2. California Department of Forestry and Fire Protection and Office of the State Fire Marshal Listing.
 3. Testing Laboratory Label.
 4. UL Listing.
 5. OSHPD Anchorage Pre-Approval No. OPA-0318
- D. Pre-Installation Meeting:
 1. Schedule and convene a pre-installation meeting prior to commencement of field operations with representatives of the following in attendance: Owner, Architect, General Contractor, smoke containment system sub-contractor, painting sub-contractor, and electrical sub-contractor.
 2. Review substrate conditions, requirements of related work, installation instructions, storage and handling procedures, and protection measures.
 3. Keep minutes of meeting including responsibilities of various parties and deviations from specifications and installation instructions.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section 01 6600–Delivery, Storage, and Handling.
- B. Comply with manufacturer's instructions.

1.07 WARRANTY

- A. Provide manufacturer's standard one year warranty.

- B. Maintenance and Testing:
 - 1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer's warranty, code agency evaluation reports, and as required by local authority having jurisdiction.
 - 2. Backup Battery: Test semi-annually during warranty period.
 - 3. Provide test documentation.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

- A. Smoke Guard Model 200
- B. Manufacturer:
 - 1. Smoke Guard Systems, 287 Maple Grove, Boise, Idaho 83704
<http://www.smokeguard.com/>
 - 2. Local Distributor; Bill Kangieser; 1915 Mark Court, Suite 100; Concord, CA; (877) - 345-1276
- C. Label each smoke containment system with following information:
 - 1. Manufacturer's name.
 - 2. Maximum leakage rating at specified pressure and temperature conditions.
 - 3. Label of quality control agency.

2.02 PERFORMANCE

- A. Air Leakage: Not to exceed 3 cfm (0.001416 m³/s) per sf of door opening at 0.1 in (25 Pa) water pressure differential at ambient temperature and 400 degrees F (204 degrees C) tested per IBC 2000 714.2.3.

2.03 COMPONENTS

- A. Screen:
 - 1. Film: Minimum 1 mil (0.025 mm) thick transparent polyimide film reinforced with minimum 100 denier Nomex yarn at .25 in (6.35 mm) each way.
 - 2. Magnetic Strips: Flexible multi-pole strips attached to longitudinal edges of film with low modulus silicone adhesive.
- B. Housing: 20 gage, powder coated, cold rolled steel container with dust cover and door with concealed hinges and a latch. Housings are 55 inches or 64 inches in length, plus 1-1/2 inches for a junction box on the left side.
- C. Mandatory Auxiliary Rails:
 - 1. Material: 16 gage ASTM A 240/240M, Type 430, ferritic stainless steel.
 - 2. Size: 2 in (51 mm) wide, 1" (25 mm) deep, as shown in Shop Drawings.
- D. Rewind Motor: NFPA 70, 90v DC.
- E. Release Mechanism: Comply with UL Standard No. 864.
- F. Screen Rewind Switch: Include switch to rewind screen into housing.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates upon which work will be installed.
 - 1. Verify related work performed under other sections is complete and in accordance with Shop Drawings.
 - 2. Verify wall surfaces and elevator door frames are acceptable for installation of smoke containment system components.
- B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- C. Commencement of work by installer is acceptance of substrate.

3.02 INSTALLATION

- A. Install smoke containment system components in accordance with manufacturer's installation instructions. See detail 4/A703 in the construction document set.

3.03 FIELD QUALITY CONTROL

- A. Field Test: Follow manufacturer's cycle test procedures.
 - 1. Notify Owner's Representative, local Fire Marshal, alarm sub-contractor and [elevator sub-contractor] [elevator service company] minimum one week in advance of scheduled testing.
 - 2. Complete maintenance service record.

3.04 DEMONSTRATION

- A. Demonstrate required testing and maintenance procedures to Owner's Representative.
- B. Maintenance and Testing:
 - 1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer's warranty, code agency evaluation reports, and as required by local authority having jurisdiction.
 - 2. Backup Battery: Test semi-annually and replace every three years minimum.
 - 3. Retain permanent record of tests.
- C. Future Painting: Paint elevator door frame and/or auxiliary rails in accordance with Operation and Maintenance Manual.
- D. Qualified Smoke Guard Inspector assesses unit(s) after exposure to a fire event.

END OF SECTION

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and color Samples.
 - 1. For entrance doors, include hardware schedule.

PART 2 - PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS

- A. Products:
 - 1. Arcadia
 - 2. Kawneer Company, Inc.
 - 3. Vistawall Architectural Products
 - 4. Tubelite Inc...
- B. Accessible Entrances: Comply with ICC/ANSI A117.1.
- C. Performance Requirements:
 - 1. Limit deflection of framing members normal to wall plane to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Limit deflection of framing members parallel to glazing plane to L/360 of clear span or 1/8 inch, whichever is smaller.
 - 3. Structural Testing: Systems tested according to ASTM E 330 at 150 percent of inward and outward wind-load design pressures do not evidence material failures, structural distress, deflection failures, or permanent deformation of main framing members exceeding 0.2 percent of clear span.
 - 4. Air Infiltration: Limited to 0.06 cfm/sq. ft. of system surface area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft..
 - 5. Water Penetration: Systems do not evidence water leakage when tested according to ASTM E 331 at minimum differential pressure of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft...
 - 6. Thermal Conductance: Average U-factor of not more than 0.57 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

- D. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated; ASTM B 209 sheet; ASTM B 221 extrusions.
- E. Glazing: As specified in Division 08 Section "Glazing."
- F. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- G. Doors: 1-3/4-inch- thick glazed doors with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods. Provide snap-on extruded-aluminum glazing stops, and preformed gaskets.
 - 1. Door Design: Narrow stile; 2-1/8-inch nominal width.
 - 2. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
 - 3. Interior Doors: Provide ANSI/BHMA A156.16 silencers, three on strike jamb of single-door frames and two on head of double-door frames.
 - 4. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
 - 5. Hardware: As specified in Division 08 Section "Door Hardware."
- H. Fasteners and Accessories: Compatible with adjacent materials, corrosion resistant, nonstaining, and nonbleeding. Use concealed fasteners except for application of door hardware.
- I. Fabrication: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide sub frames and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.
 - 1. Door Framing: Reinforce to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units for hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
- J. Aluminum Finish: Class I, clear anodic finish; AA-M12C22A41; complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Isolate metal surfaces in contact with incompatible materials, including wood, by painting contact surfaces with bituminous coating or primer, or by applying sealant or tape recommended by manufacturer.
- B. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

- C. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weather tight installation.
- D. Install framing components true in alignment with established lines and grades to the following tolerances:
 - 1. Variation from Plane: Limit to 1/8 inch in 12 feet; 1/4 inch over total length.
 - 2. Alignment: For surfaces abutting in line, limit offset to 1/16 inch. For surfaces meeting at corners, limit offset to 1/32 inch.
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.
- E. Install doors without warp or rack. Adjust doors and hardware to provide tight fit at contact points and smooth operation.

3.2 PROTECTION

- A. Protection: Protect frames as recommended by frames manufacturer to ensure frames are without damage at time of substantial completion.
 - 1. Shop finished frames: Refinish or replace damaged frames.

END OF SECTION 084113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Hardware schedule.
- B. Deliver keys to Owner.
- C. Fire-Resistance-Rated Assemblies: Provide products that comply with NFPA 80 and are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for applications indicated. On exit devices provide label indicating "Fire Exit Hardware."

PART 2 - PRODUCTS

2.1 HARDWARE

- A. Manufacturer index & Allowable Substitutions

Item	Manufacturer	Acceptable Alternate
Hinges	Ives	Bommer
Pivots	Ives	Rixon
Key Systems	Schlage	Owner Standard
Locks	Schlage	Owner Standard
Exit Devices	Von Duprin	Owner Standard
Closers	LCN	Owner Standard
Flush Bolts	Ives	Rockwood
Kick plates	Ives	Rockwood
Stops and Holders	Ives	Rockwood
Overhead Stops	Glynn-Johnson	None Available
Thresholds	Pemko	National Guard
Seals and Bottoms	Pemko	National Guard
Steel Frames	Timely	Owner Standard

- B. Manufacturers Abbreviations:

- 1. HAG Hagar Companies
- 2. IVE H.B. Ives
- 3. LCN LCN Commercial Division
- 4. PEM Pemko Mfg. Co.
- 5. SCE Schlage Electronic Security
- 6. SCH Schlage Lock Company
- 7. SIM Simplex Access Controls
- 8. TRI Trimco / BBW / Quality

- 9. VON Von Duprin
- 10. TIM Timely prefinished steel door frames
- 11. GLY Glynn-Johnson
- 12. NGP National Guard

C. Hinges:

- 1. Non removable hinges with stainless-steel pins for exterior.
- 2. Non removable hinge pins for exterior and public interior exposure.
- 3. Ball-bearing hinges for doors with closers and entry doors.
- 4. 3 hinges for 1-3/4-inch- thick doors 90 inches or less in height; 4 hinges for doors more than 90 inches in height.

D. Locksets and Latchsets:

- 1. BHMA A156.2, Series 4000, for bored locks and latches.
- 2. BHMA A156.3, Grade 1 for exit devices.
- 3. BHMA A156.5, for auxiliary locks.
- 4. BHMA A156.12, Series 5000, for interconnected locks and latches.
- 5. BHMA A156.13, Series 1000, for mortise locks and latches.
- 6. Provide trim on exit devices matching locksets.

E. Key locks to Owner's master-key system.

- 1. Cylinders with 6-pin tumblers.
- 2. Provide cylinders for and other locking doors that do not require other hardware.
- 3. Provide construction keying.
- 4. Provide key control system, including cabinet.

F. Closers:

- 1. Mount closers on interior side (room side) of door opening. Provide regular-arm, parallel-arm, or top-jamb-mounted closers as necessary.
- 2. Adjustable delayed opening (accessible to people with disabilities) feature on closers.

G. Provide wall stops or floor stops per hardware schedule for doors without closers.

H. Provide hardware finishes as follows:

ANSI	US	Description	Base Metal
625	US26D	SATIN CHROMIUM PLATED OVER NICKEL	BRASS, BRONZE
630	US32D	SATIN STAINLESS STEEL	STAIN
652	US26D	SATIN CHROMIUM PLATED OVER NICKEL	STEEL
689	US28	ALUMINUM PAINTED	ANY
AL	US28	ALUMINUM MILL FINISH	ALUMINUM
DKB	US10B	DARK BRONZE	ANY
GRY		GREY	ANY

- 1. Other Hardware: Matching finish of lockset/latchset.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount hardware in locations recommended by the Door and Hardware Institute unless otherwise indicated.

3.2 HARDWARE SCHEDULE

Heading 01 (HwSet 01)

1	SGL	DOOR 101 / MED WASTE		LHR
1	SGL	DOOR 102 / ELEV MECHANICAL		RHR
1	SGL	DOOR 103 / STORAGE		LH
1	SGL	DOOR 104 / CLOSET		LH
1	SGL	DOOR 106A / STAIR		RH
1	SGL	DOOR 109 / TELCO		RHR
1	SGL	DOOR R02 / STAIR		LHR
		3'0" x 7'0" x 1-3/4" x HMD x HMF x 60MIN		
1	SGL	DOOR 301 / STAIR TO ROOF		LHR
		3'0" x 7'0" x 1-3/4" x WD x TMF x 60MIN		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626 SCH
1	EA	CORE ONLY	23-030	626 SCH
1	EA	WALL STOP	WS407CCV	630 IVE
1	SET	SEALS	S88D 17'	DK PEM B
1	EA	DOOR SWEEP	57AV 36"	AL PEM
1	EA	THRESHOLD	271A 36" MSES10	AL PEM
1	EA	KICKPLATE	8400 8" X 34"	630 IVE

Heading 01A (HwSet 01A)

1	SGL	DOOR R03 / CLOSET		RH
		3'0" x 7'0" x 1-3/4" x HMD x HMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652 IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626 SCH
1	EA	CORE ONLY	23-030	626 SCH
1	EA	WALL STOP	WS407CCV	630 IVE

1	SET	SEALS	S88D 17'	DKB	PEM
1	EA	DOOR SWEEP	57AV 36"	AL	PEM
1	EA	THRESHOLD	271A 36" MSES10	AL	PEM
1	EA	KICKPLATE	8400 8" X 34"	630	IVE

Heading 02 (HwSet 02)

1	SGL	DOOR 217 / ELECTRICAL ROOM		LHR	
1	SGL	DOOR 234 / TELCO		RH	
1	SGL	DOOR 271 / UNFINISHED SPACE		LHR	
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD			
1	SGL	DOOR 283 / UNFINISHED SPACE		RH	

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 CUSH FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 8" X 34"	630	IVE

Heading 02A (HwSet 02A)

1	SGL	DOOR 201 / LAB WAITING ROOM		LH	
1	SGL	DOOR 206 / MEDICAL RECORDS WAITING ROOM		LH	
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD			

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 CUSH FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 02B (HwSet 02B)

1	SGL	DOOR 223B / SICK WAITING		LH	
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD			

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 CUSH FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 03 (HwSet 03)

1	SGL	DOOR 224A / PEDS PSR	RH
1	SGL	DOOR 247B / AC PSR	LH
3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD			

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	ELECTRIC STRIKE	3234	630	TRN
1	EA	SURFACE CLOSER	1461 FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	EA	POWER SUPPLY	PS861	GRY	VON
1	EA	RISER DIAGRAM	RISER/WIRING DIAGRAM		VON
4	EA	BUTTON MINI BOX	660-PB		SCE

Heading 03A (HwSet 03A)

1	SGL	DOOR 224B / PEDS PSR	LHR
1	SGL	DOOR 247A / AC PSR	RHR
3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD			

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	FIRE EXIT HARDWARE	99L-F-17 996L 3'	626	VON
1	EA	RIM CYLINDER	20-057-ICX (SPECIFY A, B OR C)	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	ELECTRIC STRIKE	4800	630	TRN
1	EA	SURFACE CLOSER	1461 FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	EA	POWER SUPPLY	PS861	GRY	VON
1	EA	RISER DIAGRAM	RISER/WIRING DIAGRAM		VON
4	EA	BUTTON MINI BOX	660-PB		SCE

Heading 04 (HwSet 04)

1	SGL	DOOR 208 / OFFICE	RH
1	SGL	DOOR 209 / OFFICE	LH
1	SGL	DOOR 244 / 1 ST FIVE	LH
1	SGL	DOOR 245 / 1 ST FIVE	RH
1	SGL	DOOR 246 / OFFICE	RH
1	SGL	DOOR 256 / OFFICE	RH
1	SGL	DOOR 257 / OFFICE	LH
1	SGL	DOOR 260 / OFFICE	RH
1	SGL	DOOR 261 / OFFICE	LH
1	SGL	DOOR 273 / OFFICE	LH

1	SGL	DOOR 274 / OFFICE		RH
1	SGL	DOOR 276 / OFFICE		LH
1	SGL	DOOR 277 / CONFERENCE		RH
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	ND53TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	S88D 17'	DKB	PEM
1	EA	DOOR BOTTOM	4131SNNBL 36" - SEMI-MORTISE	AL	PEM

Heading 05 (HwSet 05)

1	SGL	DOOR 203 / RESTROOM		RHR
1	SGL	DOOR 205 / RESTROOM		LHR
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY SET	ND40S SPA	626	SCH
1	EA	SURFACE CLOSER	1461 FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 05A (HwSet 05A)

1	SGL	DOOR 203 / LAB RESTROOM		RHR
1	SGL	DOOR 205 / LAB RESTROOM		LHR
1	SGL	DOOR 227 / RESTROOM		RH
1	SGL	DOOR 238 / RESTROOM		LH
1	SGL	DOOR 259 / RESTROOM		LH
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 05B (HwSet 05B)

1	SGL	DOOR 258 / HALLWAY		RH
---	-----	--------------------	--	----

1	SGL	DOOR 272A / HALLWAY		RHR
1	SGL	DOOR 272B / UNFINISHED SPACE		LHR
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	SIMPLEX LOCK	L1021 W/ FULL SIZE I/C CORE	626	SIM
1	EA	CORE ONLY	23-030	626	SCH
1	EA	SURFACE CLOSER	1461 FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 05C (HwSet 05C)

1	SGL	DOOR 280 / RESTROOM		RH
1	SGL	DOOR 281 / RESTROOM		LH
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	SURFACE CLOSER	1461 FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 06 (HwSet 06)

1	SGL	DOOR 210 / EXAM ROOM		LH
1	SGL	DOOR 212 / TRAUMA		LH
1	SGL	DOOR 215 / EXAM ROOM		LH
1	SGL	DOOR 216 / EXAM ROOM		LH
1	SGL	DOOR 218 / EXAM ROOM		LH
1	SGL	DOOR 219 / EXAM ROOM		LH
1	SGL	DOOR 220 / PROVIDERS		LH
1	SGL	DOOR 221 / EXAM ROOM		LH
1	SGL	DOOR 222 / EXAM ROOM		LH
1	SGL	DOOR 226 / AUTOCLAVE		LH
1	SGL	DOOR 229 / EXAM ROOM		LH
1	SGL	DOOR 230 / EXAM ROOM		LH
1	SGL	DOOR 231 / EXAM ROOM		LH
1	SGL	DOOR 232 / EXAM ROOM		LH
1	SGL	DOOR 233 / EXAM ROOM		LH
1	SGL	DOOR 235 / EXAM ROOM		RH
1	SGL	DOOR 236 / EXAM ROOM		LH
1	SGL	DOOR 237 / EXAM ROOM		LH
1	SGL	DOOR 239 / EXAM ROOM		LH
1	SGL	DOOR 240 / AUTOCLAVE		RH
1	SGL	DOOR 241 / TRAUMA		LH
1	SGL	DOOR 252 / EXAM ROOM		LH
1	SGL	DOOR 253 / EXAM ROOM		LH
1	SGL	DOOR 254 / EXAM ROOM		LH

1	SGL	DOOR 262 / EXAM ROOM		LH
1	SGL	DOOR 263 / EXAM ROOM		LH
1	SGL	DOOR 264 / PROVIDERS		LH
1	SGL	DOOR 266 / EXAM ROOM		LH
1	SGL	DOOR 267 / EXAM ROOM		LH
1	SGL	DOOR 268 / EXAM ROOM		LH
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 06A (HwSet 06A)

1	SGL	DOOR 223A / SICK WAITING		RH
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	SURFACE CLOSER	1461 RW/PA	689	LCN
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 07 (HwSet 07)

1	SGL	DOOR 207B / MED RECORDS		LHR
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 07A (HwSet 07A)

1	SGL	DOOR 207A / MED RECORDS		LH
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD		

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 08 (HwSet 08)

1	SGL	DOOR 228 / NURSE STORAGE			LH
1	SGL	DOOR 255 / NURSE STORAGE			RH
1	SGL	DOOR 279 / JANITOR			RH
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD			

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	KICK PLATE	8400 8" X 34"	630	IVE

Heading 09 (HwSet 09)

1	PR	DOOR R01 / CLOSET			RHA
		6'0" x 7'0" x 1-3/4" x HMD x HMF x NON-RTD			

Each Assembly to have:

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB42	630	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	ASTRAGAL	357C 84"		AL PEM
2	EA	KICK PLATE	8400 10" X 34"	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE

Heading 10 (HwSet 10)

1	SGL	DOOR 204 / LAB			
		3'6" x 7'0" x 1-3/4" x WD x x NON-RTD			
		POCKET DOOR			

Each Assembly to have:

1	SET	TRACK & HARDWARE	9110-84		HAG
2	EA	POCKEY PULL LOCKS	1069L	630	TRI
1	EA	TRIM FOR OPENING			TIM

Heading 12 (HwSet 12)

1	SGL	DOOR 202 / LAB WAITING ROOM			RH
		3'0" x 7'0" x 1-3/4" x WD x TMF x NON-RTD			

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
---	----	-------	----------------	-----	-----

1	EA	ENTRANCE LOCK	ND53TD SPA	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
1	EA	KICK PLATE	8400 8" X 34"	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Heading 13 (HwSet 13)

1	PR	DOOR 100B / LOBBY		LHRA
			6'0" x 7'0" x 1-3/4" x HMD x HMF x 60MIN	

Each Assembly to have:

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	FIRE EXIT HARDWARE	9947EO-F-LBR 3'	626	VON
1	EA	FIRE EXIT HARDWARE	9947L-F-LBR-17 996L 3'	626	VON
1	EA	RIM CYLINDER	20-057-ICX (SPECIFY A, B OR C)	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
2	EA	SURFACE CLOSER	1461 CUSH FC TB SRT	689	LCN
2	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	SET	SEALS	S88D 20'	DKB	PEM
1	EA	THRESHOLD	271A 72" MSES10	AL	PEM

Heading 13A (HwSet 13A)

1	PR	DOOR 107 / SDG&E		RHRA
			6'0" x 7'0" x 1-3/4" x HMD x HMF x 60MIN	

Each Assembly to have:

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	FIRE EXIT HARDWARE	9947EO-F-LBR 3'	626	VON
1	EA	FIRE EXIT HARDWARE	9947L-F-LBR-17 996L 3'	626	VON
1	EA	RIM CYLINDER	20-057-ICX (SPECIFY A, B OR C)	626	SCH
1	EA	CORE ONLY	SDG&E VTQP CYLINDER	626	SCH
2	EA	SURFACE CLOSER	1461 CUSH FC TB SRT	689	LCN
2	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	SET	SEALS	S88D 20'	DKB	PEM
1	EA	THRESHOLD	271A 72" MSES10	AL	PEM

Heading 14 (HwSet 14)

1	SGL	DOOR 106B / STAIR #3		LHR
1	SGL	DOOR 108 / STAIR #2		LHR
			3'0" x 7'0" x 1-3/4" x HMD x HMF x NON-RTD	

Each Assembly to have:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	99EO 3'	626	VON
1	EA	SURFACE CLOSER	1461 CUSH FC TB SRT	689	LCN
1	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	SET	SEALS	S88D 17'	DKB	PEM

1 EA THRESHOLD 271A 36" MSES10 AL PEM

Heading 15A (HwSet 15A)

1 SGL DOOR 205 / STAIR #1 LH
 1 SGL DOOR 214 / STAIR #2 RH
 1 SGL DOOR 270 / STAIR #3 RH
 1 SGL DOOR 300 / STAIR #1 LH
 1 SGL DOOR 302 / STAIR #3 RH
 1 SGL DOOR 304 / STAIR #2 RH
 3'0" x 7'0" x 1-3/4" x WD x TMF x 60MIN

Each Assembly to have:

3 EA HINGE 5BB1 4.5 X 4.5 NRP 630 IVE
 1 EA FIRE EXIT HARDWARE 99L-F-17 996L 3' 626 VON
 1 EA RIM CYLINDER 20-057-ICX (SPECIFY A, B OR C) 626 SCH
 1 EA CORE ONLY 23-030 626 SCH
 1 EA SURFACE CLOSER 1461 CUSH FC TB SRT 689 LCN
 1 EA KICK PLATE 8400 10" X 34" 630 IVE
 1 SET SEALS S88D 17' DKB PEM
 1 EA DOOR SWEEP 57AV 36" AL PEM
 1 EA THRESHOLD 271A 36" MSES10 AL PEM

Heading 16 (HwSet 16)

1 SGL DOOR G01 / GATE
 1 SGL DOOR G02 / GATE
 3'0" x 7'0" x 1-3/4" x GATE x MF x NON-RTD
 GATE

Each Assembly to have:

1 EA FIRE EXIT HARDWARE SD99 W/ SCHLAGE "C" KEYWAY 626 VON
 3 EA HINGE HEAVY DUTY ROLLER BEAKING WELDON GATE HINGE
 1 EA CLOSER "KANT SLAM" GATE & DOOR CLOSER

MISC ITEMS

Qty	Description	Catalog Number	Hand	Fin	Mfr
4	CONST CONTROL KEY	48-056 ICX (SPECIFY A, B OR C)			SCH
10	CONSTRUCTION KEY	48-101 ICX (SPECIFY A, B OR C)			SCH
47	KEYING CHARGES	50-231			SCH

END OF SECTION 087100

SECTION 087113 - AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data Shop Drawings and maintenance data.

PART 2 - PRODUCTS

2.1 DOOR OPERATORS AND ACCESSORIES

- A. Products:
 - 1. Chamberlain Group Inc.
 - 2. Liftmaster
 - 3. Elite Gate Operator
- B. Alternates: Contractor to provide line item alternates for the following:
 - 1. Battery Backup system # SL300 ULDC
 - 2. Manual Back drive for emergency access # SL3000 ULE
- C. Gate Operators: Model Number SL-3000 UL Sliding Gate
 - 1. Type: Power door operators complying with BHMA A156.10 and egress requirement in the IBC.
 - 2. Type: Low-energy door operators complying with BHMA A156.19.
 - 3. Type: Power-assist door operators complying with BHMA A156.19.
 - 4. Provide emergency breakaway feature for reverse swing of doors.
- D. Operator Controls: Combination microwave-scanner, motion-detecting control system and infrared-scanner detector with Card Key switch. Provide electrical interlocks to prevent activation of operator when door is locked. Coordinate with Owners security company.
- E. Signage: As required by cited BHMA standard for the type of operator.
- F. Guide Rails: Anodized aluminum, fabricated from bars or tubing, minimum 30 inches high, and finished to match doors unless otherwise indicated.
 - 1. Filler Panel: Expanded aluminum mesh
- G. Provide External Vehicle detection loops & loop detector wiring option with the sliding gate operator

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power door operators and controls. After use, readjust door operators and controls and lubricate hardware and moving parts. Securely anchor guide rails level and true to location.
 - 1. Power Door Operator Installation Standard: BHMA A156.10.
 - 2. Low-Energy Door Operator Installation Standard: BHMA A156.19.
- B. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of vehicular travel.

END OF SECTION 087113

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and 12-inch- square Samples.
- B. Fire-Resistance-Rated Assemblies: Provide products that comply with NFPA 80 and are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for applications indicated.
- C. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201.
- D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated.
 - 1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
 - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
 - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- E. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- F. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.
- G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

- A. Products:
 - 1. PPG Industries.

- B. Float Glass: ASTM C 1036, Type I, Quality-Q3.
- C. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3.
- D. Reflective-Coated Glass: ASTM C 1376, coated by pyrolytic or vacuum deposition (sputter-coating) process.
- E. Patterned Glass: ASTM C 1036, Type II, Class 1 (clear), Form 3; Quality-Q6.
- F. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II, Class 1 (clear), Form 3; Quality-Q6.
- G. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials.
- H. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
- I. Spandrel glass Units: PPG Starphire white ceramic frit spandrel glazing.

2.2 MONOLITHIC-GLASS TYPES

- A. Glass Type: GL-1 Clear float glass.
 - 1. Thickness: 1 / 4".
 - 2. Provide safety glazing labeling.
- B. Glass Type : GL-2 Tinted float glass. Solarban Z50
 - 1. Thickness: 1 / 4".
 - 2. Tint Color: Solar Grey + solarban Z50 (3) optiblue.
 - 3. Solar Heat Gain Coefficient: .28 maximum.
 - 4. Provide safety glazing labeling.

2.3 LAMINATED-GLASS TYPES

- A. Glass Type GL-4: Reflective-coated, tinted insulating glass.
 - 1. Overall Unit Thickness: 1 inch.
 - 2. Thickness of Each Glass Lite: 1 / 4".
 - 3. Outdoor Lite: Tinted float glass.
 - 4. Tint Color: Solar Grey + solarban Z50 (3) optiblue.
 - 5. Interspace Content: per Mfg.
 - 6. Indoor Lite: Clear float glass.
 - 7. Coating Location: per Mfg.
 - 8. Coating Color: Solar Grey + solarban Z50 (3) optiblue.
 - 9. Winter Nighttime U-Factor: .29 maximum.
 - 10. Summer Daytime U-Factor: .27 maximum.
 - 11. Solar Heat Gain Coefficient: .28 maximum.
 - 12. Provide safety glazing labeling.

B. Glass Type GL-5: Reflective-coated, tinted spandrel glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: 1 / 4".
3. Outdoor Lite: Tinted float glass with ceramic frit on inside face.
4. Tint Color: Solar Grey + solarban Z50 (3) optiblue.
5. Interspace Content: per Mfg.
6. Indoor Lite: Clear float glass.
7. White Ceramic frit Coating Location: inside face of outside Lite.
8. Coating Color: Solar Grey + solarban Z50 (3) optiblue.
9. Winter Nighttime U-Factor: .29 maximum.
10. Summer Daytime U-Factor: .27 maximum.
11. Solar Heat Gain Coefficient: .28 maximum.
12. Provide safety glazing labeling.

2.4 GLAZING SEALANTS

- A. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
- B. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are contained in GANA's "Glazing Manual."
- B. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- C. Remove nonpermanent labels, and clean surfaces immediately after installation.

END OF SECTION 088000

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 METAL FRAMING AND SUPPORTS

- A. Steel Framing Members, General: ASTM C 754.
 - 1. Steel Sheet Components: ASTM C 645. Thickness specified is minimum uncoated base-metal thickness.
 - 2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized ASTM A 653/A 653M, G60, hot-dip galvanized manufacturer's standard corrosion-resistant zinc coating.
- B. Suspended Ceiling and Soffit Framing:
 - 1. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch diameter, or double strand of 0.0475-inch- diameter wire.
 - 2. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, and 0.162-inch diameter.
 - 3. Carrying Channels: Cold-rolled steel, 0.0538 inch thick, 2-1/2 inches 2 inches 1-1/2 inches deep.
 - 4. Furring Channels: 3/4-inch- deep, cold-rolled channels, 0.0538 inch thick Steel studs, 0.0179 inch thick, in depth indicated Steel studs, 0.0296 inch thick, in depth indicated Steel, rigid hat-shaped channels; 7/8 inch deep, 0.0179 inch thick Steel, rigid hat-shaped channels; 7/8 inch deep, 0.0296 inch thick Resilient furring channels, 1/2 inch deep, with single- or double-leg configuration.
 - 5. Grid Suspension System for Interior Ceilings: Interlocking, direct-hung system.
- C. Partition and Soffit Framing:

1. Studs and Runners: In depth indicated and 0.0179 inch 0.0296 inch thick unless otherwise indicated.
2. Flat Strap and Backing: 0.0179 inch 0.0296 inch thick.
3. Rigid Hat-Shaped Furring Channels: In depth indicated and 0.0179 inch 0.0296 inch thick.
4. Resilient Furring Channels: 1/2 inch deep, with single- or double-leg configuration.
5. Cold-Rolled Furring Channels: 0.0538 inch thick, 3/4 inch deep.
6. Z-Furring: In depth required by insulation, 1-1/4-inch face flange, 7/8-inch wall-attachment flange, and 0.0179 inch thick.

2.3 ACCESSORIES

- A. General: Comply with referenced installation standards.
 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Acoustical Sealant for Concealed Joints: Nonsag, latex sealant complying with ASTM C 834.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation and with United States Gypsum's "Gypsum Construction Handbook."
 1. Gypsum Plaster Assemblies: Also comply with ASTM C 841.
 2. Portland Cement Plaster Assemblies: Also comply with ASTM C 1063.
 3. Gypsum Veneer Plaster Assemblies: Also comply with ASTM C 844.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Isolate steel framing from building structure, except at floor, to prevent transfer of loading imposed by structural movement.
 1. Where studs are installed directly against exterior walls, install asphalt-felt or foam-gasket isolation strip between studs and wall.
- D. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

END OF SECTION 092216

SECTION 092400 - PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and finish Samples.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: Where indicated, provide gypsum plaster assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.
- B. Fire-Resistance-Rated Assemblies: Where indicated, provide gypsum plaster assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.2 LATH

- A. Expanded-Metal Lath: ASTM C 847, galvanized, flat or self-furring as indicated, 3.4-lb/sq. yd. weight.
- B. Welded-Wire Lath: ASTM C 933, self-furring, 1.95 lb/sq. yd. weight.
- C. Woven-Wire Lath: ASTM C 1032, self-furring, with stiffener wire backing, 1.4 lb/sq. yd. weight. 1 1/2" 17 Ga.
- D. Paper Backing: FS UU-B-790, Type I, Grade D, Style 2, vapor-permeable paper Provide two layers of paper backing. Typical throughout.
 - 1. Provide paper-backed lath unless otherwise indicated
 - 2. Paper and lath/wire to be installed in two separate steps. Do not use paper backed lath.

2.3 ACCESSORIES

- A. Comply with ASTM C 1063 and coordinate depth of accessories with thicknesses and number of plaster coats required:
 - 1. Zinc and Zinc-Coated (Galvanized) Accessories:
 - a. Foundation Weep Scream: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating.

- b. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - c. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - d. Cornerbeads: Small-nose style, fabricated from zinc or zinc-coated (galvanized) steel.
 - e. Casing Beads: Square-edge style, fabricated from zinc or zinc-coated (galvanized) steel; with expanded flanges.
 - f. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, M-shaped configuration; with perforated flanges.
2. Plastic Trim: Fabricated from high-impact PVC.
- a. Cornerbeads: Small-nose style, with perforated flanges.
 - b. Casing Beads: Square-edge style, with perforated flanges.
 - c. Control Joints: One-piece-type, with perforated flanges and protective tape on plaster face.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in portland cement plaster.
- C. Bonding Compound: ASTM C 932.
- D. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
- E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing).
- F. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants"

2.4 PORTLAND CEMENT PLASTER

- A. Portland Cement: ASTM C 150 Type II.
- 1. Color for Finish Coats: Integral color per exterior elevations. Provide multiple colors per Construction documents sheet A501 & 502. Dunn Edwards colors.
- B. Masonry Cement: ASTM C 91, Type N.
- 1. Color for Finish Coats: White.
- C. Plastic Cement: ASTM C 1328.
- D. Lime: ASTM C 206, Type S; ASTM C 207, Type S.
- E. Sand Aggregate: ASTM C 897.
- 1. Color for Job-Mixed Finish Coats: In color matching Architect's sample.
- F. Ready-Mixed, Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Products: Omega
2. Colors for exterior finishes as indicated on drawings.
 - a. Member of the Stucco Manufacturers Association (SMA).
 - b. Provide multiple colors per Construction documents sheet A501 & 502. Dunn Edwards colors.
 - c. Finish: Finish texture "Coarse sand Finish"

2.5 PLASTER MIXES

- A. Base-Coat Mix: Portland cement and lime; comply with ASTM C 926.
- B. Job-Mixed Finish Coat: Portland cement and lime; comply with ASTM C 926.
- C. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters; comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- B. Install metal lath and accessories according to ASTM C 1063.
 1. Partition Framing and Vertical Furring: Install flat diamond-mesh lath.
 2. Flat-Ceiling and Horizontal Framing: Install flat diamond-mesh lath.
 3. Curved-Ceiling Framing: Install flat diamond-mesh lath.
 4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.
 5. Install lath-type, external-corner reinforcement at exterior locations.
 6. Install cornerbead at interior and exterior locations.
- C. Apply bonding compound on unit masonry and concrete plaster bases.
- D. Apply, and cure plaster materials and finishes to comply with ASTM C 926. Apply three coats. Apply float finish.

END OF SECTION 092400

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 PANEL PRODUCTS

- A. Provide in maximum lengths available to minimize end-to-end butt joints.
- B. Interior Gypsum Board: ASTM C 36/C 36M or ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Regular type unless otherwise indicated, Type X where indicated. Type as required for specific fire-resistance-rated assemblies. Sag-resistant type for ceiling surfaces.
- C. Exterior Gypsum Soffit Board: ASTM C 931/C 931M or ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Regular type unless otherwise indicated, Type X where required for fire-resistance-rated assemblies and where indicated.
- D. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M or ASTM C 1396/C 1396M, in thickness indicated. Regular type unless otherwise indicated, Type X where required for fire-resistance-rated assemblies and where indicated.
- E. Glass-Mat, Water-Resistant Gypsum Backing Board: ASTM C 1178/C 1178M, of thickness indicated. Regular type unless otherwise indicated, Type X where required for fire-resistance-rated assemblies and where indicated.
 - 1. Product: G-P Gypsum; Dens-Shield Tile Guard.
- F. Cementitious Backer Units: ANSI A118.9.

