



SECTION F

TECHNICAL SPECIFICATIONS

**KESSLER PARK
SNACK BAR & RESTROOM RENOVATION
PROJECT**

FOR

**BLOOMINGTON RECREATION & PARK DISTRICT
BLOOMINGTON, CALIFORNIA**

PROJECT NO.: 30.30.0135

SAN BERNARDINO COUNTY – DEPARTMENT OF PUBLIC WORKS –
SPECIAL DISTRICTS

TECHNICAL SPECIFICATIONS

FOR

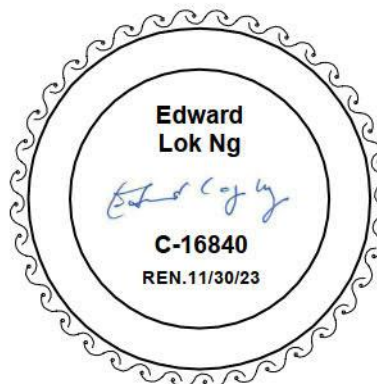
KESSLER PARK SNACK BAR
SKACK BAR, RESTROOM REMODEL, & NEW
SHADE STRUCTURE PROJECT

BLOOMINGTON RECREATION & PARK DISTRICT

February 2023

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**SECTION 000101
PROJECT TITLE PAGE**

Title : **KESSLER PARK SNACK BAR**

SNACK BAR, RESTROOM REMODEL & NEW SHADE
STRUCTURE

Client Agency : BLOOMINGTON RECREATION & PARK DISTRICT
DEPARTMENT OF PUBLIC WORKS – SPECIAL DISTRICTS
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Location : **Kessler Park Snack Bar**

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Issued separately by the District

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SECTION 01 10 00 SUMMARY OF WORK

GENERAL

1.1 SCOPE

- A. The Contractor shall provide all materials, labor, tools, plant, supplies, equipment, transportation, superintendence, temporary construction of every nature, and all other services and facilities necessary to complete the construction of the restroom facilities, including all incidental work described in the contract documents.
- B. The scope of work is contained in the contract documents.
- C. The scope of work includes, but is not limited to the following:
 - 1. General contractor to be responsible for all demolition in preparation for new work.
 - 2. Remodel existing snack bar building and its restrooms and provide a new exterior shade structure. the work to be performed includes:
 - a. Exterior of Building: Removal of existing roofing system and replace with new PVC roof system, new hvac system, new electrical transformer, new metal screen at roof, and painting of existing building.
 - b. New exterior detached Shade structure: Provide new shelter detached from building w/ metal post and pressure treated framing with new standing seam metal roofing and light fixtures.
 - c. Interior of Building: Removal of selected CMU walls, and wood frame walls, relocation and new floor sinks, mop sinks, plumbing fixtures, new LED light fixtures throughout building, replacement of all doors & door frames, replacement of sliding windows, re-finish exterior window doors, new epoxy floor paint, wall base tile, and new tables. At the hallway, removal of abandon concrete steps and renovate area for new hallway to connect the B.L.L. Storage room & Kitchen room. Typical of new furred walls per plan with new insulation, and new and replacement of electrical outlets/switches. Removal of existing kitchen appliances and new type kitchen equipment per plan. Contractor to disposed of unusable kitchen equipment and to coordinate with District for storage of existing equipment to be re-use and to verify and protect existing equipment condition.
 - d. Restrooms: Renovation to provide saw cutting & removal of the concrete slab for new replacement of plumbing fixtures, partitions, accessories, doors, and new LED light fixtures.
- D. All work shall be in accordance with applicable codes and local regulations that may apply. In case of conflict in or between the Contract Documents and a governing code or ordinance, the more stringent standard shall apply.

**KESSLER PARK SNACK BAR 01 10 00 - 1
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE**

**SECTION 01 10 00
SUMMARY OF WORK**

1.2 MISCELLANEOUS CONTRACT EXPENSES

- A. The Contractor must include in its bid the cost fees or charges payable to State, local, District, or special community development agencies unless otherwise stated in the General Requirements. Contractor will not be required to obtain building permits from the County's Building Department.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

SECTION 01 2513
PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for handling requests for substitutions submitted 60 days after the date established in the Notice of Award and pursuant to Article 6.14 of the General Conditions.

1.2 RELATED REQUIREMENTS

- A. Section 01 3300: Submittal Procedures.
- B. Section 01 6000: Product Requirements.
- C. Section 01 7700: Contract Closeout.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 APPLICATION

- A. CONTRACTOR proposed changes in products or materials required by the Contract Documents 60 days or more after the Notice of Award are considered to be requests for substitutions. District will consider requests for substitution if a product is no longer manufactured or the District and ARCHITECT, after a diligent search have verified that product or material is not available to CONTRACTOR. The following are not considered to be valid requests for substitutions:
 - 1. Revisions to the Contract Documents requested by District or ARCHITECT.
 - 2. Specified options of products included in the Contract Documents.
 - 3. Substitutions requested on a "or equal" basis.

3.2 SUBMITTALS

- A. Transmit submittals as described in related Sections for each request for substitution.
 - 1. Identify the product to be replaced in each request. Include related Specification Section and Drawing number.

SECTION 01 2513
PRODUCT SUBSTITUTION PROCEDURES

2. Provide complete documentation denoting compliance with the requirements for substitutions, and the following information, as appropriate.
 - a. A detailed comparison of significant qualities of the proposed substitution with those specified in the Contract Documents. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
 - b. Product Data, including Drawings, descriptions of products, fabrication, and installation procedures.
 - c. Samples, where applicable or requested.
 - d. CONTRACTOR certification the proposed substitution conforms to requirements of the Contract Documents in every respect and is appropriate for the applications indicated.
 - e. CONTRACTOR waiver of rights to an increase in the Contract Amount, Milestones and/or Contract Time that may subsequently become necessary because of the failure of the substitution to adequately perform.
3. If required, ARCHITECT will request additional information or documentation for evaluation. District will notify CONTRACTOR of acceptance or rejection of the substitution.
4. ARCHITECT will review and consider request for substitution and provide a recommendation to District.
5. Where a proposed substitution involves and/or affects more than one Subcontractor, CONTRACTOR shall ensure each Subcontractor cooperates with the other Subcontractor involved to coordinate the Work, provide uniformity and consistency, and assure compatibility of all products.
6. CONTRACTOR submittal and ARCHITECT review of Shop Drawings, Product Data, material lists or Samples do not constitute an acceptable or valid request for substitution.

END OF SECTION

SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for a certified Application for Payment.
 - 1. Coordinate the certified Schedule of Values and certified Application for Payment with, but not limited to, the Construction Schedule, submittal log, and list of Subcontractors.

1.2 RELATED REQUIREMENTS:

- A. Section 01 33 00 – Submittal Procedures.
- B. Section 01 77 04 – Closeout Procedures and Training.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 APPLICATION FOR PAYMENT

- A. Each certified Application for Payment shall be consistent with previous applications and payments as reviewed by Engineer, paid for by District, and:
 - 1. The initial Application for Payment and Final Application for Payment at time of Substantial Completion involve additional requirements.
- B. Payment Application Times: The period of Work covered by each Application for Payment is payment date for each progress payment as specified in the General Conditions. The period covered by each Application for Payment is previous month.
- C. Payment Application Forms: Use District provided forms for the Application for Payment.
- D. Application Preparation: Complete every entry on the form. Include execution by a person authorized to sign legal documents on behalf of General Contractor. Engineer will return incomplete applications without action.
- E. Transmittal: Submit a minimum of four signed and original copies of each certified Application for Payment to Engineer. All copies shall be complete, including releases and similar attachments.

SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to Engineer.
- F. Initial Application for Payment within 60 days of issuance of Notice to Proceed: Administrative actions and submittals, that must precede or coincide with submittal for first certified Application for Payment include, but are not limited to, the following:
1. Certified Schedule of Values.
 2. Performance and payment bonds.
 3. List of principal suppliers and fabricators.
 4. Worker Compensation certificates, if applicable.
 5. Auto Insurance, if applicable.
 6. Hazardous Material Insurance Certificates, if applicable.
 7. Construction Schedule.
 8. Submittal Schedule.
 9. Emergency Contact List.
 10. Copies of authorizations and licenses from governing authorities for performance of Work.
 11. Certified Payroll (Submitted directly to Labor Compliance in electronic format as specified by District including hard copy).
- G. Applications for Payment: Administrative actions and submittals that must precede or coincide with submittal of Progress Applications for Payment include, but are not limited to, the following:
1. Certified Payroll (submitted directly to Labor Compliance in electronic format as specified by District including hard copy).
 2. Updated and current Project Record Drawings (as-built).
 3. Monthly Construction Schedule (updated, submitted and approved).
 4. Approved Schedule of Values.
 5. List of Subcontractors (Payments Summary).
- H. Final Application for Payment at Substantial Completion: Following Engineer issuance of certificate of Substantial Completion, submit an Application for Payment:
1. Administrative actions, submittals and/or Work that shall precede or coincide with this application include:
 - a. Occupancy permits and similar approvals by authorities having legal jurisdiction over Work.
 - b. Removal of temporary facilities and services.
 - c. Testing, adjusting and balance records.
 - d. Removal of surplus materials, rubbish, and similar elements.
 - e. Meter readings.
 - f. Start-up performance reports.
 - g. District personnel training and orientations.
 - h. Operating and maintenance instruction manuals.
 - i. Preliminary Warranties, guarantees and maintenance agreements.

SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

- j. Delivery of extra materials, products and or stock.
- k. Change over information related to District occupancy, use, operation, and maintenance.
- l. Final cleaning.
- m. Ensure that Work is completed.
- n. Advise on shifting insurance coverage.
- o. List of defective Work, recognized as exceptions to certificate of Substantial Completion.
- p. Change of door locks, including keys, to District system.
- q. Certified Payroll (submitted directly to Labor Compliance in electronic format as specified by the District including hard copy).
- r. Certification that all benefit contributions due and owing to appropriate union trusts has been paid by General Contractor and Subcontractors, as specified by the Project Stabilization Agreement (PSA) and Article 6.49 of the General Conditions.
- s. Waivers and releases for General Contractor.

Payment amount to be based on actual quantities of work completed and unit bid prices. Total bid item quantities completed x unit bid price.

END OF SECTION

**SECTION 01 33 00
SUBMITTAL PROCEDURES**

PART 1 - GENERAL

1.1 Schedule of Submittals

- A. Within 30 days after receiving a Notice to Proceed, the Contractor must submit a Schedule of Submittals, in the format indicated below, in duplicate, listing all items that must be furnished for review and approval by the Engineer. The schedule must indicate the type of items (such as sample, shop drawings, catalog cut, and so forth) and include the scheduled dates of submittal. In preparing the schedule, adequate time (10 days or more exclusive of time in the mail) must be allowed for review and approval and possible resubmittal. Also, the schedule must be coordinated with the approved construction progress chart. The Contractor must revise and/or update the schedule monthly. Such revised schedules must be submitted to the Engineer for approval.
- B. Within 30 days after receiving a Notice to Proceed, the Contractor must complete and submit to the Engineer a listing of all subcontractors, including subcontractor name, address, telephone number, fax number and email address. Include an updated list with each progress payment request.
- C. Schedule of Submittals Format

Project _____

Contract No. _____

Project
Description _____

Spec. Section	Spec. Description	Paragraph Number	*Submittal Type	Date		Action Taken	Assigned Number
				Submittal	Returned		

***Submittal Type:**

C – Certificate

S – Sample

SD – Shop Drawing

CD – Catalog Data

PL – Spare Parts List

MM – Maintenance Manual

SECTION 01 33 00
SUBMITTAL PROCEDURES

1.2 Shop Drawings and Related Data

- A. Prior to submittal, the Contractor must stamp and sign the submittal to indicate that it is in accordance with the contract documents without deviation and has been reviewed and approved by the Contractor. The Contractor must make any corrections required by the Engineer. If the Contractor considers any correction indicated on the drawings to constitute a change to the contract drawings or specifications, notice must be given to the Engineer. Four prints of all approved shop drawings must be given to the Engineer. The approval of the drawings by the Engineer must not be construed as a complete check but indicates only that the submittal appears to comply with the contract documents. Approval of the shop drawings does not relieve the Contractor of responsibility for any error that may exist because the Contractor is responsible for the dimensions and for satisfactory construction of all work. The submission by the Contractor must be accompanied by a transmittal letter in a format approved by the Engineer.

1.3 Material, Equipment, and Fixture Lists

- A. When required by the technical provisions, lists of materials, equipment, and fixtures must be submitted by the Contractor in accordance with the requirements specified for shop drawings. The lists must be supported by sufficient descriptive material, such as catalogs, cuts, diagrams, and other data published by the manufacturer, as well as by evidence of compliance with safety and performance standards, to demonstrate conformance to the specification requirements. Catalog numbers alone are not acceptable. The data must include the name and address of the nearest service and maintenance organization that regularly stocks repair parts. No consideration will be given to partial lists submitted from time to time. Approval of materials and equipment is tentative, subject to submission of complete shop drawings indicating compliance with the contract documents.

1.4 Certificates of Compliance

- A. Any certificates required for demonstrating proof of compliance of materials with specification requirements, including statements of application, and extended guarantees, must be signed and submitted in quadruplicate to the Engineer at least 10 days before delivery. The Contractor must review all certificates before submissions are made to the Engineer, to ensure compliance with the contract specification requirements and to ensure that the affidavit is properly signed. Each certificate must be signed by an official authorized to certify on behalf of the manufacturing company and must contain the name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates must contain the name and address of the testing laboratory and the dates of tests to which the report applies. Certification must not be construed as relieving the Contractor from furnishing satisfactory

SECTION 01 33 00 SUBMITTAL PROCEDURES

material if, after tests are performed on selected samples, the material is found not to meet the specific requirements.

1.5 Review of Submittals

- A. When submittals are reviewed by others, each submittal must be returned to the Engineer stamped and signed or marked in one of the following ways:
 - 1. A Action: The Contractor is advised that "A Action" means that fabrication, manufacture, or construction may proceed, provided the work complies with the contract documents.
 - 2. B Action: The Contractor is advised that "B Action" means that fabrication, manufacture, or construction may proceed, provided the work complies with the notations and the contract documents.
 - 3. C Action: The Contractor is advised that "C Action" means that no work may be fabricated, manufactured, or constructed and that the Contractor must make a new submittal. Any submission marked "C Action" is not permitted on the site.
- B. The "A Action" or "B Action" submittals must be returned to the Engineer. The Contractor is responsible for obtaining prints of them and for distributing them to the field and to subcontractors.
- C. In the case of shop drawings in the form of manufacturers' descriptive literature, catalog cuts, and brochures stamped "A Action" or "B Action," returned to the Engineer, the Contractor is responsible for distributing them to the field and to the subcontractors. If the shop drawings are stamped "C Action," the Engineer will provide copies to the Contractor, who must submit new shop drawings to the Engineer.
- D. In the case of samples stamped "A Action" or "B Action," the Engineer will provide one of the samples to the Contractor. In the case of samples stamped "C Action," all of the submitted samples must be returned.

1.6 Spare Parts Data

- A. Spare parts data must be submitted in quadruplicate.

1.7 Schedule of Values

- A. The Contractor must submit a construction cost breakdown using the attached Schedule of Values. When applicable, a separate cost breakdown form must be submitted for each separate building. However, the total cost of site work for each facility must be included in the cost estimate breakdown for each restroom building. The number of items provided on the Systems Construction Cost Estimate Breakdown form are the minimum required. Additional subdivision of these items may be used by the Contractor.
- B. Submit the construction cost breakdown after contract award to the Engineer.

**SECTION 01 33 00
SUBMITTAL PROCEDURES**

- C. Do not delete items from the Schedule of Values form. However, expand the schedule "Description of Work" as necessary to allow evaluation of work or to make progress payments.
- D. If the contract price changes, the Schedule of Values must be revised to reflect the change(s) and forwarded to the Engineer.
- E. A current Schedule of Values must accompany all Contractor Requests for Payment.
- F. See following exhibit for Schedule of Values.

1.8 As-built plans.

- A. Contractor to submit as built plans.
- B. During construction, maintain as-built redline drawings for all drawings and final as-builds for contractor-generated coordination drawings. Update after completion of commissioning.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

**SECTION 01 33 00
SUBMITTAL PROCEDURES**

THE FOLLOWING SCHEDULE OF VALUES IS ONLY A LIMITED LIST AND MAY NOT CAPTURE ALL ITEMS IN THE CONSTRUCTION DOCUMENTS						
Item No.	Item Description	QTY *	Unit	Unit Cost	Amount	Drawing Sheet
1	MOBILIZATON, DEMOLITION, INSURANCE AND BONDS	1	LS			
2	CONCRETE SLAB	1	LS			A2.0
3	METAL SECURITY SCREEN & METAL GATE	1	LS			A2.0, A4.0, A8.0, A10
4	INFILL OF CMU WALL OPENINGS	1	LS			A2.0, A6.0, A8.0,
5	WOOD STUD FRAMING, PLYWOOD, MIRATEC FASCIA, & MISCELLANEOUS CARPENTRY	1	LS			A2.0, A4.0, A8.0, A10, A12, A13
6	PVC ROOF SYSTEM, FLASHING, AND SHEET METAL	1	LS			A4.0, A7.0, A8.0, A9.0, A10
7	R-13 & R-30 BATT INSULATION	1	LS			A2.0, A3.0, A7.0, A8.0, A9.0, A13
8	WINDOWS, DOORS & DOOR FRAMES WITH HARDWARE, SWING DOORS AT WINDOW OPENINGS	1	LS			A2.0, A3.0, A4.0, A7.0, A8.0, A9.0, A11, A13
9	NEW GYP BOARD AND PATCHING OF WALLS	1	LS			A2.0, A3.0, A6.0, A7.0, A8.0, A9.0, A11, A13
10	NEW INTERIOR AND EXTERIOR PAINTING OF BUILDING, AND CAULKING	1	LS			A2.0, A3.0, A5.0, A7.0, A8.0, A10
11	EPOXY PAINT AT CONCRETE FLOOR	1	LS			A2.0, A5.0
12	EPOXY PAINT AT CONCRETE FLOOR AND BASE TILE WORK, COMPLETE WITH GROUT AND SEALING	1	LS			A2.0, A5.0
13	RESTROOM WALL TILE, COMPLETE WITH GROUT AND SEALING	1	LS			A2.0, A5.0, A7.0, A11
14	EXTERIOR PLASTER SYSTEM AND PATCHING AS REQUIRED	1	LS			A2.0, A3.0
15	ALL RESTROOM ACCESSORIES, AND RESTROOM SIGNAGES	1	LS			A2.0, A5.0, A7.0, A11
16	ACCESS ROOF HATCH AND METAL LADDER	1	LS			A2.0, A3.0, A4.0, A9.0, A10

**KESSLER PARK SNACK BAR
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE**

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**SECTION 01 33 00
SUBMITTAL PROCEDURES**

17	ALL KITCHEN EQUIPMENT	1	LS			A2.0, A5.0, A7.0, A8.0
18	HVAC's, HEAT PUMP, MAKE-UP AIR, GREASE EXHAUST FAN, DUCT WORK, KITCHEN HOOD, & ANSEL FIRE EXTINGUISHER SYSTEM	1	LS			A2.0, A3.0, A4.0, A5.0, A7.0, A10, MECH. SHEETS
19	ALL PLUMBING FIXTURES AND REQUIRED BACK SUPPORTS, VENTING PIPES, SUPPLY PIPES, AND ACCESSORIES	1	LS			A2.0, A5.0, A7.0, A11, PLUMB. SHEETS
20	SERVICE, ELECTRICAL PANELS, POWER, SWITCHING, DISTRIBUTION, OCCUPANCY SENSORS, INTERIOR & EXTERIOR LIGHT FIXTURES, DATA & COMMUNICATION CONDUITS, TRANSFORMER	1	LS			A2.0, A3.0, A5.0, A6.0, A10, ELECT. SHEETS
X	AND EVERYTHING NOT INCLUDED IN THE ABOVE LIST					
	SUBTOTAL					
	FEDERAL CONDITIONS / OVERHEAD / PROFIT					
	TOTAL					

**ALTERNATE SHADE
STRUCTURE**

Item No.	Item Description	QTY *	Unit	Unit Cost	Amount	Drawing Sheet
1	CONCRETE FOUNDATION	1	LS			A12
2	STEEL SHADE STRUCTURE, & METAL ROOFING	1	LS			A4.0, A6.0, A8.0, A12, A13
3	WOOD STUD FRAMING, PLYWOOD, T&G, POST, MIRATEC FASCIA, & MISCELLANEOUS CARPENTRY	1	LS			A6.0, A8.0, A12, A13
4	NEW EXTERIOR PAINTING OF SHADE STRUCTURE AND CAULKING	1	LS			A6.0,
5	POWER, SWITCHING, DISTRIBUTION, EXTERIOR LIGHT FIXTURES	1	LS			A6.0, ELECT. SHEETS

**KESSLER PARK SNACK BAR
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE**

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**SECTION 01 33 00
SUBMITTAL PROCEDURES**

X	AND EVERYTHING NOT INCLUDED IN THE ABOVE LIST					
	SUBTOTAL					
	FEDERAL CONDITIONS / OVERHEAD / PROFIT					
	TOTAL					

**KESSLER PARK SNACK BAR
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE**

01 33 00 - 7

**SECTION 01 3543
ENVIRONMENTAL PROCEDURES**

PART 1 - GENERAL

1.1 Scope

- A. The work covered by this section consists of furnishing all labor, material, and equipment and performing all work required for compliance with environmental regulations and preventing pollution during, and as a result of, construction operations under this contract, in addition to those measures set forth in other technical provisions of these specifications.
- B. The Contractor and subcontractors must comply with all applicable environmental federal, state, local environmental, health and safety laws and regulations.

1.2 Notification

- A. The Contractor must, after receiving a notice of noncompliance with the foregoing provisions, immediately take corrective action. The notice, when delivered to its Contractor or its authorized representative at the site of the work, is deemed sufficient for this purpose. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost because of any such stop orders may be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is subsequently determined that the Contractor was in compliance.

1.3 Environmental Regulatory Compliance

- A. Within 30 days after receiving the notice to proceed or not less than 15 days prior to commencing on-site work, the Contractor must submit any environmental documents that are required by federal, state or local environmental regulations. Plans must be approved by the Engineer prior to commencing on-site work and must describe and include, but is not limited to, the following
 - 1. Waste Minimization and Management Plan must describe how natural resources potentially impacted by construction will be protected or managed; construction wastes will be stored and disposed of or recycled; and pollutants associated with building materials will be controlled. The waste minimization and management section of the plan must also list materials and construction debris to be recycled, and address the disposal of solid and hazardous wastes and materials, including asbestos and lead-based paint. It must also include tables applicable to the reclamation of chlorofluorocarbons (CFCs) and [hydrochlorofluorocarbons](#) (HCFCs) in accordance with the City recycling code and 1.4 (B) below.

SECTION 01 3543
ENVIRONMENTAL PROCEDURES

2. Environmental Compliance Plan must document NEPA compliance by describing mitigation measures to address environmental concerns/sensitive receptors identified in the National Environmental Policy Act (NEPA) document(s) in Section B. 1500, Attachments, and as set out in the mitigation measures in the General Requirements.

1.4 Environmental Site Controls

- A. Location of Hazardous Materials: The location of the Contractor's temporary storage of any hazardous materials and/or wastes must be appropriately marked and included in the health and Safety Plan (see Section 1.5 below).
- B. Post Construction Cleanup or Obliteration: The Contractor must remove and properly dispose of all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, excess or waste materials, or any other vestiges of construction as directed by the Engineer. No separate or direct payment may be made for post construction cleanup and all associated costs must be considered included in the contract price.
- C. Dust Control: The Contractor must keep the site free from dust in accordance with applicable regulations.
- D. Noise Minimization: The Contractor must perform demolition and construction operations to minimize noise including conducting work during less sensitive hours of the day in accordance with the City Noise Ordinance.

1.5 Health and Safety

- A. Prior to commencing on-site work, the Contractor must submit an Occupational Safety and Health Administration (OSHA) Emergency Action Plan (EAP) to the Engineer to demonstrate compliance by the Contractor and subcontractors with applicable OSHA regulations. If the Contractor is not required by OSHA to develop a written EAP, i.e. if 10 or fewer are employed for the construction project or any other specific regulations identified by OSHA, then the Contractor shall submit to the Engineer a signed letter stating the Contractor shall meet OSHA's EAP requirements in a verbal communication to all employees.
- B. Copies of Material Safety Data Sheets (MSDSs) for any hazardous material(s), as defined by OSHA's Hazard Communications Standard, must be included whenever such materials arrive on-site. MSDSs must be kept together and maintained centrally on-site through to project completion. Provide a copy of each MSDS in the Operating and Maintenance Manual. The use of asbestos containing materials, in excess of one percent as defined by US Environmental Protection Agency regulations, is prohibited in the construction of this project.

SECTION 01 3543
ENVIRONMENTAL PROCEDURES

Provide an executed copy of the "Certificate of Asbestos and Lead-Based Paint (New Work)" in the Operating and Maintenance Manual.

- C. The use of lead-based paint is prohibited in the construction of this project.
- D. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.
- E. The Contractor must sign and submit to the Engineer a "Certification of Asbestos and Lead-Based Paint" for this project.
- F. See following exhibits for additional information.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

SECTION 01 3543 ENVIRONMENTAL PROCEDURES

Safety and Health and Related Environmental Requirements

The Contractor is required to meet all applicable OSHA, federal, state, and local safety, health, and related environmental requirements in addition to the City requirement listed in this table.	
Issue	City Requirements
Asbestos	<i>Review of Facility Asbestos Survey:</i> Before any building maintenance, equipment installation, renovation, alteration, demolition, or other project begins, determine whether ACBM will be disturbed. <i>Proper Work Practices:</i> If ACBM is present, follow proper control procedures and work practices. <i>Consultation with Facility Asbestos Coordinator:</i> Consult with the facility manager or his or her designee before the start of any work likely to disturb ACBM. Disturbance means activities that crumble or pulverize ACBM or presumed asbestos-containing material (PACM) or generate visible debris. Operations may include drilling, abrading, cutting a hole, pulling cable, and crawling through tunnels or attics and spaces above the ceiling where asbestos is actively disturbed or asbestos-containing debris is actively disturbed. <i>Asbestos Work Authorization:</i> You must have an approved Form 8210, <i>Work Authorization - Asbestos</i>, before work begins within any building containing asbestos.
Barricades, Barriers, and Warnings	Your barricades must meet the OSHA requirements. In addition, you assume control of your work area during your activities unless otherwise specified in writing by the City Engineer (CE) or City Engineer's representative (CER).
Confined Spaces	Confined space work must meet the OSHA requirements. You must have a comprehensive confined space program that includes a written program, employee training, entry and testing equipment, and rescue capabilities. If you require access to confined space requiring a permit, then the trained, designated City representative must review and approve the project and permit. Entry into other confined spaces must be in accordance with OSHA regulations.
Electrical Work	Lock or rope off work areas involving exposed energized equipment or have an attendant present to prevent accidental contact by unqualified people. Refer to the Barricade section of this guideline for additional information.
Elevated Work and Fall Protection	Follow strictly the applicable OSHA fall protection requirements.
Excavation	All excavations 4 feet or more in depth must be properly shored or sloped and meet all OSHA requirements. Before any digging or drilling commences, inform the City COR and call Dig Safe or its local equivalent to determine whether any underground utilities are located in the work area. Submit documentation that these notifications have been performed. You must not begin digging or drilling until you have verified that underground utilities have been identified and are properly marked so that work may be accomplished in a safe manner.
Fire Protection	Do not block, remove, or otherwise prevent City fire extinguishers from being immediately accessible and usable. If a system must be impaired by a scheduled shutdown, notify the Engineer and do not proceed without the Engineer's authorization.
Hazard Communication	Inform the Engineer before any chemicals are used. Before materials are brought on site, provide material safety data sheets (MSDSs) and an inventory of materials. For projects that are anticipated to use substantial quantities of hazardous materials, you may be required to provide a routing, storage, and waste disposal plan.
Hazardous Materials	Follow all OSHA requirements regarding hazardous materials. Hazardous materials include, but are not limited to, flammable and combustible liquids, gasoline, diesel fuel, motor oil, lubricating oil, hydraulic oil, corrosive cleaners, and battery acid. Provide secondary containment for all containers of liquids that are over 5 gallons in capacity. Immediately report all hazardous material releases ("spills"), regardless of how small or where they occur, to the designated Engineer. Releases include solids, liquids, and gases.
Hot Work	Do not begin any hot work until the Engineer has completed and signed a City Hot Work Permit. The permit will be valid for only a single work shift. You must display the permit at the work site. You are prohibited from performing hot work (a) when the City has not authorized it, (b) in

SECTION 01 3543 ENVIRONMENTAL PROCEDURES

	locations in which fire protection systems have been impaired, (c) in the presence of explosive or flammable atmospheres, or (d) in locations where large quantities of flammable and combustible materials are unprotected.
Powered Industrial Trucks	Powered industrial trucks and other mobile equipment must follow all traffic rules of the City facility. The maximum speed limit for in-plant powered vehicles is 5 miles per hour. Many work areas have posted speed limits that you must strictly follow. Perform refueling only in authorized locations following safe procedures. As a general rule, the City does not allow gas- or diesel-powered industrial equipment inside City facilities. Coordinate exceptions to the rule through the City safety office.
Ladders	Strictly follow all OSHA requirements regarding ladders. Barricade the ladder use area to prevent contact with mobile equipment and employees.
Lead-Based Paint	<i>Review of Facility Lead Survey:</i> Before any construction, alterations, and/or repair activities begin, determine whether LBP will be disturbed. If the painted surface has not been tested, you must have it tested before beginning any activities that could potentially disturb LBP. <i>Proper Work Practices:</i> If LBP is present, follow proper control procedures and work practices. <i>Consultation with Engineer:</i> Consult with the Engineer before the start of any work likely to disturb LBP. Examples of activities that may affect LBP include paint removal by scraping, sanding, power tools, or heat guns; alterations that include removing drywall, structural steel, or other building materials coated with LBP; welding, cutting, or other hot work on coated metal surfaces; abrasive blasting of mail boxes and other equipment; and moving or cleaning of abrasive blasting enclosures.
Lockout/Tagout	Provide a copy of your lockout/tagout procedures, which must meet or exceed the OSHA Lockout/Tagout standard. You will be given access to and must review the City lockout/tagout program. If you encounter a City lockout/tagout device that prevents the continuation of work, do not make any attempts to remove, tamper with, or bypass the devices. Contact the Engineer and make arrangements to have the lockout device removed in accordance with City lockout removal policies.
Personal Protective Equipment	Before beginning work, evaluate the work area for hazards, determine whether contract employees will be required to use personal protective equipment (PPE) to protect themselves from these hazards, and document the hazard assessment. Wear the PPE required regardless of your perception of hazard potential.
Regulated and Prohibited Materials	<i>Pesticides.</i> The City has restricted the use of pesticides. Obtain prior approval of the City environmental compliance coordinator for special cases that may require the use of pesticide treatments. <i>Seventeen Chemical Prohibition.</i> Adhere to chemical prohibition policies. Do not use on City property any of the 17 chemicals prohibited by EPA unless the Engineer authorizes its use (each of these chemicals must be authorized separately). The district environmental compliance coordinator can supply the list. <i>Asbestos-Free Products.</i> Install no asbestos-containing products or materials in City facilities. <i>Lead.</i> Apply no lead-based paint in City facilities.
Scaffolding	Follow strictly the applicable OSHA scaffolding requirements. Provide adequate barrier protection around the scaffolding to prevent hazards to City staff.
Walking and Working Surfaces	If the project requires temporary modifications to the means of egress, inform the Engineer before performing such actions, provide appropriate alternative means of egress, and communicate these to all employees.