2.3 ACCESSORIES

- A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet. For exterior trim, use accessories formed from hot-dip galvanized-steel sheet, plastic, or rolled zinc.
 - 1. Provide cornerbead at outside corners unless otherwise indicated.
 - 2. Provide LC-bead (J-bead) at exposed panel edges.
 - 3. Provide control joints where indicated.
- B. Aluminum Accessories: Extruded-aluminum accessories indicated with manufacturer's standard corrosion-resistant primer.
- C. Joint-Treatment Materials: ASTM C 475/C 475M.
 - 1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
 - 2. Joint Compounds: Setting-type taping compound and drying-type, ready-mixed, compounds for topping. Use setting-type compounds at exterior soffits.
 - 3. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
 - 4. Cementitious Backer Unit Joint-Treatment Materials: Products recommended by cementitious backer unit manufacturer.
- D. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.
- E. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install gypsum board to comply with ASTM C 840.
 - 1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
 - 2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
 - 3. Multilayer Fastening Methods: Fasten base layers and face layer separately to supports with screws.
- B. Install cementitious backer units to comply with ANSI A108.11.
- C. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.
- D. Finishing Gypsum Board: ASTM C 840.
 - 1. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 4 finish: Embed tape at joints.
 - 2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.

3. Unless otherwise indicated, provide Level 5 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. Apply skim coat to entire surface. Level 5 is suitable for surfaces receiving gloss and semigloss enamels and surfaces subject to severe lighting. It is considered a high-quality gypsum board finish.
-
- E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.
 - F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for each type of product indicated and Samples for tile and grout.
- B. Obtain tile of each type and color or finish from same production run for each contiguous area
- C. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

PART 2 - PRODUCTS

2.1 CERAMIC TILE

- A. Ceramic tile that complies with Standard grade requirements in ANSI A137.1, "Specifications for Ceramic Tile."
- B. Tile Type CT-1: Factory-mounted, impervious natural clay or porcelain cushion-edged ceramic mosaic tile.
 - 1. Products:
 - a. Dal Tile.
 - 2. Module Size: 18" x 18".
 - 3. Finish: Factory Finish
 - 4. Color and Pattern: Aspen Lodge.
 - 5. Grout Color: Natural Clay No. 9 Polyblend Sanded.
 - 6. Trim Units: Coordinated with sizes and coursing of adjoining flat tile and matching characteristics of adjoining flat tile:
 - a. Base: Coved.
 - b. Base Cap for Portland Cement Mortar Installations: Bead (bullnose).
 - c. Base Cap for Thin-Set Mortar Installations: Surface bullnose.
 - d. Wainscot Cap for Portland Cement Mortar Installations: Bead (bullnose).
 - e. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose.
 - f. External Corners for Portland Cement Mortar Installations: Bead (bullnose).
 - g. External Corners for Thin-Set Mortar Installations: Surface bullnose.
 - h. Internal Corners: Cove.
 - i. Internal Corners: Field-buttet square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.

2.2 INSTALLATION MATERIALS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, 1/2 inch thick.
- B. Fiber-Cement Underlayment: ASTM C 1288, 1/2 inch thick.
- C. VOC Limit for Adhesives and Fluid-Applied Waterproofing Membranes: 65 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Setting and Grouting Materials: Comply with material standards in ANSI's "Specifications for the Installation of Ceramic Tile" that apply to materials and methods indicated.
 - 1. Thin-Set Mortar Type: Dry-set portland cement.
 - a. Products:
 - 1) Laticrete International Inc.
 - 2) Custom Building Products
 - 3) Bostik Findley Inc. : Hydroment
 - 4) Mapel Corp.
 - 5) Mer-Kote Products Inc..
 - 2. Grout Type: Polyblend Sanded grout.
 - a. Products:
 - 1) Laticrete International Inc.
 - 2) Custom Building Products
 - 3) Bostik Findley Inc. : Hydroment
 - 4) Mapel Corp.
 - 5) Mer-Kote Products Inc...

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For installations indicated below, follow procedures in ANSI's "Specifications for the Installation of Ceramic Tile" for providing 95 percent mortar coverage.
 - a. Exterior tile floors.
 - b. Tile floors in wet areas.
 - c. Tile swimming pool decks.
 - d. Tile floors in laundries.
 - e. Tile floors composed of tiles 8 by 8 inches or larger.
 - f. Tile floors composed of rib-backed tiles.
- B. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- C. Lay tile in grid pattern unless otherwise indicated. Align joints where adjoining tiles on floor, base, walls, and trim are the same size.
- D. Install cementitious backer units and fiber-cement underlayment and treat joints according to ANSI A108.11.
- E. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- F. Install waterproofing to comply with ANSI A108.13.
- G. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
- H. Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
- I. Interior Floor Tile Installation Method(s):
 1. Over Concrete Subfloors: TCA F112 (cement mortar bed bonded to concrete).

END OF SECTION 093000

SECTION 09385 - DIMENSION STONE TILE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.

PART 2 - PRODUCTS

2.1 STONE PRODUCTS

- A. Varieties and Sources: Subject to compliance with requirements, provide those indicated.
- B. Pattern Orientation: For stone varieties with a directional pattern, provide tile with pattern randomly oriented at various angles to sides of tiles.

2.2 DIMENSION STONE TILE

- A. Exterior wall inset tile
 1. Stone Type: Slate, complying with ASTM C 629, Classification I, Exterior.
 2. Varieties and Sources:
 - a. Emser Tile; 6350 Miramar Road, Suite A; San Diego, CA; (858) 455-6390
 - b. Color: "Rajah".
 3. Finish: Mfg standard finish.
 4. Edges: Square.
 5. Module Size: 24" x 24".
 6. Nominal Tile Thickness: 3/8 inch.
 7. Joint Width: Hand tight 1/4 inch.
 8. Grout Color: Match Tile color.

2.3 INSTALLATION MATERIALS

1. Medium Bed Mortar Type for Tiles 24 by 24 inches and Larger: Latex-portland cement, approved by manufacturer for application thickness as shown on drawings.
 - a. Custom Building Products, Inc.
2. Grout Type: Manufacturers standard "sanded" grout..

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- C. Lay tile in grid pattern unless otherwise indicated. Align joints where adjoining tiles on walls, and are the same size.
- D. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- E. Install waterproofing to comply with ANSI A108.13.
- F. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
- G. Apply sealer to cleaned stone tile flooring according to sealer manufacturer's written instructions.
- H. Exterior Wall Tile Installation Method(s):
 - 1. Exterior Walls: TCA W201 (cement mortar bed, on metal lath over waterproof membrane).

END OF SECTION 09385

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and material Samples.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Seismic Standard: Provide acoustical tile ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings - Seismic Zones 0-2."
 - 2. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies - Seismic Zones 3 & 4."
 - 3. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."
 - 4. City of San Diego building and safety standards for acoustical ceiling installation

2.2 ACOUSTICAL TILE

- A. Products:
 - 1. Armstrong Cortega No. 769
- B. Classification: As follows, per ASTM E 1264:
- C. Surface-Burning Characteristics: ASTM E 1264, Class A materials, tested per ASTM E 84.
- D. Edge Detail: Square, kerfed and rabbeted, or tongue and grooved, or butt.
- E. Thickness: 5/8 inch.
- F. Modular Size: 24" x 48".

2.3 SUSPENSION SYSTEM

- A. Ceiling Suspension System: Direct hung; ASTM C 635, heavy-duty structural classification.
 - 1. Products: Armstrong Prelude XL 15/16" Exposed Tee
- B. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated. Comply with seismic design requirements. See Construction Documents for details.
- C. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 1. Size: Provide yield strength at least 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung), but not less than 0.106-inch- diameter wire.
- D. Seismic Struts: Manufacturer's standard product designed to accommodate seismic forces.
- E. Access: Identify upward access tile with manufacturer's standard unobtrusive markers for each access unit.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Ceiling Suspension System Installation: Comply with ASTM C 636 and CISCA's "Ceiling Systems Handbook."
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
 - 1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
- C. Adhesive Installation: Install acoustical tile by bonding to substrate, using amount of adhesive and procedure recommended in writing by tile manufacturer and as follows:
 - 1. Install spines in joints between tiles; maintain bottom surface of tiles in a level plane.
 - 2. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.
- D. Stapled Installation: Fasten acoustical tile to substrate using a minimum of two staples per tile that are installed in flanges of tile and as follows:
 - 1. Maintain bottom surface of tiles in a level plane; shim tile or correct substrate as required.
 - 2. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.

- E. Arrange directionally patterned acoustical panels as indicated on Drawings.

END OF SECTION 095123

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.
- B. Extra Materials: Deliver to Owner at least 40 **linear feet** of each type and color of resilient wall base installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE RB-1

- A. Products:
 - 1. Burke Type TS
- B. Color and Pattern: Unicolor # 527 Clay
- C. Minimum Thickness: 1/8".
- D. Height: 4 inches.
- E. Lengths: Cut lengths 48 inches long.
- F. Outside Corners: preformed.
- G. Inside Corners: preformed.
- H. Finish: As selected.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare concrete substrates according to ASTM F 710. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- B. Adhesively install resilient wall base and accessories.
- C. Install wall base in maximum lengths possible. Apply to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required.

- D. Install reducer strips at edges of floor coverings that would otherwise be exposed.

END OF SECTION 096513

SECTION 096516 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Samples and Weld Rod.
- B. Extra Materials: Deliver to Owner at least 20 linear feet, in roll form and in full roll width, for each type and color of resilient sheet flooring installed.

PART 2 - PRODUCTS

2.1 SHEET VINYL FLOOR COVERING

- A. Products:
 - 1. Mannington.
- B. Color and Pattern:
 - 1. SV-1 #15140 Biospec "Cool Beige" – See plans for locations
 - 2. SV-2 #10140 Fine Fields "Cool Beige" – See plans for locations
- C. Unbacked Sheet Vinyl Floor Covering: ASTM F 1913, 0.080 inch thick.
- D. Vinyl Sheet Floor Covering with Backing: ASTM F 1303, Type II, minimum binder content of 34 percent, Grade 1.
 - 1. Overall Thickness: As standard with manufacturer.
 - 2. Interlayer Material: None.
 - 3. Backing Class: N/A .
- E. Fire-Test Response: Critical radiant flux classification of Class I, not less than 0.45 W/sq. cm per ASTM E 648.
- F. Wearing Surface: Integral.
- G. Sheet Width: As standard with manufacturer 6 feet.
- H. Seaming Method: All seams to be heat welded.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement- or blended hydraulic cement-based formulation provided or approved by flooring manufacturer for applications indicated.

- B. Adhesives: Water-resistant type recommended by manufacturer to suit sheet vinyl floor covering and substrate conditions indicated.
- C. Heat-Welding Bead: Solid-strand product of floor covering manufacturer.
 - 1. Color: Match floor covering Insert color.
- D. Integral-Flash-Cove-Base Accessories: 1-inch- radius cove strip and square metal, vinyl, or rubber cap; both provided or approved by floor covering manufacturer.
 - 1. Provide metal inside and outside corners and end stops.
- E. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare concrete substrates according to ASTM F 710. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- B. Unroll sheet floor coverings and allow them to stabilize before cutting and fitting.
- C. Maintain uniformity of resilient sheet flooring direction, and match edges for color shading at seams.
- D. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in substrates.
- E. Integral Flash Cove Base: Cove floor coverings 6 inches up vertical surfaces. Support on cove strip and butt against cap strip.
 - 1. Install metal corners and end stops.
- F. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
 - 1. Apply six coat(s).

END OF SECTION 096516

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.
- B. Extra Materials: Deliver to Owner one box for every 50 boxes or fraction thereof, of each type and color of resilient floor tile installed.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION FLOOR TILE See Sheet: A420

- A. Products:
 - 1. Mannington.
- B. Color and Pattern: Designer Essentials
 - 1. VCT #1 Field (90%) #133 "Almondine" See sheet A420 for field and accent tile pattern.
 - 2. VCT #2 Accent (5%) #113 "Cornsilk" See sheet A420 for field and accent tile pattern.
 - 3. VCT #3 Accent (5%) #255 "Frosted Jade" See sheet A420 for field and accent tile pattern.
 - 4. VCT #4 Eye Chart #101 "Night Black" Provide 2"x16" strip as shown on sheet A420
- C. Fire-Test Response: Critical radiant flux classification of Class I, not less than 0.45 W/sq. cm per ASTM E 648.
- D. Wearing Surface: See Mfg. Specifications
- E. Thickness: 0.125 inch.
- F. Size: 12 by 12 inches.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement- or blended hydraulic cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
- C. Floor Polish: Protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare concrete substrates according to ASTM F 710. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- B. Lay out tiles so tile widths at opposite edges of room are equal and are at least one-half of a tile.
- C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged. Lay tiles in patterns indicated.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply six coat(s).

END OF SECTION 096519

SECTION 096816 - SHEET CARPETING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.
- B. Extra Materials: Deliver to Owner full-width carpet equal to 5 percent of each type and color carpet installed, packaged with protective covering for storage.

PART 2 - PRODUCTS

2.1 CARPET: **CPT-1**

- A. Products:
 - 1. Pacific Crest – St. Louis I # SL702-17 “Michigan Avenue” Actionbac Ultron Nylon 6,6
- B. Fiber Content: 100 percent nylon 6, 6
- C. Pile Characteristic: Level graphics, loop pile.
- D. Density: 6462 ox/yd²
- E. Face Weight: 28
- F. Total Weight: As specified
- G. Primary Backing: Woven Polypropylene.
- H. Secondary Backing: ActionBac
- I. Width: 12 feet.
- J. Critical Radiant Flux Classification: as specified per ASTM E 648.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with CRI 104.
- B. Installation Method: Direct glue-down.

- C. Maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Bind or seal cut edges as recommended by carpet manufacturer.
- D. Install pattern parallel to walls and borders.

END OF SECTION 096816

SECTION 097750 FIBERGLASS REINFORCED WALL PANELS

PART 1: GENERAL

1.01 DESCRIPTION:

This section describes the requirements for furnishing and installing fiberglass reinforced plastic panels according to manufacturer's recommendations.

1.02 SUBMITTALS:

1. Submit in accordance with Section 013000
 - a. Two samples of each type of panel, each type of trim and fastener.
 - b. Shop Drawings: Indicate the location and dimension of joints and fastener attachments.
 - c. Installation Guide #6211.

1.03 QUALITY ASSURANCE:

Provide panels and molding only from the manufacturer specified to ensure warranty and color harmonization of accessories.

1.04 Delivery, Storage, and Handling:

1. Deliver of Materials: Package sheets on skids or pallets for shipment to project site.
2. Storage of Materials: Store panels in a dry place at the project site.
3. Handling: Remove foreign matter from face of panel by use of a soft bristle brush, avoiding abrasive action.

1.05 ROJECT CONDITIONS:

1. Installation shall not begin until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from plaster, concrete or terrazzo work has dissipated.
2. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
3. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

PART 2: PRODUCTS

2.01 MATERIALS:

1. FRP-1 Wall panels shall be KEMLITE Kemply with Surfaseal fiberglass reinforced plastic panels as manufactured by KEMLITE COMPANY, Joliet, Illinois, USA Phone: 1-800-435-0080 or 1-815-467-8600, Fax: 1-815-467-8666
 - a. Wall Panels: Panels shall be: Kemlite Wall Panels substrate with a factory laminated skin, color to be #66 silver
 - b. Fire rating: P Class C fire rated.
 - c. Division Bars, Corner Trim: Panel manufacturer's standard length extruded vinyl pieces; longest length possible to eliminate end joints.
 - d. Fasteners: Non-corrosive drive rivets.

PART 3

3.01 PREPARATION

- A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean, and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
- B. Do not begin installation until backup surfaces are put into satisfactory condition.

3.02 APPLICATION

- A. Do all cutting with carbide tipped saw blades or drill bits, or cut with snips.
- B. Install panels with manufacturer's recommended gap for panel field and corner joints.
- C. Fastener holes in the panels must be predrilled 1/8" (3.2mm) oversize.
- D. For trowel type and application of adhesive, follow adhesive manufacturer's recommendation.
- E. Using products acceptable to manufacturer, install the frp panel system in accordance with panel manufacturer's printed instructions, Installation Guide #6211.
- F. Layout of panel joints to be part of submittal package for approval.

3.03 CLEANING

- A. Remove any adhesive or excessive sealant from panel face using solvent or cleaner recommended by panel manufacturer.

SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data.
2. Samples.

B. Mockups: Full-coat finish Sample of each type of coating, color, and substrate, applied where directed.

C. Extra Materials: Deliver to Owner 1 gal. of each color and type of finish coat paint used on Project, in containers, properly labeled, sealed and unopened.

PART 2 - PRODUCTS

2.1 PAINT

A. Products:

1. Dunn Edwards (no Exceptions or substitutions).

B. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List."

C. Material Compatibility: Provide materials that are compatible with one another and with substrates.

1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

D. Use interior paints and coatings that comply with the following limits for VOC content:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints, Coatings: 150 g/L.
3. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
4. Clear Wood Finishes, Varnishes: 350 g/L.
5. Clear Wood Finishes, Lacquers: 550 g/L.
6. Floor Coatings: 100 g/L.
7. Shellacs, Clear: 730 g/L.
8. Shellacs, Pigmented: 550 g/L.
9. Stains: 250 g/L.
10. Primers, Sealers, and Undercoaters: 200 g/L.
11. Dry-Fog Coatings: 400 g/L.

12. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
13. Pretreatment Wash Primers: 420 g/L.

E. Colors: As shown on the drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.
- C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Paint exposed surfaces unless otherwise indicated.
 1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
 2. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint the back side of access panels.
 4. Color-code mechanical piping in accessible ceiling spaces.
 5. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.
- C. Walls to have one coat of primer, two coats of finish. Both finish coats shall be rolled, NO spray of finish coats. Primer coat may be sprayed and backfilled.
- D. Apply paints according to manufacturer's written instructions.
 1. Use brushes only for exterior painting and where the use of other applicators is not practical.
 2. Use rollers for finish coat on interior walls and ceilings. NO spraying of finish coats.
- E. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

- F. Apply stains and transparent finishes to produce surface films without color irregularity, cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other imperfections. Use multiple coats to produce a smooth surface film of even luster.

3.3 EXTERIOR PAINT APPLICATION SCHEDULE

A. Concrete, Nontraffic Surfaces:

1. Flat Latex: Two coats over alkali-resistant primer: MPI EXT 3.1K. (W6232V-Acri-Loc Acrylic Masonry Primer/Sealer)
2. Semigloss Latex: Two coats over alkali-resistant primer: MPI EXT 3.1K. (W6232V-Acri-Loc Acrylic Masonry Primer/Sealer)

B. Concrete Masonry Units:

1. Flat Latex: Two coats over alkali-resistant primer: MPI EXT 4.2L. (SBPR00 Int./Ext. Concrete Block Filler)
2. Semigloss Latex: Two coats over alkali-resistant primer: MPI EXT 4.2L. (SBPR00 Int./Ext. Concrete Block Filler)

C. Steel:

1. Semigloss, Alkyd Enamel: Two coats over rust-inhibitive primer: MPI EXT 5.1D. (BRPR-RO BLOC-RUST Premium / Red Oxide)
2. Gloss, Alkyd Enamel: Two coats over rust-inhibitive primer: MPI EXT 5.1D. (BRPR-RO BLOC-RUST Premium / Red Oxide)

D. Galvanized Metal:

1. Semigloss, Alkyd Enamel: Two coats over cementitious galvanized-metal primer: MPI EXT 5.3B. (GAPR00 GALV-ALUM Premium)

E. Aluminum:

1. Semigloss, Alkyd Enamel: Two coats over quick-drying primer for aluminum: MPI EXT 5.4F. (GAPR00 GALV-ALUM Premium)

F. Dressed Lumber: Including architectural woodwork doors.

1. Semigloss Latex: Two coats over primer: MPI EXT 6.3L. (EZPR00 EZ-PRIME Premium)
2. Gloss Latex: Two coats over primer: MPI EXT 6.3L. (EZPR00 EZ-PRIME Premium)

G. Plastic Trim:

1. Semigloss Latex: Two coats over bonding primer: MPI EXT 6.8A. (UGPR00 ULTRA-GRIP Premium)

H. Stucco:

1. Flat Latex: Three coats: MPI EXT 9.1A. (ESPR00 EFF-STOP Premium)

3.4 INTERIOR PAINT APPLICATION SCHEDULE

A. Concrete, Nontraffic Surfaces:

1. Low-Sheen Latex: Three coats: MPI INT 3.1E. (W6232V-Acri-Loc Acrylic Masonry Primer/Sealer)

B. Concrete Masonry Units:

1. Semigloss Latex: Two coats over latex block filler: MPI INT 4.2A. (SBPR00 Int./Ext. Concrete Block Filler)

C. Steel:

1. Semigloss, Quick-Dry Enamel: Two coats over quick-drying alkyd metal primer: MPI INT 5.1A. (BRPR-WH-BLOC-RUST Premium White)
2. Gloss, Alkyd Enamel: Two coats over alkyd anticorrosive quick-drying alkyd primer: MPI INT 5.1E. . (BRPR-WH-BLOC-RUST Premium White)

D. Aluminum:

1. Semigloss, Alkyd Enamel: Two coats over quick-drying primer for aluminum: MPI INT 5.4J. (GAPR00-GALV-ALUM Premium)

E. Dressed Lumber: Including architectural woodwork doors.

1. Semigloss Latex: Two coats over primer: MPI INT 6.3T. (EZPR00EZ Prime Premium)
2. Gloss6703 Heirloom Varnish, Alkyd Varnish: Two coats over stain and alkyd sanding sealer: MPI INT 6.3D.
3. Semigloss6702 Heirloom Varnish, Alkyd Varnish: Two coats over alkyd sanding sealer: MPI INT 6.3J.

F. Gypsum Board:

1. Flat Latex: Two coats over primer/sealer: MPI INT 9.2A. (VNPR00 Vinylastic Premium)
2. Low-Sheen Latex: Two coats over primer/sealer: MPI INT 9.2A. (VNPR00 Vinylastic Premium)
3. Eggshell Latex: Two coats over primer/sealer: MPI INT 9.2A. (VNPR00 Vinylastic Premium)
4. Satin Latex: Two coats over primer/sealer: MPI INT 9.2A. (VNPR00 Vinylastic Premium)
5. Semigloss Latex: Two coats over primer/sealer: MPI INT 9.2A. (VNPR00 Vinylastic Premium)

G. Plaster:

1. Flat Latex: Two coats over primer/sealer: MPI INT 9.2A (ESPR00 EFF-STOP Premium).

H. Spray-Textured Ceilings MONOKOTE:

1. Flat Latex: Three coats: MPI INT 9.1E.1A (UGPR00 Ultra Grip Premium)

3.5 INTERIOR PAINT FINISHES

A. Latex

1. Flat: SPMA 10-Suprema
2. Low-Sheen: SPMA 40-Suprema
3. Eggshell: EVSH 30-Evershield Int./Ext.
4. Semi-Gloss: SPMA 50-Suprema
5. Gloss: EVSH 60-Evershield Int./Ext.

3.6 EXTERIOR PAINT FINISHES

A. Latex

1. Flat: EVSH 10-Evershield
2. Semi-Gloss: EVSH 50-Evershield
3. Gloss: EVSH 60-Evershield

B. Steel (alkyd Enamels)

1. Semi-Gloss: 9 Syn-Lustro
2. Gloss: 10 Syn-Lustro

END OF SECTION

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and Samples.
 - 1. Submit full-size rubbings for metal plaques.
- B. 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.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: Alloy recommended by sign manufacturer for casting process used and for use and finish indicated.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher, with not less than the strength and durability properties of 6063-T5.
- C. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- D. Plastic Laminate: High-pressure laminate engraving stock with face and core in contrasting colors.
- E. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 SIGNS

- A. Dimensional Characters: Cast-aluminum or Cutout aluminum plate characters.
 - 1. Clear anodized finish
- B. Interior Panel Signs: Enamel-filled, reverse-engraved clear acrylic with square-cut edges and square corners.
 - 1. Finishes and Colors: As selected from manufacturer's full range.

2. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
3. Provide signs for all rooms mounted on the wall beside the room door:

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate signs where indicated or directed by Architect. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
- B. Wall-Mounted Signs:
 1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes.

END OF SECTION 101400

SECTION 102113 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and Samples.
- B. Regulatory Requirements: Comply with ICC/ANSI A117.1 for toilet compartments designated as accessible.

PART 2 - PRODUCTS

2.1 TOILET COMPARTMENTS AND SCREENS

- A. Products:
 - 1. Bobrick #1540 "Classic Series" Floor Mounted Plastic Laminate.

2.2 MATERIALS

- A. Plastic Laminate: NEMA LD 3, Grade HGS.
 - 1. Color: Wilsonart #4674-60 "Evening Tigris".
- B. Core Material for Plastic Laminate: ANSI A208.1, Grade M-2 particleboard, in thicknesses required to provide nominal thicknesses of 1 inch minimum for doors, panels, and screens and 1-1/4 inches minimum for pilasters.
- C. Pilaster Shoes and Sleeves (Caps): Stainless steel, not less than 3 inches high.
- D. Brackets: Stirrup.
 - 1. Material: Chrome-plated, nonferrous, cast-zinc alloy (zamac).

2.3 FABRICATION

- A. Toilet Compartments: Overhead braced and floor anchored.
- B. Urinal Screens: Floor and ceiling anchored.
- C. Metal Units: Internally reinforce metal panels for hardware, accessories, and grab bars.
- D. Solid-Plastic, Polymer-Resin Units: Provide aluminum heat-sink strips at exposed bottom edges of panels and doors.

- E. Doors: Unless otherwise indicated, 32-inch- wide in-swinging doors for standard toilet compartments and 36-inch- wide out-swinging doors with a minimum 32-inch- wide clear opening for compartments indicated to be accessible to people with disabilities.
- F. Door Hardware: Chrome plated or cast-zinc alloy (zamac). Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
 - 1. Hinges: Self-closing type, adjustable to hold door open at any angle up to 90 degrees.
 - 2. Latches and Keepers: Recessed unit designed for emergency access and with combination rubber-faced door strike and keeper.
 - 3. Coat Hook: Combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
 - 4. Door Bumper: Rubber-tipped bumpers at out-swinging doors or entrance screen doors.
 - 5. Door Pull: Provide at out-swinging doors. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units rigid, straight, level, and plumb, with not more than 1/2 inch between pilasters and panels and not more than 1 inch between panels and walls. Provide brackets, pilaster shoes, bracing, and other components required for a complete installation. Use theft-resistant exposed fasteners finished to match hardware. Use sleeve nuts for through-bolt applications.
 - 1. Stirrup Brackets: Align brackets at pilasters with brackets at walls. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - 2. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

END OF SECTION 102113

SECTION 102600 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and material Samples.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Extruded Plastic: ASTM D 1784, Class 1, textured, PVC or acrylic-modified vinyl plastic.
 - 1. Impact Resistance: Minimum 25.4 ft-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
 - 2. Flame-Spread Index: 25 or less per ASTM E 84.
 - 3. Smoke-Developed Index: 450 or less per ASTM E 84.
- B. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or 2; with a minimum impact-resistance rating of 15 ft-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
- C. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5.
- D. Adhesive: Recommended by manufacturer for use with material and substrate indicated.

2.2 WALL AND DOOR PROTECTION

- A. Wall Protection System: See Sheet A421, A422 and A43: Rub rail, Chair rail, Corner guard, with continuous, 0.060-inch- thick, extruded-aluminum retainer and 0.100-inch- 0.070-inch thick, extruded-plastic cover.
 - 1. Products:
 - a. Korogard Wall Protection Systems.
- B. Surface-Mounted, Plastic Corner Guards: See sheet A-420: Fabricated from opaque extruded-plastic sheet.
 - 1. Products:
 - a. Korogard Wall Protection Systems.
 - 2. Wing Size: Nominal. As Shown
 - 3. Thickness: Minimum. As Shown

4. Color and Texture: As Shown on Sheet A420.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install components level, plumb, and true to line without distortions.
- B. Hand Rails: Where splices occur in horizontal runs of more than 20 feet, offset splices of aluminum retainers and plastic covers.
- C. Apply impact-resistant wall covering with full spread of adhesive unless otherwise recommended by manufacturer. Install full height with seams vertical.

END OF SECTION 102600

SECTION 102800 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, No. 4 finish (satin), 0.0312-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, ASTM B 16, or ASTM B 30.
- C. Aluminum: ASTM B 221, Alloy 6063-T6 or 6463-T6.
- D. Sheet Steel: ASTM A 1008/A 1008M, 0.0359-inch minimum nominal thickness.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G60.
- F. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.
- H. Tempered Glass: ASTM C 1048, Kind FT (fully tempered).
- I. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- J. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- K. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.
- L. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

2.2 TOILET ACCESSORIES

- A. Manufacturers:
 - 1. Bobrick Washroom Equipment, Inc. See Sheet A-801 for all model numbers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
 - 1. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.
- B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Fire-Rated, Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINETS

- A. Fire-Protection Cabinets: Enameled-steel, semi-recessed cabinets for fire extinguisher.
 - 1. Products:
 - a. Kidde.
- B. Cabinet Construction: Nonrated for Nonrated wall construction. One Hour for rated wall construction.
 - 1. Fire-Rated Cabinets: Constructed with double walls fabricated from 0.048-inch- thick, steel sheet lined with fire-barrier material.
- C. Cabinet Material: Steel sheet.
 - 1. Trim Style: Rolled trim.
 - 2. Trim Material: Steel.
- D. Door Material: Steel.
 - 1. Door Style: Fully glazed with frame.
 - 2. Door Glazing: Break glass.
- E. Accessories: Mounting brackets, Break glass strik and Identification lettering.
- F. Finishes:
 - 1. Steel: Factory finished: "white"

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cabinets at 54 inches above finished floor to top of cabinet or heights acceptable to authorities having jurisdiction.
- B. Fire-Rated Hose or Valve Cabinets: Install cabinet with not more than 1/16-inch tolerance between pipe OD and knockout OD. Seal through penetrations with firestopping sealant.
- C. Identification: Apply decals or vinyl lettering at locations required by authorities having jurisdiction.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS

- A. Portable Fire Extinguishers: NFPA 10, listed and labeled for the type, rating, and classification of extinguisher.
 - 1. Products:
 - a. Kidde.
 - 2. Multipurpose Dry-Chemical Type: UL-rated 2-A:10-B:C, 5-lb nominal capacity, in enameled-steel container.
- B. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to cabinet interior with baked-enamel finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install mounting brackets in locations indicated at 54 inches above finished floor to top of fire extinguisher or heights acceptable to authorities having jurisdiction.
- B. Install fire extinguishers in mounting brackets and cabinets where indicated or as determined by authorities having jurisdiction.

END OF SECTION 104416

SECTION 122113 - VERTICAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.
- B. Product Standard: Unless otherwise indicated, comply with WCMA A 100.1.

PART 2 - PRODUCTS

2.1 VERTICAL LOUVER BLINDS HB-1

- A. Products:
 - 1. Hunter-Douglas or Levolor
- B. Provide blinds passing flame-resistance testing according to NFPA 701.
- C. Louver Slats: Vinyl
- D. Slat Width: 3 inch slat & no strings.
- E. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends.
- F. Tilt Operation: Manual with wand.
- G. Valance: PVC strip.
- H. Mounting: Inside frame head mount
- I. Colors, Textures, Patterns, and Gloss: As selected from manufacturer's full range.
- J. Fabrication: Comply with AWCMA Document 1029 unless otherwise indicated.
 - 1. Fabricate concealed components from noncorrodible or corrosion-resistant-coated materials.
 - 2. Provide lifting and tilting mechanisms with permanently lubricated moving parts.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install blinds level, plumb, and located not closer than 1 inch to interior face of glass.
 - 1. Flush Mounted: Install blinds with louver edges flush with finish face of opening when slats are tilted open.
 - 2. Jamb Mounted: Install headrail flush with face of opening jamb and head.
 - 3. Head Mounted: Install headrail on face of opening head.
 - 4. Recessed: Install headrail concealed within blind pocket.

- B. Adjust horizontal louver blinds to operate smoothly and easily throughout entire operational range.

END OF SECTION 122113

SECTION 142400 - HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings and Samples of exposed finishes.
 - 1. Submit operation and maintenance data to include in emergency, operation, and maintenance manuals.
- B. Regulatory Requirements: Comply with ASME A17.1 and with elevator design requirements for earthquake loads in ASCE/SEI 7.
 - 1. Effective peak velocity acceleration (A_v) for Project's location is greater than or equal to 0.20 (Seismic Risk Zones 3 and 4).
 - 2. Project's seismic design category is D.
 - 3. Elevator importance factor is 1.0.
- C. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines ICC/ANSI A117.1.
- D. Fire-Rated Hoistway Entrance Assemblies: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, based on testing at neutral pressure per NFPA 252.
- E. Maintenance: Beginning at Substantial Completion, provide one year's full maintenance service. Include monthly preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleaning, and adjusting.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. Otis Elevator Telescopic Holeless Hydraulic Elevator 3,500 #
- B. Electric Pump-Tank-Control System Equipment in Machine Room:
 - 1. Positive-displacement pump, mounted on tank with vibration isolators, with a maximum of 10 percent variation between no load and full load.
 - 2. Squirrel-cage induction motor with solid-state starting.
 - 3. Flexible connectors in piping and hydraulic silencer at pump unit.
- C. Furnish required concrete and masonry inserts. Installation is specified in other Specification Sections.
- D. "Selective-Collective Automatic Operation" as defined in ASME A17.1.

- E. Door Reopening Devices, Infrared Array: Uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams causes doors to stop and reopen.

2.2 FINISH MATERIALS

- A. Steel Sheet: Cold-rolled steel sheet, ASTM A 1008/A 1008M, exposed, matte finish, except that hot-rolled steel sheet, ASTM A 1011/A 1011M may be used for door frames.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- C. Stainless-Steel Bars: ASTM A 276, Type 304.
- D. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- E. Aluminum Extrusions: ASTM B 221, Alloy 6063.
- F. Plastic Laminate: High-pressure type complying with NEMA LD 3.

2.3 CAR ENCLOSURES AND ENTRANCES

- A. Car Enclosures: Provide enameled-steel car enclosures to receive removable wall panels, with car roof, access doors, power door operators, and ventilation. Provide standard railings complying with ASME A17.1 on car tops where required by ASME A17.1.
 - 1. Floor Finish: Ceramic Tile CT-1 as specified in section 093000.
 - 2. Wall Panels: Horizontal laminate panels; Monterey sun#4638-60.
 - 3. Front Walls (Return Panels): Horizontal laminate panels; Monterey sun#4638-60.
 - 4. Doors Faces: Satin stainless-steel, No. 4 swirled finish.
 - 5. Sills: Extruded aluminum, with grooved surface, 1/4-inch thickness.
 - 6. Luminous Ceiling: Fluorescent light fixtures with suspended aluminum egg crate ceiling
 - 7. Handrails: 1-1/2: diameter round tubular satin stainless steel on side and rear walls.
 - 8. Car and Hall Fixtures: Standard as provided by Otis Elevators.
 - 9. Security: Provide provision for security cameras in factory provided elevator wiring loom.
- B. Hoistway Entrances: Manufacturer's standard hollow-metal, sliding, door-and-frame entrances.
 - 1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
 - 2. Frames: Satin stainless-steel, No. 4 finish.
 - 3. Doors Faces: Matching car doors.
 - 4. Sills: Matching car sills.

2.4 SIGNAL EQUIPMENT

- A. Illuminated hall-call and car-call buttons.