SECTION 01 3543 ENVIRONMENTAL PROCEDURES

Emergency Procedures

Preparations for Emergency	Be prepared for emergency situations. Ensure that emergency telephone numbers are site specific, readily available, easily read, and communicated to all employees. Train and authorize employees to implement emergency procedures.
Medical Emergencies	Have procedures and medical supplies to provide emergency medical services for your own personnel. Determine how to contact emergency medical services before work begins, and have on-site capabilities to contact such services immediately.
Fires	See Fire Protection above. In the event of a fire, you must: - Immediately remove personnel from the area or building following City evacuation procedures. - Immediately contact the nearest City employee and inform him or her of the fire. You may also activate an emergency alarm in the area. If no City employees are on-site, immediately contact the local fire department. Personnel trained in the use and limitations of fire extinguishers may attempt to extinguish the fire if it is safe to do so.
Chemical Releases	See Hazardous Materials above. If the event of a hazardous material release, you must: - Immediately remove personnel from the area or building following City evacuation procedures. - Immediately contact the designated City representative and inform him or her of the release. You may also activate an emergency alarm in the area. If no City employees are on-site, immediately contact the local fire department. Contractor personnel should not respond to the release unless specifically trained and protected to perform hazardous material response.
Power Outages	In the event of a power outage, you must: - Immediately stop work and assemble for a head count and possible facility egress. - Inform all contract employees that equipment may automatically restart when power resumes. - Immediately contact the designated City representative and inform him or her of the status of contract work and personnel head count. Relay at this time all hazards created due to the power outage. When power resumes evaluate the status of operations that were being performed relative to hazard potential. For example, the interruption of ventilation in confined spaces may generate atmospheric hazards.
Accident Investigation and Reporting	As soon as is practical after an accident, investigate and document an accident investigation. The documentation must describe the incident and identify the causes and the corrective actions that will prevent future incidents. Report all accidents, whether or not they result in injury. Give the written report to the Engineer within 24 hours of the accident or incident.

**SECTION 01 3543
ENVIRONMENTAL PROCEDURES**

**Certificate of Asbestos and Lead-Based Paint
(New Work)**

To: District Engineer

Subject: Certification for new construction

City facility name: _____

City facility address: _____

Certification for new construction:

This Contractor/District hereby certifies that no asbestos-containing material in excess of 1 percent as defined by applicable US Environmental Protection Agency regulations, and no lead-based paint has been furnished or installed at the referenced project.

Contractor/District name: _____

Signature: _____

Address: _____

Telephone: _____ Date executed: _____

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 Contractor Quality Control

- A. Contractor Quality Control: The Contractor is responsible for the overall quality of all its own work and the work performed by their subcontractors working under this contract. The quality of any part of the work installed must not be less than that required by the technical divisions of this specification. If the Engineer determines that the quality of work does not conform to the applicable specifications and drawings, the Contractor will be advised in writing of the areas of nonconformance, and within 7 days the Contractor must correct the deficiencies and advise the Engineer in writing of the corrective action taken.
- B. Noncompliance with Quality Control Requirements: Failure of the Contractor to comply with the above requirements may be cause for termination for default as defined in the contract documents.

1.2 Submittals

- A. Prior to the start of on-site work, the Contractor must submit to the Engineer a Contractor Quality Control Plan that includes the following information:
 - 1. Procedures for reviewing coordination drawings, shop drawings, certificates, certifications, or other submittals.
 - 2. Testing and inspection schedule, keyed to Construction Schedule, indicating tests and inspections to be performed, names of persons responsible for inspection and testing for each segment of work including preparatory, initial, and follow-up.
 - 3. Proposed forms to be used including Contractor's Daily Report, Contractor Test and Inspection Report and Non-Compliance Check-Off List.
- B. Independent Testing and Inspection Laboratory (if any): Submit the following.
 - 1. Name.
 - 2. Address.
 - 3. Telephone number.
 - 4. Names of full-time registered engineer.
 - 5. Responsible officer.
 - 6. Copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by inspection.

1.3 Quality Control Procedures

- A. Monitor quality control over Contractor staff, subcontractors, suppliers, manufacturer's, products, services, site conditions, and workmanship.

SECTION 01 40 00
QUALITY REQUIREMENTS

- B. Comply fully with manufacturer's published instructions, including each step-in sequence of installation.
- C. Should manufacturer's published instructions conflict with Contract Documents, request clarification from the Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for work, except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons who are thoroughly qualified and trained in their respective trade, to produce workmanship of specified quality.
- F. Perform tests required by governing authorities having jurisdiction and utilities having jurisdiction.

1.4 Testing and Inspection Laboratory Services

- A. Selection and Payment:
 - 1. The District shall select and pay for services of an Independent Testing and Inspection Laboratory to perform specified testing and inspection.
 - 2. Employment of Independent Testing and Inspection Laboratory in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.
- B. Quality Assurance:
 - 1. Comply with requirements of all applicable ASTM standards.
 - 2. Laboratory: Authorized to operate in State in which Project is located.
 - 3. Laboratory Staff: Maintain a full-time registered engineer on staff to review services.
 - 4. Testing Equipment: Calibrated at reasonable intervals with devices of and accuracy traceable to either National Bureau of Standards or accepted values of natural physical constraints.
- C. Laboratory Responsibilities. Contractor shall ensure the Laboratory has the following responsibilities and limits on authority:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at Project site. Cooperate with the Engineer and Contractor in performance of services.
 - 3. Perform specified sampling, testing, and inspection of Products in accordance with specified standards.
 - 4. Determine compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify the Engineer of observed irregularities or non-conformance of work or Products.
 - 6. Submit one copy of all test results directly to the Engineer.
 - 7. Perform additional tests as required by the Engineer.

SECTION 01 40 00
QUALITY REQUIREMENTS

8. Attend appropriate preconstruction meetings and progress meetings.

- D. Limits on Authority. Contractor shall ensure the Laboratory has the following limits on authority:
1. Laboratory may not release, revoke, alter, or expand on requirements of Contract Documents.
 2. Laboratory may not approve or accept any portion of work.
 3. Laboratory may not assume any duties of Contractors.
 4. Laboratory has no authority to stop work.

1.5 Contractor Field Inspection and Testing

- A. Contractor: Test and Inspect work provided under this Contract to ensure work is in compliance with Contract requirements. Required tests and inspections are indicated in each individual Specification Section and shall be performed as required by the District inspector.
- B. Preparatory Inspection: Performed prior to beginning work and prior to beginning each segment of work and includes:
1. Review of Contract requirements.
 2. Review of shop drawings and other submittal data after return and approval.
 3. Examination to assure materials and equipment conform to Contract requirements.
 4. Examination to assure required preliminary or preparatory work is complete.
- C. Initial Inspection: Performed when representative portion of each segment of work is completed and includes:
1. Performance of required tests.
 2. Quality of workmanship.
 3. Review for omissions or dimensional errors.
 4. Examination of products used, connections and supports.
 5. Approval or rejection of inspected segment of work.
- D. Follow-Up Inspections: Performed daily, and more frequently as necessary, to assure non-complying work has been corrected.
- E. Testing and Inspection: Perform testing and inspection in accordance with requirements in individual Specification Sections.

1.6 Contractor's Daily Report

- A. The Contractor shall maintain daily reports, and provide copies to the Engineer if requested, for days that work was performed. Include the following information:
1. Date, weather, minimum and maximum temperatures, rainfall, and other pertinent weather occurrences.
 2. Daily workforce of Contractor and subcontractors, by trades.
 3. Description of work started, ongoing work, and work completed by each subcontractor.

**SECTION 01 40 00
QUALITY REQUIREMENTS**

4. Coordination implemented between various trades.
 5. Approval of substrates received from various trades.
 6. Nonconforming and unsatisfactory items to be corrected.
 7. Remarks
- 1.7 Contractor's Test and Inspection Reports
- A. Prepare and submit to the Engineer, a written report of each test or inspection signed by Contractor Quality Control Representative performing inspection within 2 days following day inspection was made.
 - B. Include the following on written reports of inspection:
 1. Cover sheet prominently identifying that inspection "CONFORMS" or "DOES NOT CONFORM" to Contract Documents.
 2. Date of inspection and date of report.
 3. Project name, location, solicitation number, and Contractor.
 4. Names and titles of individuals making inspection, if not Contractor's Project Field Superintendent.
 5. Description of Contract requirements for inspection by referencing Specification Section.
 6. Description of inspection made, interpretation of inspection results, and notification of significant conditions at time of inspection.
 7. Requirements for follow-up inspections.
- 1.8 Non-Compliance Check-Off List
- A. Maintain check-off list of work that does not comply with Contract Documents, stating specifically what is non-complying, date faulty work was originally discovered, and date work was corrected. No requirement to report deficiencies corrected same day it was discovered. Submit copy of Non-Compliance Check-Off List of non-complying work items to the Engineer on a weekly basis.
- 1.9 Completion and Inspection of Work
- A. Prior to final acceptance by the Engineer and issuance of a Certificate of Substantial Completion and/or Notice of Completion, submit a certification signed by Contractor to the Engineer stating that all work has been inspected and all work, except as specifically noted, is complete and in compliance with Contract Documents.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 General

- A. The Contractor must provide all temporary facilities and services required to complete the work and to comply with OSHA and other applicable regulations.
- B. The Contractor must maintain temporary facilities in a proper, safe, operating and sanitary condition for the duration of this Contract. Upon completion of this Contract, all such temporary work and facilities shall be removed in their entirety.

1.2 Project Sign

- A. The Contractor must construct and erect a minimum of two hard hat signs at locations designated by the Engineer. The signs must be erected prior to the commencement of on-site work.

1.3 Temporary Water

- A. The District will provide water from the existing services required for construction under this project and will pay all costs in connection with them.

1.4 Temporary Electricity

- A. Service Required: The District will provide temporary electric power throughout the construction period from the existing service. Contractor shall be responsible for connection. Contractor to provide power centers for miscellaneous tools and equipment used in the construction work, lighting for safe and adequate working conditions throughout site (at least 1/4 watts of incandescent lighting per square foot, with a socket voltage of at least 110 volts and using 100-watt lamps minimum); power for construction building.
- B. Safety: The Contractor must provide and maintain lights and signs to prevent damage or injury and must illuminate all hazardous areas. Safety lights must be operational from dusk to dawn.
- C. Requirements of Regulatory Agencies: The Contractor must obtain permits as required by local government authorities, comply with the National Electrical Code, applicable local codes, and utility regulations.
- D. Use of Permanent System: The Contractor must regulate any part of the permanent electrical system that is used for construction purposes in order to prevent interference with safety and with the orderly progress of the work. The Contractor must leave permanent electrical services in a condition as good as new.

**SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS**

- E. Materials: The materials may be new or used in the temporary works but must be adequate in capacity for the purposes intended and must not create unsafe conditions or violate the requirements of applicable codes. At the Contractor's option, patented specialty materials may be used if UL-approved.
- F. Conductors: The Contractor must use wire, cable, or busses of appropriate type, sized in accordance with the National Electrical Code for the applied loads. Use only UL-approved wire.
- G. Equipment: In compliance with NEMA standards, the Contractor must provide an appropriate enclosure for the environment in which the equipment is used.
- H. Installation: The Contractor must provide all required facilities, including transformers, conductors, poles, conduits, raceways, fuses, switches, fixtures, and lamps, located so as to avoid interference with cranes and materials-handling equipment, storage areas, traffic areas, and work under other contracts. The Contractor must install all work to have a neat and orderly appearance and to make it structurally sound throughout. The Contractor must maintain it to give continuous service and to provide safe working conditions. The Contractor must modify the service as required by the progress of the job.
- I. Removal: The Contractor must remove all temporary equipment and materials upon completion of construction, repair all damage caused by the installation, and restore the area to satisfactory condition.

1.5 Temporary Water

- A. The District will provide and maintain a temporary water supply system for building purposes.

1.6 Sanitary Provisions

- A. The Contractor must provide and keep in neat and sanitary condition conveniences and accommodations for the use of the construction personnel necessary to comply with the requirements and regulations of the local department of health and of other authorities having jurisdiction.

1.7 Approaches and Exits

- A. The Contractor must provide all necessary approaches and exits required to properly execute the work.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

**KESSLER PARK SNACK BAR 01 50 00 - 2
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE**

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 Product Options and Substitutions

- A. Provide Products that comply with Contract Documents, which are undamaged and new at time of installation.
- B. Provide Products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.

1.2 Product Delivery Requirements

- A. Transport and handle Products in accordance with manufacturer's instructions, using means and methods that will prevent damage, deterioration and loss, including theft.
- B. Schedule Product delivery to minimize long-term storage at the Project sites and prevent overcrowding of construction spaces.
- C. Coordinate Product delivery with installation schedule to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- D. Deliver Products to Project site in undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- E. Promptly inspect shipments to ensure that Products comply with project requirements, quantities are correct, Products are undamaged, and properly protected.
- F. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.3 Product Storage and Handling Requirements

- A. Store and protect Products in accordance with manufacturers' published instructions, with seals and labels intact and legible.
- B. Store Products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's published instructions.

**SECTION 01 60 00
PRODUCT REQUIREMENTS**

- C. For exterior storage of fabricated Products, place on sloped supports, above ground.
- D. Provide off-site storage and protection when Project site does not permit on-site storage or protection.
- E. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Product.
- F. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- G. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- H. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

SECTION 01 73 00 EXECUTION

PART 1 - GENERAL

1.1 Layout of Work

- A. The Contractor must lay out its work to match existing or from District-established base lines and benchmarks, as the case may be, as indicated on the drawings. The Contractor shall be responsible for all measurements based on them. The Contractor must furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor as may be required in laying out any part of the work from the base lines and benchmarks established by the District. The Contractor is responsible for the execution of the work to those lines and grades established or indicated by the Engineer.