- B. Except for buttons and illuminated elements, fabricate car and hall fixtures from satin stainless-steel, No. 4 finish.
- C. Manufacturer's standard car control station in each car. Mount in return panel adjacent to car door unless otherwise indicated.
 - 1. Mount controls to comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
- D. Emergency Communication System: Complying with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines. On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- E. Car position indicator above the car door or above the car control station. Also provide audible signal to indicate that car is either stopping at or passing the floor. Include direction arrows if not provided in car control station.
- F. Hall Push-Button Stations: Provide one hall push-button station at each landing.
- G. Hall lanterns with illuminated arrows.
 - 1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
 - 2. Units mounted in both jambs of entrance frame.
 - 3. Units mounted in both car door jambs.
- H. Hall Annunciator: With each lantern, provide audible signals. At manufacturer's option, audible signal may be placed on car.
- I. Hall position indicator above each hoistway entrance at ground floor.
- J. Corridor Call Station Pictograph Signs: Provide signs with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.5 ELEVATORS

- A. Telescopic Holeless Hydraulic Elevator 3,500 #
- B. Holeless, hydraulic plunger-cylinder units.
- C. Rated Load: 3500 lb.
- D. Rated Speed: 100 fpm
- E. Inside Width: 80 inches from side wall to side wall.

- F. Inside Depth: 65 inches from back wall to front wall (return panels).
- G. Inside Height: 96" to underside of ceiling.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between well casing and pit floor with 4 inches of nonshrink, nonmetallic grout.
- B. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.
- C. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cemented fittings.
- D. Adjust elevators for 1/4-inch leveling tolerance.
- E. Set sills flush with finished floor. Fill space under sills solidly with nonshrink, nonmetallic grout.
- F. On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.

END OF SECTION 142400

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Mechanical Sleeve Seals: Modular rubber sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- D. PVC Pipe: ASTM D 1785, Schedule 40.

2.2 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

2.3 MOTORS

- A. Motor Characteristics:
 - 1. Motors ½ HP and Larger: Three phase.
 - 2. Motors Smaller Than ½ HP: Single phase.
 - 3. Frequency Rating: 60 Hz.
 - 4. Voltage Rating: NEMA standard voltage for circuit voltage to which motor is connected.
 - 5. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 - 6. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
 - 7. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
 - 8. Enclosure: Unless otherwise indicated, open dripproof.
 - 9. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

2.4 HANGERS AND SUPPORTS

- A. Hanger and Pipe Attachments: Factory fabricated with galvanized coatings; nonmetallic coated for hangers in direct contact with copper tubing.
- B. Powder-Actuated Fasteners: Threaded-steel stud, with pull-out and shear capacities appropriate for supported loads and building materials where used.
- C. Mechanical-Expansion Anchors: Insert-wedge-type, **stainless** steel, with pull-out and shear capacities appropriate for supported loads and building materials where used.

2.5 VIBRATION ISOLATION AND SEISMIC CONTROL DEVICES

- A. Vibration Supports:
 - 1. Pads: Arranged in single or multiple layers of oil- and water-resistant, **neoprene** of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match supported equipment.
 - 2. Mounts: Double-deflection type, with molded, oil-resistant fiberglass, rubber, or neoprene isolator elements with factory-drilled, encapsulated top plate and baseplate. Provide isolator with minimum **0.5-inch** static deflection.
 - 3. Spring Isolators: Freestanding, laterally stable, spring isolators. Provide isolator with minimum **1-inch** static deflection.
- B. Vibration Hangers:
 - 1. Elastomeric Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to steel housings with threaded connections for hanger rods. Provide isolator with minimum **0.5-inch** static deflection.
 - 2. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression. Provide isolator with minimum **1-inch** static deflection.
- C. Seismic Restraints:
 - 1. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
 - 2. Channel Support System: MFMA-4, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
 - 3. Restraining Cables: Galvanized steel cables with end connections made of steel assemblies that swivel to final installation angle and use two clamping bolts for cable engagement.
 - 4. Postinstalled Anchors: **Torque-controlled expansion anchors**, seismic-rated, zinc-plated carbon steel for interior applications and stainless steel for exterior locations. Provide anchor bolts with strength four times the load imposed as tested according to ASTM E 488.

2.6 PRESSURE GAGES AND TEST PLUGS

- A. Pressure Gages: Direct-mounting, indicating-dial type complying with ASME B40.100. Dry metal case, minimum 2-1/2-inch diameter with red pointer on white face, and plastic window. Minimum accuracy 3 percent of middle half of range. Range two times operating pressure.
- B. Test Plug: Corrosion-resistant brass or stainless-steel body with two self-sealing rubber core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping. Minimum pressure and temperature rating 500 psig at 200 deg F.

PART 3 - EXECUTION

3.1 MOTOR INSTALLATION

- A. Anchor motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions.

3.2 GENERAL PIPING INSTALLATIONS

- A. Install piping free of sags and bends.
- B. Install fittings for changes in direction and branch connections.
- C. Install sleeves for pipes passing through concrete **and masonry** walls, **gypsum board partitions**, and concrete floor and roof slabs.
- D. Exterior Wall, Pipe Penetrations: Mechanical sleeve seals installed in steel or cast-iron pipes for wall sleeves.
- E. Comply with requirements in Division 07 Section "Penetration Firestopping" for sealing pipe penetrations in fire-rated construction.
- F. Install unions at final connection to each piece of equipment.
- G. Install dielectric unions and flanges to connect piping materials of dissimilar metals in gas piping.
- H. Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals in water piping.

3.3 GENERAL EQUIPMENT INSTALLATIONS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components, unless otherwise indicated.

- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.4 BASES, SUPPORTS, AND ANCHORAGES

- A. Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 - 2. Install dowel rods on 18-inch centers around the full perimeter of the base to connect concrete base to concrete floor.
 - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Use **3000-psi**, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete"
- B. Mix and install grout for fire-suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors. Place grout, completely filling equipment bases.

3.5 HANGERS AND SUPPORTS

- A. Comply with MSS SP-69 and MSS SP-89. Install building attachments within concrete or to structural steel.
- B. Install hangers and supports to allow controlled thermal and seismic movement of piping systems.
- C. Install powder-actuated fasteners and mechanical-expansion anchors in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches thick.
- D. Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 3. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

4. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 5. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
- F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

3.6 VIBRATION ISOLATION AND SEISMIC CONTROL DEVICE INSTALLATION

- A. Adjust vibration isolators to allow free movement of equipment limited by restraints.
- B. Install resilient bolt isolation washers and bushings on equipment anchor bolts.
- C. Install cables so they do not bend across sharp edges of adjacent equipment or building structure.

END OF SECTION 220500

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 GENERAL-DUTY VALVES

- A. Valve Sizes: Same as upstream piping unless otherwise indicated.
- B. Valves in Insulated Piping: With 2-inch stem extensions.
- C. End Connections: Threads shall comply with ANSI B1.20.1. Flanges shall comply with ANSI B16.1 for cast-iron valves and with ANSI B16.24 for bronze valves. Solder-joint connections shall comply with ANSI B16.18.
- D. One-Piece, Copper-Alloy ¼ turn Ball Valves: Brass or bronze body with chrome-plated bronze ball, PTFE or TFE seats, and 400-psig minimum CWP rating.
- E. Two-Piece, Copper-Alloy ¼ turn Ball Valves: Bronze body with full port, chrome-plated bronze ball; PTFE seats; and 600-psig minimum CWP rating and blowout-proof stem.
- F. Bronze, Swing Check Valves: Class 125, bronze body with bronze disc and seat.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use ball valves for shutoff duty; globe and ball for throttling duty.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves for each fixture and item of equipment.
- D. Install three-valve bypass around each pressure-reducing valve using throttling-type valves.
- E. Install valves in horizontal piping with stem at or above center of pipe.
- F. Install valves in a position to allow full stem movement.

- G. Install check valves for proper direction of flow in horizontal position with hinge pin level.

END OF SECTION 220523

SECTION 220700 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Quality Assurance: Labeled with maximum flame-spread index of 25 and maximum smoke-developed index of 50 according to ASTM E 84.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- B. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
- C. Mineral-Fiber Blanket Insulation: Comply with ASTM C 553, Type II and ASTM C 1290, Type I.
- D. Mineral-Fiber, Preformed Pipe Insulation: Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ.
- E. Mineral-Fiber, Pipe and Tank Insulation: Complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB; and having factory-applied **FSK jacket**. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less.
- F. Polyolefin Insulation: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.
- G. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- H. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- I. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
- J. Factory-Applied Jackets: When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
- K. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
- L. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

PART 3 - EXECUTION

3.1 PIPE INSULATION INSTALLATION

- A. Comply with requirements of the Midwest Insulation Contractors Association's "National Commercial & Industrial Insulation Standards" for insulation installation on pipes and equipment.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Insulation Installation at Fire-Rated Wall, Partition, and Floor Penetrations: Install insulation continuously through penetrations. Seal penetrations. Comply with requirements in Division 07 Section "Penetration Firestopping."
- D. Flexible Elastomeric Insulation Installation:
1. Seal longitudinal seams and end joints with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 2. Insulation Installation on Pipe Fittings and Elbows: Install mitered sections of pipe insulation. Secure insulation materials and seal seams with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- E. Mineral-Fiber Insulation Installation:
1. Insulation Installation on Straight Pipes and Tubes: Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 2. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
 3. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- F. Polyolefin Insulation Installation:
1. Seal split-tube longitudinal seams and end joints with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

2. Insulation Installation on Pipe Fittings and Elbows: Install mitered sections of polyolefin pipe insulation. Secure insulation materials and seal seams with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

G. Interior Piping System Applications: Insulate the following piping systems:

1. Domestic hot water.
2. Recirculated domestic hot water.
3. Roof drain bodies and horizontal rainwater leaders of storm water piping.
4. Exposed water supplies and sanitary drains of fixtures for people with disabilities.

H. Do not apply insulation to the following systems, materials, and equipment:

1. Flexible connectors.
2. Sanitary drainage and vent piping.
3. Drainage piping located in crawlspaces unless otherwise indicated.
4. Chrome-plated pipes and fittings, except for plumbing fixtures for people with disabilities.
5. Piping specialties, including air chambers, unions, strainers, check valves, plug valves, and flow regulators.

3.2 EQUIPMENT INSULATION SCHEDULE

A. Domestic water and domestic hot-water hydropneumatic tank insulation shall be[**one of**] the following:

B. Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawlspaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

C. Domestic Hot and Recirculated Hot Water:

1. Insulation shall be the following:

- a. Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch** thick or minimum required by current CAC Title 24 Standards.

D. Roof Drain and Overflow Drain Bodies:

1. All Pipe Sizes: Insulation shall be[**one of**] the following:

- a. Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch** thick.

E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Insulation shall be the following:

- a. Flexible Elastomeric: **1/2 inch** thick.
- b. Mineral-Fiber, Preformed Pipe Insulation, Type I: **1/2 inch** thick.
- c. Polyolefin: **1/2 inch** thick.

END OF SECTION 220700

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Comply with NSF 14 for plastic, potable domestic water piping and components.
- B. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Hard Copper Tubing: ASTM B 88, Types L and M, water tube, drawn temper with wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 1. Copper Unions: Cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
 - 2. Joining Materials: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder.
- B. Soft Copper Tubing: ASTM B 88, Types K and L, water tube, annealed temper with copper pressure fittings, cast-copper-alloy or wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 1. Joining Materials: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder.
- C. Galvanized-Steel Piping: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe, with ASME B16.4, Class 125, galvanized, standard pattern gray-iron, threaded fittings.
- D. CPVC Piping: ASTM F 441/F 441M, Schedule 40 pipe with ASTM F 438, CPVC Schedule 40 socket-type fittings.
- E. PEX Tube and Fittings: ASTM F 877, SDR 9 PEX tubing and ASTM F 1807, metal insert-type fittings with copper or stainless-steel crimp rings.
 - 1. Manifold: ASTM F 877 plastic or corrosion-resistant-metal assembly, with a plastic or corrosion-resistant-metal valve for each outlet.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
 - 1. PVC Fittings: ASTM D 2466, Schedule 40, socket type.
- G. Special-Duty Valves:

1. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
 2. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.
- H. Transition Fittings: Manufactured piping coupling or specified piping system fitting. Same size as pipes to be joined and pressure rating at least equal to pipes to be joined.
- I. Flexible Connectors: Stainless-steel, corrugated-metal tubing with wire-braid covering. Working-pressure rating a minimum of 250 psig.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping installation requirements.
- B. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for wall penetration systems.
- C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
- D. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- E. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.
1. Soldered Joints: Comply with procedures in ASTM B 828 unless otherwise indicated.
- F. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for pipe hanger and support devices.
- G. Support vertical piping at each floor.
- H. Install flexible connectors in suction and discharge piping connections to each domestic water pump.

3.2 INSPECTING AND CLEANING

- A. Inspect and test piping systems as follows:
1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

- B. Clean and disinfect potable domestic water piping by filling system with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

3.3 PIPING SCHEDULE

- A. Underground, Service Entrance Piping: Schedule 80 PVC piping.
- B. Aboveground Distribution Piping: Type L, hard copper tubing

3.4 VALVE SCHEDULE

- A. Drawings indicate valve types to be used; (1/4 turn) unless noted otherwise. Where specific valve types are not indicated, the following requirements apply:
 1. Shutoff Duty: Use bronze ball valves for piping NPS 2 and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 and larger.
 2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
 3. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
 4. Drain Duty: Hose-end drain valves.
- B. Install ball valves close to main on each branch and riser serving two or more plumbing fixtures or equipment connections and where indicated.
- C. Install ball valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.
- D. Install drain valve at base of each riser, at low points of horizontal runs, and where required to drain water distribution piping system.
- E. Install swing check valve on discharge side of each pump and elsewhere as indicated.
- F. Install ball valves in each hot-water circulating loop and discharge side of each pump.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Pipe-Applied, Atmospheric Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.
- B. Hose Connection Vacuum Breakers: ASSE 1011, nickel-plated bronze, with nonremovable and manual drain features and garden-hose threaded connection.
- C. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013.
- D. Water Regulators: ASSE 1003.
- E. Balancing Valves: MSS SP-110 for two-piece, copper-alloy ball valves, with memory stop.
- F. Thermostatic Mixing Valves: Manually adjustable, bronze body. Include check stop and union on hot- and cold-water-supply inlets.
 - 1. Powers, Symmons or Leonard
- G. Hose Bibbs: Bronze body in chrome-plated finish, with removable composition disc, threaded or soldered inlet, garden-hose threaded outlet, and loose-key handle.
- H. Wall Hydrant: Recessed, nonfreeze, automatic draining, antibackflow type, with key operator and threaded inlet, garden-hose threaded outlet, and stainless steel finish with locking door.
- I. Stop-and-Waste Drain Valves: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
- J. Water Hammer Arrester: Bellows or piston type with pressurized cushioning chamber.
- K. Strainers: Y-pattern, bronze body, 125-psig minimum steam working pressure.
- L. Water Filters: Cartridge type, including housing, fittings, filter cartridges, and cartridge end caps.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install backflow preventers at each water-supply connection to mechanical equipment and where required by authorities having jurisdiction.
- B. Install hose bibbs with integral or field-installed vacuum breaker.

END OF SECTION 221119

SECTION 221123 - DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data. Include certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Comply with UL 778 for motor-operated water pumps.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PUMPS

- A. In-Line, Sealless Centrifugal Pumps: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps. Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal; rated for 125-psig minimum working pressure and minimum continuous water temperature of 225 deg F.
 - 1. Products:
 - a. Taco, Grundfos, Bell & Gossett
 - 2. Casing: Bronze, with threaded or companion-flange connections.
 - 3. Impeller: Stainless Steel.
- B. Horizontally Mounted, In-Line, Separately Coupled Centrifugal Pumps: Factory-assembled and -tested, in-line, single-stage, separately coupled, overhung-impeller centrifugal pumps designed for installation with pump and motor shafts mounted horizontal. Rated for 125-psig minimum working pressure and minimum continuous water temperature of 225 deg F.
 - 1. Products:
 - a. Taco, Grundfos, Bell & Gossett
 - 2. Casing: Radially split, bronze, with threaded companion-flange connections.
 - 3. Impeller: Statically and dynamically balanced, closed, and keyed to shaft.
 - 4. Impeller Material: ASTM B 584, cast bronze or stainless steel.
 - 5. Shaft and Shaft Sleeve: Steel shaft with copper-alloy shaft sleeve.
 - 6. Seal: Mechanical; with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and rubber bellows and gasket.
 - 7. Bearings: Oil lubricated; bronze-journal or ball type.
 - 8. Motor: Resiliently mounted to pump casing.

2.2 MOTORS

- A. NEMA MG 1, "Standard for Motors and Generators." Include NEMA listing and labeling.
- B. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- C. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

2.3 CONTROLS

- A. Thermostats: Electric; adjustable for control of hot-water circulation pump.
 - 1. Type: Water-immersion temperature sensor, for installation in piping.
 - 2. Settings: Start pump at 115 deg F and stop pump at 125 deg F
- B. Timers: Electric, for control of hot-water circulation pump.
 - 1. Type: Programmable, seven-day clock with manual override on-off switch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with HI 1.4.
- B. Install pumps with access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
- C. Support pumps and piping so weight of piping is not supported by pump volute.
- D. Install electrical connections for power, controls, and devices.
- E. Suspend in-line pumps independent from piping. Use continuous-thread hanger rods and vibration isolation hangers. Fabricate brackets or supports as required for pumps.
- F. Install vertical in-line pumps on concrete bases.
- G. Connect piping with valves that are at least the same size as piping connecting to pumps.
- H. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- I. Install shutoff valve and strainer on suction side of pumps.
- J. Install nonslam check valve and throttling valve on discharge side of pumps.
- K. Install thermostats in hot-water return piping.

- L. Install pressure gages or test plugs on suction and discharge of each pump. Install at integral pressure gage tappings where provided.

END OF SECTION 221123

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Minimum Pressure Requirement for Soil, Waste, and Vent: 10-foot head of water.
- B. Comply with NSF 14, "Plastic Piping Components and Related Materials," for plastic piping components.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

- A. Copper Drainage Tube and Fittings: ASTM B 306, Type DWV drawn temper with copper, Type DWV drainage fittings.
- B. Hubless Cast-Iron Soil Pipe and Fittings: ASTM A 888 or CISPI 301, with ASTM C 1277 shielded couplings.
- C. PVC Plastic, DWV Pipe and Fittings: ASTM D 2665, Schedule 40, plain ends with PVC socket-type, DWV pipe fittings if allowed by authority having jurisdiction.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping installation requirements.
- B. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- C. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for wall penetration systems.
 - 1. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- D. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side

with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

- E. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- F. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- G. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- H. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- J. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.
- K. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure unless otherwise indicated.
- L. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for pipe hanger and support devices.

3.2 PIPE SCHEDULE

- A. Aboveground Applications: Hubless, cast-iron soil pipe and fittings
- B. Belowground Applications: Hubless, cast-iron soil pipe and fittings or PVC plastic, DWV pipe and drainage-pattern fittings with cemented joints if allowed by local code authority having jurisdiction.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS.

- A. Cleanouts

1. Application: Floor cleanout, Wall cleanout, For installation in exposed piping
2. Body or Ferrule: Cast iron
3. Clamping Device: [Required]
4. Outlet Connection: Threaded
5. Closure: Brass plug with straight threads and gasket
6. Adjustable Housing Material: Cast iron with threads
7. Frame and Cover Material and Finish: Nickel-bronze
8. Frame and Cover Shape: Round
9. Top-Loading Classification: Heavy Duty. Provide Extra Heavy Duty in traffic areas.

- B. Floor Drains

1. Products:
 - a. Zurn, Smith or Josam
2. Standard: ASME A112.3.1
3. Pattern: Floor
4. Body Material: Gray iron
5. Seepage Flange: Required
6. Clamping Device: Required
7. Outlet: Bottom
8. Sediment Bucket: Not required >. Top of Body and Strainer Finish: Nickel bronze
9. Top Shape: Round
10. Top-Loading Classification: Medium Duty.
11. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.
12. Standard: ASME A112.6.3.
13. Material: ABS or PVC.
14. Seepage Flange: Required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.
- B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- C. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor unless otherwise indicated.
 - 1. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 2. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- D. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- E. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- F. Install grease removal devices on floor. Install trap, vent, and flow-control fitting according to authorities having jurisdiction. Install control panel adjacent to unit, unless otherwise indicated.
- G. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain grease removal devices.

END OF SECTION 221319

SECTION 221413 - FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: This Section includes storm drainage piping inside the building.
- B. Minimum Pressure Requirement for Storm Drainage: 10-foot head of water.
- C. Comply with NSF 14, "Plastic Piping Components and Related Materials," for plastic piping components.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

- A. Hubless Cast-Iron Soil Pipe and Fittings: ASTM A 888 or CISPI 301 with ASTM C 1277 shielded couplings.
- B. PVC Plastic, DWV Pipe and Fittings: ASTM D 2665, Schedule 40, with PVC socket type fittings made to ASTM D 3311, drain, waste, and vent patterns if allowed by authority having jurisdiction for below grade piping only.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping installation requirements.
- B. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- C. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for wall penetration systems.
 - 1. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- D. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

- E. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- F. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Storm Drain: 1 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.
- G. Install PVC storm drainage piping according to ASTM D 2665.
- H. Install underground PVC storm drainage piping according to ASTM D 2321.
- I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- J. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.
- K. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- L. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for pipe hanger and support devices.

3.2 INSPECTION

- A. Inspect and test piping systems following procedures of authorities having jurisdiction.

3.3 PIPE SCHEDULE

- A. Aboveground Applications: **Hubless, cast-iron soil pipe and fittings (Insulate above ceilings)**
- B. Belowground Applications: **Hubless, cast-iron soil pipe and fittings or PVC plastic, DWV pipe and fittings with solvent-cemented joints if allowed by authority having jurisdiction.**

END OF SECTION 221413

SECTION 221423 - STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Roof Drains
 - 1. Products:
 - a. Zurn
 - b. Smith
 - c. Josam
 - 2. Standard: ASME A112.6.4.
 - 3. Type: General purpose roof drain.
 - 4. Body Material: Cast iron
 - 5. Flange: Anchor with weep holes
 - 6. Outlet: Bottom
 - 7. Dome Material: Cast iron
 - 8. Features and Accessories: Underdeck clamp

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- B. Install floor drains at low pints of surface areas and where indicated. Set tops of drains flush with finished floor.
 - 1. Trap drains connected to sanitary building drain.
 - 2. Install drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes.

- C. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
 - 1. Install roof-drain flashing collar or flange so no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.

END OF SECTION 221423

SECTION 223400 - FUEL-FIRED DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Gas-Fired Water Heaters: Bear AGA certification label.
- C. Comply with requirements of applicable NSF, AWWA, or FDA and EPA regulatory standards for tasteless and odorless, potable-water-tank linings.
- D. Comply with performance efficiencies prescribed in ASHRAE 90.2, "Energy Efficient Design of New Low-Rise Residential Buildings."
- E. Warranties: Submit a written warranty executed by manufacturer agreeing to repair or replace water heaters that fail in materials or workmanship within 5 years from date of Substantial Completion. Failures include, but are not limited to, tanks and elements.

PART 2 - PRODUCTS

2.1 WATER HEATERS, GENERAL

- A. Insulation: Suitable for operating temperature and required insulating value. Include insulation material that surrounds entire tank except connections and controls.
- B. Anode Rods: Factory installed, magnesium.
- C. Combination Temperature and Pressure Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.
- D. Drain Valve: Factory or field installed.

2.2 GAS-FIRED WATER HEATERS

- A. Products:
 - 1. AO Smith
- B. Commercial, Storage, Gas Water Heaters: ANSI Z21.10.3, high efficiency with adjustable thermostat for use with powered-vent water heaters for natural-gas fuel. Steel tank with 150-psig working-pressure rating, ASME labeled, through-roof, direct-vent and combustion air intake system with concentric fitting.

C.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install temperature and pressure relief valves and extend to closest floor drain.
- B. Install vacuum relief valves in cold-water-inlet piping.
- C. Install shutoff valves and unions at hot- and cold-water piping connections.
- D. Make piping connections with dielectric fittings where dissimilar piping materials are joined.
- E. Connect gas water heaters according to NFPA 54. Connect gas vent and draft hoods and diverters where required. Extend to outside and terminate in vent cap.
- F. Provide hot water temperature alarms and mixing valves meeting OSHPD 3 requirements.
- G. Provide 100% redundant systems meeting OSHPD requirements.

END OF SECTION 223400

SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for each type of plumbing fixture, including trim, fittings, accessories, appliances, appurtenances, equipment, and supports.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
- C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- D. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.

PART 2 - PRODUCTS

2.1 WATER CLOSET (Flush Valve)

- A. Vitreous-China Water Closet: Elongated, siphon-jet type, floor-mounted with flushometer valve.
 - a. Basis-of-Design Product: Product indicated on Drawings.
- 2. Design Consumption: 1.6 gal./flush
- B. Toilet Seat: Elongated, solid plastic open front without cover with bumpers and hardware, Commercial, Standard class.
 - 1. Basis-of-Design Product: Product indicated on Drawings.
 - 2. Flushometer Valve: Brass body, brass or copper pipe or tubing inlet with wall flange and tailpiece with spud, screwdriver check stop, and vacuum breaker. Polished, chrome-plated, exposed metal parts. Consumption: 1.6 gal./flush.

Basis-of-Design Product: Product indicated on Drawings.

2.2 WATER CLOSET (Flush Tank)

- A. Vitreous-China Water Closet: Elongated, siphon-jet type, floor-mounted, floor outlet with close-coupled, gravity-type tank.
 - a. Basis-of-Design Product: Product indicated on Drawings.
 - 2. Design Consumption: 1.6 gal./flush
- B. Toilet Seat: Elongated, solid plastic open front without cover with bumpers and hardware, Commercial, Standard class.
 - a. Basis-of-Design Product: Product indicated on Drawings.

2.3 URINAL

- A. Vitreous-China Urinal: Accessible, wall -mounting, back-outlet, siphon-jet type.
 - a. Basis-of-Design Product: Product indicated on Drawings.
 - 2. Design Consumption: 1 gal./flush
- B. Flushometer Valve: Cast-brass body, brass or copper pipe or tubing inlet with wall flange and tailpiece with spud, screwdriver check stop, and vacuum breaker. Polished, chrome-plated, exposed metal parts. Consumption: 1.0 gal./flush.
 - a. Basis-of-Design Product: Product indicated on Drawings.

2.4 LAVATORY (Counter and Wall Mounted)

- A. Vitreous-China Lavatory: Accessible, wall-mounting,
 - a. Basis-of-Design Product: Product indicated on Drawings.
- B. Vitreous-China Lavatory: Accessible, Counter mounting, self-rimming.
 - a. Basis-of-Design Product: Product indicated on Drawings.
- C. Faucets: ASME A112.18.1; solid brass, chrome finish.
 - 1. Basis-of-Design Product: Product indicated on Drawings
 - 2. Maximum Flow Rate: 0.5 gpm
- D. Drain: Grid strainer with NPS 1-1/4 tailpiece
- E. Trap: Chrome-plated with slip-joint inlet and wall flange.

- F. Supply and Drain Insulation: Soft-plastic covering; removable at stops.
- G. Fixture Support: Concealed arm for wall-mounting, lavatory-type fixture. Include steel uprights and feet.

2.5 SINKS – Counter Mounted

- A. Stainless-Steel Sink: Counter-mounting, self-rimming type, 18 gauge thick, one or two compartment per plans.
 - a. Basis-of-Design Product: Product indicated on Drawings.
- B. Faucet: Solid brass, chrome finish
- C. Maximum 2.2-gpm flow rate.]
 - 1. Basis-of-Design Product: Product indicated on Drawings
- D. Disposer: See plans for hp, UL labeled.
 - 1. Basis-of-Design Product: Product indicated on Drawings

2.6 SERVICE SINK

- A. Enameled, Cast-Iron, Service Sink: Floor mounting type
 - a. Basis-of-Design Product: Product indicated on Drawings.
- B. Plastic Mop-Service Basin: 24"x24"x10" with rim guard, mop hanger and drain.
- C. Faucet: Widespread, solid brass, chrome plated with supplies on 8-inch centers. Wall braced spout with integral vacuum breaker, pail hook, and hose-thread outlet.
 - 1. Basis-of-Design Product: Product indicated on Drawings.
- D. Mounting: Floor.
- E. Rim Guard: Manufacturer's standard
- F. Drain: NPS 3 with grid strainer.

2.7 ELECTRIC WATER COOLER

- A. Description: Wall-mounted bi-level bubbler type, stainless steel cabinet.
 - a. Basis-of-Design Product: Product indicated on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATIONS

- A. Install fitting insulation kits on fixtures for people with disabilities.
- B. Install fixtures with flanges and gasket seals.
- C. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- D. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
- E. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.
- F. Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.
- G. Fasten wall-mounted fittings to reinforcement built into walls.
- H. Fasten counter-mounting plumbing fixtures to casework.
- I. Secure supplies to supports or substrate within pipe space behind fixture.
- J. Set shower receptors and mop basins in leveling bed of cement grout.
- K. Install individual supply inlets, supply stops, supply risers, and tubular brass traps with cleanouts at fixture.
- L. Install water-supply stop valves in accessible locations.
- M. Install traps on fixture outlets. Omit traps on fixtures having integral traps. Omit traps on indirect wastes unless otherwise indicated.
- N. Install disposers in sink outlets. Install switch where indicated, or in wall adjacent to sink if location is not indicated.
- O. Install hot-water dispensers in back top surface of sink or in counter with spout over sink.
- P. Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.
- Q. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.
- R. Install piping connections between plumbing fixtures and piping systems and plumbing equipment. Install insulation on supplies and drains of fixtures for people with disabilities.

PLUMBING FIXTURES

S. Ground equipment.

END OF SECTION 224000

SECTION 230500 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Mechanical Sleeve Seals: Modular rubber sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- D. PVC Pipe: ASTM D 1785, Schedule 40.

2.2 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

2.3 MOTORS

- A. Motor Characteristics:
 - 1. Motors 1/2 HP and Larger: Three phase.
 - 2. Motors Smaller Than 1/2 HP: Single phase.
 - 3. Frequency Rating: 60 Hz.
 - 4. Voltage Rating: NEMA standard voltage for circuit voltage to which motor is connected.
 - 5. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 - 6. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
 - 7. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
 - 8. Enclosure: Unless otherwise indicated, open dripproof.
 - 9. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

2.4 HANGERS AND SUPPORTS

- A. Hanger and Pipe Attachments: Factory fabricated with galvanized coatings; nonmetallic coated for hangers in direct contact with copper tubing.
- B. Powder-Actuated Fasteners: Threaded-steel stud, with pull-out and shear capacities appropriate for supported loads and building materials where used.
- C. Mechanical-Expansion Anchors: Insert-wedge-type, zinc coated or stainless steel, with pull-out and shear capacities appropriate for supported loads and building materials where used.

2.5 VIBRATION ISOLATION AND SEISMIC CONTROL DEVICES

- A. Vibration Supports:
 - 1. Pads: Arranged in single or multiple layers of oil- and water-resistant, neoprene of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match supported equipment.
 - 2. Restrained Mounts: Double-deflection type, with molded, oil-resistant fiberglass, rubber or neoprene isolator elements with factory-drilled, encapsulated top plate and baseplate. Provide isolator with minimum 0.5-inch > static deflection.
 - 3. Spring Isolators: Freestanding, laterally stable, restrained-spring isolators. Provide isolator with minimum 1-inch static deflection.
- B. Vibration Hangers:
 - 1. Elastomeric Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to steel housings with threaded connections for hanger rods. Provide isolator with minimum 0.5-inch static deflection.
 - 2. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression. Provide isolator with minimum 1-inch static deflection.
- C. Seismic Restraints:
 - 1. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
 - 2. Channel Support System: MFMA-4, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
 - 3. Restraining Cables: Galvanized -steel cables with end connections made of steel assemblies that swivel to final installation angle and use two clamping bolts for cable engagement.
 - 4. Post-Installed Anchors: Torque-controlled expansion anchors, seismic rated, zinc-plated carbon steel for interior applications and stainless steel for exterior locations. Provide anchor bolts with strength four times the load imposed as tested according to ASTM E 488.

2.6 PRESSURE GAGES AND TEST PLUGS

- A. Pressure Gages: Direct-mounting, indicating-dial type complying with ASME B40.100. Dry metal case, minimum 2-1/2-inch diameter with red pointer on white face, and plastic window. Minimum accuracy 3 percent of middle half of range. Range two times operating pressure.
- B. Test Plug: Corrosion-resistant brass or stainless-steel body with two self-sealing rubber core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping. Minimum pressure and temperature rating of 500 psig at 200 deg F.

PART 3 - EXECUTION

3.1 MOTOR INSTALLATION

- A. Anchor motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions.

3.2 GENERAL PIPING INSTALLATIONS

- A. Install piping free of sags and bends.
- B. Install fittings for changes in direction and branch connections.
- C. Install sleeves for pipes passing through concrete and masonry walls, gypsum board partitions, and concrete floor and roof slabs.
- D. Exterior Wall, Pipe Penetrations: Mechanical sleeve seals installed in steel or cast-iron pipes for wall sleeves.
- E. Comply with requirements in Division 07 Section "Penetration Firestopping" for sealing pipe penetrations in fire-rated construction.
- F. Install unions at final connection to each piece of equipment.
- G. Install dielectric unions and flanges to connect piping materials of dissimilar metals in gas piping.
- H. Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals in water piping.

3.3 GENERAL EQUIPMENT INSTALLATIONS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components, unless otherwise indicated.

- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.4 BASES, SUPPORTS, AND ANCHORAGES

- A. Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 - 2. Install dowel rods on 18-inch centers around the full perimeter of the base to connect concrete base to concrete floor.
 - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete"
- B. Mix and install grout for pump and other equipment base plates, and anchors. Place grout, completely filling equipment bases.

3.5 HANGERS AND SUPPORTS

- A. Comply with MSS SP-69 and MSS SP-89. Install building attachments within concrete or to structural steel.
- B. Install hangers and supports to allow controlled thermal and seismic movement of piping systems.
- C. Install powder-actuated fasteners and mechanical-expansion anchors in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches thick.
- D. Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 3. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

4. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 5. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
- F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

3.6 VIBRATION ISOLATION AND SEISMIC CONTROL DEVICE INSTALLATION

- A. Adjust vibration isolators to allow free movement of equipment limited by restraints.
- B. Install resilient bolt isolation washers and bushings on equipment anchor bolts.
- C. Install cables so they do not bend across sharp edges of adjacent equipment or building structure.

END OF SECTION 230500

SECTION 230523 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product
 - 1. DaSta.

PART 2 - PRODUCTS

2.1 GENERAL-DUTY VALVES

- A. Valves to be ¼ turn unless noted otherwise.
- B. Valve Sizes: Same as upstream piping unless otherwise indicated.
- C. Valves in Insulated Piping: With 2-inch stem extensions.
- D. End Connections: Threads shall comply with ANSI B1.20.1. Flanges shall comply with ANSI B16.1 for cast-iron valves and with ANSI B16.24 for bronze valves. Solder-joint connections shall comply with ANSI B16.18.
- E. One-Piece, Copper-Alloy Ball Valves: Brass or bronze body with chrome-plated bronze ball, PTFE or TFE seats, and 400-psig minimum CWP rating.
- F. Two-Piece, Copper-Alloy Ball Valves: Brass or bronze body with full port, chrome-plated bronze ball; PTFE seats; and 600-psig minimum CWP rating and blowout-proof stem.
- G. Bronze, Swing Check Valves: Class 125, bronze body with bronze disc and seat.
- H. Bronze Gate Valves: Class 125, bronze body with nonrising stem and bronze solid wedge and union-ring bonnet.
- I. Bronze Globe Valves: Class 125, bronze body with bronze disc and union-ring bonnet.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use gate and ball valves for shutoff duty; globe and ball for throttling duty.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves for each fixture and item of equipment.

- D. Install three-valve bypass around each pressure-reducing valve using throttling-type valves.
- E. Install valves in horizontal piping with stem at or above center of pipe.
- F. Install valves in a position to allow full stem movement.
- G. Install check valves for proper direction of flow in horizontal position with hinge pin level.

END OF SECTION 230523

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Certified TAB reports.
- B. TAB Firm Qualifications: AABC NEBB or TABB certified.
- C. TAB Report Forms: Standard TAB contractor's forms approved by Architect.
- D. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine the approved submittals for HVAC systems and equipment.
- C. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- D. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- E. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- F. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- G. Examine automatic temperature system components to verify the following:
 - 1. Dampers, valves, and other controlled devices are operated by the intended controller.
 - 2. Dampers and valves are in the position indicated by the controller.
 - 3. Integrity of dampers and valves for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.

4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
 5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 6. Sensors are located to sense only the intended conditions.
 7. Sequence of operation for control modes is according to the Contract Documents.
 8. Controller set points are set at indicated values.
 9. Interlocked systems are operating.
 10. Changeover from heating to cooling mode occurs according to indicated values.
- H. Report deficiencies discovered before and during performance of test and balance procedures.

3.2 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" ASHRAE 111 NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish.
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) and metric (SI) units.

3.3 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare schematic diagrams of systems' "as-built" duct layouts.
- B. For variable-air-volume systems, develop a plan to simulate diversity.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Verify that motor starters are equipped with properly sized thermal protection.
- E. Check for airflow blockages.
- F. Check condensate drains for proper connections and functioning.
- G. Check for proper sealing of air-handling unit components.
- H. Check for proper sealing of air duct system.

3.4 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data; number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against approved pump flow rate.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
 - 1. Open all manual valves for maximum flow.
 - 2. Check liquid level in expansion tank.
 - 3. Check makeup-water-station pressure gage for adequate pressure for highest vent.
 - 4. Set system controls so automatic valves are wide open to heat exchangers.
 - 5. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.

3.5 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 - 2. Air Outlets and Inlets: Plus or minus 10 percent.
 - 3. Heating-Water Flow Rate: Plus or minus 10 percent.
 - 4. Cooling-Water Flow Rate: Plus or minus 10 percent.

END OF SECTION 230593

SECTION 230700 - HVAC INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Quality Assurance: Labeled with maximum flame-spread index of 25 and maximum smoke-developed index of 50 according to ASTM E 84.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- B. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
- C. Mineral-Fiber Blanket Insulation: Comply with ASTM C 553, Type II and ASTM C 1290, Type I.
- D. Mineral-Fiber Board Insulation: Comply with ASTM C 612, Type IA or Type IB. For equipment applications, provide insulation with factory-applied FSK jacket.
- E. Polyolefin Insulation: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.
- F. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- G. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- H. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
- I. Factory-Applied Jackets: When factory-applied jackets are indicated, comply with the following:
 - 1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
- J. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

PART 3 - EXECUTION

3.1 INSULATION INSTALLATION

- A. Comply with requirements of the Midwest Insulation Contractors Association's "National Commercial & Industrial Insulation Standards" for insulation installation on pipes and equipment.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Insulation Installation at Fire-Rated Wall, Partition, and Floor Penetrations: Install insulation continuously through penetrations. Seal penetrations. Comply with requirements in Division 07 Section "Penetration Firestopping."
- D. Flexible Elastomeric Insulation Installation:
 - 1. Seal longitudinal seams and end joints with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 - 2. Insulation Installation on Pipe Fittings and Elbows: Install mitered sections of pipe insulation. Secure insulation materials and seal seams with adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- E. Mineral-Fiber Insulation Installation:
 - 1. Insulation Installation on Straight Pipes and Tubes: Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - 2. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
 - 3. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 - 4. Blanket and Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 - 5. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier.
- F. Plenums and Ducts Requiring Insulation:
 - 1. Concealed and exposed supply.
 - 2. Concealed and exposed return air located in nonconditioned space.
- G. Plenums and Ducts Not Insulated:
 - 1. Metal ducts with duct liner.
 - 2. Factory-insulated plenums and casings.
 - 3. Flexible connectors.
 - 4. Vibration-control devices.

5. Factory-insulated access panels and doors.

H. Piping Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawlspaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.2 DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed duct insulation shall be the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick

END OF SECTION 230700

SECTION 230900 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings detailing operating control sequences of each item of HVAC equipment and system and Product Data for controllers, sensors, operators, control panels, thermostats, humidistats, actuators, and control valves and dampers.
- B. Operation Sequence: Per owners request

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install control wiring concealed, except in mechanical rooms, and according to requirements specified in Division 26 Sections.

END OF SECTION 230900

SECTION 231123 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Quality Assurance: Comply with NFPA 54 & CPC 2007.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Minimum Operating-Pressure Ratings:
 - 1. Piping and Valves: 100 psig minimum unless otherwise indicated.
 - 2. Service Regulators: 100 psig minimum unless otherwise indicated.
 - 3. Service Meter Minimum Operating Pressure: 5 psig

2.2 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
 - 2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
 - 3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
 - 4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
- B. PE Pipe: ASTM D 2513, SDR 11.
 - 1. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe with tracer wire.
 - 2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D2513, SDR 11 and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

2.3 SPECIALTIES

- A. Appliance Flexible Connectors:
 - 1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.

2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
 3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
 4. Corrugated stainless-steel tubing with polymer coating.
- B. Strainers: ASTM A 126, Class B, cast-iron body, Y-pattern, full size of connecting piping, CWP rating of 125 psig. Include 40-mesh startup strainer, and perforated stainless-steel basket.
- C. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.
- D. Service Meters: Comply with gas company requirements.
- E. Detectable Warning Tape: PE film warning tape 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection; colored yellow.

2.4 VALVES

- A. General Requirements for Metallic Manual Gas Shutoff Valves: Comply with ASME B16.33.
1. CWP Rating: 125 psig
- B. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.
1. Body: Bronze, complying with ASTM B 584.
 2. Ball: Chrome-plated brass.
 3. Stem: Bronze; blowout proof.
 4. Seats: Reinforced TFE; blowout proof.
 5. Packing: Separate packnut with adjustable stem packing threaded ends.
 6. CWP Rating: 600 psig.
 7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- C. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
1. Body: Bronze, complying with ASTM B 584.
 2. Ball: Chrome-plated bronze.
 3. Stem: Bronze; blowout proof.
 4. Seats: Reinforced TFE; blowout proof.
 5. Packing: Threaded body packnut design with adjustable stem packing.
 6. CWP Rating: 600 psig.
 7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- D. Bronze Plug Valves: MSS SP-78.
1. Body: Bronze, complying with ASTM B 584.

2. Plug: Bronze.
 3. Operator: Square head or lug type with tamperproof feature where indicated.
 4. Pressure Class: 125 psig.
 5. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 6. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- E. Cast-Iron, Nonlubricated Plug Valves: MSS SP-78.
1. Body: Cast iron, complying with ASTM A 126, Class B.
 2. Plug: Bronze or nickel-plated cast iron.
 3. Seat: Coated with thermoplastic.
 4. Stem Seal: Compatible with natural gas.
 5. Operator: Square head or lug type with tamperproof feature where indicated.
 6. Pressure Class: 125 psig.
 7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- F. PE Ball Valves: Comply with ASME B16.40.
1. CWP Rating: 80 psig
 2. Operating Temperature: plus 30 degrees to plus 120 deg F
 3. Operator: Nut or flat head for key operation with tamperproof feature where indicated.
- G. Earthquake Valves: ASCE 25, listed and labeled by an NRTL acceptable to authorities having jurisdiction.

2.5 PRESSURE REGULATORS

- A. General Requirements: Single stage, steel jacketed, and corrosion resistant. Include elevation compensator.
- B. Service-Pressure Regulators: ANSI Z21.80; 100-psig maximum inlet pressure. Factory- or field-installed, stainless-steel screen in vent opening if not connected to vent piping.
- C. Line Pressure Regulators: ANSI Z21.80; 5-psig- maximum inlet pressure. Factory- or field-installed, stainless-steel screen in vent opening if not connected to vent piping.
- D. Appliance Pressure Regulators: ANSI Z21.18; 1-psig maximum inlet pressure. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.

PART 3 - EXECUTION

3.1 OUTDOOR PIPING INSTALLATION

- A. Comply with requirements in Division 23 Section "Common Work Results for HVAC" for basic piping installation requirements.

- B. Install underground, natural-gas piping buried at least 36 inches below finished grade.
 - 1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.
- C. Install underground, PE, natural-gas piping according to ASTM D 2774.
- D. Install shutoff valve, downstream from gas meter, outside building at gas service entrance.
- E. Install earthquake valves aboveground outside buildings according to listing.
- F. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Division 23 Section "Common Work Results for HVAC" for wall penetration systems.
- G. Install service meters to comply with gas company requirements.

3.2 INDOOR PIPING INSTALLATION

- A. Comply with requirements in Division 23 Section "Common Work Results for HVAC." for basic piping installation requirements.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install escutcheons at penetrations of interior walls, ceilings, and floors.
- D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- E. Install service meters to comply with gas company requirements.
- F. Install gas stops for shutoff to appliances with low-pressure gas supply.
- G. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- H. Connect branch piping from top or side of horizontal piping.
- I. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
- J. Install strainer on inlet of each line pressure regulator and automatic or electrically operated valve.
- K. Connect gas piping to equipment and appliances with shutoff valves and unions. Install gas valve upstream from and within 72 inches of each appliance using gas. Install union or flanged connections downstream from valves.

- L. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to the outdoors and terminate with weatherproof vent cap.
- M. Do not use natural-gas piping as grounding electrode.

3.3 PIPING JOINT CONSTRUCTION

- A. Threaded Joints: Thread pipe with tapered pipe threads complying with ASME B1.20.1.
- B. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators.
- C. Joints in Steel Piping with Protective Coating: Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
- E. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.
- F. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions conforming to SAE J513. Tighten finger tight then using wrench. Do not overtighten.
- G. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End Pipe and Fittings: Use butt fusion.
 - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.4 VALVE INSTALLATION

- A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.
- B. Install underground valves with valve boxes.
- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- D. Install anode for metallic valves in underground PE piping.

3.5 OUTDOOR PIPING SCHEDULE

- A. Underground natural-gas piping shall be the following:
 - 1. PE pipe and fittings joined by heat-fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.

B. Aboveground natural-gas piping shall be the following:

1. Galvanized Steel pipe with galvanized-iron fittings and threaded joints.

3.6 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground, branch piping 2" and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

3.7 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG AND UP TO 5 PSIG

A. Aboveground, branch piping 2" and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

3.8 GAS SHUTOFF VALVE SCHEDULE

A. Connections to Existing Gas Piping: Use valve and fitting assemblies made for tapping utility's gas mains and listed by an NRTL.

B. Underground:

1. PE valves.
2. NPS 2 and Smaller: Bronze plug valves.
3. NPS 2-1/2 and Larger: Cast-iron, nonlubricated plug valves.

3.9 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 and smaller shall be the following:

1. Bronze plug valve.

B. Valves in branch piping for single appliance shall be the following:

1. Bronze plug valve.

END OF SECTION 231123

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Heating and cooling water piping and condensate drain piping.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. Hard Copper Tubing: ASTM B 88, Type L for condenser water and heating water, Type M for condensate drainage piping. Condensate piping shall be insulated, ASME B16.22 wrought-copper solder fittings and ASTM B 32, 95-5 tin antimony solder.
- B. Steel Pipe: ASTM A 53, Schedule 40 plain ends with malleable-iron threaded fittings, Class 150 for condenser water.
- C. Unions: ASME B16.39, malleable-iron, Class 150, hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends.
- D. Flexible Connectors: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket; 150-psig minimum working pressure, 250 deg F maximum operating temperature.
- E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, ends.

2.2 SPECIAL-DUTY VALVES

- A. Calibrated Plug Valves: 125-psig water working pressure, 250 deg F maximum operating temperature; bronze body with calibrated orifice. Provide with connections for portable differential pressure meter with integral check valves and seals. Valve shall have integral pointer and calibrated scale to register degree of valve opening.
- B. Pressure-Reducing Valves: Diaphragm-operated, cast-iron or brass-body valve, with low-inlet pressure check valve, inlet strainer removable without system shutdown, and noncorrosive valve seat and stem.
- C. Safety Relief Valves: Brass or bronze body with brass and rubber, wetted, internal working parts; to suit system pressure and heat capacity; according to ASME Boiler and Pressure Vessel Code: Section IV.

2.3 HYDRONIC SPECIALTIES

- A. Manual Air Vent: Bronze body and nonferrous internal parts; 150-psig working pressure, 225 deg F operating temperature; manually operated with screwdriver or thumbscrew; with NPS 1/8 discharge connection and NPS 1/2 inlet connection.
- B. Diaphragm-Type Compression Tanks: Welded carbon steel, 125-psig working pressure, 375 deg F maximum operating temperature. Separate air charge from system water to maintain design expansion capacity, by means of a flexible diaphragm securely sealed into tank. Provide taps for pressure gage and air charging fitting, and drain fitting. Support vertical tanks with steel legs or base; support horizontal tanks with steel saddles. Tank, with taps and supports, shall be constructed, tested, and labeled according to ASME Pressure Vessel Code: Section VIII.
- C. Chemical Feeder: 5-gal., bypass-type, welded steel; 125-psig working pressure; complete with fill funnel and inlet, outlet, and drain valves. Furnish chemicals specially formulated to prevent accumulation of scale and corrosion in piping system and connected equipment, developed based on analysis of makeup water.
- D. Y-Pattern Strainers: 125-psig working pressure; cast-iron body (ASTM A 126, Class B), flanged ends for NPS 2-1/2 and larger, threaded connections for NPS 2 and smaller, bolted cover, perforated Type 304 stainless-steel basket, and bottom drain connection.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with requirements in Division 23 Section "Common Work Results for HVAC" for basic piping installation requirements.
- B. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Division 23 Section "Common Work Results for HVAC" for wall penetration systems.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping free of sags and bends and install fittings for changes in direction and branch connections.
- E. Use the fewest number of joints belowground and within floor slabs.
- F. Install piping at a uniform slope of 0.2 percent upward in the direction of flow.
- G. Make reductions in pipe sizes using eccentric reducer fitting installed with level side up.
- H. Install branch connections to mains using tee fittings in main with takeoff out the bottom of the main, except for up-feed risers, which shall have swing joint and takeoff out the top of the main line.

- I. Install unions in pipes adjacent to each valve, at final connections with each piece of equipment, and elsewhere as indicated.
- J. Install flexible connectors at inlet and discharge connections to pumps (except in-line pumps) and other vibration-producing equipment.
- K. Remove stems, seats, and packing of valves and accessible internal parts at piping specialties before soldering or brazing.

3.2 VALVE INSTALLATIONS

- A. Shutoff Duty: Use gate or ball valves.
- B. Throttling Duty: Use globe or ball valves.
- C. Install shutoff-duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and elsewhere as indicated.
- D. Install throttling-duty valves at each branch connection to return mains, at return connections to each piece of equipment, and elsewhere as indicated.
- E. Install calibrated plug valves on the outlet of each heating or cooling element and elsewhere as required to facilitate system balancing.
- F. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple and cap.
- G. Install check valves on each pump discharge and elsewhere as required to control flow direction.
- H. Install safety relief valves on hot-water generators and elsewhere as required by authorities having jurisdiction. Pipe discharge to floor drain without valves.
- I. Install manual air vents at high points in the system, at heat-transfer coils, and elsewhere as required for system air venting.
- J. Run piping from boiler air vent connection or air separator to compression tank with 1/4 inch per foot upward slope towards tank. Connect boiler outlet piping.
- K. Install valves with stem up. Allow clearance above stem for check mechanism removal.

3.3 SPECIALTIES INSTALLATIONS

- A. Install chemical feeders in each hydronic system in upright position with top of funnel not more than 48 inches above floor. Install feeder across pump or in bypass line, off main using ball valves on each side of feeder, and in the main between bypass connections. Pipe drain, with ball valve, to nearest equipment drain.

- B. Install diaphragm-type compression tanks on floor. Vent and purge air from hydronic system; charge tank with proper air charge to suit system design requirements.
- C. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated.

3.4 TESTING, ADJUSTING, AND BALANCING

- A. Clean and flush hydronic piping systems. Remove, clean, and replace strainer screens.
- B. Hydrostatically test completed piping at a pressure one and one-half times operating pressure. Isolate equipment before testing piping. Repair leaks and retest piping until there are no leaks.
- C. Balance water flow within distribution system, including submains, branches, and terminals, to indicated quantities as required by Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.5 PIPING SCHEDULE

- A. Hot and Chilled Water, NPS 2 and Smaller:
 - 1. Aboveground: Drawn-temper copper tubing with soldered joints, or steel pipe with threaded joints.
 - 2. Aboveground: Steel pipe with threaded joints.
 - 3. Aboveground: CPVC pipe and fittings with solvent welded joints.
 - 4. Belowground or within Slabs: Annealed-temper copper tubing with soldered joints.
- B. Condensate Drain Lines: Drawn-temper copper tubing with soldered joints or PVC pipe with solvent-welded joints.

END OF SECTION 232113

SECTION 232123 - HYDRONIC PUMPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data. Include certified pump-performance curves, furnished specialties, motor horsepower and electrical characteristics.
- B. Comply with UL 778 for motor-operated water pumps.

PART 2 - PRODUCTS

2.1 HYDRONIC PUMPS

- A. Close-Coupled, End Suction Centrifugal Pumps: Factory-assembled and -tested, designed for installation with pump and motor shafts mounted horizontally. Rated for 175-psig minimum working pressure and minimum continuous water temperature of 250 deg F. Pumps shall be supplied with variable frequency drives. Product indicated on drawings.
 - 1. Casing: Cast iron, with replaceable bronze wear rings, threaded gage tappings at inlet and outlet, and companion-flange connections.
 - 2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
 - 3. Pump Shaft: Carbon Steel, with bronze shaft sleeve.
 - 4. Mechanical Seal: Ceramic with copper seal flush line.
- B. 5 HP and Larger: Grease-lubricated ball bearings.
- C. Motor shall be non-overloading within full range of pump performance.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pumps with access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
- B. Support pumps and piping so weight of piping is not supported by pump volute.
- C. Install electrical connections for power, controls, and devices.
- D. Suspend in-line pumps independent from piping. Use continuous-thread hanger rods and vibration isolation hangers. Fabricate brackets or supports as required for pumps.

- E. Install vertical in-line pumps on concrete bases.
- F. Connect piping with valves that are at least the same size as piping connecting to pumps.
- G. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- H. Install shutoff valve and strainer on suction side of pumps.
- I. Install nonslam check valve and throttling valve on discharge side of pumps.

END OF SECTION 232123

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Comply with ASME B31.5, "Refrigerant Piping," and with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

PART 2 - PRODUCTS

2.1 TUBES AND FITTINGS

- A. Copper Tube: ASTM B 88, Types K and L and ASTM B 280, Type ACR.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- D. Brazing Filler Metals: AWS A5.8.

2.2 VALVES

- A. Thermostatic Expansion Valve: Comply with ARI 750; forged brass or steel body, stainless-steel internal parts, copper tubing filled with refrigerant charge for 40 deg F suction temperature; 700-psig 450-psig working pressure, and 240 deg F operating temperature.
- B. Solenoid Valves: Comply with ARI 760; 240 deg F temperature rating, 400-psig working pressure, 240 deg F operating temperature; and 24-V normally closed holding coil.

2.3 REFRIGERANT PIPING SPECIALTIES

- A. Strainers: Welded steel with corrosion-resistant coating and 100-mesh stainless-steel screen with socket ends; 500-psig working pressure and 275 deg F working temperature.
- B. Moisture/Liquid Indicators: 500-psig operating pressure, 240 deg F operating temperature; with replaceable, polished, optical viewing window and color-coded moisture indicator.
- C. Filter Dryers: 500-psig operating pressure; 240 deg F operating temperature; with replaceable core kit, gaskets, and filter filter-dryer wax removal cartridge.
- D. Mufflers: Welded steel with corrosion-resistant coating and socket ends; 500-psig operating pressure; 240 deg F operating temperature.

- E. Refrigerant: ASHRAE 34, R-22 R-407C R-410A.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with requirements in Division 23 Section "Common Work Results for HVAC" for basic piping installation requirements.
- B. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Division 23 Section "Common Work Results for HVAC" for wall penetration systems.
- C. Install refrigerant piping and charge with refrigerant according to ASHRAE 15.
- D. Belowground, install copper tubing in PVC conduit. Vent conduit outdoors.
- E. Insulate suction lines to comply with Division 23 Section "HVAC Insulation."
- F. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.
- G. Install solenoid valves upstream from each thermostatic expansion valve. Install solenoid valves in horizontal lines with coil at top.
- H. Install thermostatic expansion valves as close as possible to distributors on evaporator coils.
- I. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- J. Install strainers upstream from and adjacent to solenoid valves, thermostatic expansion valves, and compressors unless they are furnished as an integral assembly for device being protected:
- K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

3.2 PIPING SCHEDULE FOR REFRIGERANT R-22

- A. Suction Lines: Copper, Type ACR Type K Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- B. Hot-Gas and Liquid Lines: Copper, Type ACR Type K Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

3.3 PIPING APPLICATIONS FOR REFRIGERANT R-407C.

- A. Suction Lines: Copper, Type ACR Type K Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- B. Hot-Gas and Liquid Lines: Copper, Type ACR Type K Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

3.4 PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Suction Lines: Copper, Type ACR Type K Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- B. Hot-Gas and Liquid Lines: Copper, Type ACR Type K Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

END OF SECTION 232300

SECTION 232500 – HVAC WATER TREATMENT

PART 1 GENERAL

1.1 DESCRIPTION

A. This section specifies cleaning and treatment of circulating HVAC water systems, including the following:

1. Tower Cooling Water - Closed Loop Systems Fluid Coolers
2. Condenser Water – Open Cooling Water Loop Systems
3. Tower Cooling Water – Evaporative Condensers
4. Evaporative Fluid Coolers – Direct and/or Indirect

1.2 RELATED WORK

- A. Test requirements and instructions on use of equipment/system: Section 01 00 00, GENERAL REQUIREMENTS.
- B. General mechanical requirements and items, which are common to more than one section of Division 23: Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- C. Piping and valves: Section 23 21 13, HYDRONIC PIPING and Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING.

1.3 QUALITY ASSURANCE

- A. Refer to paragraph, QUALITY ASSURANCE in Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- B. Technical Services: Provide the services of an experienced water treatment specialist or technical representative approved by the Water Treatment System Manufacturer to direct flushing, cleaning, pre-treatment, training, debugging, and acceptance testing operations; direct and perform chemical limit control during construction period and monitor systems for a period of 12 months after completion and acceptance by owner, including not less than

12 service calls and written status reports. During this period perform monthly tests of the cooling tower for Heterotrophic Bacteria and submit reports stating Colony Forming Units per milliliter.

- C. Field Quality Control and Laboratory Reports: During the one year service period, the water treatment laboratory shall provide not less than 12 reports based on on-site periodic visits, as stated in paragraph 1.3.B, sample taking and testing, and review with facility personnel, of water treatment control for the previous period. In addition to field tests, the water treatment laboratory shall provide laboratory test reports. These monitoring reports shall assess water treatment instrumentation accuracy, scale formation, fouling and corrosion control, and shall contain instructions for the correction of any out-of-control condition.
- D. Log Forms: Provide water treatment test log form in electronic format that can be reproduced by owner for use by plant personal making regular system water tests.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Manufacturer's Literature and Data including:
1. Electronic Chemical-Free treatment for open loop systems, including installation and operating instructions.
 2. Conductivity Controller and Blowdown Valve, including installation and operating instructions.
 3. Optional Coupon Rack and other Accessories as required by the contract documents.
- C. Water analysis verification. Water analysis to include at a minimum the analysis of the following compositions of the Make-up water source:
1. pH
 2. Specific Conductivity ($\mu\text{S}/\text{cm}$)
 3. Calcium Hardness (as ppm CaCO_3)

4. Total Hardness (as ppm CaCO_3)
 5. Total Alkalinity or m-Alkalinity (as ppm CaCO_3)
 6. Chloride (as Cl^-)
 7. Iron (as Fe)
 8. Phosphate (as PO_4)
 9. Silica (as SiO_2)
 10. Sulfate (as SO_4)
- D. Maintenance and operating instructions in accordance with Section 01 00 00, GENERAL REQUIREMENTS suitable for inclusion into a standard 3-ring binder.

PART 2 - PRODUCTS

3.1 GENERAL

- A. The Contractor shall furnish and install an Electronic Chemical-free Water Treatment System as shown and detailed on the contract documents. All components of the system provided will be manufactured and supplied by a single company and be certified to be functionally compatible, such as the SBC™ manufactured by Griswold Water Systems of Corona, CA or an approved substitution.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify field conditions and suitability for installation according to manufacturer's published installation data.

3.3 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

- B. Install equipment level and plumb.
- C. Install equipment per recommendations in the manufacturer's published installation data.
- D. Cleaning of piping systems using the Electronic Treatment System (SBC™):
 - 1. Immediately after hydrostatic testing of piping, systems shall be cleaned, drained, and flushed with clean water. Any chemical cleaners used in this process shall be thoroughly flushed from the piping system.
 - 2. Under no circumstance will water be allowed to sit stagnant or circulate without water treatment after initial cleaning and testing.
 - 3. Proper system layup procedures must be followed anytime the water system is not running.
 - a. An appropriate corrosion inhibitor as determined by the factory trained and certified water treatment specialist shall be first circulated in the system for a minimum of two hours.
 - b. The system shall be drained of all water.
 - c. Immediately prior to putting the Electronic Treatment System (SBC™) into operation, the system shall be re-filled with clean water.
 - 4. Consult with Water Treatment System Manufacturer or the local Representative for additional details.

3.3 TESTING

- A. Engage a factory-authorized service representative to perform startup service for the Cooling Tower Water Treatment System.
 - 1. Inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
 - 2. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational.
 - 3. Place HVAC water-treatment system into operation and calibrate controls during the

preliminary phase of HVAC systems' startup procedures.

4. Set up Cooling Tower blowdown system according to the Manufacturer's recommendations based upon the site water analysis as specified in PART 1.4 C – Submittal Data of this Section.
 5. An Initial Start-up Service Report shall be provided to the operator and the Manufacturer by field service technician.
- B. No water system using an Electronic Treatment System (SBC™) shall be put into operation without the SBC™ being energized and the blowdown system and mechanical filtration systems fully operational. Failure to comply may result in damage to connected heat exchange equipment from scaling and corrosion, or fouling from biological growth.

3.4 ADJUSTING

1. One year of Cooling Water Treatment Service by a Factory Authorized and Trained Service Technician, including remote monitoring, shall be provided with the cost of the Cooling Tower Water Treatment System.
2. At approximately every 30 days from Initial Start-up Service, the Service Technician shall monitor the performance of the system and make system adjustments as necessary.
3. A written Service Report shall be provided to the Owner/Operator and to the Manufacturer.
4. The monitoring by the Service Technician will include the following:
 - a. Confirm all water treatment system equipment is functioning properly.
 - b. Inspect for any evidence of scale formation.
 - c. Inspect for any evidence of high bacteria levels or biofilm formation.
 - d. Confirm source of makeup water.
 - e. Perform required makeup water analysis
 - 1) Conductivity

- 2) pH
- 3) Chloride
- f. Perform required basin water analysis
 - 1) Conductivity
 - 2) pH
 - 3) Chloride
 - 4) Bacteria analysis by Dipslide or by ASTM D6530 (Kool Kount Assay)
- g. Calibrate and adjust conductivity controller and other sensors as required

3.5 TRAINING

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain Cooling Tower Water Treatment Systems and equipment.
- B. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
 1. Schedule at least four (4) hours of training with Owner.
 2. Provide at least seven days' advance notice.
- C. Review data in maintenance manuals, especially data on recommended parts inventory and supply sources and on availability of parts and service.

SECTION 233100 - HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for fire and smoke dampers and Shop Drawings detailing duct layout and including locations and types of duct accessories, duct sizes, transitions, radius and vaned elbows, special supports details, and inlets and outlet types and locations.
- B. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- C. Comply with NFPA 96 for ducts connected to commercial kitchen hoods.
- D. Comply with UL 181 for ducts and closures.

PART 2 - PRODUCTS

2.1 DUCTS

- A. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip galvanized coating.
- B. Carbon-Steel Sheets: ASTM A 1008/A 1008M; with oiled, matte finish for exposed ducts.
- C. Joint and Seam Tape, and Sealant: Comply with UL 181A.
- D. Rectangular Metal Duct Fabrication: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- E. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124. Must comply with OSHPD requirements.
 - 1. Thickness: 1 inch
 - 2. Airstream surface coated with an antimicrobial erosion-resistant coating.
 - 3. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - 4. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment.

2.2 ACCESSORIES

- A. Volume Dampers and Control Dampers: Single-blade and multiple opposed-blade dampers, standard leakage rating, and suitable for horizontal or vertical applications; factory fabricated and complete with required hardware and accessories.

- B. Fire Dampers: Rated and labeled according to UL 555 by an NRTL; factory fabricated and complete with required hardware and accessories.
- C. Ceiling Fire Dampers: Labeled according to UL 555C by an NRTL and complying with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory." Provide factory-fabricated units complete with required hardware and accessories.
- D. Smoke Dampers: Labeled according to UL 555S by an NRTL. Combination fire and smoke dampers shall also be rated and labeled according to UL 555. Provide factory-fabricated units complete with required hardware and accessories.
- E. Flexible Connectors: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- F. Flexible Ducts: Spiral-wound steel spring with flameproof vinyl sheathing complying with UL 181, Class 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Outdoor, Supply-Air Ducts: Seal Class A.
 - 2. Outdoor, Exhaust Ducts: Seal Class C.
 - 3. Outdoor, Return-Air Ducts: Seal Class C.
 - 4. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
 - 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 - 6. Unconditioned Space, Exhaust Ducts: Seal Class C.
 - 7. Unconditioned Space, Return-Air Ducts: Seal Class B.
 - 8. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 - 9. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
 - 10. Conditioned Space, Exhaust Ducts: Seal Class B.
 - 11. Conditioned Space, Return-Air Ducts: Seal Class C.
- C. Conceal ducts from view in finished and occupied spaces.
- D. Avoid passing through electrical equipment spaces and enclosures.

- E. Support ducts to comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Hangers and Supports."
- F. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- G. Install volume and control dampers in lined duct with methods to avoid damage to liner and to avoid erosion of duct liner.
- H. Install fire and smoke dampers according to UL listing.
- I. Install fusible links in fire dampers.
- J. Clean duct system(s) before testing, adjusting, and balancing.

3.2 TESTING, ADJUSTING, AND BALANCING

- A. Balance airflow within distribution systems, including submains, branches, and terminals to indicated quantities.

END OF SECTION 233100

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Products shall be licensed to use the AMCA-Certified Ratings Seal.
- C. Power ventilators shall comply with UL 705.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL VENTILATORS

- 1. Basis-of-Design Product: Product indicated on Drawings
- B. Housing: Removable, spun-aluminum, dome top and outlet bafflesquare, one-piece, aluminum base with venturi inlet cone.
 - 1. Upblast Units: Aluminum discharge baffle to direct discharge air upward, with rain and snow drains.
 - 2. Wall-Mounting Units: Aluminum rectangular base with venturi inlet cone, motor mount, and vibration isolators designed for wall mounting.
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- D. Belt-Driven Drive Assembly: Resiliently mounted to housing.
 - 1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - 2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - 4. Fan and motor isolated from exhaust airstream.
- E. Accessories:
 - 1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
 - 2. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
 - 3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 - 4. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

- F. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
1. Configuration: Self-flashing without a cant strip, with mounting flange
 2. Overall Height: 8 inches Pitch Mounting: Manufacture curb for roof slope.
 3. Mounting Pedestal: Galvanized steel with removable access panel.
 4. Hertz: 60.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Roof-Mounted Units: Install roof curb on roof structure, according to ARI Guideline B. NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install and secure roof-mounted fans on curbs, and coordinate roof penetrations and flashing with roof construction.

END OF SECTION 233423

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and color charts for factory finishes.

PART 2 - PRODUCTS

2.1 OUTLETS AND INLETS

A. Diffusers:

- 1. Products:
 - a. Titus
 - b. Krueger
 - c. Metalaire
- 2. Material: Steel - Modular Core
- 3. Finish: Baked enamel, white
- 4. Mounting: Surface for hard ceiling areas and T-bar for lay-in ceiling tile areas

B. Wall and Ceiling Registers:

- 1. Products:
 - a. Titus
 - b. Krueger
 - c. Metalaire
- 2. Material: Steel
- 3. Finish: Baked enamel, white
- 4. Mounting: Lay in.

C. Wall and Ceiling Grilles:

- 1. Products:
 - a. Titus
 - b. Krueger
 - c. Metalaire
- 2. Material: Steel
- 3. Finish: Baked enamel, white
- 4. Mounting: Lay in

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel unless otherwise indicated. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 235100 - BREECHINGS, CHIMNEYS, AND STACKS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 LISTED SPECIAL GAS VENT

- A. Description: Double-wall metal vents tested according to UL 1738 and rated for 480 deg F continuously, with positive or negative flue pressure complying with NFPA 211 and suitable for condensing-gas appliances.
- B. Construction: Inner shell and outer jacket separated by at least 1/2-inch airspace.
- C. Inner Shell: ASTM A 959, Type 29-4C stainless steel.
- D. Outer Jacket: Stainless steel.
- E. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
 - 1. Termination: Stack cap designed to exclude 90 percent of rainfall.
 - 2. Termination: Round chimney top designed to exclude 98 percent of rainfall.
 - 3. Termination: Exit cone with drain section incorporated into riser.

2.2 INSTALLATION

- A. Install vents according to stipulated minimum clearances from combustibles.
- B. Seal between sections of positive-pressure vents using only sealants recommended by manufacturer.
- C. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
- D. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.

END OF SECTION 235100

SECTION 236513.16 - CLOSED CIRCUIT FORCED DRAFT COOLING TOWER

PART 1 GENERAL

1.1 DESCRIPTION

A. This section specifies:

1. Closed Circuit Forced Draft Cooling Towers (Fluid Coolers)

1.2 RELATED WORK

- A. Test requirements and instructions on use of equipment/system: Section 01 00 00, GENERAL REQUIREMENTS.
- B. General mechanical requirements and items, which are common to more than one section of Division 23: Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- C. Piping and valves: Section 23 21 13, HYDRONIC PIPING and Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING.
- D. Section 23 25 00, HVAC Water Treatment
- E. Section 23 05 48 Vibration and Seismic Controls for HVAC

1.3 QUALITY ASSURANCE

- A. Refer to paragraph, QUALITY ASSURANCE in Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- B. The complete coil shall be leak tested under water to 350 P.S.I.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Manufacturer's Literature and Data including:
 1. Submit product data indicating dimensions, weights, capacities, ratings, motor electrical characteristics, VFD data, water filtering system, electronic, chemical free water treatment system, and tower performance data.
 2. Submit two copies of installation and maintenance manuals including technical

data and performance charts, shop drawings indicating manufacturer's recommended structural supports including dimensions, sizes and locations of mounting holes, hardware, detailed drawings of major components and a list of all parts and the source of supply.

- C. Maintenance and operating instructions in accordance with Section 01 00 00, GENERAL REQUIREMENTS suitable for inclusion into a standard 3-ring binder.

1.5 WARRANTY

- A. Provide manufacturer's one year complete tower parts warranty and one year Contractor's labor warranty for all cooling tower components beginning from the date of Beneficial Occupancy.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: Recold
- B. Evapco
- C. Baltimore Air Coil

2.2 GENERAL

- A. GENERAL: The unit shall be a forced draft, centrifugal fan, counterflow Closed Circuit Fluid Cooler. The unit shall be of low profile design with a single fan mounted on the end of the unit for convenient access by service personnel. The unit shall ship completely factory assembled with all accessories factory installed.
- B. COIL SECTION: The coil shall be constructed entirely of copper to provide superior corrosion resistance. The tubes shall be 5/8" O.D. copper tubing with type L headers. The coil shall be supported by stainless steel tube sheets and high temperature grommet inserts that allow the coil to move within the insert. The complete coil shall be leak tested under water to 350 P.S.I. to assure leak-free operation.
- C. FAN SECTION: The unit design shall have the fan wheel and motor and drive

components in the dry, entering airstream. This will extend the service life of the unit and provides easy access to the drive system. The fan wheel shall be statically and dynamically balanced and mounted on a solid steel fan shaft supported on each end with self-aligning heavy-duty pillow block bearings. The bearings shall be rated for 200,000-hour average life. Provide extended grease lines for easy maintenance. The v-belt drive system shall be designed for 150% of motor horsepower and the fan housing shall be equipped with curved inlet rings for maximum efficiency. Unit shall be furnished with blower inlet screens and OSHA approved belt guards.