1.2 Contractor's Temporary Use of Facilities and Equipment

- A. No new facilities or equipment intended for the permanent installation, including materials-handling vehicles, may be used for temporary purposes unless specified in the contract or unless the Contractor has the written permission of the Engineer.

1.3 Cleaning

- A. Cleaning During Construction:
 - 1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
 - 2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
 - 3. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
 - 4. Collect and remove waste materials, debris, and rubbish from site as specified in the Environmental Compliance and Management Plan as required in Section 01 35 43 - Environmental Procedures.
- B. Final Cleaning:
 - 1. Use cleaning materials and agents recommended by manufacturer or fabricator of surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.
 - 2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's published instructions.
 - 3. Complete following cleaning operations before requesting the Engineer's inspection for Substantial Completion.

SECTION 01 73 00

EXECUTION

- a. Clean Project Site, yard and grounds if applicable, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
 - b. Remove tools, construction equipment, machinery and surplus material from Project Site.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - d. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
 - e. Broom clean concrete floors in unoccupied spaces.
 - f. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - g. Remove labels that are not permanent labels.
 - h. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
 - i. Wipe surfaces of mechanical and electrical equipment, and other similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
 - j. Leave Project clean and ready for occupancy.
4. Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction.
 5. Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from Project Site and dispose of in accordance with requirements of local authorities having jurisdiction.
 - a. Where extra materials of value remain after completion of construction have become City property, store these materials as directed by the Engineer.

SECTION 01 73 00
EXECUTION

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes: Procedures for achieving the most environmentally conscious Work feasible within the limits of the Construction Schedule, Contract Sum, and available materials, equipment, and products.
 - 1. Participate in promoting efforts of the District to create an energy-efficient and environmentally-sensitive structure.
 - 2. Use recycled-content, toxic-free, and environmentally-sensitive materials and equipment.
 - 3. Use environmentally-sensitive procedures.
 - a. Protect the environment, both on-site and off-site, during demolition and construction operations.
 - b. Prevent environmental pollution and damage.
 - c. Effect optimum control of solid wastes.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents and prevailing District Ordinances.
- C. Related Sections:
 - 1. Section 01 40 00 - Quality Requirements: Contractor's Daily Report.
 - 2. Section 01 50 00 - Temporary Facilities and Controls: Temporary ventilation, progress cleaning and waste removal.
 - 3. Section 01 60 00 - Product Requirements: Substitutions.
 - 4. Section 02 41 00 - Roof Removal and Substrate Preparation
 - 5. Section 02 41 19 - Selective Structure Demolition.

1.2 DEFINITIONS

- A. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of dust fumes, vapors, or gases.
- B. Construction and demolition waste: Include solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.
 - 1. Rubbish: Includes both combustible and noncombustible wastes, such as paper, boxes, glass, crockery, metal and lumber scrap, metal cans, and bones.
 - 2. Debris: Includes both combustible and noncombustible wastes, such as leaves and tree trimmings that result from construction or maintenance and repair work.

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- C. Chemical waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
- D. Diversion: Redirection of waste ordinarily deposited in a municipal landfill to a recycling facility or to another destination for reuse.
- E. Environmental pollution and damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.
- F. Hazardous materials: Includes pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).
- G. Interior final finishes: Materials and products that will be exposed at interior, occupied spaces; including flooring, wallcovering, finish carpentry, and ceilings.
- H. Municipal Solid Waste Landfill: A permitted facility that accepts solid, non-hazardous waste such as household, commercial, and industrial waste, including construction and demolition waste.
- I. Packaged dry products: Materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.
- J. Sediment: Soil and other debris that has been eroded and transported by storm or well production runoff water.
- K. Sanitary wastes:
 - 1. Garbage: Refuse and scraps resulting from preparation, cooking, distribution, or consumption of food.
 - 2. Sewage: Domestic sanitary sewage.
- L. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, and special coatings.

1.3 SUBMITTALS

- A. Solid Waste Management and Environmental Protection Plan: Prepare and submit at the Preconstruction Meeting a Solid Waste Management and Environmental Protection Plan including, but not limited to, the following:
 - 1. Procedures for Recycling/Re-Use Program in compliance with the District OR County recycling code.
 - 2. Schedule for application of interior finishes.

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3. Revise and resubmit Solid Waste Management and Environmental Protection Plan as required by the District OR County.
 - a. Approval of the Contractor's Solid Waste Management and Environmental Protection Plan, will not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.
- B. With each Contractor's Report as specified in Section 01 40 00 – Quality Requirements, submit an updated Summary of Solid Waste Disposal and Diversion. Submit on form in Appendix A of this Section. Include manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material for:
 1. Municipal Solid Waste Landfills.
 2. Recycling/Reuse Facilities.
- C. With Record Submittals as specified in Section 01 77 04 - Closeout Procedures and Training, submit the following:
 1. Final Summary of Solid Waste Disposal and Diversion. Submit on form in Appendix A of this Section.
 2. Resource Conservation and Recovery Act Project Summary. Submit on form in Appendix B of this Section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 RECYCLING AND REUSE

- A. Collection: Implement a recycling/reuse program that includes separate collection of waste materials of the following types as appropriate to local and regional recycling/reuse facilities:
 1. Concrete.
 2. Metal.
 - a. Ferrous.
 - b. Non-ferrous.
 3. Wood.
 4. Debris.
 5. Glass.
 6. Paper/Cardboard.
 7. Plastic.
 8. Gypsum.
 9. Paint.
 10. Carpet.
 11. Others as appropriate.

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CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- B. Recycling/reuse centers: Contact governmental solid waste offices, Environmental Protection Agency (EPA) regional offices, and applicable non-profit organizations.
 - 1. Concrete.
 - 2. Metal.
 - a. Ferrous.
 - b. Non-ferrous.
 - 3. Wood.
 - 4. Debris.
 - 5. Glass.
 - 6. Paper/Cardboard.
 - 7. Plastic.
 - 8. Gypsum.
 - 9. Paint.
 - 10. Carpet.
 - 11. Others as appropriate.
- C. Handling:
 - 1. Clean materials which are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
 - 2. Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- D. Participate in re-use programs: identify local and regional re-use programs, including but not limited to non-profit organizations such as schools, local housing agencies, and public arts programs, that accept used materials. The following are examples for contractor's information only.
 - 1. National materials exchange network, such as CAL-MAX a free service provided by various state and regional offices, designed to help businesses find markets for materials that traditionally would be discarded. The premise of the program is that material discarded by one business may be a resource for another business.
 - a. Items and regions covered by materials exchange programs may vary. Contact the applicable regional materials exchange program. In California, contact CAL-MAX at (916) 255-2369.
 - 2. Habitat For Humanity, a non-profit housing organization that rehabilitates and builds housing for low income families.
 - a. Sites requiring donated materials vary. Contact the national hotline (800) HABITAT.
- E. Rebates, tax credits, and other savings obtained for recycled or re-used materials accrue to Contractor.

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CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

3.2 ENVIRONMENTAL CONTROLS

- A. Protection of natural resources: Preserve the natural resources within the Project boundaries and outside the limits of permanent Work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by the Engineer, upon completion of the Work.
1. Confine demolition and construction activities to work area limits indicated on the Drawings and as directed by the Engineer.
 - a. Temporary construction: As specified in Section 01 50 00 - Temporary Facilities and Controls.
 - b. Demolition and salvage operations: As specified in Section 02 41 19 - Selective Structure Demolition.
 - c. Disposal operations for demolished and waste materials that are not identified to be salvaged, recycled or reused:
 - 1) Remove debris, rubbish, and other waste materials resulting from demolition and construction operations, from site.
 - 2) No burning permitted.
 - 3) Transport materials with appropriate vehicles and dispose off-site to areas which are approved for disposal by governing authorities having jurisdiction.
 - 4) Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage and sweep, wash, or otherwise clean project site, streets, or highways.
 - 5) Comply with applicable regulations.
 2. Water resources as follows:
 - a. Comply with requirements of the National Pollutant Discharge Elimination System (NPDES) and the State Pollutant Discharge Elimination System (SPDES).
 - b. Oily substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water.
 - 1) Store and service construction equipment at areas designated for collection of oil wastes.
 - c. Mosquito abatement: Prevent ponding of stagnant water conducive to mosquito breeding habitat.
 - d. Prevent run-off from site during demolition and construction operations.
 3. Land resources: Prior to construction, identify land resources to be preserved within the Work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from The District OR County.
 4. Air Resources: Prevent creation of dust, air pollution, and odors.
 - a. Use water sprinkling, temporary enclosures, and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- 1) Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.
 - b. Store volatile liquids, including fuels and solvents, in closed containers.
 - c. Properly maintain equipment to reduce gaseous pollutant emissions.
 - d. Interior final finishes: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible in accordance with The District OR County approved Solid Waste Management and Environmental Protection Plan.
 - e. Temporary Ventilation: As specified in Section 01 50 00 - Temporary Facilities and Controls, and as follows:
 - 1) Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
 - 2) Provide adequate ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60-degrees F minimum to 90-degree F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by District Engineer.
 - f. Pre-occupancy ventilation: After final completion and prior to initial occupancy, provide adequate ventilation for minimum 5 days. Pre-occupancy ventilation procedures:
 - 1) Use supply air fans and ducts only;
 - 2) Temporarily seal exhaust ducts;
 - 3) Temporarily disable exhaust fans;
 - 4) Provide exhaust through operable windows or temporary openings.
 - 5) Provide temporary exhaust fans as required to pull exhaust air from deep interior locations. Stair towers may be used for exhausting air from the building during the temporary ventilation.
 - 6) After pre-occupancy ventilation and prior to final testing and balancing of HVAC system, replace air filters and make HVAC system fully operational.
5. Noise Control: Perform demolition and construction operations to minimize noise. Perform noise producing work in less sensitive hours of the day or week as directed by the Engineer.
 - a. Repetitive, high level impact noise will be permitted only between the hours permitted in the District Noise Ordinance. Do not exceed the limitations specified by OSHA.
 - b. Provide equipment, sound-deadening devices, and take noise abatement measures that are necessary for compliance.

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

Appendix A

SUMMARY OF SOLID WASTE DISPOSAL AND DIVERSION

Project Name: _____

Contractor Name: _____ License Number: _____

Contractor Address: _____

Solid Waste Material	Date Material Disposed/ Diverted	Amount Disposed/ Diverted (ton or cu.yd)	Municipal Solid Waste Facility (name, address, & phone number)	Recycling/Reuse Facility (name, address, & phone number)	Comments (if disposed, state why not diverted)
Concrete					
Metal					
Wood					
Debris					
Glass					
Paper/ Cardboard					
Plastic					
Gypsum					
Paint					
<u>Carpet</u>					
<u>Other</u>					

Signature: _____

Date: _____

Appendix B

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

RESOURCE CONSERVATION AND RECOVERY ACT - PROJECT SUMMARY

Project Name: _____

Contractor Name: _____ License Number: _____

Contractor Address: _____

1.0 EPA GUIDELINE ITEMS

A. Fly Ash:

1. Total dollar amount of concrete and cement provided for this project.
\$_____.
2. Total dollar amount of concrete and cement containing fly ash provided for this project. \$_____.
3. Were there any technical impediments to increasing the amount of concrete and cement containing fly ash provided for this project?
_____.
 - a. If yes, please explain. _____

_____.

B. Building Insulation Products:

1. Total dollar amount of building insulation products provided for this project.
\$_____.
2. Total dollar amount of building insulation products containing recycled materials provided for this project. \$_____.
3. Were there any technical impediments to increasing the amount of building insulation products containing recycled materials provided for this project?
 - a. If yes, please explain. _____

_____.

C. Floor Tiles (ceramic):

1. Total dollar amount of floor tile (ceramic) provided for this project.
\$_____.
2. Total dollar amount of floor tile (ceramic) containing recycled materials provided for this project. \$_____.
3. Were there any technical impediments to increasing the amount of floor tile (ceramic) containing recycled materials provided for this project?
 - a. If yes, please explain. _____

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

2.0 SPECIFICATIONS

NOT USED

3.0 SOLID WASTE PREVENTION

- A. Total dollar amount of solid waste disposed (landfill) for this project.

\$_____.

- B. Total weight of solid waste disposed (landfill) for this project.

\$_____.

4.0 RECYCLING

- A. Total dollar value of solid waste diverted from landfill and recycled or reused for this project. (Express as total dollar amount for solid waste disposal in landfill for equivalent type and amount of diverted waste.) \$_____.

- B. Total weight of solid waste diverted from landfill and recycled or reused for this project. (Express as total weight for solid waste disposal in landfill for equivalent type and amount of diverted waste.) \$_____.

5.0 COMMENTS

- A. Comments and suggestions for increasing amount of recycled materials used in construction materials.

- B. Comments and suggestions for improving solid waste prevention and recycling efforts during construction.

Signature: _____ Date: _____

SECTION 01 77 04
CLOSEOUT PROCEDURES AND TRAINING

PART 1 - GENERAL

1.1 Manuals

- A. Purpose: Operation and maintenance manuals are for the training of, and use by, District employees in the operation and maintenance of the systems and related equipment as specified below. The manuals must consist of instruction on systems and equipment. A separate manual or chapter must be prepared for each of the following classes of equipment or system:
 - 1. Doors.
 - 2. Plumbing systems.
 - 3. Mechanical systems.
 - 4. Electrical systems.
 - 5. Miscellaneous building equipment and systems.
- B. Content: Unless otherwise indicated, each chapter must contain the following, as applicable:
 - 1. Introduction.
 - 2. Table of contents.
 - 3. Description of system (including design intent and considerations).
- C. Preparation: The outline below is intended as a general guide for preparing the manuals. The manuals must be prepared to provide for the optimum operation and maintenance of the various systems. The description of systems and general operating instructions for plumbing and electrical manuals may cover only complicated or unusual parts of these systems, such as sewage ejectors, transformers, high tension switchgear, and signal and alarm systems. Manufacturer's literature and data must be those of the actual equipment installed under contract for the particular facility. Further guidance is available in the ASHRAE Handbook, 1984, Systems Volume, Chapter 39, Mechanical Maintenance.
- D. Suggested Outline for Operation and Maintenance (O&M) Manuals: This is a suggested outline, with general requirements of O&M manuals. The outline is presented to indicate the extent of material to be covered and the individual items required in manuals for major facilities. The outline may be modified to suit specific installations; however, the purpose of the manual must be fulfilled. The manual is not intended to duplicate manufacturers' data, but proper references must be made in the text of the O&M manual to indicate that that information is applicable and where it is located.
 - 1. Part I. Description and Design Intent
 - a. Introduction
 - 1) Provide a brief description of project and purpose of the maintenance manual. The following statements must be included: "Operation and maintenance of this equipment must be performed in accordance with this manual and posted instructions, subject to compliance with applicable technical

SECTION 01 77 04
CLOSEOUT PROCEDURES AND TRAINING

guides and standards issued by the District. It is recognized that minor changes in control points and settings will be required, based on actual operating experience, to correct varying conditions and improve operation. When such changes appear necessary, they must be submitted to the maintenance manager for consideration. Upon approval of any changes, the applicable portions of all copies of the manual and proposed instructions must be revised and reissued, and any change in operating procedure brought to the attention of all operating personnel."