- D. MOTORS: All motors shall be premium efficiency, suitable for outdoor application.
- E. WATER DISTRIBUTION SYSTEM: The unit spray distribution system shall be designed to evenly distribute the spray water, continuously wetting the coil. The spray nozzles shall be made of PVC and utilize a large-orifice design to help prevent clogging. The spray nozzle shall distribute the water in a full 360 degree radius for maximum distribution. The internal piping shall be schedule 40 PVC to prevent spray system corrosion. The spray system piping will extend through the unit casing to allow flushing of the system when needed. The spray nozzles, which shall be attached to the piping with stainless steel clamps, can be inspected or removed through one of the stainless steel access doors. The re-circulating unit pump shall be a close-coupled, centrifugal type pump that uses a mechanical seal. A stainless steel anti-vortexing hood shall be provided on the pump suction.
- F. MAKE-UP WATER SYSTEM: The unit shall have an external float system that uses a solid brass make-up water valve with a large diameter plastic float that is located on the exterior of the sump pan, allowing easy inspection and extended service life. The make-up valve shall be positioned above the overflow connection so that backflow preventors are not required.
- G. SEPARATOR: A vortex style, solids from liquid separator shall be employed to

remove particles from the cooling tower basin.

1. Separator shall be constructed to ASME standards with minimum 0.25", high quality, carbon steel.
2. Separator inlet shall be capable of passing a solid sphere equal to 25 percent of the inlet pipe connection size.
3. Separator shall be low pressure drop design operating in the range of 1-8 psi.
4. Separator shall be accessible having cleanout opening on side of unit.
5. Separator shall not have flanged body or removable dome.
 - 1) No slots or movable parts are allowed in the head area that requires servicing or cleaning.
6. Separator shall incorporate both an automatic internal air bleed and a manual air bleed.
7. Spin arrestor plates shall be installed under the bottom spin plate to retard re-entrainment of solids.
8. Separator shall be equipped with a timer controlled motor-operated purge valve to periodically flush solids collected in the separator down the service drain.

H. ELECTRONIC WATER TREATMENT SYSTEM

1. Provide factory mounted Electronic Water Treatment System Equal to the SBC™ manufactured by Griswold Water Systems of Corona, CA or an approved substitution.
 - 1) The use of other chemical free technologies including but not limited to ultrasound, cavitation, magnets, copper/zinc alloys, copper/silver electrodes, electrostatic systems and such like will not be allowed.
 - 2) Water treatment system will treat the full flow of the spray water.
2. Driver Panel:

- 1) Unit mounted NEMA 4 metal enclosure, powder-coated steel enclosure shall be MET Certified to UL 508A and CSA 22.2 14-95 Standards.
 - 2) An internally mounted Circuit Breaker will be used to provide safety system shutoff for servicing. Replaceable fuses are not acceptable.
 - 3) Maximum power required for Electronic Water Treatment System shall be 100 watts.
 - 4) System must be able to operate continuously without water in the reaction chamber. Electrical interlock with water circulation pump is not allowed.
 - 5) To compensate for possible signal strength loss due to changes in location or operating conditions, the Driver must incorporate an automatic self-tuning program to ensure that maximum signal is always seen by the water flowing through the Reaction Chamber.
9. Alarm Relay with S.P.D.T Dry form C contact (for building management system or remote monitor) shall verify the following System operating status conditions:
- 1 Primary Power Status: e.g. Loss of utility power, tripped circuit breaker, or unit unplugged.
 - 2 Secondary Power Status: e.g. Severed or removed Reaction Chamber signal cable connection, or failure of one or more coils to properly auto-tune.
 - 3 Driver Processor Board Operation Status: e.g. Board overheated, electronic failure
10. NEMA-4 construction for the Driver is required. Powered fan ventilation with inlet air filter is not allowed.
11. Electronic signals shall be generated by use of digital technology under

microprocessor control. A combination of AC and DC pulses will be controlled by factory programming of the microprocessor.

H. Conductivity Controller

1. Electronic Water Treatment System Manufacturer shall furnish a Conductivity Controller to provide proper automatic conductivity based blowdown control for the cooling tower.
2. Conductivity controller shall have the following features:
 - a. NEMA 4x enclosure.
 - b. Maintenance free Toroidal conductivity sensor. Standard contact type probes will not be acceptable.
 - c. Large graphical display with easy to read font.
 - d. Flow Switch input.
 - e. 4-20 mA isolated analog output.
 - f. Dry contact alarm output.
3. Flow sensor to prevent off-cycle blowdown operation
4. Sample Valve shall be provided for convenient withdrawing of water samples
5. Isolation valves will be provided to allow for cleaning probe and flow switch without turning system water flow.

I. Blowdown or Bleed Valve:

1. Provide NEMA 3R, motorized, spring return, ball valve with 120 volt, single phase power input.
 - a. Install bypass line with block valve around blowdown valve for servicing and emergency manual blowdown operation.
 - b. Install throttling valve ahead of the blowdown valve to make adjustments in blowdown volume rate if required.
 - c. Bleed Valve size to be determined by fifteen minute per hour blowdown rate

calculated at maximum tower load for three cycles of concentration

- J. Corrosion Test Coupon Assembly:
 - 1. Provide a two-station or four-station corrosion coupon rack constructed of PVC, complete with piping, valves, and mild steel and copper coupons. Locate copper coupon downstream from mild steel coupon in the test coupon assembly. Include isolation and ball valves and a flow control valve to limit velocity to less than 5 feet per second.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify field conditions and suitability for installation according to manufacturer's published installation data.

3.2 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. Install equipment level and plumb.
- C. Install equipment per recommendations in the manufacturer's published installation data.
- D. Cleaning of piping systems using the Electronic Treatment System (SBC™):
 - 1. Immediately after hydrostatic testing of piping, systems shall be cleaned, drained, and flushed with clean water. Any chemical cleaners used in this process shall be thoroughly flushed from the piping system.
 - 2. Under no circumstance will water be allowed to sit stagnant or circulate without water treatment after initial cleaning and testing.
 - 3. Proper system layout procedures must be followed anytime the water system is

not running.

- a. An appropriate corrosion inhibitor as determined by the factory trained and certified water treatment specialist shall be first circulated in the system for a minimum of two hours.
- b. The system shall be drained of all water.
- c. Immediately prior to putting the Electronic Treatment System (SBC™) into operation, the system shall be re-filled with clean water.
4. Consult with Water Treatment System Manufacturer or the local Representative for additional details.

3.3 TESTING

- A. Engage a factory-authorized service representative to perform startup service for the Cooling Tower Water Treatment System.
 1. Inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
 2. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational.
 3. Place HVAC water-treatment system into operation and calibrate controls during the preliminary phase of HVAC systems' startup procedures.
 4. Set up Cooling Tower blowdown system according to the Manufacturer's recommendations based upon the site water analysis as specified in PART 1.4 C – Submittal Data of this Section.
 5. An Initial Start-up Service Report shall be provided to the operator and the Manufacturer by field service technician.
- B. No water system using an Electronic Treatment System (SBC™) shall be put into operation without the SBC™ being energized and the blowdown system and

mechanical filtration systems fully operational. Failure to comply may result in damage to connected heat exchange equipment from scaling and corrosion, or fouling from biological growth.

3.4 ADJUSTING

1. One year of Cooling Water Treatment Service by a Factory Authorized and Trained Service Technician, including remote monitoring, shall be provided with the cost of the Cooling Tower Water Treatment System.
2. At approximately every 30 days from Initial Start-up Service, the Service Technician shall monitor the performance of the system and make system adjustments as necessary.
3. A written Service Report shall be provided to the Owner/Operator and to the Manufacturer.
4. The monitoring by the Service Technician will include the following:
 - a. Confirm all water treatment system equipment is functioning properly.
 - b. Inspect for any evidence of scale formation.
 - c. Inspect for any evidence of high bacteria levels or biofilm formation.
 - d. Confirm source of makeup water.
 - e. Perform required makeup water analysis
 - 1) Conductivity
 - 2) pH
 - 3) Chloride
 - f. Perform required basin water analysis
 - 1) Conductivity
 - 2) pH
 - 3) Chloride
 - 4) Bacteria analysis by Dipslide or by ASTM D6530 (Kool Kount Assay)

- g. Calibrate and adjust conductivity controller and other sensors as required

3.5 TRAINING

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain Fluid Cooler and all Water Treatment Systems and equipment.
- B. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
 - 1. Schedule at least four (4) hours of training with Owner.
 - 2. Provide at least seven days' advance notice.
- C. Review data in maintenance manuals, especially data on recommended parts inventory and supply sources and on availability of parts and service.

END OF SECTION 236513.16

SECTION 238146 - WATER-SOURCE UNITARY HEAT PUMPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with ASHRAE 15 and ASHRAE 90.1.
- D. Comply with safety requirements in UL 484 and UL 1995.
- E. Warranty: Submit a written warranty signed by manufacturer agreeing to repair or replace refrigeration components that fail within five years after Substantial Completion.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Factory-assembled and -tested, packaged water-source heat pumps complete with controls.
- B. Cabinet and Chassis: Galvanized-steel casing: Access panels for access and maintenance of internal components. Knockouts for electrical and piping connections. Glass-fiber liner, complying with UL 181. Plastic or stainless-steel drain pan pitched per ASHRAE 62.
- C. Water Circuit: Refrigerant-to-water heat exchanger leak tested to 450 psig on refrigerant side and 400 psig on waterside. Factory mount heat exchanger on resilient rubber vibration isolators.
- D. Refrigerant-to-Air Coil: Copper-tubes with aluminum fins, leak tested to 450 psig.
- E. Refrigerant Circuit Components: Sealed refrigerant circuit rated per ARI-ISO-13256. Service fittings on suction and liquid for charging and testing. Pilot-operated, sliding-type reversing valve with replaceable magnetic coil. ASTM B 743 copper refrigerant piping with wrought-copper fittings and brazed joints. Minimum 3/8-inch- thick, flexible elastomeric insulation on piping exposed to airflow through unit.
 - 1. Filter-Dryer: Factory installed to clean and dehydrate refrigerant circuit.
 - 2. Compressor: Installed on vibration isolators in an acoustically treated enclosure with anti-recycle timer; high- and low-pressure cutout, or loss of charge switch; and internal thermal-overload protection.
 - a. Freezestat stops compressor if water-loop temperature falls below 35 deg F.
 - b. Condensate overflow switch stops compressor with high condensate level in pan.

- F. Filters: Disposable pleated type.
- G. Basic Unit Controls: Low- and high-voltage protection. Overcurrent protection for compressor and fan motor. Random time delay, three to ten seconds, starts on power-up. Control voltage transformer.
- H. Electrical Connection: Single electrical connection with fused disconnect.
- I. Hose kits rated for minimum 400-psig working pressure, stainless steel braided, and operating temperatures from 33 to 211 deg F. Tag to equipment designations. Two-piece bronze body ball valves with stainless-steel ball and stem, and galvanized-steel lever handle. Y-type with blowdown valve in supply connection. Balancing device with meter ports to allow flow measurement with differential pressure gage. Automatic balancing valve. Controls in addition to those required for other options. Provide solenoid valve.
 - 1. Thermostat Optional Features:
 - a. Heat-cool-off switch.
 - b. Fan on-auto switch.
Automatic changeover.
 - c. Exposed temperature set-point and indication.
 - d. Deg F indication.
 - 2. Terminal Controller Options:
 - a. Scheduled operation for occupied and unoccupied periods on seven-day clock with minimum four periods per day.
 - b. Unoccupied period override.
 - c. Backup for volatile memory.

2.2 CONCEALED WATER-SOURCE HEAT PUMPS, 5 TONS AND SMALLER

- A. Products:
 - 1. Carrier
- B. Cabinet and Chassis: Flanged duct connections; minimum 1/2-inch- thick insulation.
- C. Fan: Direct driven, centrifugal, with multispeed, ECM motor.
- D. Water Circuit: Stainless-steel, brazed plate, refrigerant-to-water heat exchanger.
 - 1. Domestic Water Heating: Refrigerant-to-domestic water heat exchanger shall be double-wall vented type with factory-mounted pump and controls.
 - 2. Waterside Economizer: Copper tube and aluminum fin coil with three-way valve and entering-water temperature sensor and controller.
 - 3. Water Regulating Valves: Limit water flow and control head pressure.
- E. Refrigerant Circuit: Charge with R-410A refrigerant. Hermetic scroll compressor. Thermal expansion valve refrigerant metering device.

- F. Electric Heating Coil: Helix-wound, nickel-chromium-wire heating elements in ceramic insulators mounted on steel supports.

Filters: 1 inch

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Concrete Bases: Install floor-mounting units on 4-inch- high concrete bases.
- B. Mount water-source heat pumps on concrete base with vibration isolators and seismic restraints.
- C. Suspend water-source heat pumps from structure with using threaded steel rods and minimum 0.25-inch- static deflection rubber-in-shear vibration isolators and seismic restraints.
- D. Connect supply and return hydronic piping to heat pump with hose kits.
- E. Connect heat-pump condensate drain pan to indirect waste connection with condensate trap.
- F. Connect supply and return ducts with flexible duct connectors.
- G. Install electrical devices furnished by manufacturer but not specified to be factory mounted.
- H. Install piping adjacent to machine to allow service and maintenance.

END OF SECTION 238146

1.01 SECTION 260100 - GENERAL PROVISIONS FOR ELECTRICAL WORK

- A. The provisions of this section apply to all work specified in all sections of Division 26.
- B. The General Conditions, Supplementary Conditions, Special Requirements, and applicable portions of Division 1 of the Specification are a part of this Division and the requirements contained herein are supplementary to them.

1.02 PRINCIPAL WORK IN THIS SECTION

- A. Division 26 includes all in materials, equipment, fabrication, installation and tests required for fully operational and safe systems, including, but not limited to, all appurtenances and features, whether specified or shown on drawings, required for conformance with applicable Codes and approval by the Authorities Having Jurisdiction.
- B. Special Conditions
 - 1. All existing electrical, telephone, CATV and street/parking lot lighting systems shall remain fully operational until new systems are completely installed, tested and ready for final connection. Demolition work shall not start until new systems are completely installed, tested and approved and fully operational
 - 2. All existing manholes, handholes and vaults are full of water. Approximately two (2) inches of mud and debris are present on the bottom of all existing manholes, handholes and vaults. As part of the bid, the Contractor shall pump, clean and maintain all existing manholes, handholes and vaults free from water, mud and debris for the duration of the contract. Electrical manholes contain energized medium voltage cables and access shall be coordinated with the Architect/Owner's Representative . The Contractor shall use qualified personnel having adequate experience working with medium voltage installations to work in electrical manholes. The Contractor shall use extreme caution and OSHA recommended safe measures.
 - 3. All existing materials and equipment which are required to be removed or disconnected (but are not indicated for use in the new work) shall be offered to the Architect/Owner's Representative for salvage. If declined by the Architect/Owner's Representative , the Contractor shall dispose of the existing materials and equipment off campus at a bonafide disposal area. Items indicated to be salvaged shall remain the property of the Owner and, if not indicated to be reused in the new work, shall be transported and delivered to an on-campus storage area as directed by the Architect/Owner's Representative.

1.03 RELATED WORK AND REQUIREMENTS

- A. Related Work Specified Elsewhere:
- B. Coordination: Refer to Architectural, Civil, Structural and Mechanical Drawings for the construction details and coordinate the work of this Division with that of other Divisions. Order the work of this Division so that progress will harmonize with that of other Divisions and all work will proceed expeditiously. The work of this Division shall include direct responsibility for the correct placing and connection of electrical work in relation to the work of other Divisions.

- C. Examine other Divisions for work related to the work of this Division especially Division 27 - MECHANICAL.

1.04 REFERENCE STANDARDS

- A. By submitting a Bid, Contractor is deemed to represent himself as competent to accomplish the work of this Division in conformance with applicable Codes. In case of conflict between the Contract Documents and Code requirements, the Codes shall take precedence. Should such conflicts appear, cease work on the parts of the contract affected and immediately notify the Architect in writing. It shall be the Contractor's responsibility to correct, at no cost to the Owner, any work he executes in violation of Code requirements. Specific references to Codes elsewhere in this Division are either to aid the Contractor in locating applicable information or to deny him permission to use options which are permitted by Codes.
- B. Applicable Codes: (Current adopted editions unless otherwise noted):
 - 1. National Electrical Code.
 - 2. California Building Code
 - 3. California Fire Code
 - 4. CCR Titles (as applicable)
 - 5. Fire Marshal Regulations
 - 6. Regulations of all other authorities having jurisdiction.
- C. Where conflict or variation exists among Codes, the most stringent shall govern.

1.05 QUALITY ASSURANCE

- A. All equipment and accessories shall be the product of a manufacturer regularly engaged in its manufacture.
- B. All equipment and accessories shall be new, free from defects and listed by Underwriters' Laboratories, Inc. or bearing its label unless otherwise noted.
- C. All equipment and accessories shall be in compliance with the applicable standards and with all applicable National, State and local Codes.
- D. All items of a given type shall be the products of the same manufacturer. Contractor shall provide same manufacturer's product throughout the project.

1.06 SUBMITTALS

- A. Submittal requirements for Division 26 shall be in accordance with Division 1 except as modified

herein. All time requirements shall be based on the notice to proceed date of the General Contract. All materials and equipment furnished under Division 26 shall be submitted to the Architect/ Owner's Representative for approval. Such approval shall be in writing from the including that which is exactly as specified. Any materials or equipment installed without written approval shall be subject to immediate removal.

- B. Submittals shall be packaged separately for each system or major piece of equipment and reviewed by the Contractor for verification of compliance with the contract documents prior to submitting. Separate, bound submittals shall be provided for each specification section to the. All interface between specification sections shall be indicated in each submittal. Any deviations from the specific materials or substitutions for items specified shall be itemized in the front of each submittal.
- C. Equipment submittal shall include manufacturer's name, model, type, number, finish, size and capacity of the equipment at the given conditions. This information shall be provided in bound submittals, each containing an index and all submittals. The number of copies shall be as indicated in Division 1. The title shall provide the project name, system identity, the specification number and the Contractor's name and address. This submittal shall be in addition to the shop drawings hereinafter specified. Partial submittals of material submitted from time to time are not acceptable and may be returned without review.
- D. Equipment Layout Drawings: "Equipment Layout Drawings" shall be provided for each equipment room, yard or area containing equipment items furnished under Division 26. Layout drawings shall consist of a plan view of the room or area (to a 1/4"=1'-0" minimum scale) showing projected outlines of all equipment, complete with dotted lines indicating all required clearances, including all clearances needed for removal or service. Location of all conduit and pull boxes shall be indicated. Drawings shall indicate any and all conflicts with other trades.
- E. General
 - 1. Architect's review of the submittal is only for general conformance with design concept of the project and general compliance with the information given in the contract documents. The submittal procedure is required in an effort to minimize the problems which occur due to the discovery of Contractor non-compliance at the construction site. The Contractor is responsible for confirmation and correlation of the dimensions, quantities and sizes, for information that pertains to fabrication methods or construction techniques and for coordination of work of all Divisions of the work. Deviations, if any, from Contract Documents shall be clearly and completely indicated (by a separate letter if deviations are extensive) in the submittals, and the lack of such is deemed complete compliance with Contract Documents without any deviations. Submittals favorably processed will not relieve the Contractor of responsibility for deviations not so reported nor for errors in the submittal.
 - 2. Contractor Stamp: All submittals shall be stamped with the following text or equivalent and signed by the Contractor's representative.

"IT IS HEREBY CERTIFIED THAT THE PRODUCTS SHOWN AND MARKED IN THIS SUBMITTAL ARE IN COMPLIANCE WITH THE CONTRACT DOCUMENTS AND CAN BE INSTALLED IN THE ALLOCATED SPACES EXCEPT WHERE DEVIATIONS ARE NOTED.

CERTIFIED BY: _____ DATE: _____"

3. All submittals shall be complete and with catalog data and information properly marked to show, among other things, equivalency of product (where substitution is requested), adequacy in capacity and performance to meet minimum capacities of performance as specified or indicated. Arrange the submittals in the same sequence as these specifications and reference (at the upper right-hand corner) the particular specification provision for which each submittal is intended. Incomplete submittals will be rejected.
4. Refer to the other sections of this Division for specific requirements.

B. Material List

Within 15 days after award of Contract, submit for approval a complete list of materials proposed for use. Furnish names and addresses of manufacturers, catalog numbers (where applicable) types and trade names. For purposes of uniformity, only one manufacturer will be accepted for each class or type of material. This list is in addition to Shop Drawings.

C. Shop Drawings:

Submit shop drawings with such promptness as to cause no delay in the work. Do not commence fabrication of the equipment until the approved drawings are received from the Owner's representative.

D. Other Submittals: As required by other sections of this Division.

1.07 SUBSTITUTIONS:

1. A sample of each item submitted for substitution shall be accompanying the submittal for review.
2. A unit price quotation shall be provided with each item intended for substitution. This quote shall include a unit price for the specified item and a unit price for the intended substitute item. The Contractor shall also provide a total (per item) of the differential payback to the Owner should the intended substitute item be approved as equivalent to that which is specified.

1.08 OPERATION AND MAINTENANCE MANUALS:

- A. The Contractor shall furnish operation and maintenance manuals for each electrical system and for each piece of equipment. The complete manual, bound in hardback binders or an approved equivalent, shall be provided to the Architect/Owner's Representative. The number of copies shall be as indicated in Division 1. One (1) manual shall be furnished prior to the time that system or equipment tests are performed and the remaining manuals shall be furnished before the contract is completed. The following identification shall be inscribed on the cover the words "OPERATING AND MAINTENANCE MANUAL," the name and location of the building, the name of the Contractor and the contract number.

- B. The manual shall include the names, addresses and telephone numbers of each Subcontractor installing equipment and systems and of the local manufacturer's representatives for each item of equipment and each system. The manual shall have a table of contents and be assembled to conform to the table of contents with tab sheets placed before instructions covering each subject. The instruction sheets shall be legible with large sheets of drawings folded in. The manual shall include, but not be limited to, the following:
1. System layout showing components.
 2. Devices and controls.
 3. Wiring and control diagrams showing operation and control of each component.
 4. Sequence of operation describing start-up, operation and shutdown.
 5. Functional description of the principal system components.
 6. Installation instructions.
 7. Maintenance and overhaul instructions.
 8. Lubrication schedule including type, grade, temperature range and frequency.
 9. Safety precautions, diagrams and illustrations.
 10. Test procedures.
 11. Performance data.
 12. Parts list.
- C. The parts list for equipment shall indicate the sources of supply, recommended spare parts and the service organization which is reasonably convenient to the building site. The manual shall be complete in all respects for all equipment, controls and accessories provided.
- D. The manual shall include the following:
1. Final panelboard schedules (8-1/2"x11").
 2. Final motor control center schedules (8-1/2"x11").
 3. Coordination studies and short circuit calculations.
 4. Final test reports (including infrared scans).
 5. Catalog cuts of final approved light fixtures.

1.09 RECORD DRAWINGS:

- A. On one (1) set of contract drawings, kept at the site during construction, mark all work that is installed differently from that shown on plans, including revised circuitry, material or equipment.

Sufficient dimensions shall be provided to locate all materials installed beneath and outside the building including, but not limited to, underground conduits, cabling, ground rods and stubouts.

- B. All changes or revisions to the contract drawings including, but not limited to, those indicated by amendment, change order, field order, written response to RFI/RFC or other contractual means shall be kept current as the work progresses and shall be incorporated onto the final record drawings.
- C. Accurately locate and dimension all underground and embedded conduit runs on the record drawings.
- D. The marked drawings shall be kept current as the work progresses and shall be available for inspection upon request.

At the close of construction these or a copy of these drawings shall be turned over to the Architect/Owner's Representative for use in preparing record drawings

[1. As part of the reproducible record drawings, the Contractor shall include:

- a. Final motor control schedules as modified during construction.
 - b. Final panelboard schedules as modified during construction.
 - c. Final light fixture schedule as modified during construction.
- E. Drawings and specifications are intended to complement each other. Where a conflict exists between the requirements of the drawings and/or the specifications, request clarification.
 - F. The Architect shall interpret the drawings and the specifications, and his decision as to the true intent and meaning thereof and the quality, quantity, and sufficiency of the materials and workmanship furnished thereunder shall be accepted as final and conclusive.
 - G. In case of conflicts not clarified prior to Bidding deadline, use the most costly alternative (better quality, greater quantity, or larger size) in preparing the Bid. A clarification will be issued to the successful Bidder as soon as feasible after the Award and if appropriate a deductive change order will be issued.

All provisions shall be deemed mandatory except as expressly indicated as optional by the word "may" or "option".

Accumulate the following and deliver to the Architect's representative prior to final acceptance of the work.

H. Record (as-built) Drawings:

- 1. Maintain in good order in the field office a complete set of electrical prints. Update the drawings daily with neat and legible annotations in red ink showing the work as actually installed.
- 2. The actual size, location and elevation of all buried lines, boxes, monuments, and stubouts shall be accurately located and diminished from building walls or other permanent landmarks.

3. Furnish the originals.
- I. O&M Manuals: Furnish copies of an operating and maintenance manual as indicated in Division 1. Each manual shall be bound and indexed and shall include the following:
 1. Operating and service instructions for systems and equipment as required by other sections of this Division. A spare parts list recommended for purchase by Owner shall be included.
 2. Updated approved materials list, shop drawings, and catalog information as required by SUBMITTALS subsections.
 3. List of material and equipment manufacturers (with names, addresses and phone numbers of local suppliers) in order to expedite ordering of replacement parts by the Owner. This list may be integrated with the material list.
- J. Permits and Certificates of Inspection: Furnish the originals.
- K. Testing procedures and test results required in this and other sections: Furnish two copies.
- L. Other data required by other sections of this Division: Furnish two copies.

1.10 MATERIALS

- A. Materials shall be new, in accordance with the specifications of the Institute of Electrical and Electronic Engineers (IEEE), National Electrical Manufacturer's Association (NEMA), National Fire Production Association (NFPA), and the National Electrical Code (NEC), and shall have an Underwriter's Laboratories (UL) listing and bear their label where such services is available.
- B. Materials for the same purpose shall be of the same make and shall be the manufacturer's latest standard design that complies with the specification requirements.

1.11 SUBSTITUTIONS

- A. Substitutions will be allowed only in strict conformance with the General Conditions of the Contract and Division 1.
- B. Whenever in specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name or by name of manufacturer such specification shall be deemed to be used for the purpose of facilitating description of material, process, or article desired and shall be substantially equal or better in every respect to that so indicated or specified. If material, process, or article offered by Contractor is not, in opinion of architect, substantially equal or better in every respect to that specified, then Contractor shall furnish material, process, or article specified. Burden of proof as to equality of any material, process, or article shall rest with Contractor. Contractor shall submit request together with substantiating data for substitution of an "or equal" item within thirty-five (35) days after award of contract. Provision authorizing submission of "or-equal" justification data shall not in any way authorize an extension of time for performance of this contract.
- C. When no specific make of material, apparatus or equipment is mentioned, a first-class specification grade product made by a well established manufacturer shall be used that conforms to the requirements of the contract documents and is acceptable to the Architect.

- D. The Contractor shall assume any extra costs to other work or trades resulting from the use of substitutions. All substitutions accepted shall be provided at no extra charge.

1.12 WORKMANSHIP AND INSTALLATION METHODS

- A. Workmanship shall be in conformance with the "NECA (National Electrical Contractors Association) Standards of Installation" and the best standard practice of the trade except where indicated otherwise.
- B. Execute the work so as to contribute to ease of operation and maintenance, maximum accessibility and best appearance. Execute it so that the installation will conform and adjust itself to the building structure, its equipment and its usage. The work shall be symmetrical, plumb, uniform, properly aligned and firmly secured in place.
- C. Install equipment in accordance with the manufacturer's instructions and recommendations unless otherwise noted or specified.

1.13 LOCATIONS, SIZES, ROUTINGS AND CLEARANCES

- A. For the purpose of clearness and legibility, the drawings are essentially diagrammatic. The size and location of equipment is shown to scale wherever possible, but the Contractor shall make use of all the data in the Contract Documents, and shall verify such information. Contractor is responsible for the equipment provided by him fitting in the spaces available while maintaining required working, ventilation, and equipment maintenance access space. Exercise particular care that such space is not infringed by the work of other Divisions.
- B. Conduit Routing: The drawings show the points of termination of the conduits, and may suggest a route for the conduit. However, it shall be the responsibility of the Contractor to install the conduits with a minimum number of bends in such a manner as to conform to the structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and meet all Code requirements with such offsets and special fittings as may be required. Conduit shall be run concealed in building structure unless otherwise indicated.

1.14 TESTS

- A. General
 - 1. Demonstrate that all components of the work of this Division have been provided and that they operate in accordance with the Contract Documents.
 - 2. Provide instruments and personnel for tests and demonstrations. Submit signed test results.
 - 3. Notify the Architect in writing, seven days in advance of tests to allow presence of his representative.
- B. Specific: Refer to the other sections of this Division for test requirements.

Cleaning shall be done as the work proceeds. Remove waste and debris weekly to keep the site as clean as is practical.

Vacuum clean dirt and debris from interiors of switch-boards, panelboards, transformers, and similar items. Leave exposed parts of the electrical work in a neat, clean and usable

condition, with painted surfaces unblemished and plated metal surfaces polished. Clean lighting fixtures and wipe lamps clean.

1.15 CLEANUP AND HOUSEKEEPING

- A. Cleaning shall be done as the work proceeds. Remove waste and debris weekly to keep the site as clean as is practical.

Vacuum clean dirt and debris from interiors of switch-boards, panelboards, transformers, and similar items. Leave exposed parts of the electrical work in a neat, clean and usable condition, with painted surfaces unblemished and plated metal surfaces polished. Clean lighting fixtures and wipe lamps clean.

1.16 DESCRIPTION OF BID DOCUMENTS

- A. Contract Documents, the Contractor shall notify and secure directions from the [Architect.] [Owner's Representative.]
- B. Drawings and specifications are intended to complement each other. Where a conflict or ambiguity exists between the requirements of the drawings and the specifications, request clarification. Do not proceed with work without direction.
- C. The Architect/Owner's Representative shall interpret the drawings and the specifications. The interpretation by the Architect/Owner's Representative as to the true intent and meaning thereof and the quality, quantity and sufficiency of the materials and workmanship furnished thereunder shall be accepted as final and conclusive.
- D. In the case of conflicts or ambiguities not clarified prior to the bidding deadline, use the most costly alternative (better quality, greater quantity and larger size) in preparing the bid. A clarification will be issued to the successful bidder as soon as feasible after the award and, if appropriate, a deductive change order will be issued.
- E. Where items are specified in the singular, this division shall provide the quantity as shown on drawings plus any spares or extras indicated on the drawings or in the specifications.

1.17 DEFINITIONS:

- A. "Provide" means furnish, install and connect unless otherwise described in specific instances.
- B. "Extend", "Submit", "Repair" and similar words mean that the Contractor shall accomplish the action described.
- C. "Codes" or "Code" means all codes, laws, statutes, rules, regulations, ordinances, orders, decrees, and other requirements of all legally constituted authorities and public utility franchise holders having jurisdiction.
- D. "Verify Location" when noted for an item, means that the locations of the item within the room is tentative and not necessarily as shown on the drawings. Contractor shall request the exact location of the item from the Architect's Representative during construction. The item may be located anywhere

in the room at no additional cost to the Owner.

- E. "Products", "materials" and "equipment" are used interchangeably and mean materials, fixtures, equipment, accessories, etc.
- F. "Utility areas" are defined as mechanical, electrical, telephone, janitorial, and similar rooms or spaces which are normally used or occupied only by custodial or maintenance personnel. "Public areas" are defined as the rooms or spaces which are not included in the utility areas definition.

1.18 EXAMINATION OF SITE:

1.19 PERMITS, FEES AND INSPECTIONS:

- A. Obtain, schedule and pay for permits, licenses, approvals, tests, and inspections required by legally constituted authorities and public utility franchise holders having jurisdiction over the work.

1.20 ELECTRO-MECHANICAL REQUIREMENTS:

1.21 GUARANTEES:

- A. Guaranty requirements for Division 26 shall be in accordance with Division 1 except as modified herein.
- B. All materials and equipment provided shall be warranted for a minimum period of one (1) year from the official date of completion.
- C. Refer to Division 1 for guaranty format.

TEMPORARY ELECTRICAL SERVICE:

- D. The Contractor shall provide labor and materials required for the installation and maintenance of temporary lighting and required power sources for the Contractor's equipment inside the building or construction site and for pedestrian walkways during the period of construction.
- E. The building or construction site shall be sufficiently illuminated so that construction work can be safely performed. Special attention shall be given to adequately lighting stairs, ladders, pedestrian walkways, floor openings, etc. Walkway lights shall be controlled by a switch within the building or construction site.
- F. Power shall be on and all lighting shall be in operation before painting work commences.

1.22 PROGRESS OF UNDERGROUND CONSTRUCTION:

1.23 ELECTRICAL PHASING AND PHASE ROTATION:

1.24 ELECTRICAL SERVICE OUTAGES:

Written notice of proposed utility outages shall be delivered to the [Architect/ Owner's Representative] at least fourteen (14) days prior to the start of the proposed outage. Contractor shall be responsible for all

the related work that may be required to provide continued electrical service. The Contractor shall be responsible for the sequencing of all work including, but not limited to, installation of new electrical lines, abandonment of existing electrical lines and interfacing between new and existing lines to ensure uninterrupted service.

1.25 SEQUENCING OF ELECTRICAL WORK:

1.26 POSTED OPERATING INSTRUCTIONS:

1.27 TRAINING:

- A. User staff and maintenance personnel shall be thoroughly trained in the use of each system or major piece of equipment installed. This training shall be provided as part of the Contractors bid to supply the system or equipment. Additional training requirements shall be as specified in the subsequent sections of Division 26.

1.28 DELIVERY AND STORAGE:

- A. Equipment and materials shall be properly stored, adequately protected and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Plastic conduit shall be stored on even supports and in locations not subject to direct sunrays or excessive heat. Cables shall be sealed, stored and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Damaged or defective items shall be replaced with new items at no cost to the Owner. The Architect/ Owner's Representative shall determine if a damaged or defective item is to be replaced with a new item. The decisions by the Architect/ Owner's Representative in these matters shall be final.

1.29 OSPD REQUIREMENTS

- A. The following are additional OSPD requirements. Should any of these requirements conflict with superseding sections in this specification the engineer on record should be notified in writing.
 - 1. In clinic patient areas, the grounding terminals of all receptacles and non current carrying conductive surfaces of fixed electric equipment subject to personal contact, operating over 100 volts, shall be grounded by an insulated copper conductor. The grounding conductor shall be sized per the NES and installed with the branch circuit conductors in metal raceways per section 517.13.
 - 2. The wiring method in clinic patient care areas shall be in metal raceways or cable assemblies. Metallic raceways and cable sheath assemblies shall be approved as a ground path.
 - 3. The following wiring methods are not allowed in clinic patient areas:
 - a. Non metallic cable trays
 - b. Electric nonmetallic tubing
 - c. Nonmetallic Extensions

- d. Rigid nonmetallic conduit
 - e. Surface raceways except low voltage applications.
4. Panelboards serving normal and essential branch circuits in clinics shall have their equipment grounded and bonded together with a minimum #10 insulated copper conductor.
 5. Provide signal systems with provisions for visual and audible communications between patients and nursing personnel and between healthcare facility staff.

END OF SECTION

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70.
- B. Conductor Insulation: Comply with NEMA WC 70 for specified types herein.
- C. Multiconductor Cable: Not allowed.