- 2) "This manual is specifically developed to assist the District official in charge at the facility to operate and maintain the building systems and equipment. Manufacturers' recommendations set forth for certain components must be followed during the complete warranty period for that equipment."
- 3) Contents of Manual. This portion of the introduction must explain that the manual is to contain complete operating, maintenance, and safety instructions for all equipment listed. It must also contain any other appropriate references as required to outline an explanation of the manuals and major categories of reference material required with the manuals.

b. Table of Contents

- 1) The table of contents must list numbers and titles of chapters, sections, and main paragraphs, with their page numbers. Each volume in a set of manuals must contain its own table of contents. Publications containing 10 or more illustrations or tables must include a list of illustrations or tables, as applicable. These lists must show number, title, and page number of each illustration and table. Following is a typical table of contents:
 - a. Doors
 - 1.) Specialized hardware
 - b. Plumbing Systems
 - 1.) Potable water
 - 2.) Sanitary drains
 - c. Electrical Systems
 - 1.) Incoming Service
 - 2.) Electrical power distribution
 - 3.) Lighting and lighting controls
 - d. Mechanical Systems
 - 1.) HVAC / Exhaust thermostats & controls
 - e. Miscellaneous Building Equipment

2. Part II. Operating Sequence and Procedures

- a. Contents: Each chapter must describe the procedures necessary for District personnel to operate the system and equipment covered in that chapter.

SECTION 01 77 04
CLOSEOUT PROCEDURES AND TRAINING

- b. Operating Procedures: The operating procedures must be divided into four subsections: Startup, Operation, Emergency Operation, and Shutdown.
 - 1) Startup: Give complete instructions for energizing the equipment and making initial settings and adjustments whenever applicable. If equipment is fully automatic, a statement to that effect is all that is required. If a specific sequence of steps must be performed, give step-by-step instructions in the proper sequence. If timing- (such as warm-up between power-on and adjustment) is important, clearly state the specific minimum time required at the proper point in the procedure. Refer to controls and indicators by panel; make references consistent with the nomenclature used in illustrations and tables of controls and indicators. If preliminary settings differ for different modes of operations, give procedures for each mode.
 - 2) Operation: Give detailed instructions in proper sequence for each mode of operation. When, for a given action on the part of the operator, alternate equipment responses are possible, give the appropriate operation reaction to each.
 - 3) Emergency Operation: If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under these conditions. Include here only those alternate methods of operation (from normal) that the operator can follow when there is a partial failure or malfunctioning of components, or other unusual condition.
 - 4) Shutdown: Include instructions for stopping and securing the equipment after operation. If a particular sequence is required, give step-by-step instructions in that order.
- 3. Part III. Maintenance Instructions and Requirements
 - a. Contents: Each chapter must describe the procedures necessary for District personnel to perform the maintenance on the systems and equipment covered in that chapter. Emphasis must be placed on the method of mechanical control of systems and equipment from a maintenance standpoint. References must be made, as appropriate, to drawings, schematics, and sequences of operation included as part of the construction contract drawings and specifications that show piping and equipment arrangements and items of control. Prints of these drawings must be reduced to 11 inches x 17 inches for insertion in the manuals. Drawings must represent the "as-built" condition.
 - b. Maintenance Procedures: The maintenance procedures must be divided into two categories: Preventive Maintenance and Corrective Maintenance.
 - 1) Preventive Maintenance

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- i. Provide a schedule for preventive maintenance. State, preferably in tabular form, the recommended frequency of performance for each preventive maintenance task (cleaning, inspection, and scheduled overhauls).
 - ii. Provide instruction and schedules for all routine maintenance cleaning and inspection, with recommended lubricants.
 - c. Manufacturers' Brochures: Include manufacturers' descriptive literature covering devices used in the system, together with illustrations, exploded views, and renewal parts lists. This section must also include special devices manufactured by the Contractor.
 - d. Special Maintenance: Provide information of a maintenance nature covering warranty items that have not been discussed elsewhere.
 - e. Shop Drawings: Provide a copy of all approved shop drawings covering approval of equipment for the project with the manufacturers' brochures.
 - f. Spare Parts Lists: Include a recommended spare parts list for all equipment furnished for the project. The parts list must include a tabulation of descriptive data for all the electrical-electronic spare parts and all the mechanical spare parts proposed for each type of equipment or system. Each part must be properly identified by part number and manufacturer.
 - g. Warranty: Include a copy of the "special" or extended warranty in the operation and maintenance manual.
- E. Submittal, In both "hard" and electronic DVD, CD-ROM or flash drive format:
- 1. Preliminary Submittal: Two draft copies of the completed manuscript for items in this outline must be submitted to the District Engineer for review within 30 days after approval of equipment to be provided. One copy will be returned to the Contractor within 15 days after submittal and, if required, must be revised and resubmitted within 15 days.
 - 2. Final Submittal: four complete sets of manuals must be furnished to the Engineer not later than 30 days before completion of the project.
 - 3. Final Submittal must be accepted by the Engineer before training can begin.

1.2 Other Closeout Submittals

- A. Additional requirements for Systems Manuals, Operating Instructions, Training and other deliverables are contained in individual Specification Sections. All closeout requirements must be provided to and accepted by the Engineer prior to requesting final payment. Examples of additional closeout requirements include, but are not limited to, the following
- 1. Final Punch-List with all items certified as complete.

**SECTION 01 77 04
CLOSEOUT PROCEDURES AND TRAINING**

2. Record "As Built" Drawings, the Contractor shall submit certified As-Built Record Drawings and Specifications in the quantities and media specified.
3. Warranty, the Contractor shall submit all transferable guarantees and warranties for equipment, materials and installations furnished by any manufacturer, supplier, or installer.
4. Signed Asbestos and Lead-Based Paint Certificate.
5. Survey Report.
6. Material Safety Data Sheets
7. Signed and sealed Contractor Release of Claims.
8. Payment for items of work covered in the plans specifications Division 1 will be based on the lump sum unit bid price for mobilization. No additional compensation will be allowed.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

SECTION 02 41 00
ROOF REMOVAL AND SUBSTRATE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Removal of existing roofing components and substrate preparation related to roof replacement work.
- B. Recycling of attached built-up roofing system, membranes, adhesion, foam insulation, damaged plywood, etc.

1.2 RELATED SECTIONS

- A. Division 1 – Submittal Procedures
- B. Section 01 60 00 – Product Requirements
- C. Section 06 15 16 – Wood Roof Deck Repair and Replacement

1.3 UNIT PRICES

- A. Provide unit prices for the work described in Item 3.6.

1.4 ALTERNATES

- A. Provide alternate pricing for recycling of the following existing roof system components:
 - 1. Attached built-up roofing system and membrane.
 - 2. Damaged plywood.
 - 3. Rigid foam insulation board.
- B. Refer to Article 3.8 for preparation requirements related to recycling of existing components.
- C. Contact Nationwide Foam Recycling, Framingham, MA, (888) 820-2760, or similar recycling company, for recycling of existing roofing components.
- D. The recycler shall provide a certificate/letter to the District identifying the following:
 - 1. Project name and location.
 - 2. Contractor name.
 - 3. Components recycled as part of the project.
 - 4. Total weight and/or volume of materials recycled.

SECTION 02 41 00
ROOF REMOVAL AND SUBSTRATE PREPARATION

1.5 REFERENCES

- A. Reference standards of the following sources are applicable to products and procedures specified in Part 2 - Products and Part 3 – Execution of this Section:
 - 1. Factory Mutual Global (FM)
 - 2. National Roofing Contractors Association (NRCA)

1.6 SUBMITTALS

- A. Prior to the start of work, submit the following to the District for approval:
 - 1. Product submittals required within Division 1.
- B. Refer to Division 1 for procedural requirements related to the submittal process.

1.7 QUALITY ASSURANCE PROCEDURES

- A. Applicator Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive a manufacturer's warranty. Company shall have a minimum of 5 years documented experience certified by roofing system manufacturer.
- B. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by roofing system manufacturer for specified roofing system and shall be in compliance with specified regulatory requirements.
- C. Examine the technical specifications and drawings. Verify all dimensions, detail conditions, roof plan notes and existing site conditions that may affect the work. Verification of existing dimensions and site conditions is the responsibility of the Contractor. No additional compensation will be considered for failure to verify existing dimensions, detail conditions, roof plan note callouts, and existing site conditions.
- D. Upon examination, if conflicts between the technical specifications and drawings, and those of federal, state or local regulatory agencies, the product manufacturer, industry roofing standards, or District-mandated requirements are discovered, notify the District immediately for resolution.
- E. During work, if conditions are discovered which do not allow for continuation of the work per the technical specifications and drawings, notify the District immediately for resolution.

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ROOF REMOVAL AND SUBSTRATE PREPARATION

1.8 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 01 60 00 for transport, handling, storage and product requirements.
- B. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.
- C. Store materials in weather protected environment, clear of ground and moisture. Protect foam insulation from direct sunlight exposure. Store roll materials standing on end.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not perform roof removal work during inclement weather.
- B. Cold weather precautions:
 - 1. Refer to product manufacturer and NRCA requirements and recommendations for cold weather application requirements and restrictions.
- C. Material Safety Data Sheets (MSDS) of all specified products shall remain on site for the duration of this project.

PART 2 – PRODUCTS

2.1 FASTENERS

- A. For re-securement of wood deck to underlying structural components, per Article 3.4:
 - 1. For untreated wood: No. 14 fluorocarbon-coated screws, length as necessary to penetrate minimum 1-1/4-inch depth into underlying wood structural framing.
 - 2. For treated wood: Stainless steel screws; length as necessary to penetrate minimum 1-1/4-inch depth into underlying wood structural framing.
- B. For re-securement of existing perimeter wood nailers to underlying substrates, per Article 3.5:
 - 1. For securement to untreated wood: No. 14 fluorocarbon-coated

SECTION 02 41 00
ROOF REMOVAL AND SUBSTRATE PREPARATION

- screws, length as necessary to penetrate minimum 1-1/4-inch depth into underlying wood substrate.
2. For securement to treated wood: Stainless steel screws; length as necessary to penetrate minimum 1-1/4-inch depth into underlying wood substrate.
 3. For securement to existing masonry walls: 1/4-inch minimum diameter "Tapcon" screws or other fastener type suitable to adequately secure the wood to the existing masonry wall.

PART 3 - EXECUTION

3.1 GENERAL

- A. Exercise caution to avoid damage to components indicated as "existing" or remaining in place. Do not disturb these components.
- B. Prior to any cutting, drilling, or removals, view both sides of the surface affected. If damage occurs to existing components, repair or replace components defaced or damaged during removals to the satisfaction of the District.
- C. Prior to work start, the contractor shall obtain the services of a licensed plumber to verify that all roof drains and plumbing vents located within the project area are free of debris and properly functioning. Notify the District immediately if roof drains or plumbing vents are found to be blocked, clogged, or otherwise not properly functioning. The licensed plumber shall provide a letter indicating all roof drains and plumbing vents in the project area are free of debris and properly functioning. Refer to Section 013300.

3.2 ROOF REMOVAL

- A. Removal of existing roofing and related components: Remove and discard all existing roofing materials down to the structural deck, except components designated for recycling per Article 1.4. This includes spray-applied polyurethane foam roof systems (where existing), roofing membranes, base flashings, penetration flashings, insulation, underlying roof membranes, underlayment, and sheet metal flashings and accessories, as indicated in the specifications and drawings. Remove all roofing and related components in a manner that will not cause damage to the underlying structural deck.
- B. Do not begin work until the substrates have been prepared as specified, and are ready and acceptable to have materials installed. By beginning work, the Contractor acknowledges that the substrates are satisfactory.

SECTION 02 41 00
ROOF REMOVAL AND SUBSTRATE PREPARATION

- C. Existing roof system protection:
 - 1. Do not use adjacent roof areas as storage areas for roofing materials.
 - 2. Where excessive traffic over new or existing roofing is unavoidable, provide and use 3/4-inch plywood, set over a minimum of 1-1/2 inch thick rigid board insulation to protect roofing components in place (expanded polystyrene insulation is not acceptable).
 - 3. When materials are stored on the roof, provide roof protection as indicated above.

3.3 TEMPORARY DISPLACEMENT OF ROOFTOP EQUIPMENT

- A. Temporary displacement of gas lines, conduit, junction boxes and condensate lines:
 - 1. Temporarily displace gas lines, conduit, junction boxes, condensate lines or other items that may interfere with roof replacement work. Any necessary disconnection of gas lines, conduit and junction boxes is to be performed by a licensed mechanical/electrical contractor as applicable to the work being performed. Coordinate all disconnections with the District.
- B. After completion of work, reinstall any mechanical units that have been temporarily displaced. Reconnect all electrical, plumbing, gas lines and ventilation ducts where required. All reconnection of plumbing, gas lines, electrical conduit and ventilation ducts is to be performed by a licensed mechanical/electrical contractor. Coordinate all reconnections with the District.
- C. After completion of work, reconnect any gas lines, conduit and/or junction boxes have been disconnected. Reconnection of gas lines, conduit and/or junction boxes is to be performed by a licensed mechanical/electrical contractor as applicable to the work being performed. Coordinate all reconnections with the District.

3.4 DECK INSPECTION AND RE-SECUREMENT

- A. After completion of roof removal work, inspect the existing roof deck. If damaged or deteriorated roof deck is encountered, notify the District immediately. Refer to Section 06 15 16 for roof deck repair/replacement procedures.
- B. Re-securement of wood decks:
 - 1. For locations requiring a wind uplift rating of FM 1-90 or less:

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ROOF REMOVAL AND SUBSTRATE PREPARATION

- a. In the field of the roof, re-secure the existing wood deck at a maximum spacing of 12-inches on center (every other rib for 1-1/2 in. deck) at underlying supports in the field of the roof. At the roof perimeters and corners, re-secure the deck at a maximum spacing of 6 inches on center (every rib for 1-1/2 in deck) at all underlying supports.
 - b. At each deck side lap, secure the deck to the supporting members. For interlocking-type side laps, secure both sides of the lap (upper and lower). For overlap-type side laps, ensure securement penetrates all deck panels at the laps.
 - c. Ensure spacing between each side lap fastener or side lap fasteners and supports is no more than 36-inches in the field of the roof and no more than 30-inches on center in the perimeter and corner areas. Fasten overlap-type side laps with FM-Approved side lap fasteners.
2. For locations requiring a wind uplift rating of FM 1-105 through 1-120:
 - a. In the field of the roof, re-secure the existing wood deck at a maximum spacing of 6-inches on center (at every rib for 1-1/2 in. deck) at underlying supports in the field of the roof. At the roof perimeters and corners, re-secure the deck with two fasteners every 6-inches on center (two fasteners at each rib location for 1-1/2 in deck) at all underlying supports.
 - b. At each deck side lap, secure the deck to the supporting members. For interlocking-type side laps, secure both sides of the lap (upper and lower). For overlap-type side laps, ensure securement penetrates all deck panels at the laps.
 - c. Ensure spacing between each side lap fastener or side lap fasteners and supports is no more than 30-inches in the field of the roof and no more than 15-inches on center in the perimeter and corner areas. Fasten overlap-type side laps with FM-Approved side lap fasteners.

3.5 RE-SECUREMENT OF PERIMETER WOOD BLOCKING

- A. Re-secure wood blocking (nailers) to the underlying substrate at perimeters in a manner to resist a minimum force of 300 lbs. per linear foot, at a minimum spacing of 12-inches on center. Refer to FM Global Loss Data Sheet 1-49.