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
 - 6. Or equal.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
- D. All cables shall arrive on the job site in un-broken packages.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Copper conductors: Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Insulation: Thermoplastic type THWN or THHN. Use conductors with 150 degrees C insulation in abnormally high ambient temperatures as applicable. Type THHN may be used in dry locations.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. All conductors are to be installed in conduit/raceways.
- B. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS & FIRESTOPPING

- A. Provide sleeves for conduits passing through poured concrete walls and concrete or concrete fireproofed steel beams. Provide 18 gauge galvanized steel and place in correct position in forms before concrete is poured. Sleeve shall be at least ½" above finished floor all around. Pack void between sleeve and conduit as follows:
 - 1. Where conduit is run between floors in a fireproof shaft, pack with Duxseal
 - 2. Where conduit penetrates a fire separation, any of the following packing methods may be used to restore integrity of the separation if code approved: cement, mineral fiber sprayed with flame retardant coating or Dow Corning 3—6548 RTV silicon foam, 3M caulk #CP25, 3M putty #303 or equal. Seal shall be water tight and shall be accomplished prior to wire pulling.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Grounding systems and equipment.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper only wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Compression type, sized for pipe.

- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper 5/8 inch in diameter by 8 feet

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- C. Conductor Terminations and Connections:
 - 1. Welded connectors
 - 2. Bolted connectors

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors in all circuit runs, in addition to those required by NFPA 70
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- D. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
 - 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG unless otherwise noted insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
 - 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

- E. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.
 - 1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.
- B. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 - 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 - 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 - 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify electrical engineer of record promptly. Provide at notification alternate method of reducing ground resistance below the above noted compliant values.

END OF SECTION 260526

SECTION 265600 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior luminaires with lamps and ballasts.
 - 2. Luminaire-mounted photoelectric relays.
 - 3. Poles and accessories.

1.2 SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, and finishes.
- B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with IEEE C2, "National Electrical Safety Code."
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with submitted upon product being an approved equal, available products that may be incorporated into the work include, but are not limited to, product(s) indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

- A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
 - 1. LER Tests Incandescent Fixtures: Where LER is specified, test according to NEMA LE 5A.
 - 2. LER Tests HID Fixtures: Where LER is specified, test according to NEMA LE 5B.

- B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.
- G. Exposed Hardware Material: Stainless steel.
- H. Acrylic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation. Minimum thickness is 0.125 inches. All prismatic lenses shall be pattern 12 unless otherwise noted.
- I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

- a. Color: As selected from manufacturer's standard catalog of colors.
 - b. Color: Match Architect's RAL color number.
 - c. Color: As selected by Architect from manufacturer's full range.
- N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
 3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
- O. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
1. Label shall include the following lamp and ballast characteristics:
 - a. "USES ONLY" and include specific lamp type.
 - b. Lamp tube configuration (twin, quad, triple), base type, and nominal wattage for compact fluorescent luminaires.
 - c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
 - d. Start type (preheat, rapid start, instant start) compact fluorescent luminaires.
 - e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
 - f. CCT and CRI for all luminaires.

2.3 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

- A. Comply with UL 773 or UL 773A.
- B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.
 1. Relay with locking-type receptacle shall comply with ANSI C136.10.
 2. Adjustable window slide for adjusting on-off set points.

2.4 FLUORESCENT BALLASTS AND LAMPS

A. Ballasts for Low-Temperature Environments:

1. Temperatures 0 Deg F and Higher: Electronic type rated for 0 deg F starting and operating temperature with indicated lamp types.
2. Temperatures Minus 20 Deg F and Higher: Electromagnetic type designed for use with indicated lamp types.

B. Ballast Characteristics:

1. Power Factor: 90 percent, minimum.
2. Sound Rating: Class A.
3. Total Harmonic Distortion Rating: 10 percent or less.
4. Electromagnetic Ballasts: Comply with ANSI C82.1, energy-saving, high power factor, Class P, automatic-reset thermal protection.
5. Case Temperature for Compact Lamp Ballasts: 65 deg C, maximum.
6. Transient-Voltage Protection: Comply with IEEE C62.41.1 and IEEE C62.41.2, Category A or better.

C. Low-Temperature Lamp Capability: Rated for reliable starting and operation with ballast provided at temperatures 0 deg F and higher.

2.5 BALLASTS FOR HID LAMPS

A. Comply with ANSI C82.4 and UL 1029 and capable of open-circuit operation without reduction of average lamp life. Include the following features unless otherwise indicated:

1. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.
2. Minimum Starting Temperature: Minus 22 deg F.
3. Normal Ambient Operating Temperature: 104 deg F.
4. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.

B. High-Pressure Sodium Ballasts: Electromagnetic type with solid-state igniter/starter and capable of open-circuit operation without reduction of average lamp life. Igniter/starter shall have an average life in pulsing mode of 10,000 hours at an igniter/starter-case temperature of 90 deg C.

2.6 HID LAMPS

A. High-Pressure Sodium Lamps: ANSI C78.42, CRI 21 (minimum), CCT color temperature 1900 K, and average rated life of 24,000 hours, minimum.

1. Dual-Arc Tube Lamp: Arranged so only one of two arc tubes is lighted at one time and, when power is restored after an outage, the cooler arc tube, with lower internal pressure, lights instantly, providing an immediate 8 to 15 percent of normal light output.

B. Low-Pressure Sodium Lamps: ANSI C78.43.

- C. Metal-Halide Lamps: ANSI C78.43, with minimum CRI 85, and CCT color temperature 4000K.
- D. Pulse-Start, Metal-Halide Lamps: Minimum CRI 85, and CCT color temperature 4000K.
- E. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 85, and CCT color temperature 4000K.

2.7 GENERAL REQUIREMENTS FOR SUPPORT COMPONENTS

- A. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.
- B. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
 - 1. Materials: Shall not cause galvanic action at contact points.
- C. Breakaway Supports: Frangible breakaway supports, tested by an independent testing agency acceptable to authorities having jurisdiction, according to AASHTO LTS-4-M.

2.8 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Division 26 Section "Raceway and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

2.9 GROUNDING

- A. Ground metal support structures according to Division 26 Section "Grounding and Bonding for Electrical Systems".
 - 1. Install grounding conductor pigtail for connecting luminaire to grounding system.
- B. Ground nonmetallic support structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."
 - 1. Install grounding conductor and conductor protector.

END OF SECTION 265600

SECTION 271500 LOW-VOLTAGE VOICE, DATA

PART 1 – GENERAL

1.1 Summary

A. This Section includes the following:

1. Voice and Data cables rated at CAT6 and lower.
2. Station termination connectors rated at CAT6 and lower.
3. MDF termination equipment for CAT6 and lower rated cables.
4. Overhead paging system, cable and termination.

1.2 ACTION SUBMITTALS

1.3 INFORMATIONAL SUBMITTALS

1.4 QUALITY ASSURANCE

PART 2 – PRODUCTS

2.1 Voice, Data and Speaker Cable

A. CAT6 Data Cable

1. All data cable should be non-plenum Category 6 four pair.
2. There will be two data cables run to each location. One data cable must be blue; the other cable must be orange.
3. The data cable manufacturer can be 'General Cable', 'Mohawk' or of similar quality. If a different manufacturer is chosen, it must be submitted for approval prior to installation.

B. CAT3 Voice Cable

1. All voice cable should be non-plenum Category 3. Category 5 cable may be used for voice if there is a cost savings.
2. There will be one cable run to each location. The voice cable may be grey or white.
3. The data cable manufacturer can be 'General Cable', 'Mohawk' or of similar quality. If a different manufacturer is chosen, it must be submitted for approval prior to installation.

C. Paging System Speaker Cable

1. Paging system cable should be 18 AWG non-plenum 4 conductor stranded and shielded.
2. An example of speaker cable is (General Cable E20345-41-10) (DS21804).

2.2 Station Side Components

OW-VOLTAGE VOICE, DATA

A. Faceplates, Data, Voice Jacks and Speakers

1. Faceplates should be AllenTel four port, white (Part # AT70-4-15).
2. One blue and one orange CAT6 jack will be terminated at each location. The CAT6 jacks should be AllenTel (Blue - Part # AT66-20) and (Orange - Part # AT66-16).
3. Two CAT3 jacks will be terminated at each location. The CAT3 jacks should be AllenTel (White – Part # AT34-15).
4. Speakers – Bogen 70 volt flush mount ceiling speakers. (Bogen Part # S86T725PG8U/W).

2.3 MDF Rack, Distribution and Patch Panels

A. Rack System

1. 7 foot by 19 inch two post rack in black. Manufacturer is Chatsworth (Chatsworth Part # 55053-X03).
2. Universal Cable Runway (Ladder). (Chatsworth Part # 10250-712).
Note: All peripheral rack and ladder mounting hardware including clamps should be installed.
3. Vertical Cable Management. (Chatsworth Part # 30162-703).

B. Patch Panels & Telco Termination Equipment

1. AllenTel 96 port patch panel (AllenTel Part # AT66-PNL-96).
2. Full Blue termination board. (AllenTel Part # GB183B1).
3. 66M Punch Blocks. (Siemens Part # M1-50).

PART 3 – EXECUTION

3.1 Cabling (Station Side)*

A. Data Cable

1. All data cables will be home run from the station end to the one telco/data room on the second floor.
2. Every location will have two data cables installed. One blue CAT6 data cable will be terminated on a blue CAT6 data jack and an orange CAT6 data cable will be terminated on an orange CAT6 data jack.
3. All data cables should be terminated as the 586B configuration.
4. The data jack inserts will be inserted into the four port face plates. The blue connector will be on the lower left port as you face the jack, and the orange connector will be on the lower right port as you face the jack.

OW-VOLTAGE VOICE, DATA

5. All faceplates will be labeled by location number with a label maker. The cabling numbering plan will be relevant and the same for the voice cables at the location.

B. Voice Cable

1. All voice cables will be home run from the station end to the one telco/data room on the second floor.
2. Every location will have two voice cable pairs terminated. The blue/white pair and the orange/white pair will be terminated on separate CAT3 jack inserts.
3. The voice jack inserts will be inserted into the four port face plates. The blue/white pair connector will be on the upper left port as you face the jack, and the orange/white pair connector will be on the upper right port as you face the jack.
4. All faceplates will be labeled by location number with a label maker. The cabling numbering plan will be relevant and the same for the data cables at the location.

C. Paging Cable & Speakers*

1. Each overhead speaker cable leg will be home run from the telco/data room on the second floor.
2. Each cable run should accommodate no more than six speakers on each pair. For example: six speakers may be connected to the red & green pair of a cable and six speakers may be attached to the white and black pair of the same cable.
3. The red wire will be connected to the appropriate wattage tap on the speaker and the green wire connected as common. The white wire will be connected to the appropriate wattage tap on the speaker and the black wire connected as common.
4. Each paging cable leg should be marked in numerical order and documented on the cabling map.
5. Paging cables can be coiled in a service loop and left elevated in the telco/data room.
6. Ceiling tile mounted paging speakers should be installed according to the map in the addendum**.
7. The speaker grills should be attached to the ceiling tiles using the provided screws and nuts. Fender washers are required as backing to the ceiling tiles. Four fender washers per speaker are required.
8. The cable should be attached to the appropriate wattage tap which will be documented on the map.

3.2 MDF Rack, Distribution, Patch Panels & Telco Punch Blocks (Telco/Data Room)

OW-VOLTAGE VOICE, DATA

A. Data Racks

1. Two 7 foot by 19 inch wide data racks will be installed in line with the Cox Communications data rack.
2. The racks will be fixed to the floor by lag bolts and washers or by 'RedHead' fasteners as applicable.
3. The data racks will be supported overhead by an 8 foot long by 12 inch wide ladder system. The ladder will be attached to the wall at one end and to the top of each rack.
4. Three vertical cable management systems will be installed between the racks and on each side.

B. Cable Distribution

1. The two colored CAT6 and one CAT3 bundles will enter the telco/data room in individual 4" conduits.
2. The CAT6 cables should be routed across the ladder rack separately and fed down the vertical cable management raceways on opposite sides of the rack.
3. Cables should be routed in a way that ensures the integrity of the CAT6 bandwidth capabilities. Cables should not be run next to electrical conduits or across lighting fixtures. The
4. Data cables should not be run next to electrical conduits or across lighting fixtures. The cables should not be bent or kinked in any way. Standard specifications for bend radius and sheath length should be observed.
5. The CAT3 voice cables should be routed down the wall and brought up through the bottom of the 66M block termination stand offs. The cable bundles should begin their bend at least one foot below the 'full blue' backboards.
6. The use of 'D-rings' or other cable routing hardware is required. Sufficient growth room should be considered in the choice of routing hardware.
7. The voice cables should be distributed in numerical order starting at the top left and working down. There will be six cables per side on the 66M blocks.

C. Patch Panels & Telco Punch Blocks

1. The 96 port patch panels will be installed in two groups of three panels each. The first group of 288 ports will receive the blue CAT6 cables. The second group of patch panels will receive the orange CAT6 cables.
2. Placement of the patch panels will be determined at the time of work.
3. All Patch panels will be labeled from the factory as ports 1 to 96. The second and third patch panels must be re-labeled using a label maker. The numbers will run sequentially from 97 to 288 on the respective patch panels.
4. The back of the patch panels (paper area) should be marked with the true cable number starting at 97 to 288.

OW-VOLTAGE VOICE, DATA

5. All data drops should be LAN tested and certified. The certification report should be provided to FHCSD IT staff when complete.
6. The placement of the 'full blue' backboards will be determined at the time of install.
7. Telecom punch blocks should be marked neatly with the corresponding cable number. A line should be marked that will denote the separation between each four pair that is punched down.
8. White 'mushroom' jumper wire blocks should be installed above the full blue backboards.

SECTION 281600 – INTRUSION DETECTION/ACCESS CONTROL/FIRE SYSTEM

PART 1 - GENERAL

The primary mission or function of the integrated intrusion/access control/fire system to be obtained in this procurement is to provide the backbone of a comprehensive security management program. These specifications provide for the integration and future add-on capability of additional intrusion, access and fire systems.

The intrusion systems are intended to provide protection of high value internal areas against intrusion and for the detecting or discouraging of burglary or vandalism during the hours the facilities are unoccupied.

The access control system, through the addition of card readers and access control modules, can provide the 24-hour capability of effectively managing the entry and/or exit of authorized individuals and restricting access.

The fire system is designed to be either the communicator for an existing installed fire system or as an integrated control reporting system back to the central station for the early detection of fire, water flow, or supervisory alarms.

1.1 Introduction

These specifications contain the functional and operational requirements for an integrated intrusion alarm/access control/fire system employing audio as the primary means of intrusion detection for both interior protection and perimeter protection. This procurement shall include all the equipment required to be installed at various facilities as noted in Attachment A.

The alarm system is based on the concept of combining computer technology with intelligence provided by utilizing audio detection and operator involvement to provide the highest quality monitoring and effective results.

1.2 Intent

It is the intent of these specifications to procure a fully acceptable, effective and reliable integrated security system. These specifications recognize the importance of complete system operation and are not limited to specifying of equipment only. The following are also required from the selected bidder:

1.2.1 Proven experience in the security business.

1.2.2 Prompt delivery and professional installation and service of equipment as specified.

1.2.3 UL Central Station providing 24-hour alarm monitoring.

- 1.3 Bidder must provide, for objective evaluation, references, which clearly state and show the effectiveness of proposed equipment and services.
- 1.4 All equipment described herein shall be the product of one manufacturer or products approved as compatible by the manufacturer. Used products will not be acceptable. Manufacturer must satisfactorily demonstrate that he has supplied and will continue to supply products to avoid the obsolescence of equipment installed in the building.
- 1.5 Bidder must currently maintain a computerized audio monitoring station of established reputation for back-up capabilities. He must demonstrate that personnel, on duty twenty-four hours per day, have successfully monitored audio and fire systems.
- 1.6 Bidder shall show satisfactory evidence that he maintains as an integral part of his organization, and under his control, a fully equipped service department capable of providing timely maintenance and factory-authorized service as required with on-going replacement parts.
- 1.7 All equipment shall be fully guaranteed. This guarantee shall become effective from the day of installation. When in normal operation, if the equipment is found to be below manufacturer specification, repair and replacement of equipment shall be provided. Repairs shall be started within twenty-four hours and completed without delay. Bidder shall either stock spares or is capable of obtaining all required replacement parts within 24 hours.
 - 1.7.1 Equipment damaged by vandalism, acts of God, building occupants, or stolen during hours when building is occupied, shall be replaced or repaired at the client's request and expense within twenty-four (24) hours.
- 1.8 All the work within the scope of this bid shall be performed in accordance with the applicable state, county and city laws and ordinances. The bidder shall be able to obtain all permits and licenses as required in addition to being a licensed contractor. All materials, supplies and equipment being furnished shall be installed in accordance with the latest version of the applicable standards of:
 - 1.8.1 OSHA
 - 1.8.2 National Electrical Code (NEC)
 - 1.8.3 Underwriters' Laboratories, Inc (UL)
 - 1.8.4 Section 16010 - Electrical General Requirements
 - 1.8.5 Section 16100 - Basic Electrical Materials and Methods
 - 1.8.6 Uniform Building Code
 - 1.8.7 Americans with Disabilities Act (ADA)
 - 1.8.8

1.9 Scope

The functional requirements define the subscriber equipment, central processing system (CPS) and operational procedures for an integrated audio intrusion/access control/fire system.

Subscriber equipment consists of a UL Listed subscriber control unit (SCU) with the required audio sensors, glass break detectors, alarm contacts and arming device(s). Sounds of unauthorized entry or from the compromise of the fence and alarm loop violations, are detected and transmitted to the CPS and monitoring console for operator action.

System control, to the extent of arming and disarming, is under the control of the occupant(s) of the protected facility with restrictions as imposed by the administration and enforced by the central station database and the central station operator. Arming and disarming of the alarm system will not effect the 24-hour monitoring of the fire system.

System control at the protected premise will be accomplished through an intelligent keypad interface and/or access cards via the appropriate reader technology.

The central processing system is designed to receive, display, log and annunciate all actions and audible sounds transmitted from the protected premise.

The security system requires that the central processing system, subscriber control unit, and detection devices be designed and to be operated as an integrated security system.

PART 2 - SUBSCRIBER CONTROL UNIT

- 2.0.1 The subscriber control unit (SCU) shall contain circuitry for an integrated audio intrusion/access control/fire communicator security system and communications interface for up to eight (8) separate independent zones utilizing a module approach.
- 2.0.2 The SCU shall have expandable modular connection for at least one hundred twenty eight (128) audio sensors. All sensor unit outputs shall be connected independently at a summing point such that the addition or removal of any sensor shall not change the system sensitivity to the output of any other remaining unit.
- 2.0.3 Each SCU shall have the capability for modular integration of access control for up to 28 readers. Reading the user's card, verifying authorization of proper door, time, date and arming/disarming of security system will release an electrically operated lock on the door and disarming of security system. The access system shall operate in conjunction with the fire system and meet all requirements for fire safety.
- 2.0.4 The SCU shall provide a modular expansion for a maximum of one hundred forty-four (144) hardwire alarm loop inputs with modular expansion for sixty

three (63) wireless alarm loops for the monitoring of switched contacts and auxiliary devices.

- 2.0.4.1 These loops shall be completely programmable for:
- NO and/or NC loops.
 - Supervised or non-supervised.
 - Programmable distinct alarm codes.
- 2.0.5 The SCU shall have a self-contained back-up power source, sufficient for at least 12 hours of continuous operation that will automatically become operational and report the loss of AC power to the central station after one minute of continuous power loss.
- 2.0.6 The SCU shall have the ability to operate as one system or be divided into eight independent zones each with separate inputs, outputs and arming devices.
- 2.0.7 The 144 hardwire or 63 wireless alarm loops may be assigned in any quantities to the eight zones and shall be able to be designated for alarm device type at the central station.
- 2.0.8 The SCU and each audio sensor and any major component shall be provided with tamper protection and shall report tamper alarms, to the central station twenty-four (24) hours a day.
- 2.0.9 The SCU will function as a silent alarm, meaning no sirens or other sounding device will sound upon alarm violation when the system is armed to full security. The system shall have the capability for the following:
- 2.0.9.1 When the SCU cannot contact the central station to report an alarm condition, the siren or bell will sound after the abort sequence.
- 2.0.9.2 When the SCU is programmed to sound the siren on specified loop violations during the occupied mode of security.
- 2.0.9.3 All fire related alarms and to meet certain system applications and requirements.
- 2.0.10 The SCU and modules shall provide a minimum of 4 programmable auxiliary outputs, which can be controlled via options in software or operator controlled from the central station. These outputs can be used for controlling CCTV devices, lights, turning off/on any number of devices, and limited energy management capabilities.
- 2.0.11 In addition to intrusion capabilities of the SCU, it must also have passed Underwriters Laboratories testing for the monitoring of fire devices as a fire communicator.

- 2.1 Intrusion System
 - 2.1.1 The audio intrusion system at the protected premises shall consist of a subscriber control unit with one or more audio sensors, as required.
 - 2.1.2 The volumetric audio detection capability of each audio sensor when connected to the subscriber control unit shall meet the requirements of Section 2.2.
 - 2.1.3 Magnetic switch contacts shall be installed on all required movable openings. Stored audio must accompany all perimeter violations.
 - 2.1.4 The subscriber control unit shall be capable of adjusting the audio sensitivity threshold of each audio detector or complete system upon command from the CPS.
 - 2.1.5 The CPS audio threshold adjustment range shall be covered with a minimum of sixteen equal, equivalent power increments or steps.
 - 2.1.6 The SCU shall have the capability to automatically digitally store and replay audible sounds immediately preceding and after any audio event that exceeds the selected sound threshold level of the detection circuitry and causes an audio activation. Stored audio shall be continuous from approximately 1.0 second before the event to 4.0 seconds after the event.
 - 2.1.7 Stored audio surrounding an event shall be retained until the SCU is reset from the central station. Replay of stored audio shall be controlled by the central station operator.
 - 2.1.8 The SCU shall transmit stored and live audio to the central station at the occurrence of an audio activation, and with all initial loop violations, if said loop is optional. An audible marker tone shall be transmitted at the end of stored audio and before live audio begins.
 - 2.1.9 Audio annunciated at the central station shall be of sufficient quality that voice or other common sounds can be correctly interpreted at the distance of 2 to 4 feet directly in front of the CPS.
 - 2.1.10 The system shall have an optional impact timer that can be selected for individual audio detectors where it is desired or necessary to delay triggering an audio activation unless a subsequent sound occurs more than 2.5 seconds after the initial sound. The system will ignore all sounds during the 2.5-second delay, and then reset itself after 20 seconds if no subsequent sounds are detected.
 - 2.1.11 The audio detector in shall display on the operator terminal indicating the detector and module for which the audio activation occurred.

2.2 Sensors

The sensors to be used in the intrusion system shall be integrated and designed into the overall system to provide for impact activated, audio detection of an intrusion of the protected facility or compromise of the chain link fence line.

2.2.1 The interior sensors shall meet the following requirements:

- 2.2.1.1 The sensor shall have sufficient gain and response characteristics to meet the threshold detection requirements of an audio detection system.
- 2.2.1.2 The audio output from each sensor will be wired independently to the subscriber control unit, so as not to be in serial or parallel with other audio sensors.
- 2.2.1.3 The sensor, when installed with the subscriber control unit, shall be capable of omni-directional audio coverage of approximately 6,000 square feet of unrestricted building space.
- 2.2.1.4 Each sensor will have an audio output to the SCU in the frequency range of 300-12,000 Hz.
- 2.2.1.5 Sensors shall be located so as to cover all entrances, hallways and critical areas of the facility as such noted and required.
- 2.2.1.6 Each sensor shall, in conjunction with the SCU, have the ability to perform a self-test diagnosis during arming/disarming of the system and report failure of said sensor back to the central station. This information shall be logged at the central station. If any of the sensors in the installed facility fail, then arming is inhibited and the failure is displayed on the central station operator terminal and display on the LCD keypad. This self-test feature can also be initiated from the keypad.
- 2.2.1.7 All sensors shall be securely affixed to the mounting surface and be capable of tamper protection using an internal switch.
- 2.2.1.8 Complete audio system calibration includes sensitivity settings for each sensor, SCU, and the CPS.
- 2.2.1.9 The sensors shall be calibrated for audio detection by placing the impact sound source not more than 25 feet from the sensor and adjusting the sensitivity level of the sensor electronically to the minimum level that indicates an audio activation occurred.
- 2.2.1.10 The SCU shall have the ability to allow for final overall system sensitivity to detect audio activations.

- 2.2.1.11 In areas where glass breakage protection is to be provided, a single sensor shall be used to also provide for audio detection of the selected area.
- 2.2.2 The fence sensor cable, if required, shall meet the following requirements:
 - 2.2.2.1 The sensor cable shall have sufficient gain and response characteristics to meet the threshold detection requirements for both "cut" and "climb".
 - 2.2.2.2 The audio output from the sensor cable will be wired independently to the subscriber control unit, so as not to be in serial or parallel with other audio sensors.
 - 2.2.2.3 The sensor cable, when installed with the subscriber control unit and processor, shall be capable of protecting a fence zone of up to 800 feet long with up to 2,000 feet of inactive cable connected between the cable and the processor.
 - 2.2.2.4 The sensor cable/processor will have an audio output to the SCU in the frequency range of 300-12,000 Hz.
 - 2.2.2.5 The sensor cable shall have a polyethylene, UV resistant outer covering with a life expectancy of 10 years.
 - 2.2.2.6 The sensor cable/processor shall, in conjunction with the SCU, have the ability to perform a self-test diagnosis during arming/disarming of the cable and report failure of said cable back to the central station. This information shall be logged at the central station. If the cable on the installed fence fails self test, then arming is inhibited and the failure is displayed on the central station operator terminal. This self-test feature can also be initiated from the keypad.
 - 2.2.2.7 The cable shall be securely affixed to the fence surface every 10 inches and have internal tamper protection.
 - 2.2.2.8 System calibration of each individual processor shall include calibration for both "cut" sensitivity and "climb" sensitivity.
 - 2.2.2.9 The SCU shall have the ability to allow for final overall system sensitivity to detect audio activations.

2.3 Access Control System

Integrated into each SCU is the RS 485 interface to communicate with up to 7 access control modules. Each module will have the following capabilities:

- 2.3.1 Access control for up to 4 doors using distributed database technology.

- 2.3.2 8,000 event local buffer for logging access, status, arm and disarm activity, time and attendance, and guard tour. All activity in this buffer can be manually or automatically programmed to have all data transmitted to the central station for report generation at certain times.
- 2.3.3 Verification for up to 10,000 users on-site, using Magnetic Stripe, Weigand or Proximity Card technology and or keypad.
 - 2.3.3.1 The actual number and configuration of cards to be provided under this bid is to be determined. Cards to be provided shall be able to be private labeled and integrate a photo ID if so required.
 - 2.3.3.2 The access control system shall also have ability to interface to Biometric devices, such as fingerprint, hand geometry, voice recognition etc., via a wiegand protocol.
- 2.3.4 Module will have the ability to be remotely programmed from the central station.
- 2.3.5 Module can be programmed to automatically arm/disarm the security system if a card is valid for that security level.
- 2.3.6 Self-contained and monitored power for system and door locks.
 - 2.3.6.1 Reporting if "AC power loss" after 1 minute back to the central station.
 - 2.3.6.2 Reporting of "AC Power Restoral" to central station.
 - 2.3.6.3 Reporting of "Low Battery" to central station.
 - 2.3.6.4 Reporting of "Power Down" to central station.
- 2.3.7 Four additional ports, each communicating to 3 keypads for a total of 12 keypads or communicating to a relay module controlling 8 relays for a total of 32 outputs.
 - 2.3.7.1 Through the use of the relay module, elevator control can be optioned.
- 2.3.8 Anti-passback option available in a local or global configuration on the system, which can be optioned to clear at midnight.
- 2.3.9 Capability for optional "Free Egress" via an electronic switch.
- 2.3.10 Access verification for each user includes the following:
 - 2.3.10.1 User must be authorized for that door.

- 2.3.10.2 User must be allowed at the current time and day including holidays.
- 2.3.10.3 Access to an armed area is denied unless the user is authorized to disarm.
- 2.3.10.4 In addition, a "Master Card" capability must also be a programmable option.
- 2.3.11 Four separate programmable "Guard Tour" shifts, which will provide an alarm back to the central station on an exception basis.
- 2.3.12 System shall have a software option capability for a minimum schedule of 16 holidays throughout the year.
- 2.3.13 Temporary access cards for vendors, and/or guests, etc shall be able to be programmed into the system with a selectable start and expiration date.
- 2.3.14 The access control system, when integrated into the system, must meet and operate in accordance with NFPA 101 - Life Safety Codes.
- 2.3.15 The access module shall have one tamper loop, four door loops and ten programmable alarm loops.
- 2.4 Arming Device
 - 2.4.1 System arming/disarming shall be accomplished with an intelligent keypad interface and/or an access card and associated reader via the following options:
 - 2.4.1.1 Arm/disarm with card only.
 - 2.4.1.2 Arm/disarm with card plus access code.
 - 2.4.1.3 Arm/disarm with anti-passback option via card.
 - 2.4.1.4 Arm/disarm with anti-passback option via card and access code.
 - 2.4.2 The system shall have a lockout feature after an invalid access code has been entered four times on the keypad.
 - 2.4.3 The keypad shall have the capacity for at least 9,000 different four-digit access codes.
 - 2.4.4 The system shall allow up to three-digit personnel verification back to the central station via the keypad or access cards.
 - 2.4.5 A master code can be programmed for the arming of all eight zones.

- 2.4.6 The keypad shall indicate system status via an 80-character LCD display.
- 2.4.7 The keypad shall have audible prompting.
- 2.4.8 The keypad shall indicate the alarm loop status of the system.
- 2.4.9 The keypad shall have the ability to initiate a duress code or 911.
- 2.4.10 The user shall be able to, via the keypad, automatically initiate the audio sensor self-test function.
- 2.4.11 The keypad shall provide programmable audible indication during the delayed entry or exit period.
- 2.4.12 System must be capable of operating 16 intelligent keypads directly from the SCU and up to 6 keypads per access module.
- 2.4.13 The keypad shall show status of system power (AC).
- 2.4.14 The keypad shall have a master code feature, which allows to bypass loops or failed sensors.
- 2.5 Fire Reporting
 - 2.5.1 It is the intent of the fire reporting system as specified in these specifications to provide a higher degree of fire reporting safety for the facility. The system shall be designed, constructed and tested in conformance with a relative test standard for UL 864 Central Station Fire.
 - 2.5.2 The SCU, through the use of its 16 programmable loops, shall have the ability to annunciate individual loop violations, trouble and restorals of the fire sensors.

PART 3 - CENTRAL PROCESSING SYSTEM

The central processing system (CPS) to be operated by the contractor shall be operating Microsoft Windows NT Server V4.0 or higher and Microsoft SQL Server 6.5 database or higher. It shall be UL Listed for Burglary and Fire applications, integrated computer/audio based central station that shall provide for all event logging, alarm and status annunciation with suggested operator response, color graphic description of alarms and access control/authentication features. All events, both SCU and operator generated shall be logged with the date and time of occurrence.

All CPS hardware that is required to make up the system shall have redundant spares on-site with additional spares available from the manufacturer via overnight service.

3.1 Minimum CPS Hardware Requirements

- 3.1.1 The CPS shall be a Pentium III microprocessor based
- 3.1.2 Processor speed of 866MHz
- 3.1.2 512MB Main Memory (SDRAM)
- 3.1.3 Hard Disk memory of 40GB
- 3.1.4 CD-ROM Drive - 40x variable speed
- 3.1.4 Internal tape drive back-up of 10/20GB
- 3.1.5 1.44 MBytes Floppy Disk (3-1/2")
- 3.1.5 Two (2) RS 485 communication ports
- 3.1.6 10/100-Base T Ethernet Network Interface
- 3.1.7 Two (2) parallel printer ports
- 3.1.8 SVGA Color Monitor with associated keyboard
- 3.1.9 12 separate audio channels/speakers for the receiving of the audio transmitted from the SCU. This shall have the capability to be expanded to 56 channels.
- 3.1.10 Integrated modems for the uploading and downloading of account options and activity.

- 3.2 Minimum CPS Software Requirements
 - 3.2.1 The operating software shall be an integrated multi-tasking, real-time ODBC database software package with applications designed for alarm monitoring, annunciation, access control, communication monitoring and display, real-time and historical annunciation and display and report generation.
 - 3.2.1.1 MS Windows NT Server V4.0 or higher
 - 3.2.1.2 MS SQL V6.5 Database or higher
 - 3.2.1.3 Specific application software designed for alarm monitoring
 - 3.2.2 The software shall be a menu-driven system with a minimum of 1-2 keystrokes or mouse clicks to call up information.
 - 3.2.3 Database shall be available for up to 20,000 systems with the ability to report status of each account monitored.
 - 3.2.4 Database/verification available for up to 10,000 access and 1,000 intrusion users per system.
 - 3.2.5 Provide operator information to handle alarms on an "IF/THEN" basis.
 - 3.2.6 Self-test and auto-diagnostics built into system.
 - 3.2.7 Alarms generated from either the intrusion or access control systems will be displayed on the operator's terminal in a priority, color-coded format.

- 3.2.8 The software shall have the ability to remotely control the sensitivity settings for the audio activation circuitry in the SCU. The operator shall have the ability to adjust the audio sensitivity threshold compensate for temporary ambient noise variations at the protected premise for both the SCU and the individual audio detector circuits as needed.
- 3.2.9 Facilities will periodically experience abnormal levels of ambient audio. To temporarily compensate for these situations, the operator may reduce the sensitivity below the predetermined baseline, for a period, which is pre-programmed from 0-75 minutes. After the programmed time, the system will automatically return the subscriber sensitivity setting to the normal sensitivity level.
- 3.2.10 The sensitivity level will not be affected by telephone line loss or operation of the central station equipment.
- 3.3 Audio Activations/Alarm
- 3.3.1 An audio activation is defined as a response to a sound level of sufficient energy to cause the SCU to contact the central station. Upon contact, the central station equipment shall identify the account, display the identification for an audio activation, and identify the audio sensor that caused the activation, and provide full audio and playback of stored audio. The system shall automatically log each audio activation per account.
- 3.3.2 An audio activation shall be considered an audio alarm when the operator has listened to the sounds being generated from the premises, replayed the stored audio and has determined that the sounds which caused the audio activation are those generated from unauthorized entry into the protected facility or acts of vandalism.
- 3.3.3 When it has been determined that an alarm condition exists the operator shall maintain communication with the facility under attack and proceed with the established procedures for reporting alarms.
- 3.4 Alarm Monitoring/Reporting
- 3.4.1 On any alarm in which a police or alarm investigator response is requested, the operator shall maintain the account on the screen. The audio channel shall be routed to the recorder output and a recording initiated. The stored audio shall be maintained and replayed at a convenient time so that it is included on the audio recording.
- 3.4.2 The audio may be routed to an amplifier for distinguishing the account being investigated and provide easier monitoring. Through the use of the live audio, the operator may be capable of forwarding additional helpful information to the

investigating party. Contact shall be maintained with the investigators to ensure that this information is received.

- 3.4.3 Alarm indications at the monitoring console caused by methods of detection other than audio shall display on the monitoring console with complete account and alarm identification.
- 3.4.4 After the alarm condition has been reported to the central station the audio portion of the system shall operate as described previously.
- 3.4.5 Alarm conditions other than audio shall be immediately reported to the alarm investigator or police unless, through the use of live audio, the cause of the alarm can be positively identified and is determined to be a false alarm.
- 3.4.6 It shall be possible to locate loop violations preventing arming from either the keypad or the central station.
- 3.5 Account Management
 - 3.5.1 The CPS must have the means of logging account activity on a real time basis. The system shall have the ability to selectively recall account activity in the form of account searches and create a permanent record.
 - 3.5.2 The equipment shall have the ability to automatically log, recall, and print on command as listed.
 - 3.5.2.1 Search for audio activations over a specified time range for a single account.
 - 3.5.2.2 Search for accounts on account number range that have more than a specified (arbitrary) number of audio activations for a specified time frame.
 - 3.5.2.3 Search for error message by account number and time frame.
 - 3.5.2.4 Search for perimeter violations by account number and time frame.
 - 3.5.2.5 Search for delayed perimeter (exit door) violations by account number and time frame.
 - 3.5.2.6 Search for sensitivity levels set below a specified sensitivity level by individual account number and time frame.
 - 3.5.2.7 Search for audio sensor failure of self-test at the time of arming by account number.