3.6 RECYCLING OF EXISTING ROOFING COMPONENTS

- A. Built-up roofing membrane:
 1. Confirm securement type of built-up roofing membrane. Note that fully-adhered roofing membranes cannot be recycled.

SECTION 02 41 00
ROOF REMOVAL AND SUBSTRATE PREPARATION

2. Cut membrane into manageable pieces, following the instructions of the recycler. Remove and discard existing membrane seams, fastening strips, and associated fasteners.
3. Remove roofing membrane from the roof surface.
4. Contact the recycler for instructions regarding storage of roofing membrane awaiting pick-up.

END OF SECTION

SECTION 02 41 19
SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Procedures for demolition and removal of existing building elements.
 - 2. Removal of designated building equipment and fixtures.
 - 3. Salvaged items.
 - 4. Salvaged material.
 - 5. Salvaged items for re-use.
- B. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 01 35 43 - Environmental Procedures: Recycling and reuse of waste materials.

1.2 SYSTEM DESCRIPTION

- A. The extent of Selective Demolition Work is that Work necessary, and required to facilitate the new construction indicated.
- B. Demolition shall be such that all construction, new and existing, can be performed, and completed in accordance with the construction documents.
- C. The contractor shall visit the project site and familiarize himself with the existing conditions and project requirements.
- D. Verify the scope of the Work under this Section including salvage material. The Contractor shall be responsible for removing all materials and kitchen equipment which the District wishes to salvage prior to the beginning of this Work and securely storing them. Contractor to verify during the pre-construction meeting for equipment that is owned by the district and equipment owned by the Baseball little league and for which equipment to salvage.

1.3 QUALITY ASSURANCE

- A. Performance Criteria:
 - 1. Requirements of Structural Work: Do not cut structural work in a manner resulting in a reduction of load-carrying capacity of load/deflection ratio.

SECTION 02 41 19
SELECTIVE STRUCTURE DEMOLITION

2. Operational and Safety Limitations: Do not cut operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in a manner intended or resulting in a decreased operational life, increased maintenance or decreased safety.
3. Visual Requirements: Do not cut work which is exposed on the exterior or exposed in occupied spaces of the building in a manner resulting in a reduction of visual qualities or resulting in substantial evidence of the demolition work judged by the Engineer to be cut and patched in a visually unsatisfactory manner.
4. Loading: Do not superimpose loads at any point upon existing structure beyond design capacity including loads attributable to materials, construction equipment, demolition operations and shoring and bracing.
5. Vibration: Do not use means, methods, techniques or procedures which would induce vibration into any element of the structure.
6. Fire: Do not use means, methods, techniques or procedures which would produce any fire hazard unless otherwise approved by the Engineer.
7. Water: Do not use means, methods, techniques or procedures which would produce excessive water run-off, and water pollution.
8. Air Pollution: Do not use means, methods, techniques or procedures which would produce uncontrolled dust, fumes or other damaging air pollution.

1.4 PROJECT SITE

- A. Indicated "Existing Construction" was obtained from existing drawings or other information which may not reflect actual conditions. The Contractor shall verify all existing conditions and notify the Engineer of discrepancies before proceeding with the Work.
- B. Perform the removal, cutting, drilling, etc., of existing work with extreme care, and using small tools in order not to jeopardize the structural integrity of the building.
- C. Occupancy: Contractor shall have full use of the facility during construction.
- D. Condition of Structure: The District assumes no responsibility for the actual condition of portions of the structure to be demolished.
- E. Partial removal: Items of salvageable value to the Contractor may be removed from the structure as the work progresses if not claimed by the District. Salvaged items must be transported from the site as they are removed.
- F. Protection: Make sure that the safe passage of persons around the area of demolition is maintained during the demolition operation. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

SECTION 02 41 19
SELECTIVE STRUCTURE DEMOLITION

1.5 PROTECTION OF EXISTING CONSTRUCTION

- A. Provide temporary protection of existing construction (floors, roof, and walls) when adjoining new work and in traffic areas.
- B. Provide temporary construction, constructed of framing and plywood, to protect existing construction and surrounding surfaces from damage by movement of materials and personnel.
- C. The contractor is responsible for all damage to existing structure and shall replace or repair all areas of damage.
- D. Repair, replace, or rebuild existing construction as required or as directed which has been removed, altered or disrupted to allow for new construction. Existing construction shall be corrected to match adjacent construction, new or existing.
- E. Perform cutting of existing concrete and masonry construction with saws and core drills. Do not use jack-hammers or explosives.

1.6 SHORING AND BRACING

- A. Provide temporary shoring of existing construction to allow removal of existing structural elements. Maintain shoring until new structural elements are in place and accepted by the Engineer and District Inspector(s).

PART 2 - PRODUCTS

2.1 SALVAGED ITEMS

- A. The Contract Documents indicate the existing materials that are to be reinstalled in the new construction. The Contractor shall remove, protect and reinstall these items as indicated.
 - 1. Items for "Reinstallation" will be indicated as such within the Contract Documents.
- B. Materials scheduled for reinstallation which are damaged by the Contractor to the extent that they cannot be reinstalled shall be replaced by the Contractor with equal quality material at no additional cost to the District.
- C. Coordinate with the Engineer on disposition of salvage items not scheduled for reinstallation, demolished materials, and equipment. Salvaged materials, not reinstalled, shall be delivered, as directed, to the District.

SECTION 02 41 19
SELECTIVE STRUCTURE DEMOLITION

2.2 SALVAGED MATERIALS

- A. Removed and salvaged materials of value not designated for reinstallation, unless claimed as salvage by the District, shall become the property of the Contractor and shall be removed from the premises by the Contractor and recycled, reused or disposed of as specified in Section 01 3543- Environmental Procedures.
- B. The District will remove or, under separate contract, have all materials and equipment which the District requires removed prior to Work under this Section begins.

2.3 SALVAGED ITEMS FOR RE-USE

- A. Materials and items scheduled for re-use which are damaged by the contractor to the extent which they cannot be re-used shall be replaced by the Contractor at no additional cost to the District.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 PREPARATION

- A. Temporary Support: Provide adequate temporary support for work to be cut to prevent failure. Do not endanger other work.
- B. Provide adequate protection of other work during selective demolition to prevent damage and provide protection of the work from adverse weather exposure.

**SECTION 02 41 19
SELECTIVE STRUCTURE DEMOLITION**

3.3 PROCEDURE

- A. Employ only skilled tradesmen to perform selective demolition.
- B. Cut work by methods least likely to damage work to the retained and work adjoining.
- C. In general, where physical cutting action is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete and masonry work.
- D. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
- E. Where selective demolition terminates at a surface or finish to remain, completely remove all traces of material selectively demolished, including mortar beds. Provide smooth, even, substrate transition.

3.4 POLLUTION CONTROLS

- A. Use temporary enclosures and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with AQMD standards.
- B. Comply with governing authorities pertaining to environmental protection.
 - 1. Protect natural resources as specified in Section 01 3543 - Environmental Procedures.
- C. Clean adjacent portion of the structure and improvement of dust, dirt and debris caused by demolition operations, as directed by the Engineer and governing authorities. Return adjacent areas to its condition prior to the start of the work.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. Collect, recycle, reuse, and dispose of demolished materials as specified in Section 01 3543 - Environmental Procedures and as approved by the County in the Solid Waste Management and Environmental Protection Plan.

3.6 SCHEDULE OF SELECTIVE DEMOLITION

- A. Slab on Grade:
 - 1. Where indicated, saw cut perimeter of existing slab minimum of 50 percent of slab thickness to provide a breaking point to remove existing concrete.

SECTION 02 41 19
SELECTIVE STRUCTURE DEMOLITION

2. Break concrete slab to be removed into portions easily removed, maximum 3-foot dimensions in any side.
 3. Remove all concrete pieces within removed area down to the existing subgrade.
- B. Plumbing:
1. Remove all plumbing fixtures and accessories including all exposed supply, waste, and vent piping.
 2. Concealed piping within and below slab construction shall be identified, and capped a minimum of 3 inches (8 cm) below finish floor.
- C. Electrical Service:
1. All electrical circuits within the existing structure shall be abandoned from the existing service entrance section, beyond.
 2. Remove all abandoned electrical conduit, boxes, and wiring back to the existing electrical service which is to remain.
- D. Provide additional selective demolition as indicated and required by the Contract Documents and as required for indicated new construction.
- E. Items for demolition covered under the plans and these specifications include rubber base, wall tile, plumbing features, F.A.U., concrete slab saw cut, cap utilities, remove interior walls, built-in counters, some doors, electrical lighting, toilet partitions, selective demolition, and as shown on drawings.
- F. Payment for items of work covered in the plans and Division 2 specification will be based on the lump sum bid price for building demolition and removals, no additional compensation will be allowed.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
 - 2. Openings for other work.
 - 3. Form accessories.
 - 4. Form stripping.
- B. Related Documents: The Contract Documents, as defined in - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections; Supply of concrete accessories for placement by this section:
 - 1. Section 03 20 00 – Concrete Reinforcement.
 - 2. Section 03 30 00 – Cast-In-Place Concrete.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 - Structural Concrete for Buildings.
 - 2. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 3. ACI 347 - Recommended Practice For Concrete Formwork.
- B. United States Department of Commerce Product Standard (PS):
 - 1. PS 1 - Construction and Industrial Plywood.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Provide data on void form materials and installation requirements. Submit data on form-coating materials.
 - 2. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347.

**SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES**

- B. Where necessary, design formwork under direct supervision of a Professional Engineer experienced in design of formwork and licensed in State where Project is located at no additional cost to the District.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver void forms and installation instructions in manufacturer's packaging.
- C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Formwork: Reuse forms to greatest extent possible without damaging structural integrity of concrete and without damaging aesthetics of exposed concrete.

PART 2 - PRODUCTS

2.1 WOOD FORMS

- A. Forms for Exposed Finish Concrete: Plywood panels, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
 - 1. Plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Lumber: Construction grade; with grade stamp clearly visible.

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

2.2 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Void Forms (Carton Forms): Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set. Thickness indicated on drawings.
- C. Tubular Column Type: Metal or fiberglass-reinforced plastic. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
- D. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match the control sample. Provide solid backing and form supports to ensure stability of textured form liners.

2.3 ACCESSORIES

- A. Form Ties: Factory-fabricated, removable or snap-off type, metal, of fixed or adjustable length as applicable, with cone ends. Designed to prevent form deflection and to prevent spalling concrete upon removal. Back break dimension, 1-1/2 inch from exposed concrete surface. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.
- B. Form Release Agent: 100 percent biodegradable colorless agent which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of subsequent coatings intended for use on concrete surfaces. Zero VOC.
 - 1. Envirolux by Conspec,
 - 2. SMD-10 Soy Form Release by Strategic Market Development
 - 3. Bio-Form by Leahy-Wolf,
 - 4. Or equal as permitted in Section 01 60 00 - Product Requirements: Product options and substitutions.
- C. Corners: Chamfered, wood strip 3/4x3/4-inch size; maximum possible lengths.
- D. Dovetail Anchor Slot: Galvanized steel, 22-gage thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

- F. Waterstops (Rubber/PVC): Rubber or Polyvinyl chloride, minimum 1,750 tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, width as indicated on Drawings, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
 - 1. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to District.

3.2 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 FORMWORK INSTALLATION

- A. Install formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 347R.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Furnish in largest available sizes to minimize number of joints and to conform to joint system indicated on Drawings.

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

- E. Obtain the Engineer's approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners of concrete members, to produce uniform, smooth lines and tight edge joints.
- G. Install void forms in accordance with manufacturer's published instructions. Protect forms from moisture or crushing.

3.4 FORM RELEASE AGENT APPLICATION

- A. Apply form release agent on formwork in accordance with manufacturer's published instructions.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories in accordance with manufacturer's published instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- G. Install water stops in accordance with manufacturer's published instructions continuous without displacing reinforcement. Seal joints watertight.

**SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES**

3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 CONSTRUCTION

- A. Site Tolerances:
 - 1. Construct formwork to maintain tolerances required by ACI 301 and ACI 347.
 - 2. Camber slabs and beams 1/4 inch per 10 feet in accordance with ACI 301.

3.8 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspection and testing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

SECTION 03 20 00 CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing steel bars.
 - 2. Reinforcement accessories.
- B. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 03 30 00 - Cast-in-Place Concrete: Coordination between concrete placement and reinforcing.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 - Structural Concrete for Buildings.
 - 2. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 3. ACI SP-66 - American Concrete Institute - Detailing Manual.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 2. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
 - 3. ASTM A 704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
- C. American Welding Society (AWS):
 - 1. AWS D 1.4 – Structural Welding Code for Reinforcing Steel.
- D. Concrete Reinforcing Steel Institute (CRSI):
 - 1. CRSI - Manual of Practice.
 - 2. CRSI 63 - Recommended Practice for Placing Reinforcing Bars.
 - 3. CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.

**SECTION 03 20 00
CONCRETE REINFORCEMENT**

1.3 SUBMITTALS

- A. Submittal Procedures:
 - 1. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel [and wire fabric, bending and cutting schedules, and supporting and spacing device. Include special reinforcement required for openings through concrete structures.
 - 2. Assurance/Control Submittals;
 - a. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - b. Submit certified copies of mill test report of reinforcement materials analysis.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice ACI 301, ACI SP-66, ACI 318, and ASTM A 184.
- B. Reinforcement design is provided by the Structural Engineer of Record, experienced in design of this work and licensed in the State where the Project is located.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management
 - 1. Recycled Content
 - a. Steel Products: Post-consumer recycled content plus one half of pre-consumer recycled content not less than 75 percent.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615, 40 ksi yield grade; deformed billet steel bars, unfinished.
- B. Reinforcing Steel Mat: ASTM A 704, ASTM A 615, 40 ksi yield grade; steel bars or rods, unfinished.
- C. Reinforcing Steel Mesh: ASTM A 185; 6X6, w 1.4 X w 1.4.
- D. Dowels at Construction Joints: 1/4" x 4.5" Diamond Dowels by PNA Construction Technologies or approved equal.

**SECTION 03 20 00
CONCRETE REINFORCEMENT**

2.2 ACCESSORIES

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type (CRSI, Class 1) or stainless steel protected (CRSI, Class 2); size and shape as required.

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI SP-66 and ACI 318.
- B. Weld reinforcement in accordance with AWS D1.4.
- C. Locate reinforcing splices not indicated on drawings, at point of minimum stress. Review location of splices with the Engineer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

**SECTION 03 20 00
CONCRETE REINFORCEMENT**

- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing in accordance with ACI 318.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspection.
- B. Inspect reinforcing locations, bar types and sizes, wire ties, and welding (if applicable).

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes all labor, materials and appliances, and perform all operations in connection with the installation of Concrete Work, and all related work incidental to the completion thereof, as shown on the drawings, complete, in strict accordance with the drawings and as specified herein. Section Includes:
 - 1. Cast-in-place (CIP) concrete in foundations, foundation walls, slabs-on-grade.
 - 2. Finishing of concrete slabs and toppings. Concrete liquid surface treatment, sealer, and slip-resistant coatings.
 - 3. Expansion and contraction, control joints in CIP concrete.
 - 4. Concrete curing and protection.
 - 5. Non-shrink grout including installation and forming.
 - 6. Testing related services.
- B. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents and References in Section 1.2.
- C. Related Sections: Related work specified elsewhere includes but may not be limited to
 - 1. Section 03 20 00 – Concrete Reinforcement.