- 3.5.2.8 Search for accounts in account number range that has had a failure of an audio sensor.
 - 3.5.2.9 Provide listing of users authorized on the system by employee name, user number, card number, access module number, door number, shift number, and arm/disarm authority.
 - 3.5.2.10 Provide time and attendance reporting by employee name, date, time in, time out, daily time totaled, and total time for days specified.
 - 3.5.2.11 Provide report for controlled exit granted, entry granted, free exit and guard check-in.
 - 3.5.2.12 Provide reports of all alarm conditions, such as power signals, door alarms, entries that were denied, guard tour alarms, and passback alarms.
 - 3.5.2.13 Provide report on aborted arm attempts, armed late, system armed, and system disarmed.
 - 3.5.2.14 Provide report for all auxiliary control functions, and automatic door lock and unlock.
- 3.5.3 Reports will be printed as required indicating each time the system is armed or disarmed. These reports shall be capable of showing the date and time of opening and closing, by individual.

4.0 Personnel

The service provider shall have qualified and certified personnel on staff to provide the highest level of service during the term of the contract. The following will be the minimum requirements.

- 4.0.1 Installation/Service - Shall have a minimum of one technician on permanent staff that has attended and has been certified by an approved training seminar by the manufacturer dealing with the UL installation procedures and service/maintenance of intrusion, access control and fire equipment.
- 4.0.2 Central Station Operator - Shall have a minimum of one shift supervisor or key operator on permanent staff that has attended and been certified by an approved operator training seminar.

Each operator shall have completed a formal individual training program for new operators. This training shall consist of familiarization with the central station operation, review of the operators manual for the appropriate central station receiver, and a minimum of five (5) shifts of observation of the monitoring.

Each operator shall be exposed to recorded audio activations, audio alarms, and be thoroughly schooled in the identification of these audio recordings. The operator will then be given a monitoring shift under close supervision of the shift supervisor for not less than five (5) shifts.

- 4.0.3 Central Station Technical - Shall have a minimum of one technician on permanent staff that has been certified by an approved training seminar by the manufacturer for the repair and maintenance of the central station receiver in use.

5.0 Communication Requirements

- 5.1 In an audio-based security alarm system, the number of subscriber accounts which are multiplexed to a speaker for monitoring of audio activations shall be limited, to ensure that a subscriber has a 90% probability of obtaining an audio channel with the central station receiving unit on the first attempt.
- 5.2 The SCU shall reliably operate over the telephone company's switched network such that digitally-coded data and live or stored audio can be exchanged between the subscriber and the central station for communication as necessary to protect the subscriber premise.
- 5.3 A second dial line, cellular radio dial line, or a dedicated line may be added but is required for the fire communicator.
- 5.4 The SCU is able to dial pulse or DTMF. DTMF is preferred when available. The SCU will automatically switch to pulse if unable to use DTMF, before aborting.
- 5.5 The SCU will be capable of dialing a minimum of two (2) telephone numbers with a maximum of 25 digits, with multiple pauses for dial tone.
- 5.6 The central station shall be able to contact the SCU to upload/download access control activity or to modify operating characteristics or options.

SECTION 283100 - FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. System Description: Noncoded, conventional, hardwired, zoned, 24-V dc loop system.
 - 1. Initiating Device Circuits: NFPA 72, Class B, Style B.
 - 2. Notification Appliance Circuits: NFPA 72, Class B, Style Y.
- B. Submittals: Product Data and system operating description.
- C. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals, make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations.
- D. Comply with NFPA 72.
- E. UL listed and labeled.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 FACP

- A. General: Modular, power-limited design with electronic modules, UL 864 listed.
- B. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, trouble, and supervisory signals to a remote alarm station through a digital alarm communicator transmitter and telephone lines.
- C. Secondary Power: 24-V dc supply system with sealed lead calcium batteries and automatic battery charger and an automatic transfer switch.

2.2 ALARM-INITIATING DEVICES

- A. Manual Pull Stations: UL 38 listed, double-action mechanism, red in color with molded, raised-letter operating instructions in contrasting color.
- B. Smoke Detectors: UL 268, 24-V dc, self-restoring, photoelectric type, plug-in arrangement.
- C. Heat Detectors: UL 521 listed combination 135 deg F fixed-temperature and rate-of-rise unit.

2.3 NOTIFICATION APPLIANCES

- A. Bells: Electric-vibrating type, with 94 dBA at 10 feet.
- B. Low-Level Chimes: Vibrating type with 75 dBA.
- C. High-Level Chimes: Vibrating type with 81 dBA.
- D. Horns: Electric-vibrating-polarized type, 90 dBA at 10 feet.
- E. Visual Alarm Device: Xenon-strobe lights listed under UL 1971, with the word "FIRE" engraved in 1-inch- high letters. Rated Light Output: 110 candela.

2.4 WIRE AND CABLE

- A. General: UL listed and labeled as complying with NFPA 70, Article 760.
- B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.
- C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and test systems according to NFPA 72. Comply with NECA 1.
- B. Wiring Method: Install wiring in metal raceways.
- C. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

END OF SECTION 283100

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Include all work and materials necessary for the completion of all Site Clearing and Demolition as indicated on the drawings and specified herein. Requirements of Division 1 apply to work of this section.
- B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- D. Utility Locator Service: Notify DigAlert utility locator service for the area where Project is located and obtain the necessary utility markouts before site clearing.
- E. Do not commence site clearing operations until temporary erosion and sedimentation control and any required plant protection measures are in place.
- F. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

1.2 REGULATING REQUIREMENTS

- A. The Contractor shall comply with all requirements of the governing agencies having jurisdiction.
- B. Contractor shall obtain a demolition permit from the City of San Diego prior to the start of work.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 PREPARATION

- A. It shall be the Contractor's full responsibility to furnish and maintain all temporary barricades, warning lights and other types of protection and prevent accidental injury to the general public and all personnel on the project.

- B. All existing improvements and all existing active utility lines to remain (whether above or below ground) within the new construction area shall be properly and adequately protected from damage during the entire construction period. It shall be the responsibility of the Contractor to restore to their original condition any of these existing items that are damaged or disturbed in any way.
- C. Contractor shall be responsible to protect adjacent properties, roads, right-of-ways, utilities and other improvements above or below ground from damage while performing the work.
- D. Protect all areas indicated to remain prior to the start of any site clearing or demolition. Provide temporary fencing as a minimum to protect areas and facilities subject to damage from site clearing or demolition work or as indicated on the drawings or elsewhere in the specifications. Provide and install all signage necessary to exclude persons, except those connected with the work, from entering the work area. Contractor is responsible for preventing unauthorized persons from entering the work area.
- E. Protect and maintain benchmarks and survey control points from disturbance.
- F. Locate and clearly flag trees and vegetation to remain or to be relocated.
- G. Protect remaining trees and shrubs from damage and maintain vegetation. Employ a licensed arborist to repair tree and shrub damage. Restore damaged vegetation. Replace damaged trees that cannot be restored to full growth, as determined by arborist.
- H. Do not store materials or equipment or permit excavation within drip line of remaining trees.
- I. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the Water Pollution Control Plan and in compliance with EPA document No. EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- J. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.

3.2 SITE CLEARING

- K. Unless otherwise indicated to remain, completely remove from the entire site any existing vegetation, trees, shrubs, bushes, roots debris, poles, posts, structures, foundations, curbs, walls, steps, slabs, pavement, substructures, underground utilities, irrigation lines and appurtenances, fences, any above and below grade improvements, etc., including any other items necessary to construct the new work under this contract. Sawcut and remove portions of existing concrete and/or asphaltic concrete paving as indicated on the drawings or elsewhere in the specifications.
- L. Strip topsoil. Stockpile topsoil that will be reused in the Work.
 - 1. Stockpile surplus topsoil to allow for respreading deeper topsoil.

- M. Trees and tree stumps shall be removed, together with the bulk of the roots, to a minimum depth of 6 feet below the existing grade within a radius of 12 feet beyond perimeter of trunk at ground line. The resulting holes created by the tree removal shall be filled with clean earth and compacted to the same density as specified in Section 312000 Earth Work, for fills. Holes resulting from the tree removal shall not be backfilled until approved by the Geotechnical Engineer or other designated authority.
- N. In areas not to be further excavated, fill depressions resulting from site clearing. Place and compact satisfactory soil materials in 6-inch thick layers (see Geotechnical Report recommendations) to density of surrounding original ground per the project's Geotechnical Report's recommendations.
- O. During demolition operations, thoroughly wet down debris to allay the dust as necessary. Remove debris from the site as it accumulates. Accumulation of debris will not be permitted.
- F. Discing existing vegetation into existing surface soils will not be permitted under any circumstances.
- G. Furnish and provide watering equipment as required for dust control.
- H. Dispose of waste materials, including trash, debris, and excess topsoil, off Owner's property in accordance with the governing authorities. Burning waste materials on-site is not permitted.
 - 1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Work in this section includes all required excavation, grading, preparation of subgrade for fills, proper placement of fills, including backfilling and compaction, the watering, rolling and compacting of fill material in place and the finish grading all as required by the drawings and as specified herein.
- B. All grading work shall be performed in accordance with:
 - 1. Title 24, Part 2 C.C.R, 2007 C.B.C. Appendix J.
 - 2. The grading code and ordinances of the City of San Diego, and any special requirements of the permit.
- B. Unauthorized excavation consists of excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- C. Do not interrupt existing utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
- D. The Contractor shall make a site visit prior to bidding and make a thorough inspection of the site in order to familiarize himself with the scope of earthwork required to complete the project per the drawings. The dirt work quantities for import or export, if any, will be included in Contractor's bid.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All imported material and sources for import material shall be approved by the Geotechnical Engineer prior to hauling on site. Contractor shall be responsible for communicating the necessary information to the Geotechnical Engineer in a timely manner so the Geotechnical Engineer may perform appropriate testing and reporting.
- B. The Contractor shall import any and all additional fill material required to complete the grading on this project. The cost of such import shall be at Contractor's expense. All earth imported shall be clean and free from all rubbish and debris. Import fill shall be inorganic granular non-expansive soils free from rocks or lumps greater than 3 inches in maximum dimension. Import fill shall be sampled by the Geotechnical Engineer at the source prior to importation to the site. The proposed import fill shall be tested and approved by the Geotechnical Engineer relative to expansion potential, sulfate content, and corrosion potential.

- C. Fill material within the paved areas shall be clean, well-pulverized soil free of vegetation matter, rocks larger than 3 inches in any dimension, and other debris, and shall be subject to approval by the Geotechnical Engineer.
- D. Backfill material for storm drain and utility lines shall be non-expansive granular materials, such as clean sand, and shall be placed in a minimum thickness of 6 inches for bedding and backfilled to a minimum of 12 inches above top of pipe. Bedding sand shall have a sand equivalent value of 30 or greater. Any requirements imposed by the governing jurisdiction that are above and beyond these minimums shall be at contractor's expense.
- E. All surplus earth material not needed for the completion of the grading shall be removed from the site by the Contractor at Contractor's expense and disposed of in a legal manner.
- F. Should soil of inadequate density and bearing capability be encountered at the elevations indicated on the drawings, or where new fill is to be placed upon existing loose fill material exposed by excavation, the excavation shall be carried to the depth required to attain soil of bearing quality as determined by the Geotechnical Engineer. The adequacy of all soil bearing value shall be determined by the Geotechnical Engineer.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Contractor shall protect adjacent properties, roads, right-of-ways, easements and existing improvements from damage during the life of the grading operation and prevent caving, sloughing or the placing of materials or stock piles on adjacent properties.
- B. Provide cribbing, sheathing, 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. The responsibility for the design, installation, and maintenance of required cribbing and shoring shall be entirely that of the Contractor and shall meet the approval of the State Division of Industrial Safety and local governing agencies' requirements.
- C. All utility lines and structures shall be protected and treated as indicated. The Contractor shall bear the costs for all repairs to damaged or broken utilities and any damages related thereto.
- D. Borrow pits shall not be dug on the site.
- E. It shall be the Contractor's full responsibility to take all measures necessary during grading to protect slope areas, both cut and fill, existing improvements and adjacent properties from storm damage and flood hazard originating on this project. It shall be the Contractor's responsibility to maintain completed slopes until all slopes are in satisfactory compliance with the job specifications, all berms have been properly constructed, and all associated drainage devices have met the specified requirements. It shall also be the Contractor's responsibility to prevent silt run-off from the limits of work.
- F. Protect and maintain erosion and sedimentation controls during earth moving operations.

- G. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- H. Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents.
- I. Excavate for structures, building slabs, pavements, and walkways. Trim subgrades to required lines and grades.
- J. Utility Trenches: Excavate trenches to indicated slopes, lines, depths, and invert elevations. Maintain 12 inches of working clearance on each side of pipe or conduit.
 - 1. Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
 - 2. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Place and compact final backfill of satisfactory soil material to final subgrade.
- K. Proof-roll subgrade below pavement with a pneumatic-tired and loaded 10-wheel, dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- L. Subexcavated surfaces and all other surfaces to receive fill shall be scarified to a minimum depth of 8 inches, moistened to at least the optimum moisture content, and densified to a minimum relative compaction of 90 percent (ASTM D1557).
- M. Footings shall bear entirely on compacted fill or entirely on dense natural soil. Footings shall not span from cut to fill soil conditions. Where grading would cause transition conditions, the natural soils shall be overexcavated and recompacted per the Project's Geotechnical Report.
- N. All fill shall be placed in 6-inch or less lifts, moisture conditioned per the Project's Geotechnical Report above the optimum moisture content, and densified to a minimum relative compaction of 90 percent (ASTM D 1557).
- O. Grade areas to a smooth surface to cross sections, lines, and elevations indicated. Grade lawns and unpaved subgrades to tolerances of plus or minus 0.20' and walkways, pavements and areas within building lines to plus or minus 0.10'.
- P. Under pavements and walkways, place subbase course material on prepared subgrades and compact at optimum moisture content to required grades, lines, cross sections, and thicknesses where specified on the plans and in the Project's Geotechnical report.
- Q. Under slabs-on-grade, place drainage course on prepared subgrade and compact to required cross section and thickness as specified on the plans and in the Project's Geotechnical report.
- R. Allow testing agency to inspect and test each subgrade and each fill or backfill layer and verify compliance with requirements.

- S. During all earthwork operations, water shall be applied to the surfaces in the working area at frequent intervals and in sufficient quantities to allay the dust and for proper compaction. No other method will be permitted.
- T. Upon completion of work in this Section, remove rubbish, trash, and debris resulting from operations. Remove disused equipment and implements of service, and leave entire area involved in a neat, clean, and acceptable condition. Contractor to dispose of all debris in a legal manner.

END OF SECTION 312000

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and hot-mix asphalt design mixes. Include certification, by authorities having jurisdiction, of approval of each job mix.
- B. Regulatory Requirements: Comply with requirements of the latest adopted edition of the Standard Specifications for Public Works Construction including the City of San Diego Supplement, the most current adopted State of California Department of Transportation Standard Specifications as well as the most current edition of the City of San Diego' Standard Drawings for asphalt paving work.
- C. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types."
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located and complying with ASTM D 3515 for the following nominal, maximum aggregate sizes:
 - a. Base Course: 1 inch.
 - b. Surface Course: 1/2 inch.
- B. Tack Coat: AASHTO M 140 emulsified asphalt, or AASHTO M 208: SS-1h cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- C. Pavement-Marking Paint: MPI #97 latex traffic marking paint.
 - 1. Color: As indicated per plan.
- D. Wheel Stops: Precast, air-entrained concrete, 3500-psi minimum compressive strength, and approximately 6 inches high by 9 inches wide by 7 feet long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

PART 3 - EXECUTION

3.1 PAVING

- A. Tack coat existing asphalt or concrete surfaces and allow tack coat to cure undisturbed.
- B. Place hot-mix asphalt to required grade, cross section, and thickness. Promptly correct surface irregularities in paving course.
 - 1. Spread mix at minimum temperature of 260 deg F.
- C. Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers. Complete compaction before mix temperature cools to 180 deg F.
- D. Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness.
- E. Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to 92 percent of reference maximum theoretical density according to ASTM D 2041.
- F. Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- G. While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- H. Remove and restore paved areas that are defective or contaminated. The pavement shall be true to grade and cross section. The surface shall not vary from the edge of a 10-foot straightedge more than 1/8 of an inch except at intersections or at changes in grade.
- I. Apply pavement-marking paint with mechanical equipment to a minimum wet film thickness of 15 mils after pavement has been aged for an appropriate amount of time prior to pavement parking.
- J. Securely attach wheel stops into pavement with two galvanized-steel dowels.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and design mixtures for concrete.
- B. Comply with ACI 301 unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Welded Wire Reinforcement: ASTM A 185, flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- C. Portland Cement: ASTM C 150, Type I or II
 - 1. Fly Ash: ASTM C 618, Type C or F.
- D. Normal-Weight Aggregates: ASTM C 33, Combined aggregate gradation shall be 8% to 18% for large topsize aggregates (1 ½ inches) or 8% to 22% for smaller topsize aggregates (1 in. or ¾ in.) retained on each sieve below the topsize and above the No. 100.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
- E. Air-Entraining Admixture: ASTM C 260.
- F. Chemical Admixtures: ASTM C 494. Calcium chloride shall not be used.
- G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- H. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.
- I. Pavement-Marking Paint: MPI #97 latex traffic marking paint.
 - 1. Color: As indicated per plan.

2.2 CONCRETE MIXTURES

- A. Proportion normal-weight concrete mixes to provide the following properties:

1. Compressive Strength (28 Days): 3000 psi or as indicated on the plans or in the project's geotechnical report.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
3. Slump Limit: Not more than 4 inches.
4. Air Content: 5-1/2 percent plus or minus 1.5 percent.

PART 3 - EXECUTION

3.1 PAVING

- A. Accurately position and support reinforcement, and secure against displacement.
- B. Locate and install contraction, construction, isolation, and expansion joints as indicated or required.
- C. Place concrete in a continuous operation within planned joints or sections. Do not add water to adjust slump.
- D. Float surfaces to true planes within a tolerance of 1/8 inch in 10 feet and apply a non-slip broom finish.
- E. Tool outside edges of pavement to a radius of 1/2 inch; and tool transverse contact joints, expansion joints, and joints adjacent to an existing pavement to a radius of 1/4 inch unless otherwise noted.
- F. Begin curing after finishing concrete: Apply membrane-forming curing compound to concrete.
- G. Allow concrete paving to cure for a minimum of 7 days and be dry before starting pavement marking.
- H. Apply traffic paint with mechanical equipment to a minimum wet film thickness of 15 mils.
- I. Owner will engage a qualified testing agency to perform tests and inspections.
- J. Remove and replace concrete paving that is broken, damaged, or defective. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- K. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days.

END OF SECTION 321313

SECTION 323119 - DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and color Samples.

PART 2 - PRODUCTS

2.1 DECORATIVE METALLIC-COATED STEEL TUBULAR PICKET FENCES

- A. Decorative Metallic-Coated Steel Tubular Picket Fences: Comply with ASTM F 2408, for light industrial (commercial) application (class) unless otherwise indicated.
 - 1. Available Products:
 - a. Tubular Steel components hot –dip galvanized after forming.
- B. Metallic-Coated Steel Sheet: Galvanized-steel sheet or aluminum-zinc alloy-coated steel sheet.
- C. Post Caps: Hot-dip galvanized steel, UV-resistant plastic, or aluminum.
- D. Pickets: Square tubes see drawings for sizes.
 - 1. Extend pickets beyond top rail as indicated and press flat and trim to produce spear point shape.
 - 2. Picket Spacing: 4 ½” on center, maximum.
- E. Finish: Organic coating complying with requirements in ASTM F 2408.

2.2 GATES

- A. Galvanized-Steel Frames and Bracing: Fabricate members from square tubes 2 by 2 inches formed from 0.108-inch nominal-thickness, metallic-coated steel sheet or formed from 0.105-inch nominal-thickness steel sheet and hot-dip galvanized after fabrication.
- B. Picket Size, Configuration, and Spacing: Comply with requirements for adjacent fence.
- C. Finish: Primed and Painted Gloss Black.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fences by setting posts as indicated and fastening rails and infill panels to posts. Peen threads of bolts after assembly to prevent removal.
- B. Post Excavation: Excavate holes to a diameter of not less than four times post size and a depth of not less than 24 inches plus 3 inches for each foot or fraction of a foot that fence height exceeds 4 feet.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.
 - 2. Space posts uniformly at 8 feet o.c.
- D. Install gates level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Adjust hardware for smooth operation and lubricate where necessary.

END OF SECTION 323119

SECTION 328400 – PLANTING IRRIGATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide complete irrigation system.

1.2 RELATED WORK

- A. Section 329300 – Landscape Planting
- B. Section 02970 – Landscape Maintenance

1.3 QUALITY ASSURANCE

- A. Due to the scale of drawings, it is not always possible to indicate all offsets, fittings, sleeves, etc., which might be required. Carefully investigate the structural and finished conditions affecting the work. Install the work to avoid conflicts between irrigation system, plantings, other site utilities, and architectural features.

1.4 SUBMITTALS

- A. Material List -

1. Furnish the articles, equipment, materials or processes specified by name in the drawings and specifications. No substitution will be allowed without prior written approval by the Architect.
2. Submit complete material list prior to performing any work. Material list shall include the manufacturer, model number and description of all materials and equipment to be used. Substitutions must be identified as such.
3. Equipment or materials installed or furnished without prior approval of the Architect may be rejected and the Contractor required to remove such materials from the site at his own expense.
4. Approval of any item, alternate or substitute indicates only that the product or product apparently meet the requirements of the drawings and specifications on the basis of the information or samples submitted.

- B. Record Drawings:

1. Record accurately on one set of contract drawings all changes in the work constituting departures from the original contract drawings.
2. The changes and dimensions shall be recorded in a legible and workmanlike manner to the satisfaction of the Architect or Owner's authorized representative. Prior to final

- inspection of work, submit record drawings to the Architect or Owner's authorized representative.
3. Dimensions from/to permanent points of reference such as buildings, sidewalks, curbs, etc. shall be shown. Data on record drawings shall be recorded on a day to day basis as the project is being installed. All lettering on drawings shall be minimum 1/8 inch in size.
 4. Show locations and depths of the following items:
 - a. Point of connection (including water meters, backflow preventors, master control valves, etc.)
 - b. Routing of sprinkler pressure lines (dimensions shown at a maximum of 100 feet along routing and at all changes in direction)
 - c. Gate valves
 - d. Automatic remote control valves
 - e. Quick coupling valves
 - f. Routing of control wires
 - g. Irrigation controllers
 - h. Related equipment (as may be directed)
 5. Maintain record drawings on site at all times. Upon completion of work, transfer all as-built information and dimensions to a clean set of bond prints, using red, waterproof ink.

C. Controller Charts –

1. Record drawings shall be approved by the Architect before controller charts are prepared.
2. Provide one controller chart for each controller supplied.
3. The chart shall show the area controlled by the automatic controller and shall be the maximum size which the controller door will allow.
4. The chart is to be a reduced drawing of the actual as-built system. However, in the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced.
5. The chart shall be a blackline or blue-line ozalid print and a different color shall be used to indicate the area of coverage for each station.
6. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 5 mils thick.
7. These charts shall be completed and approved prior to final inspection of the irrigation system.

D. Operation and Maintenance Manuals –

1. Prepare and deliver two (2) sets of operation and maintenance manuals as specified in Division 1 and as follows:
 - a. Catalog and parts sheets on every material and equipment installed under this Contract.
 - b. Guarantee statement.
 - c. Complete operation and maintenance instructions on all major equipment.
 - d. Assemble manual in hard cover three-ring binder with table of contents.
2. In addition to the above mentioned maintenance manuals, provide the Owner's maintenance personnel with instructions for major equipment and show evidence in writing to the Architect at the conclusion of the project that this service has been rendered.

E. Equipment to be Furnished –

1. Supply as a part of this Contract the following tools:
 - a. Two sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied on this project.
 - b. Two five-foot valve keys for operation of gate valves.
 - c. Two keys for each automatic controller.
 - d. Six quick coupler keys and matching hose swivels for each type of quick coupling valve installed.
2. The above mentioned equipment shall be turned over to the Owner at the conclusion of the project. Before final inspection can occur, evidence that the Owner has received material must be shown to the Architect.

1.5 STORAGE AND HANDLING

- A. Exercise care in handling, loading, unloading, and storing pvc pipe and fittings.
- B. Transport pvc pipe in a vehicle which allows the length of pipe to lie flat for the full length of the pipe sections.
- C. Pipe sections dented or damaged will be rejected, whether installed or not.

1.6 GUARANTEE

- A. On company letterhead, re-type the following information and provide to Owner at completion of project:

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the drawings and specification, ordinary wear and tear and unusual abuse, or neglect excepted. We agree to repair or replace defects in materials and workmanship, including damages consequential to defects in materials and workmanship and repair or replacement, which develop during one year after completion and acceptance of work, at no cost to Owner. We agree to make such repairs and replacements within a reasonable time, as determined by Owner, after receipt of notice. In the event of our failure to make such repairs and replacements within a reasonable time after notification by Owner, we authorize Owner to proceed to have such repairs and replacements made at our expense and we will pay all costs and charges upon demand.

Project:

Location:

Signed:

Company:

Address:

Date of Acceptance:

PLANTING IRRIGATION

328400 - 3

PART 2 - PRODUCTS

2.1 PVC PRESSURE MAIN LINE PIPE AND FITTINGS

- A. Provide pvc Class 315 for pressure main line pipe sizes 2 inches and longer.
 - 1. Fabricate pipe from an NSF approved Type I, Grad I, pvc compound conforming to ASTM D1784 resin specifications. Meet requirements set forth in FS PS-22-70, with an appropriate standard dimension ratio (S.D.R.) (Solvent-Weld Pipe).
- B. Provide pressure main line pipe for size 1-1/2 inch and smaller of pvc Schedule 40 with solvent welded joints.
 - 1. Fabricate pipe from an NSF approved Type I, Grade I, pvc compound conforming to ASTM D1785 resin specifications. Meet requirements set forth in FS PS-21-70.
- C. Provide pvc solvent weld fittings of Schedule 80, 1-2, II-I NSF approved, in accordance with ASTM D2467.
- D. Provide solvent cement and primer for pvc solvent-weld pipe and fittings of type specified by manufacturer for project materials and conditions.
- E. Ensure that pvc pipe bears the following markings:
 - 1. Manufacturer's name.
 - 2. Nominal pipe size.
 - 3. Schedule or class.
 - 4. Pressure rating in psi.
 - 5. NSF approval seal.
 - 6. Date of extrusion.
- F. Ensure that fittings bear manufacturer's name or trademark, material designation, size, applicable IPS schedule or NSF seal of approval.

2.2 PVC NON-PRESSURE LATERAL LINE PIPE

- A. Provide non-pressure buried lateral line pipe fabricated of pvc Schedule 40, with solvent weld joints.
- B. Fabricate pipe from an NSF approved Type I, Grade II, pvc compound conforming to ASTM D1784 resin specifications. Meet requirements set forth in FS PS-22-70, with an appropriate standard dimension ratio (S.D.R.).
- C. Provide pvc solvent weld fittings of Schedule 40, 1-2, II-I NSF approved, in accordance with ASTM D2466.

- D. All other requirements for pvc non-pressure lateral line pipe are as specified for pressure main line pipe and fittings.

2.3 BRASS PIPE AND FITTINGS

- A. Provide red brass screwed pipe conforming with FS WW-P-351.
- B. Provide red brass fittings conforming with FS WW-P-460.

2.4 GATE VALVES

- A. Provide gate valves 3 inches and smaller of 125 pound SWP bronze with screw-in bonnet, non-rising stem and solid wedge disc.
- B. Provide with threaded ends and equip with bronze handwheel.
- C. Manufacturer: Nibco.

2.5 QUIC COUPLING VALVES

- A. Provide type with a brass two-piece body designed for working pressure of 150 psi, operable with quick coupler, identify as reclaimed water per drawings.

2.6 BACKFLOW PREVENTION UNITS

- A. Provide units of type and size required by drawings.
- B. Include wye strainers at backflow prevention units, with bronze screwed body with 60 mesh monel screen.

2.7 CHECK VALVES

- A. Include anti-drain valves of heavy-duty virgin pvc construction with FIP thread inlet and outlet. Provide stainless steel and neoprene internal parts. Ensure that anti-drain valves are field adjustable against drawout from 5 to 40 feet of head.
- B. Manufacturer: Valcon ADV.

2.8 CONTROL WIRING

- A. Make connections between the automatic controllers and the electrical control valves with direct burial copper wire AWG-UF 600 volt. Provide different colored pilot wires for each automatic controller. Provide white common wires with a different colored stripe for each automatic controller. Use No. 14 wire as a minimum.

- B. Installation of the wiring will be in the same trench and installed along the same route as pressure supply or lateral lines where possible.
- C. Where more than one wire is placed in a trench, tape wiring together at intervals of 10 feet.
- D. Provide an expansion curl within 3 feet of each wire connection. Ensure sufficient length of expansion curl at each splice connection at each electrical control so that in case of repair, the valve bonnet may be brought to the surface without disconnecting the control wires. Loosely lay control wires in trench without stress or stretching of control wire conductors.
- E. Make splices with Rainbird Snap-Tite wire connectors. Use one splice per connector sealing pack.
- F. Field splices between automatic controller and electrical control valves will not be allowed without prior approval.

2.9 AUTOMATIC CONROLLER

- A. Provide type and size required by drawings.
- B. Final location will be as approved.
- C. Provide final hook-up to 120 volt electrical power.

2.10 ELECTRICAL CONTROL VALVES

- A. Provide type as specified on drawings.
- B. Include manual flow adjustment.
- C. Provide one control box for each electrical control valve.

2.11 CONTROL VALVE BOXES

- A. Use 10 inch box for all gate valves; 12 inch for automatic valves, with green bolt down cover. Provide 6 inch pvc extension sleeve.

2.12 SPRINKLER HEADS

- A. Provide sprinkler heads of the same size, type, and which deliver the same rate of precipitation with the diameter (or radius) of throw, pressure, and discharge as shown or scheduled on drawings.
- B. Provide spray heads with screw adjustment.
- C. Fabricate riser units in accordance with drawing details.
- D. Provide heads of same type by a single manufacturer throughout project.

2.13 BOOSTER PUMP

- A. Refer to plumbing drawings and specifications for irrigation booster pump specification.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Exercise extreme care in excavating and working near utilities. Verify locations of in place utilities and services.
- B. Coordinate installation so there will be no interference with utilities or other construction of difficulty in planting trees, shrubs, and ground covers.
- C. Carefully check all grades.

3.2 PREPARATION

- A. Prior to installation, stake out all pressure supply line routing and location of sprinkler heads.
- B. Obtain approval of layout by Architect.
- C. Connect system to water supply points, at approximate location shown on drawings.
- D. Make electrical connections for automatic controllers at approximate locations shown on drawings.

3.3 INSTALLATION

- A. Trenching:
 - 1. Dig trenches straight and support pipe continuously on bottom of trench. Lay pipe to an even grade. Follow layout indicated on drawings.
 - 2. Coverage: 18 inches for pressure supply lines; 12 inches for non-pressure lines; and 18 inches for control wiring.
- B. Backfilling:
 - 1. Do not backfill until required tests have been successfully performed and witnessed. Carefully backfill with excavated materials for backfilling, consisting of earth, loam, sandy clay, sand, or other approved materials, free from large clods of earth or stone. Mechanically compact landscaped areas to dry density equal to adjacent undisturbed soil in planting areas. Conform to adjacent grades without dips, sunken areas, humps and other surface irregularities.
 - 2. Initially place fine granular material backfill on all lines. No foreign matter larger than 1/2 inch will be permitted in the initial backfill.
 - 3. Flooding of trenches will be permitted only with prior approval.

4. If settlement occurs and subsequent adjustments in pipes, valves, sprinkler heads, lawn or planting, or other construction are necessary, make adjustments without cost to Owner.
- C. Trenching and Backfill Under Paving:
1. Backfill trenches located under areas where paving, asphaltic concrete or concrete with sand – 6 inches under the pipe and 3 inches over – and compacted in layers to 95% compaction using manual or mechanical tamping devices. Compact trenches for piping to equal the compaction of the existing adjacent undisturbed soil and leave in a firm unyielding condition. Leave trenches flush with the adjoining grade.
 2. Do not cut, jack, or bore through any in-place concrete.
 3. Provide for a minimum cover of 18 inches between the top of pipe and bottom of aggregate base for all pressure and non-pressure pipe installed under asphaltic concrete piping.
- D. Assemblies:
1. Install irrigation lines following approximate routing shown on drawings.
 2. Install no multiple assemblies in plastic lines. Provide each assembly with its own outlet.
 3. Thoroughly clean pvc pipe and fittings of dirt, dust, and moisture before installation. Follow recommendations of manufacturer for installation and solvent welding.
 4. On pvc to metal connections, work metal connections first. Use Teflon tape, or other approved, on all threaded pvc to pvc, and on all threaded pvc to metal joints. 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.
- E. Line Clearance: Provide a minimum clearance of 6 inches from each other and from lines of other trades. Install parallel lines directly over one another.
- F. Automatic Controllers: Connect remote control valves to controllers in numerical sequence required by drawings.
- G. High Voltage Wiring for Automatic Controllers: Provide 120 volt connection to power source.
- H. Remote Control Valves: Install where shown. When grouped together, allow at least 12 inches between valves. Install each remote control valve in a separate valve box. Stencil each valve number on valved box top with exterior enamel paint. Where feasible, locate out of turf areas.
- I. Flushing of System: After all new sprinkler pipe lines and risers are in place and connected, all necessary diversion work has been completed, and prior to installation of sprinkler heads, open the control valves with a full head of water and flush out the system.
- J. Sprinkler Heads: Install heads where shown on drawings. Do not exceed maximum spacing shown on drawings or suggested by manufacturer.
- K. It is the intent of the irrigation drawings to indicate the installation of pop-up type sprinklers in landscaped areas adjacent to pedestrian circulation, vehicular circulation and anywhere that pop-up sprinklers would be required to provide for the safety and welfare of individuals and their respective property. In the event that pop-up type sprinklers have not been specified in

these areas, it shall be the responsibility of the irrigation contractor to bring this to the attention of the Architect immediately or install the pop-up sprinkler to match those specified.

3.4 TEMPORARY REPAIRS

- A. Where it may be necessary to excavate near existing trees, exercise care to avoid injury. Excavate by hand in areas where 2 inch and larger roots occur. Tunnel under and heavily wrap with several layers of burlap, roots 2 inches in diameter except where directly in the path of irrigation lines or conduit. Where a ditching machine is run close to trees having roots smaller than 2 inches in diameter, hand trim walls of the trench adjacent to the tree, making clean cuts. Paint cut and damaged roots 1 inch and larger with two coats of Tree Seal, or other approved. Close trenches adjacent to trees within 24 hours, or shade the tree side of the trench with burlap or canvas.

3.5 FIELD QUALITY CONTROL

A. Adjustment of the System:

1. Flush and adjust sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, parking areas, and buildings.
2. If it is determined that adjustments in the irrigation equipment can make the system more effective, make the approved adjustments prior to plantings. Adjustments could also mean changes in nozzle sizes and degrees of arc.
3. Lowering raised sprinkler heads must be accomplished within ten days after notification by Owner.
4. Set sprinkler heads perpendicular to finished grades unless otherwise shown on drawings.

B. Testing of Irrigation System:

1. Request presence of Architect 48 hours in advance of each testing procedure.
2. Test pressure lines under hydrostatic pressure of 150 pounds per square inch, and prove watertight.
Note: Testing of pressure main lines shall occur prior to installation of electric control valves.
3. Test piping under to-be-paved areas under hydrostatic pressure of 150 pounds per square inch, and prove watertight prior to paving.
4. Sustain pressure in lines for at least 2 hours without pressure drop. If pressure drops within 2 hours, replace joints and repeat test until such time as no pressure drop occurs.
5. Provide necessary force pump and other testing equipment necessary.
6. When the sprinkler irrigation system is completed, perform a coverage test to determine if the water coverage for planting areas is complete and adequate. Correct inadequacies due to deviations from drawings, or where system has willfully been installed without bringing possible deficiencies to the attention of the Architect in advance. Perform these tests prior to planting of ground covers.