1.2 REFERENCES

- A. General:
 - 1. The publications listed below form a part of this specification to the extent referenced.
 - 2. Where a date is given for reference standards, the edition of that date shall be used. Where no date is given for reference standards, the latest edition available on the date of Notice Inviting Bids shall be used.
- B. American Association of State Highway and Transportation Officials (AASHTO).
 - 1. AASHTO M182, "Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats."
- C. Unless otherwise shown or specified, the work shall conform to the following standards and recommendations of the American Concrete Institute (ACI), latest editions adopted:

**SECTION 03 30 00
CAST-IN-PLACE CONCRETE**

1. ACI 117, "Standard Specification for Tolerances for Concrete Construction and Materials."
 2. ACI 121R, "Quality Assurance Systems for Concrete Construction."
 3. ACI 212.2R, "Guide for Use of Admixtures in Concrete."

 4. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
 5. ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete."
 6. ACI 304.2-R, "Placing Concrete by Pumping Methods."
 7. ACI 305, "Hot Weather Concreting."
 8. ACI 306, "Cold Weather Concreting."
 9. ACI 306.1 "Standard Specification for Cold Weather Concreting."
 10. ACI 308, "Standard Practice for Curing Concrete."
 11. ACI 309R, "Guide for Consolidation for Concrete."
 12. ACI 315, "Details and Detailing of Concrete Reinforcement."
 13. ACI 347, "Guide to Formwork for Concrete."
 14. ACI SP-15, "Field Reference Manual" which includes ACI 301 "Specifications for Structural Concrete for Buildings" and reference standards specified therein.
- D. American Society for Testing and Materials (ASTM).
1. ASTM A615, "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement."
 2. ASTM C33, "Standard Specification for Concrete Aggregates."
 3. ASTM C39, "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."
 4. ASTM C94, "Standard Specification for Ready-Mixed Concrete."
 5. ASTM C150, "Standard Specification for Portland Cement."
 6. ASTM C156, "Standard Test Method for Water Retention by Concrete Curing Materials."
- E. Concrete Reinforcing Steel Institute (CRSI),
1. CRSI "Manual of Standard Practice."

1.3 SUBMITTALS

- A. Submittal Procedures:
1. Review of submittals will cover general design only. In no case shall submittal review relieve the Contractor of the responsibility for strength of concrete, general or detailed dimension, quality or quantity of materials, or any other conditions, functions, performance or guarantees required.
 2. Product Data:
 - a. Manufacturers' literature containing product and installation specifications and details.

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

- b. Where Manufacturer's specifications, recommendations, and/or directions are required in this specification, deliver to the Engineer two (2) copies of such printed specifications, recommendations, and/or directions for approval before any work is commenced.
 - c. Sources of fine and coarse aggregate. Once approved, the source of fine and coarse aggregate shall not be changed without written approval of the Engineer.
 - d. List of manufacturers and brand names for cement, mineral and liquid admixtures, bond breakers, curing compounds, joint sealants, and materials other than aggregates and reinforcing steel. Include product data sheets, instructions, and specifications for use.
3. Batch Plant Equipment and Procedures
- a. Supplier of concrete and ready-mix grout. Only one source will be approved for the Contractor, including all subcontractors. All concrete and ready-mixed grout supplied to the project shall originate from the approved single facility.
 - b. The following information shall be submitted:
 - 1) Name of supplier.
 - 2) Plant location.
 - 3) Plant volume and output capacity.
 - 4) Capacity of transit equipment.
 - 5) Estimated travel time from plant to jobsite.
 - c. If the Contractor elects to use an on-site concrete batching plant, the following information shall be submitted:
 - 1) Drawings and data including proposed location of the batch plant on the site.
 - 2) List of and performance data for material handling equipment.
 - 3) Procedures for processing, handling, transporting, sorting, and proportioning the materials for concrete.
 - d. All other data necessary to show the supplier's capability to produce concrete of the quality and quantity required.
4. Concrete Procedures
- a. The following information shall be submitted:
 - 1) Procedure for mixing and transporting concrete to the point of placement.
 - 2) Procedures for placement of concrete.
 - 3) Methods of obtaining and maintaining the required concrete temperature during placement and initial curing.
 - 4) Procedures for consolidating the concrete.
 - 5) Procedures how concrete is finished and cured (slab-on-grade concrete).
5. Assurance/Control Submittals:
- a. Test Reports: Submit the following reports directly to the Engineer from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 01 4000 - Quality Requirements.

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- b. Submit laboratory test reports for concrete materials and mix design test, including certified copy of results of aggregate tested by ASTM C1260 or C1567. Mix designs for each strength and type of concrete proposed for use. Details to be included are found in section 2.7.
 - c. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - d. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- 6. Delivery Tickets:
 - a. Copies of delivery tickets for each load of concrete delivered to site.
 - b. Indicate on each ticket information required by ASTM C94 including additional information required herein.
 - c. Mix identification number on ticket shall match number on submitted and approved mix design
 - d. Indicate number of drum revolution from when water is added until concrete is discharged.
 - e. Submit copies to Testing Laboratory same day as concrete delivery.
- 7. Verification Samples:
 - a. At exposed concrete location provide a sample of concrete with medium broom finish and sealed for Engineer's approval.

B. Closeout Procedures and Training:

- 1. Project Record Documents: Accurately record the following:
 - a. Shop drawings shall be corrected to reflect actual field changes and become part of the "Record As-Built Drawings."
- 2. Extra Products: Submit extra products as specified in this Section.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials in unopened containers with labels identifying contents.
- C. Store powdered materials in dry area and in manner to prevent damage. Protect liquid materials from freezing or exceeding maximum storage temperatures set by product manufacturer.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 - 1. Conform to ACI 305 R when placing concrete during hot weather.
 - 2. Conform to ACI 306 R when placing concrete during cold weather.

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1.6 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Concrete placement accessories:
 - a. Mixing equipment: Return excess concrete to supplier; minimize water used to wash equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Applied Concrete Technology, Inc.,
 - 2. The Euclid Chemical Company,
 - 3. Fortifiber Corporation,
 - 4. ChemRex Inc.,
 - 5. W.R. Meadows, Inc.,
 - 6. Reef Industries,
 - 7. Stego Industries LLC,.
 - 8. L & M Construction Chemicals, Inc.
 - 9. Curecrete Chemical Company, Inc.
 - 10. Midwest Floor Care Inc.,
 - 11. General Resource Technology, Inc.,
 - 12. Or approved equal
- B. Product Requirements: Product options and substitutions: Permitted.

2.2 CONCRETE MATERIALS

- A. Concrete:
 - 1. Concrete shall be in accordance with ASTM C94. If a conflict exists between ASTM C94 and these specifications, these specifications shall govern.
- B. Portland Cement: ASTM C150 – Type I unless otherwise specified or approved by the Engineer.
 - 1. Assume full responsibility for the quality and soundness of cement. Cement is to be of one type and from the same mill; it is to be of uniform color for all concrete with permanently exposed concrete finishes.
- C. Liquid admixtures: All admixtures shall be used in conformance with the manufacturer's recommendations. When air entraining admixtures, water reducing admixtures, high range water reducing admixtures, and non-corrosive accelerating admixtures are used in any combination, all products shall be from the same manufacturer or the ready-mix concrete producer shall certify that they

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are compatible. The following admixtures are permitted when approved in writing prior to use or are required as specified herein and shall be used in strict accordance with the manufacturer's specifications or recommendations:

1. Calcium chloride: Conform to ACI 301. The water soluble chloride ion level shall not exceed 0.3 percent by weight of cement.
2. Air-entraining admixtures: ASTM C260 shall be used to achieve the specified air content in all permanently exposed exterior concrete. For steel hard trowel interior slab finish, do not use air entrainment admixtures. The total air entrainment (entrained and entrapped air) must not exceed 3 percent. For steel trowel exterior slab finish, comply with ACI 318 and ACI 302.
 - a. Euclid: AEA-92 or Air Mix 200.
 - b. BASF: Micro-Air, MBVR-Standard, and MB AE 90.
 - c. Sika: Sika AEA-14, Sika AEA-15, and Sika Air.
 - d. W.R. Grace: Darex EH, Darex II AEA, Daravair AT60, Daravair 1400, and Daravair 1000.
 - e. Or approved equal.
3. Water-reducing admixtures: Conform to ASTM C494, Type A, containing not more chloride ions than allowed in paragraph C., above.
 - a. Euclid: Eucon WR series or Eucon MR.
 - b. BASF: Masterpave, Masterpave N, PolyHeed 997, Pozzoloth 220N, and Glenium 7500.
 - c. W.R. Grace: Daracem 55 and Daracem 65, WRDA 82 and WRDA with HYCOL.
 - d. Sika: Sikament HP, Plastocrete 161, and Sikament 686.
 - e. General Resource Technology: Polychem 400 NC and Polychem 1000.
 - f. Or approved equal.
4. Water-reducing/accelerating admixtures: Conform to ASTM C494, Type C or E having long-term test results showing non-rusting on metal deck and reinforcing steel.
 - a. Euclid: Accelguard series.
 - b. BASF: Pozzutec 20+, Pozzoloth NC 534, and Rheocrete CNI.
 - c. Sika: Sika Rapid-1 and Plasocrete 161FL.
 - d. W.R. Grace: Lubricon NCA, Polarset, and DCI.
 - e. Or approved equal.
5. Water-reducing/retarding admixtures: Conform to ASTM C494, Type D containing not more than 1 percent chloride ions.
 - a. Euclid: Eucon Retarder series.
 - b. BASF: Delvo Stabilizer, Masterpave series, and Pozzoloth 100XR, 200N, 220N and 322N.

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- c. Sika: Plastimet.
 - d. W.R. Grace: Daratard 17, WRDA-64, and WRDA-82.
 - e. Or approved equal.
6. High-range/water-reducing (HRWR) admixtures: Conform to ASTM C494, Type F or G super plasticizers containing 1 percent maximum chloride ions may be used with low slump (3 inches maximum) concrete to produce flowable concrete (up to 8 inches slump) with early strength gain and 28-day strengths equal to reference concrete. HRWR admixture may be used providing not more than 60 minutes is allowed from addition of admixture to final placement of concrete. HRWR admixture shall be used in concrete with a maximum water/ cement ratio of 0.50 or less and is suggested in the following:
- a. In pumped concrete.
 - b. In concrete topping slabs
 - c. In lieu of the specified water-reducing admixture (Type A) where confinement of placing due to heavy reinforcement or narrow space requires flowable concrete.
 - d. Where more than 30 minutes is required between the addition of admixtures to final placement of the concrete, a combination of water-reducing, set controlling admixtures (ASTM C494, Types A, D, & E) as in Master Builders Company "Synergized Performance System" may be used.
 - 1) Euclid: Eucon 37 or Eucon 537.
 - 2) BASF: Rheobuild 1000, Glenium 3000 NS, and Glenium 3400NV.
 - 3) Sika: Sikament 300, Viscocrete 2100, and Sikament 686.
 - 4) W.R. Grace: Daracem 100, ADVA Cast 530, Mira 92, and ADVA Cast 575.
 - 5) Or approved equal.
- D. Fly ash: Conform to ASTM C618. The use of a quality fly ash will be permitted as a cement-reducing admixture (minimum 15 percent and maximum 25 percent). Fly ash used in concrete shall be from a single source and of a single class in combination with Portland cement of a single source and single class unless otherwise approved by the Engineer. The fly ash shall meet all of the requirements of ASTM C618, Class C or Class F, with the following special requirements: The loss on ignition in Table 1 shall not exceed 3 percent. Compliance to Table 1A shall apply. The amount retained on the 325 sieve in Table 2 shall not exceed 34 percent. Where a Type II low-alkali cement is specified, the total C₃A shall be less than 8 percent of total cementitious material. The chemical analysis of the fly ash shall be reported in accordance with ASTM C311. Quality assurance testing and reports for a minimum of six months shall

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be submitted by the fly ash supplier. The option to use fly ash must be approved prior to use.

- E. Granulated Blast Furnace Slag is an alternative to fly ash and shall conform to ASTM C989 Grade 100 or 120. Granulated blast furnace slag may be used as a substitute for a maximum of 30 percent of Portland cement.
- F. Certification: Certification of the above requirements is required from the admixture manufacturer prior to mix design review and approval by the Engineer. Upon request by the Engineer, a qualified representative is to be provided to assure proper use of admixtures. Use of admixtures, other than listed above will be permitted only when approved by the Engineer.
- G. Aggregates:
 - 1. Normal-weight concrete - ASTM C33. For slabs, also conform to combined aggregate grading recommendations of ACI 302 and ACI 302.1R, unless otherwise permitted by the Engineer.
 - 2. All concrete exposed to the weather shall conform to the limits of deleterious substances and physical properties of Table 3, ASTM C 33.
 - 3. Local aggregates: Local aggregates not complying with ASTM C33 but which have been shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Engineer.
 - 4. The nominal size of an aggregate particle shall not exceed:
 - a. 20 percent of the narrowest dimension between sides of forms.
 - b. 33 percent of the depth of slabs.
 - c. 75 percent of the dimension between reinforcing bars.
 - d. 75 percent of the dimension between reinforcing bars and forms.
 - 5. Maximum size of coarse aggregates and minimum cementitious contents: ACI 301 and ACI 302.1R.
 - 6. Concrete aggregate alkali-silica reactivity (ASR) shall be tested in accordance with ASTM C1260 with a 14-day expansion (no supplementary cementing materials) or ASTM C1567 (with supplementary cementing materials) of less than 0.1 percent. Materials (cement, supplementary cementing materials, and aggregates) to be used in the concrete shall be tested. Coarse aggregates and fine aggregates shall be individually tested. If two grades of coarse aggregates are blended, they shall be individually tested.
 - 7. Abrasive aggregates non-slip finishes: Fused aluminum oxide grits, or crushed emery, as abrasive for non-slip finish with emery aggregate containing not less than 40 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, non-glazing, and unaffected by freezing, moisture, and cleaning materials.

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H. Water:

1. Clean, potable, and free of injurious amounts of oil, acid, alkali, organic or other deleterious matter not detrimental to concrete; drinkable.
2. Water shall contain no more than 650 parts per million of chlorides as Cl or more than 1000 parts per million of sulfates as SO₄. In no case shall the water contain an amount of impurities that will cause a change in the setting time of Portland cement of neither more than 25 percent nor a reduction in compressive strength of mortar at 14 days of more than 5 percent when compared to the results obtained with distilled water when tested in accordance with ASTM C109.
3. Water used for curing shall not contain impurities in amounts to cause discoloration of the concrete or mortar or to produce etching of the surface.
4. Recycled water shall conform to ASTM C94.