3.6 MAINTENANCE

- A. Ensure complete successful system operation for 10 days under automatic operation prior to any subsequent construction operations such as plantings.

3.7 CLEAN-UP

- A. Clean-up after each portion of this work. Legally remove refuse and excess dirt from site, walks and paving by brooming and washing down.
- B. Correct damages to work of others to original condition.

3.8 FINAL OBSERVATION PRIOR TO FINAL ACCEPTANCE

- A. Operate each system in its entirety for the Architect at time of final observation. Rework items not to Architect's satisfaction.
- B. Show evidence that Owner has received accessories, charts, record drawings, tools and equipment required before final inspection can occur.

3.9 OBSERVATION SCHEDULE

- A. Provide the following prior to notification for the meetings shown:
 - 1. Pre-job conference – 7 days.
 - 2. Pressure supply line installation and testing – 48 hours.
 - 3. Automatic controller installation – 48 hours.
 - 4. Control wire installation – 48 hours.
 - 5. Lateral line and sprinkler installation – 48 hours.
 - 6. Coverage test – 48 hours.
 - 7. Final inspection – 7 calendar days.
- B. Site observations cannot commence without Record Drawings. Party requesting observations are subject to hourly reimbursement to others if observations are requested without all other requirements having been met.

END OF SECTION 328400

SECTION 329300 – PLANTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Soil Preparation.
- B. Planting.
- C. Staking.
- D. Sodding.
- E. Clean up.

1.2 RELATED WORK

- A. Section 02811 – Landscape Irrigation System.

1.3 QUALITY ASSURANCE

- A. Source Quality:
 - 1. Submit documentation at least 60 days prior to planting that all plant materials are available. Materials are subject to inspection after confirmation of ordering.
 - 2. Materials are subject to inspection at place of growth and upon delivery, for conformity to specifications. Inspection, approval and rejection can also take place at other times during progress of work.
 - 3. Request, in writing, inspection of plant materials at place of growth. Identify place of growth, and quantity of plants to be inspected.
 - 4. As described in the planting notes for tree tagging, the Architect may opt to either visit the tree nursery or review photographs submitted by the Contractor. In either case visit the nursery and select trees conforming to specifications prior to review by the Architect.

1.4 SUBMITTALS

- A. Prior to installation submit for review and approval specifications and product information on items being used on project. Submit bound with list of items as cover sheet. Conform to Section 01300.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade mark, and conformance to State law.
- B. Provide copies of receipts for all amendments specified in these specifications or in the Soils Report.
- C. Deliver plants with legible identification labels. Label trees, evergreens, bundles of containers of like shrubs and groundcover plants. State correct plant name and size indicated on plant list. Use durable waterproof labels with water-resistant ink which will remain legible for at least 60 days.
- D. Protect plant material during delivery to prevent damage to root ball or desiccation of leaves.
- E. Notify Architect 7 days in advance of delivery of plant materials and submit itemization of plants in each delivery.
- F. Store plants in shade and protect from weather.
- G. Maintain and protect plant material in a healthy, vigorous condition.
- H. Exercise care in handling, loading, unloading and storing of plant materials. Replace damaged materials.

1.6 JOB CONDITIONS

- A. Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practice.
- B. Coordinate this work of this section with installation of underground irrigation system, utilities, piping and watering heads.

1.7 SAMPLES AND TESTS

- A. Architect reserves the right to take and analyze samples of materials for conformity to specifications. Provide samples for testing upon request. Remove rejected materials from site immediately upon rejection at no additional cost. Testing costs will be paid for by Owner if materials prove to be in compliance with specifications.
- B. Prior to amending soils, contractor shall have soil tested for agricultural suitability as described in planting notes.
- C. Provide 1 cubic foot sample of medium grind topping mulch to Architect for review and approval.

1.8 GUARANTEE

- A. Guarantee materials against poor, inadequate, diseased and inferior materials and workmanship for one year after 90 day maintenance agreement expiration.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The following organic, soil amendments and fertilizer are to be used for bid purposes only. Specific amendments and fertilizer will be selected and specified after rough grading operations are complete and Contractor has had soil samples tested.
- B. Provide standard, approved and first-grade quality materials, in prime condition when installed and accepted. Deliver commercially processed and packaged material in manufacturer's unopened containers bearing the manufacturer's guaranteed analysis. Supply a sample of all supplied materials accompanied by analytical data from an approved laboratory source illustrating compliance, or bearing the manufacturer's guaranteed analysis.
- C. Organic Amendment:
 - 1. Nitrogen Stabilized: 0.56 to 0.84 percent N based on dry weight for wood residual or rice hulls.
 - 2. Particle Size: 95 to 100 percent passing 6.35 mm standard sieve; 80 to 100 percent passing 2.33 mm standard sieve.
 - 3. Salinity: Ensure that saturation extract conductivity does not exceed 3.5 millimohs per centimeter at 25 degrees C. as determined by saturation extract method.
 - 4. Iron Content: Minimum 0.08 percent dilute acid soluble Fe on dry weight basis.
 - 5. Ash: 0 to 6 percent dry weight.
- D. Soil Amendment:
 - 1. Soil Sulfur: Agricultural grade sulfur containing minimum of 99 percent sulfur expressed as elemental.
 - 2. Iron Sulfate: 20 percent iron expressed as metallic iron, derived from ferric and ferrous sulphate, 10 percent sulfur expressed as elemental.
 - 3. Calcium Carbonate: 95 percent lime as derived from oyster shells.
 - 4. Gypsum: Agricultural grad product containing 98 percent minimum calcium sulphate.
- E. Fertilizer:

1. Planting Fertilizer: pelleted or granular form consisting of the following percents by weight and mixed by commercial fertilizer supplier: 6-nitrogen, 20-phosphoric acid, 20-potash.
 2. Planting Tablets: Provide slow-release type with potential acidity of not more than 5 percent by weight containing the following percents by weight of nutrients listed: 20-nitrogen, 10-phosphoric acid, 5-potash, 2.6-combined calcium, 1.6-combined sulphur, 0.35-iron elemental from ferrous sulfate. Provide in 21 gram tablets manufactured by Agriform, or other approved.
 3. Hydroseeding Fertilizer: provide ammonium phosphate which consists of the following percent by weight and mixed by a commercial fertilizer supplier: 16-nitrogen, 20-phosphoric acid, 0-potash.
 4. Pre-Sod Fertilizer: Provide type consisting of the following percents by weight and mixed by a commercial fertilizer supplier: 16-hydrogen, 20-phosphoric acid, 8-potash.
 5. Sulphate of potash: 0-0-50.
 6. Single super-phosphate: Commercial product containing 18 to 20 percent available Phosphoric Pentoxide, or other approved.
 7. Urea formaldehyde: 38-0-0.
 8. Hydroseeding Fertilizer: provide ammonium phosphate which consists of the following percent by weight and mixed by a commercial fertilizer supplier: 16-nitrogen, 20-phosphoric acid, 0-potash.
- F. Import or Amended Top Soil: Ensure silt plus clay content of top soil does not exceed 20 percent by weight, with a minimum 95 percent passing the 2.0 mm sieve. Do not allow the sodium absorption ratio SAR to exceed 6. The electrical conductivity (ECE) of the saturation extract cannot exceed 3.0 millimohs per centimeter at 25 degrees C. Ensure boron content is less than 1 part per million as measured on the saturation extract. To ensure compliance with these requirements, submit samples of soil for analysis prior to, and following backfilling.
- G. Plant Materials:
1. Provide plant materials in accordance with State Department of Agriculture's regulation for nursery inspections, rules and ratings. Provide plants with a normal habit of growth, sound, healthy, vigorous and free from insect infestations, plant diseases, sunscalds, and other disfigurements. Ensure tree trunks are sturdy and have well hardened systems and vigorous and fibrous root systems which are not root or pot-bound. In the event of disagreement as to condition of root system, the root conditions of the furnished plants in containers will be determined by removal of earth from the roots of not less than two plants, or more than 2 percent of the total number of plants of each species or variety. Where container grown plants are from several sources, roots of not less than two plants of each species or variety from each source will be inspected. In the event that the sample plants inspected are found to be defective, the entire lot or lots of plants represented by the defective samples may be rejected. Plants rendered unsuitable for planting due to this inspection will be considered samples and will be provided at no cost to the Owner.
 2. Size of plants will correspond with that normally expected for species and variety of commercially available nursery stock or as specified on drawings. The minimum acceptable size of plants measured before pruning with the branches in normal position, must conform with the measurements specified in plant list. If approved by the Owner, larger sized plants may be used, but without additional cost. If larger plants are approved

- for use, the ball of earth or spread of roots for each plant will be increased proportionately.
3. Plants not meeting requirements of these specifications are considered to be defective whether in place or not. They must be immediately removed and replaced with new acceptable and approved plants of the required size, species and variety at no additional cost to the Owner.
 4. Pruning: Do not prune, trim, top or alter the shape of trees or plants except as approved.
 5. Provide plant material true to botanical and common name and variety as specified in Annotated Checklist of Woody Ornamental Plants in California, Oregon and Washington, published by University of California School of Agriculture (latest edition).
 6. Nursery Grown and Collected Stock: Grow under climatic conditions similar to those in locality of project: container-grown stock in vigorous, healthy condition, not root-bound or with root system hardened off. Use only liner stock plant material which is well established in removable containers or formed homogenous soil sections.
 7. Sod: Provide Marathon II 'BONZAI'.
 8. Select trees which are aesthetically desirable and are good examples of the species. Trees with gashes, misshapen trunks or branches, topped leaders, structural defects, badly crossed branches, or other visual defects will not be accepted.
 9. Seed: Label seed and provide in sealed containers with signed copies from vendor certifying that each container is full labeled in compliance with State Agricultural Code and is in compliance with minimum requirements of these specifications. Wet, moldy or damaged seed will not be permitted. Provide seed mix per plan.
- H. Hydroseeding Fiber Mulch: Provide Hydro-mulch as manufactured by Conwed, or other approved equal, composed of wood cellulose fiber and containing no germination or growth inhibiting factors. Ensure a consistent texture which disperses evenly and remains suspended in agitated water. Provide with a temporary green dye and the following percentage property analysis: moisture content 9 plus or minus 0.8; 3 o.d. basis; organic matter 99.2 plus or minus 0.8; ash content 0.8 plus or minus 0.2; pH 4.8 plus or minus 0.5; water holding capacity (grams of H₂O per 100 grams of fiber) 1150 minimum.
- I. Hydroseeding Additive (Binder): Provide Ecology Control-M Binder organic seeding additive.
- J. Guying and Staking Materials:
1. Wood Tree Stakes: lodge pole pine, full treated with Coppernaphthanate Wood Preservative in strict accordance with FS TT-W-572 Type 1, Composition B, 2 inch minimal normal size diameter by 10 feet long, no split stakes.
 2. Ties: Provide rigid tie stock No. LP, size corresponding to tree box size as manufactured by VIT Company or other approved.
- K. Tree Paint: Provide Morrison Tree Seal, Cabot Tree Paint, or other approved.
- L. Water: Provide clean, potable water.
- M. Mulch: Provide medium grind bark, consisting of organic fibrous, woody bark mixture of varied particle size such that 90 to 100 percent passes 1 inch sieve, 80 to 100 percent passes 1/2 inch sieve, and 20 to 60 percent passes 1/4 inch sieve, or approved equal. Mulch shall be free of contaminants and weed seed and shall have a pleasant musty or moldy soil-like odor. Putrid,

ammonia and sour-smelling materials will be deemed unacceptable. Recycled construction materials will not be permitted.

N. Wood Headerboards:

1. Provide 2-inch by 4-inch pressure treated Douglas fir or redwood construction grade headerboards. Make splices with 1-inch by 4-inch pieces no less than 12 inches long. Place 1-inch by 3-inch by 16-inch stakes at intervals of not more than 5 feet. Cut stakes level and set below top of headerboards.
2. On sharp turns and curves, four 1/2 inch by 4-inch laminated boards, or two 1-inch by 4-inch laminated boards may be permitted.
3. Nail stakes and splices with galvanized common nails. Nail as required for solid installation.
4. Provide header as shown on drawings, laid true to line and grade, protect in-place adjacent improvements, shrubbery and other properties. Place stakes on ground cover side of header.

O. Sand: Provide washed silica sand.

P. Root Barrier: UB24-2 by Deep Root Corp., (800)458-6778. Install at all trees within 5' of concrete paving, curbs or mow strips, or as shown on plans. Install barrier with vertical ribs facing toward the tree and with the top edge 1/2" above finish grade.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Obtain certification that final grades to 1/10 foot have been established prior to commencing landscaping operations. Provide for inclusion of all amendments, settling, etc. Be responsible for shaping all planting areas as indicated on drawings or as required.
- B. Inspect trees, shrubs and liner stock plant material for injury, insect infestation and trees and shrubs for improper pruning.
- C. Do not begin planting of trees until deficiencies are corrected or plants replaced.

3.2 PREPARATION

A. Soil Preparation:

1. After proper finished grades have been verified or established, cross-rip all planting areas to a depth of 12", condition and fertilize soil in accordance with recommendations of soil testing laboratory and as approved by Owner. The following is for bid purposes only. Uniformly spread and cultivate amendments thoroughly by means of mechanical tiller into top 6 inches of soil.
Application rates per 1,000 square feet:

Nitrogen stabilized organic amendment	4 cubic yards
16-16-16 Commercial Fertilizers	15 lbs.
Agricultural gypsum	100 lbs.
Soil sulphur	20 lbs.

2. At time of planting, ensure that top 2 inches of all areas to be planted or seeded are free of stones, stumps, and other deleterious matter 1 inch in diameter or larger, and free from wire, plaster, concrete, wood, and similar materials which would cause hindrance to planting or maintenance.

- B. Final Grades: Make minor modifications to grade as may be necessary to establish required final grade. Ensure that finish grade provides proper drainage of the site and surface drainage is away from building. Final grades are to be 1 inch below adjacent paved areas, sidewalks, valve boxes, headers, clean-outs, drains, manholes, etc., or as shown on drawings or required by City. Eliminate erosion scars prior to commencing maintenance period.

3.3 PLANTING INSTALLATION

A. General:

1. Perform actual planting only during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice, as approved.
2. Distribute in planting areas only as many plants as can be planted and watered that same day.
3. Ensure that containers which are opened and plants removed are handled with care such that ball of earth surrounding roots is not broken and that plants are planted and watered immediately. Do not open containers prior to placing plants in planting areas.
4. The irrigation system shall be operational and approved prior to planting.

B. Pre-Plant Weed Control:

1. Use a non-selective systemic contact herbicide as recommended and applied by an approved licensed landscape pest control advisor and applicator. Leave sprayed plants intact for at least 15 days.
2. Clear and remove these existing weeds by mowing or grubbing off all plant parts at least 2 inches below surface of soil over entire areas to be planted.
3. After irrigation system is operational, apply water for 10 days as needed to achieve weed germination. Apply contact herbicides and wait as needed before planting. Repeat as required.
4. Maintain weed free site until acceptance by Owner.

- C. Lay-Out: Mark locations for plants and outlines of areas to be planted before any plant pits are dug. Gain City approval. If underground construction or utility lines are encountered in the excavation of planting areas, other locations for planting may be selected Owner. Accomplish layout with flagged grade stakes indicating plant names and specified container size on each stake. Confirm location and depth of underground utilities and obstructions.

D. Planting of Trees and Shrubs:

1. Strip and stack approved excavation for planting which is encountered within areas for trenches, tree holes, plant pits and planting beds.
2. Remove from site excess soil generated from planting holes and not used for backfilling.
3. Protect areas from excessive compaction when trucking plants or other materials to planting areas.
4. Provide excavated holes with vertical sides with roughened surfaces and of a size twice the diameter and 1-1/2 times the depth of the root ball for all trees and shrubs.
5. Cut cans on two side with acceptable can cutter only. Do not injure root ball. Superficially loosen edge roots on three sides after removing from can.
6. Remove bottom of plant boxes before planting. Remove sides without damage to root ball after positioning plant and partially backfilling.
7. Center plant in pit or trench.
8. Face plants with fullest growth into prevailing wind.
9. Set plant plumb and hold rigidly in position until soil has been firmed around ball or roots.
10. Backfill container plants with:
 - 6 parts by volume on-site soil
 - 4 parts by volume organic amendment
 - 1 pound 6-20-20 fertilizer mix/cu. yd. of mix
 - 2 pounds iron sulfate per cubic yard of mixNote: The above is for bid purposes only. Specific backfill recommendations are made as a result of the soils testing described on the planting plan.
11. Raise all plants which settle deeper than the surrounding grade. After plant has been placed, add sufficient backfill to hole to cover approximately 1/2 of root ball. Add water to the top and thoroughly saturate root ball and adjacent soil.
12. After water has completely drained, place planting tablets:
 - 1 tablet per 1-gallon container
 - 2 tablets per 5-gallon container
 - 3 tablets per 15-gallon container
 - 4 tablets per 24 inch box
 - 5 tablets per 30 inch box
 - 6 tablets per 36 inch box
 - 7 tablets per 42 inch box
 - 8 tablets per 48 inch and larger boxesSet planting tablets with each plant on top of root ball while plants are still in their containers so the required number of tablets can be verified.
13. Backfill remainder of hole and tamp firm. Construct an earthen basin around each plant after backfilling. Provide basin of depth sufficient to hold at least 2 inches of water. Construct basins with amended backfill. Remove basin in all turf areas after initial watering.
14. Limit pruning to minimum necessary. Remove injured twigs and branches. Pruning may not be done prior to delivery of plants. Paint cuts over 3/4 inch in diameter with tree paint.
15. Stake trees immediately after planting. Install stakes plumb.
16. Do not bring iron sulfate into contact with concrete surfaces due to potential staining. Contractor is responsible for cleaning or replacing stained surfaces.

E. Planting Groundcover:

1. Ensure that groundcover remains in the flats until transplanting. Flats' soil must contain sufficient moisture so it will not fall apart when lifting plants.
2. Plant groundcovers in straight rows evenly spaced unless shown otherwise, and at intervals required by drawings. Use triangular spacing unless otherwise noted on drawings.
3. Plant each rooted plant with its proportionate amount of flat soil. Immediately sprinkle after planting until entire area is soaked to full depth of each hole. Protect plants from damage and trampling.

F. Hydroseeding:

1. Install large trees and shrubs (5 gallon and larger) if they occur in hydroseeded areas.
2. Install trees and shrubs (1 gallon) and groundcovers from flats if they occur in hydroseeded areas.
3. Provide see mixes as shown on plan.
4. Apply hydro-seed by an approved hydro-mulch company.
5. Apply in a form of slurry consisting of cellulose fiber, seed, chemical additives, commercial fertilizer and water. When hydraulically sprayed on soil, ensure that hydro-mulch forms a blotter like groundcover impregnated uniformly with seed and fertilizer and allows the absorption of moisture and rainfall to percolate to the underlying soil.
6. Prepare the slurry at the site by first adding water to the tank when the engine is at half throttle. When water level has reached height of agitator shaft, provide full circulation, then add seed, followed by fertilizer, then mulch. Only add the mulch to the mixture after the seed and the tank is at least 1/3 filled with water. By the time the tank is 2/3 to 3/4 full, all mulch shall be in. Commence spraying immediately when tank is full.
7. Spray with uniform visible coat by using the green color as a guide. Apply the slurry in a sweeping motion, in an arched stream so as to fall like rain allowing the wood fibers to build on each other until a good coat is achieved and the material is spread at the required rates.
8. Remove slurry not used within two hours from the site.
9. Fill out the daily worksheets by the nozzle man, with the following information: Seed type and amount, mulch type and amount, number of loads and amount of water, seeding additive type and amount, area covered and equipment used, capacity and license number.
10. Do not allow any slurry to be sprayed into any reservoir basin or drainage ditches and channels which may impede the flow of rain or irrigation water. Clean up any spilled slurry.
11. After application of hydro-mulch, wash excess material from previously planted materials and architectural features. Avoid washing or eroding mulch materials.
12. Ensure that application equipment has a built-in agitation system and operating capacity sufficient to agitate, suspend and mix a slurry containing not less than 40 pounds of fiber mulch plus a combined total of 7 pounds fertilizer solids for each 100 gallons of water.
13. Slurry distribution lines shall be large enough to prevent stoppage and shall be equipped with a set of hydraulic spray nozzles which will provide a continuous non-fluctuating discharge. Capacity requirements is 1,500 gallons, mounted on a traveling unit, either self-propelled or drawing by a separate unit which will place slurry tank and nozzles within sufficient proximity of areas to be seeded.
14. Hydraulic equipment used for pesticide applications shall consist of a clean 150 gallon capacity fiberglass tank, complete with mechanical agitation. Pump volume shall be 10 gallons per minute, while operating at a pressure of 100 pounds per square inch.

Distribution lines shall be large enough to carry the volume of water necessary for even chemical distribution. Spray nozzle must cover a 15-foot swath, with a minimum output of 5 gallons per minute at 80 pounds per square inch.

G. Sod Planting:

1. Remove rocks, weeds and debris from areas to be sodded. Work up soil to a depth of 6 inches, and break up all clods.
2. Carefully smooth all surfaces to be sodded. Roll area to expose soil depressions or surface irregularities. Re-grade as required.
3. Spread turf fertilizer 16-20-0 onto soil evenly at rate of one pound per 100 square feet of lawn area. Rake in lightly. Be sure soil is level and smooth before laying sod. Avoid laying sod on bone dry soil
4. Lay first strip of sod slabs along a straight line. Use a string in irregular areas. Butt joints tightly, do not overlap edges. On second strip, stagger joints much as in laying masonry. Use a sharp knife to cut sod to fit curves, edges, sprinkler heads.
5. Do not lay whole lawn before watering. When a conveniently large area has been sodded, water lightly preventing drying. Continue to lay sod, and to water until installation is complete.
6. After laying sod, roll lightly to eliminate irregularities and to form good contact between sod and soil. Avoid heavy roller or excessive initial watering which may cause roller marks.
7. Water thoroughly the completed lawn surface. Soil should be moistened at least 8 inches deep. Repeat sprinkling at regular intervals to keep sod moist at all times until rooted. After sod is established, decrease frequency and increase amount of water per application as necessary.
8. Replace all dead or dying sod with equal material.

H. Mulch Cover: Dress all groundcover, perennial and annual beds with 2" layer of mulch, except 2:1 slopes and turf areas.

3.4 CLEAN-UP

- A. After all planting operations are complete, remove all trash, excess soil, empty plant containers, and rubbish from the property. Repair scars, ruts and other marks in the ground and leave ground in a neat and orderly condition.
- B. Leave the site in a broom-clean condition, and wash down all paved areas within the project site. Leave walks in a clean and safe condition.

3.5 OBSERVATION SCHEDULE

- A. Notify Owner in advance for the following inspections, according to the time specified:
 1. Pre-Job conference – 7 days.
 2. Final grade review – 48 hours.

3. Plant material review – 48 hours.
 4. Plant layout review – 48 hours.
 5. Soil preparation and planting operations – 48 hours.
 6. Pre-maintenance – 7 days.
 7. Final inspection – 7 days.
- B. No site visits shall commence without all items noted in previous observation reports either completed or remedied unless such compliance has been waived by the Architect.

END OF SECTION 329300

SECTION 329700 – LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. 90 day maintenance.
- B. Weeding.
- C. Fertilization.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Section 02811 – Landscape Irrigation System.
- B. Section 02950 – Landscape Planting
- C. Section 02520 – Portland Cement Concrete Paving

1.3 QUALITY ASSURANCE

- A. Provide services by an experienced landscaping maintenance company.

1.4 MAINTENANCE PERIOD

A. Continuously maintain all site areas involved in this contract during the progress of work and during the maintenance period until final acceptance of the work by City. Improper maintenance or possible poor condition of the project at the termination of the scheduled maintenance period may cause postponement of the final completion date of the Contract at no additional cost to Owner. Continue maintenance until acceptable to the Owner.

- 1. Provide sufficient numbers of workers and adequate equipment to perform work during maintenance period.
- 2. Maintenance period does not start until all elements of construction, planting, and irrigation for the complete project are in accordance with the contract documents for this project.
- 3. Request an inspection to begin maintenance period after all planting and related work has been completed in accordance with contract documents. Maintenance period commences as described in written notification by the Owner.
- 4. Prior to commencement of maintenance period, ensure that all ground covers and lawn areas have been planted and that all lawn areas show an even, healthy stand of grass seedlings or sod, grass having been mown twice.

5. Any day or days that there is failure to properly maintain plantings, replace suitable plants, perform weed control or maintain hardscape areas will not be credited as part of the 90 days maintenance. The project will not be segmented into maintenance phases.
6. Keep paved areas free of silt, dirt, leaves and other planting area debris. Maintain these areas at least broom clean through the duration of the maintenance period, cleaning no less often than once per week.

1.5 GUARANTEE AND REPLACEMENT

1. Guarantee: Guarantee plant material against any and all poor, inadequate or inferior materials and workmanship for one year. Replace plants found to be dead or in poor condition due to faulty materials or workmanship, at no extra cost to Owner.
2. Replacement: Replace materials found to be dead, missing or in poor condition during the maintenance period immediately. The Architect is the sole judge of the acceptability of condition. Make replacements of materials within 15 days after condition develops or written notification from Architect has been sent. Architect has the right to make emergency repairs without releasing Contractor's guarantee and warranty to Architect.

1.6 INSPECTIONS

1. Request normal progress inspection at least 72 hours in advance of an anticipated inspection. Inspections are as follows:
 1. Immediately prior to commencement of this maintenance work.
 2. Completion of the first (90) day maintenance period.
 3. Final Acceptance.

1.7 PROJECT FINAL ACCEPTANCE

1. Prior to date of final inspection, acquire approved reproducible prints and finally record from the job record set, all changes made during construction and deliver them to Architect.
- B. Deliver guarantees to Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

1. Ensure that all materials conform to other sections of these specifications for planting and irrigation, and as acceptable to Architect.
2. Provide monthly record of all herbicides, insecticides and disease control chemicals used on site.

PART 3 - EXECUTION

3.1 MAINTENANCE

- A. Weed and cultivate all areas at intervals of not more than 10 days.
 - 1. Perform watering, mowing, rolling, edging, trimming, fertilization, spraying, pest control, and cleaning as may be required.
- B. Street gutters and curbs are to be included.
 - 1. Maintain adequate protection for people and property, and be financially responsible for damages and injuries. Notify the Architect immediately should damage occur as a result of maintenance operations and provide repair or remuneration.
 - 2. Between the 15th and 20th calendar day of the maintenance period, reseed or resod all spots or areas within the lawn where normal turf growth is not evident.

3.2 TREE AND SHRUB CARE

- 1. Watering: Maintain a large enough water basin around plants so that enough water can be applied to establish moisture through the major root zone. When hand watering, use a water wand to break force of water.
- B. Pruning:
 - 1. Prior to any pruning obtain written approval from the Architect to proceed.
 - 2. Trees:
 - a. Propose tree pruning to the Architect should there be health or structural reasons for doing so, including the need to eliminate diseased or damaged growth, eliminate structurally unsound growth, reduce potential for wind toppling or wind damage, or maintain growth within limited space.
 - b. If requested by the City provide pruning for aesthetic enhancement according to "pruning" by Sunset Books.
 - c. Major pruning of deciduous trees shall be during their dormant season.
 - 3. Shrubs:
 - a. The objectives of shrub pruning are the same as for trees. Do not clip shrubs into balled or boxed forms unless such is required by the design.
 - b. Making pruning cuts to lateral branches or buds or flush with trunk. Stubbing will not be permitted.
 - 4. Staking and guying: Ensure that stakes and guys remain in place through acceptance and monitor to prevent girdling of trunks or branches and to prevent rubbing that causes bark wounds. All nursery stakes shall be removed.

1. Weed control: Keep all areas free of weeds. Use recommended legally approved herbicides. Avoid frequent soil cultivation that destroys shallow roots. Use mulches per specifications to help prevent weed seed germination.
- C. Insect and disease control: Maintain a reasonable control with approved materials.
1. Fertilize as specified by the agronomic soils testing recommendations and as follows for bid purposes:
 1. Commencement of maintenance period -6 pounds per 1,000 square feet with top dress fertilizer.
 2. At end of first 30 days of maintenance period – 6 pound per 1000 square feet with top dress fertilizer.
 3. At end of maintenance period and at 30 day intervals should maintenance period be extended for any reason – 6 pounds per 1,000 square feet with fertilizer mix.
 4. Avoid applying fertilizer to the root ball and base of main stem; rather, spread evenly under plant to drip line. Rates will vary from about a cup of nitrate fertilizer (depending upon nitrogen percentage) around a newly installed small plant to about 1/2 pound of actual nitrogen per inch of trunk diameter measured four feet from the ground for mature trees.
- D. Replacement of plants: Replace dead, dying and missing plants with plants of a size, condition and variety acceptable to the Architect at no additional cost to the Owner.

3.3 GROUND COVER CARE

1. Weed control: Control weeds, preferably with pre-emergent herbicides, but also by hand or with selective systemic herbicides. Hoe weeds as little as possible since this may result in plant damage.
2. Watering: Water lawns at such frequency as weather conditions required to replenish solid moisture below root zone.
- B. Weed control: If needed, control broad leaf weeds with selective herbicides.

3.4 LAWN AND TURF CARE

- A. Turf must be well-established prior to final acceptance.
1. Watering: Water lawns at such frequency as weather conditions required to replenish soil moisture below root zone.
- B. Weed control: If needed, control broad leaf weeds with selective herbicides.
- C. Mowing:
 1. Perform mowing at such times of the day or week as may be requested by the Owner so as not to impede the Owner's operations. Mowing times may be at times other than

normal working hours or days. Perform work at Owner's convenience at no additional cost to the Owner.

2. Clean up grass clippings during and after mowing, and remove legally from site. Use of blowing-type equipment in lieu of sweeping or vacuuming is not acceptable.

D. Renovating:

1. If required, remove thatch by verticutting, preferably in the Fall of the year, but otherwise in the Spring. At this time, fertilize with nitrate and over-seed if needed. Over-seeding must precede pre-emergency herbicides by at least 4 to 6 weeks. Normally, this means that lawns which have been invaded by crabgrass would be renovated and over-seeded in the Fall and treated for crabgrass control in the following late Winter.
2. Clean up grass clippings during and after mowing, and remove legally from site. Use of blowing-type equipment in lieu of sweeping or vacuuming is not acceptable.

3.5 IRRIGATION SYSTEM

1. Inspection: Check all systems for proper operation. Lateral lines must be flushed out after removing the last sprinkler head or two at each end of the lateral. Adjust heads as necessary for unimpeded coverage and no overspray.
2. Controllers: Set and program automatic controllers for season water requirements. Give Owner a key to controllers and instruction on how to turn off system in case of emergency as specified in other sections of these specifications.
3. Repair all damages to irrigation system at no additional cost to the Owner. Make all repairs within one watering period.

END OF SECTION 329700

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Work of this section includes the furnishing and installation of all necessary storm drain lines and related storm drain structures as required by the drawings and as specified herein.
- B. Submittals:
 - 1. Coordination Drawings showing piping profiles and elevations at a horizontal scale of 1 inch equals 50 feet and a vertical scale of 1 inch equals 5 feet. Indicate underground structures and show pipe types, sizes, materials and elevations of other utilities crossing system piping.
 - 2. Manufacturer's product data: For each type of manufactured material and product indicated.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. PVC Type PSM Sewer Pipe and Fittings, ASTM D 3034, SDR 35, for gasketed joints. Include ASTM F 477 elastomeric-seal gaskets.
- B. PVC ASTM D2729 perforated storm drain line.
- C. Special Pipe Couplings and Fittings: Rubber or elastomeric sleeve and band assembly fabricated to match OD of pipes to be joined, for nonpressure joints.
- D. Cleanouts: All storm drain cleanouts per the applicable City of San Diego Standard Drawing, City specifications and plans.

2.2 UTILITY STRUCTURES

- A. DRAINAGE STRUCTURES
 - 1. Construct drainage structures at locations and to the design and dimensions indicated. Exposed concrete work shall have a smooth troweled finish with rounded corners and edges finished plumb and true.
 - 2. Concrete for drainage structures shall be per the Standard Drawings indicated on the plans.
 - 3. Forms for concrete drainage structures shall be rigid and substantial. Plywood or tongue and grooved lumber shall be used for forming the exposed faces of all concrete drainage structures. The top surfaces of the concrete shall be finished by bringing mortar to the surface with tamping, troweling smooth, and tooling the edges.
 - 4. Forms shall be kept in place not less than five days after placing, unless otherwise directed or approved. Concrete work shall be cured by keeping it continuously wet for not less than seven days after placing.

- B. Manhole Frames and Covers: Cast iron conforming to ASTM 48, Class 30 per City of San Diego Standard Drawing M-2 and City specifications.
- C. Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16 (AASHTO HS20-44), heavy-traffic, structural loading, with provision for sealant joints. Grate covers in traffic areas shall be traffic rated and ADA compliant.
- D. Storm Drain Filter Inserts: Storm drain filter inserts shall be by Kristar Enterprises, Inc.; model number per plan.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install piping pitched at minimum slope of 1 percent and 36-inch minimum cover unless otherwise indicated.
- B. Accurately shape and thoroughly compact trench bottom to grade. Excavate joint space when bells are used so that the lowest 1/3 of all pipe has firm bearing for its entire length. Lay pipe to lines and grades indicated with sections close jointed to form a smooth flow line. Keep trenches clean until installed work has been approved.
- C. Bedding material shall be a minimum of clean ¾-inch crushed rock extending 4 inches beneath the pipe per the City of San Diego's Regional Standard Drawings. Clean sand shall comprise the remainder of the bedding material to 12 inches above top of pipe. Place sand simultaneously on each side of the pipe, and thoroughly compact to provide lateral support for the line. Place the remaining backfill in six inch layers above top of bedding material, moisten as required and compact with hand or pneumatic tampers. Compacting by flooding is prohibited. Bedding sand shall have a sand equivalent value of 30 or greater.
- D. Compaction shall be performed and comply with the related requirements of Section 31200 Earth Moving.
- E. Lay bell, hub, or groove ends up-grade; accurately center the following spigots in them.
- F. Polyvinylchloride Pipe: Lay and bed in accordance with ASTM D2321.
- G. Lateral connections to main lines and angles in lines shall be made with the use of elbows, wyes or tees. Only fittings supplied or recommended by the pipe manufacturer shall be used.
- H. All structures and devices indicated as public agency standards shall be constructed in accordance with the standard plans and specifications of that agency.
- I. Where drainage structures, and appurtenances are constructed in the public street or rights-of-way, they shall be constructed in accordance with the standard plans and specifications of the authority having jurisdiction, and in the presence of a representative of that agency.
- J. Upon completion of the work, the Contractor shall provide proof that the work performed has been inspected, approved, and accepted by the governing agency having jurisdiction. The contractor shall also be responsible for satisfying any As-Built drawing requirements by the governing agency having jurisdiction.

- K. Provide adequate cribbing, sheathing, and shoring as necessary to safely retain the earth sides of all excavation and trenches from caving and other damage resulting from excavating, together with suitable forms of protection against property damage and bodily injury to personnel employed on the work and the general public. The design, installation, and maintenance of required cribbing and shoring shall be entirely that of the Contractor.
- L. It shall be the Contractor's full responsibility to furnish and maintain all temporary barricades, warning lights, and other types of protection to prevent accidental injury to the general public and all personnel employed on the project.
- M. Drain lines, including trenches, shall be protected from damage during the entire construction period. It shall be the responsibility of the Contractor to replace or rework any damaged portion of the work at his own expense until such time as the project is accepted.
- O. Upon completion of the work, all storm drain systems shall be left free from silt, debris, and obstructions.
- P. Install storm drain filter inserts after all final landscaping and paving have been completed.

END OF SECTION 334100