2.3 CURING/SEALING/HARDENERS

- A. Dissipating liquid membrane-forming compounds for curing concrete; Conform to ASTM C309, Type 1. Curing compound shall be compatible with floor sealer or finish used. Low VOC.
1. Euclid: VOX Kurex DR VOX series; waterborne products.
 2. W.R. Meadows: 1100-Clear series.
 3. Edoco: Burke Aqua Resin Cure.
 4. L&M Construction Chemicals: Cure R.
 5. BASF: Kure 200W
 6. Or approved equal.
- B. Method of curing shall be approved by the finish flooring applicator where finishes are indicated.
- C. Exterior Sealers: applied to horizontal concrete surfaces permanently exposed to salts, deicer chemicals and moisture, including parking decks. The manufacturer shall provide a five-year labor and materials warranty on performance of the sealer. Sealer shall be compatible with the curing compound used.
1. Euclid: Eucoguard or Diamond Clear or Super Diamond Clear.
 2. ChemREX: Hydrozo Clear 40.
 3. Or approved equal.
- D. Liquid Densifier/Sealer/Hardener: to be applied on exposed concrete floors cured with dissipating membrane forming curing compound to harden and densify concrete surfaces. Sealers are to be clear, chemically reactive, a waterborne solution of silicate or silicate materials and proprietary components, odorless, and colorless.
1. ChemMasters: Chemisil Plus
 2. Conspec Marketing and Manufacturing Co., Inc. Intraseal

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3. Euclid Chemical Company: Euco Diamond Hard (Liquid Sealer and Hardener)
4. L&M Construction Chemicals: Seal Hard (Liquid Sealer and Hardener)
5. Curecrete Chemical Company: Ashford Formula (Liquid Sealer and Hardener)
6. W.R. Meadows, Inc.: Liqui-Hard
7. Sika: Sikafloor 3S
8. Sonneborn: Kure-N-Harden
9. Symons Corporation: Buff Hard
10. Or approved equal.

2.4 JOINTS AND EMBEDDED ITEMS:

- A. Construction and Contraction Joints: Comply with ACI 301 and recommendations of ACI 302.1R. Sealant shall be two-part semi-rigid epoxy, and shall have minimum Shore A Hardness of 80 when measured with ASTM D2240.
- B. Isolation Joints: Fillers shall consist of 1/8-inch width strips of neoprene, synthetic rubber, or approved substitute, extending the full depth of the slab. Sealant shall be two-part elastomeric type, polyurethane base.

2.5 PROPORTIONING

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If laboratory trial batch method is used, use an independent testing facility acceptable to the Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing and inspection unless otherwise acceptable to the Engineer.
- B. Submit written reports to the testing laboratory of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and approved. Include the following information for each concrete mix design:
 1. Method used to determine the proposed mix design.
 2. Gradation of fine and coarse aggregates, plus combined aggregate gradation for slabs, ACI 302.1R.
 3. Aggregate specific gravities and absorptions.
 4. Proportions of all ingredients including reported on a saturated surface dried basis all admixtures added either at the time of batching or at the job site.
 5. Water-cementitious ratio.
 6. Slump, ASTM C143.
 7. Certification of the chloride content of individual admixtures and of the mixes as proposed.
 8. Air Content: ASTM C173 (Volumetric Method).

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AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE

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9. Unit weight of concrete, ASTM C138.
10. Strength at 3, 7, and 28 days, ASTM C39.
11. Method of recording batch proportions.
12. Substantiating test reports.

- C. Concrete types and strengths: Minimum 28 Day Compressive Strength shall be per design requirements but not less than:
1. Paving base, columns, beams, walls, foundations, and footings: 3,500 psi.
 2. Slab-on-grade: 3,500 psi.
 3. All concrete exposed to weather shall be air entrained (ASTM C260).
 4. All concrete shall be normal weight except as noted above.

When the concrete mix design is developed from laboratory trial batching, adjust proportions to produce a design mix at least 1200 psi greater than the specified strength.

When the field experience method is used, the required average compressive strength shall be determined in accordance with ACI 318. Documentation that proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength shall consist of a field strength test record representing materials and proportions to be used for this project. A field strength test record shall consist of at least 10 consecutive tests encompassing a period of time of not less than 45 days and made within the past 12 months.

Also, see general and specific notes on structural drawings.

- D. Weights: All concrete shall be normal-weight concrete unless otherwise designated on the structural drawings.
- E. Aggregate gradation: For slabs, also conform to combined aggregate grading recommendations of ACI 302.1R, unless otherwise permitted. For all other concrete not otherwise noted the coarse aggregate gradation shall conform to ASTM C33 size no. 57 or larger.
- F. Durability: Conform to ACI 301.
1. All concrete exposed to potentially destructive weathering, such as freezing and thawing, or to de-icer chemicals is to be air-entrained, 6 percent $\pm$ 1 percent, a minimum six sacks cementitious per cubic yard of concrete, 0.45 maximum water-cementitious ratio, and, 4-inch maximum slump.
 2. Water-cement ratio: For concrete subject to freezing and thawing or deicer chemicals, the water-cement ratio shall not exceed 0.53 by weight including any water added to meet specified slump in accordance with the requirements of ASTM C94 unless otherwise noted.
- G. Slump: Conform to ACI 301.

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1. 3 ½ inch maximum for consolidation by vibration
2. 5 inch maximum for consolidation by other methods
3. 8 inch maximum for flowable concrete. Concrete containing HRWR admixture (super plasticizer): 3 inch maximum before addition of HRWR
4. Where field conditions require slump to exceed that specified above, the increased slump shall be obtained by the use of a superplasticizer only, and the Contractor shall obtain written approval from the Engineer who may require an adjustment to the mix.

H. Slab-On-Grade

1. Concrete shall conform to ACI 302.1R except that the minimum 28-day compressive strength shall be 3,500 psi.
2. The minimum cementitious content shall be in accordance with ACI 302.1R Table 6.2.
3. The maximum water-cementitious ratio shall be 0.48.
4. The maximum water content shall not be greater than 250 lbs. per cubic yard of concrete.
5. The air content shall be less than 3 percent.

I. Production of concrete: Conform to ACI 301:

1. Cast-in-place concrete used in the work shall be produced at a single off-site batching plant or may be produced at an on-site batch plant.
2. All concrete shall be proportioned conforming to the approved mix designs and of the materials contained in those approved mixes. A certified copy of the design weights for each mix shall be kept at the producing plant for each class of concrete used on the project.
3. Plant equipment and facilities are to conform to the "Check List for Certification of Ready-Mixed Concrete Production Facilities" of the National Ready-Mixed Concrete Association (NRMCA) and have NRMCA or approved certification within the past year.
4. Coarse aggregates shall be washed and, if necessary, shall be uniformly moistened just before batching. Each size of coarse aggregate shall be batched from separate bins as required to produce the combined grading requirements.
5. Prior to adding a high-range water reducer (super plasticizer), slump shall not exceed the working limit. The high-range water reducing admixture shall be accurately measured and pressure-injected into the mixer as a single dose. If added at the jobsite, the field dispensing system shall conform to the same requirements as a plant system and tested prior to each day's operation. After the addition of the high-range water reducer, the concrete shall be mixed at mixing speed for a minimum of 5 minutes.
6. Ready-mixed and on-site batched concrete shall be batched, mixed, and transported in accordance with ASTM C94.
 - a. Truck mixers and their operation shall ensure that the discharged concrete is uniformly within acceptable limits of consistency, mix, and grading. All mechanical details of the mixer, such as water-measuring

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and discharge apparatus, conditions of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum shall be checked before the use of the unit will be permitted.

- b. Truck mixers shall be equipped with approved revolution counters by which the number of revolutions of the drum or blades may readily be verified. The water tank system of the truck shall be equipped with gauges that permit accurate determination of the tank contents.
 - c. Each batch of concrete shall be mixed in a truck mixer for not less than 80 revolutions of the drum or blades and at the rate of rotation designated as mixing speed by the manufacturer of the equipment. Additional mixing, if any, shall be at the speed designated as the agitating speed by the manufacturer of the equipment. All materials, including mixing water but excluding any high-range water reducers added onsite, shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.
 - d. The concrete producer shall furnish duplicate delivery tickets, one for the Contractor and one given to the District's Representative for each batch of concrete. The information provided on the delivery ticket shall include the quantity of materials batched including the amount of free water in the aggregate and any water added onsite. Show the date, time of day batched, and if ready-mixed the time of discharge from the truck. The quantity of water that can be added at the site without exceeding the maximum water-cementitious ratio specified shall be noted on the delivery ticket.
7. Concrete produced by on-site volumetric batching and continuous mixing if approved shall conform to ASTM C685.
8. For concrete produced on site with a central batch plant, mixing shall be done in an approved batch mixer.
- a. The Contractor shall maintain and operate the on-site batch plant and transportation equipment in a manner that will produce the results specified in this section.
 - b. The Engineer reserves the right to reject the proposed on-site plant if, in his/her opinion, the on-site plant will interfere with other operations or impair the quality of the concrete.
 - c. The quantities of cement, pozzolanic materials, and aggregates used in each batch shall be determined by automatic weighing. The quantity of water shall be determined by weighing or volumetric measurement.
 - d. The weighing equipment for aggregates shall be readily adjustable both to compensate for variation in moisture content of the aggregates and for changing mix proportions. Moisture-sensing devices shall automatically compensate the aggregate weights for changes in moisture content. The charging of weigh hoppers directly from aggregate handling equipment such as front-end loaders will not be permitted.

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- e. Mixers in centralized batching and mixing plants shall be arranged so that mixing actions can be observed from a location convenient to the mixing-plant operator's station.
 - f. Equipment shall be provided that discharges pozzolanic material into the cement hopper only after the addition of the Portland cement. Pozzolanic materials shall be stored in such a manner as to permit ready access for the purpose of inspection and sampling and be suitably protected against contamination of moisture. Should any pozzolan show evidence of contamination or be otherwise unsuitable, the Engineer will reject it and require that it be removed from the site.
 - g. Dispensers for admixtures shall have the capacity of the full quantity of the properly diluted solution required for each batch. They shall be maintained in a clean and freely operating condition. Admixtures shall be added to the premeasured water for the batch or shall be discharged into the batch by flowing automatically and uniformly into the stream of mixing water from the beginning to end of its flow into the mixer. Equipment for measurement shall give visual confirmation of the accuracy of the measurement for each batch.
 - h. The central batch mixer shall be rotated at a speed recommended by the manufacturer and mixing shall be continued for a minimum of 1-1/2 minutes after all materials are in the drum.
 - i. Each stationary mixer shall be equipped with a mechanically operated timing and signaling device that will indicate and ensure the completion of the required mixing period and will count the batches.
 - j. All concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.
9. The Engineer may increase the mixing time when the charging and mixing operations fail to produce a delivered batch in which variations of consistency, mix, or grading are within the limits specified.
10. Variations in consistency during the discharge of a single batch shall not exceed 1 inch of slump, except that a greater variation will be permitted if the slump of the concrete decreases and no water is added. Variations in mix and in grading of different parts of the delivered batch shall be within limits stated in ASTM C94.
11. Water shall be introduced prior to, during, and following mixer-charging operations.
12. When a mixer produces unsatisfactory results, it shall be repaired promptly and effectively, or it shall be replaced.
13. Mixers shall not be loaded in excess of their rated capacity.
14. Overmixing, such as to require addition of water to preserve the required consistency or to reduce slump, will not be permitted.
15. All other concrete: Conform to ACI 301
16. Use of accelerating admixtures in cold weather and retarding admixtures in hot weather shall not relax placement requirements specified herein.

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17. All concrete placed at ambient temperatures below 50 degrees F is to contain an approved accelerator. The concrete temperature when delivered at the site shall be at least 50 degrees F.
18. All concrete placed at ambient temperatures above 80 degrees F is to contain an approved retarder.
19. All concrete required to be air-entrained is to contain an approved air-entraining admixture.
20. When improved workability, pumpability, lower water-cement ratio, or high ultimate and/or early strength is required, the HRWR admixture (super plasticizer) may be used.
21. Ensure air content for slabs with steel trowel finish is less than 3.0 percent.
22. The concrete shall be of such consistency and composition that it can be worked readily into the corners and angles of the forms and around reinforcement without permitting materials to segregate or free water to collect on the surfaces. Within the limiting requirements, adjust the consistency of the concrete as may be necessary to produce mixtures which will be placeable with reasonable methods of placing and compacting. Maintain on the job at all times adequate extra cement to be used at rate of 1/2 sack cement per cubic yard concrete for each 2" slump increase for corrections due to wetness desired or obtained. No water shall be added to concrete except with the approval of the District inspector.
23. No water shall be added to concrete except with the approval of the District inspector. The water-cementitious ratio stated on the approved mix designs shall not be exceeded unless approved by the Engineer. Re-tempered concrete shall be mixed for not less than 80 revolutions of the drum or blades and at the rate of rotation designated as mixing speed by the manufacturer of the equipment.
24. Adjustments to concrete mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant at no additional cost to District. Laboratory test data for revised mix design and strength results must be submitted and accepted before using in work.

2.6 FORMWORK

- A. Section 03 10 00: Concrete Forming and Accessories

2.7 REINFORCING MATERIALS

- A. Section 03 20 00: Concrete Reinforcement

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 INSTALLATION - GENERAL

- A. Install all cast-in-place concrete work in accordance with ACI 301 except as herein specified.
- B. All bearing materials shall be inspected by the Engineer prior to placing concrete. The Engineer shall be the sole judge as to the suitability of the bearing material.
- C. Compact stone base aggregate to thickness indicated on drawings. Proof roll stone screenings topping to provide smooth hard surface on which to place slab. Surface should not show footprints or truck tracks when driven over.
- D. Immediately before placing concrete, spaces to be occupied by concrete shall be free from standing water, ice, mud, and debris.
- E. Concrete shall not be deposited under water or where water in motion may injure the surface finish of the concrete.
- F. Immediately before placing concrete for exterior sidewalk, curb and gutter, pavements, and slab-on-grade, subbases and compacted subgrades shall be thoroughly moistened, but not muddied, by sprinkling with water. Surfaces shall be kept moist by frequent sprinkling, as required, up to the time of placing of concrete.
- G. Forms and the reinforcement shall be thoroughly cleaned of ice and other coatings. Remove surplus form releasing agent from the contact face of forms.

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- H. Notify all trades concerned and the District's Representative sufficiently in advance of the scheduled time for concrete placement to permit installation of all required work by other trades.
- I. Before placing concrete, all required embedded items, including dovetail anchor slots, anchors, inserts, curb angles, metal frames, fixtures, sleeves, drains, stair nosing's, accessory devices for Mechanical and Electrical installations shall be properly located, accurately positioned and built into the construction, and maintained securely in place.
- J. Build into construction all items furnished by the District and other trades. Provide all offsets, pockets, slabs, chases and recesses as job conditions require.
- K. Place and properly support reinforcing steel and anchor bolts.
- L. The alignment, orientation, spacing, and embedment length of mechanical load transfer devices in slab-on-grade and pavements shall conform to dimensions and tolerances shown on the drawings.
- M. The Engineer and District Inspector shall be notified when the first concrete pour is scheduled.

3.3 INSTALLATION - FORMWORK

- A. Section 03 10 00 - Concrete Forming and Accessories
- B. Construction and Contraction Joints: Conform to ACI 301 and recommendations of ACI 302.1R.

3.4 REINFORCEMENT

- A. Placement: Section 03 20 00 - Concrete Reinforcement

3.5 METHODS OF PLACEMENT AND PLACING CONCRETE

- A. Placement: Conform to ACI 301:
 - 1. Maintain concrete cover around reinforcing as per Section 3.3 above and ACI 301.
 - 2. The methods and equipment used for transporting concrete to the site work and the time that elapses during transportation shall not cause segregation of coarse aggregate or slump loss in excess of 1 inch when measured at the point of discharge.

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3. Concrete shall be placed within 90 minutes after the water has been added to the cement and aggregates. Concrete shall be placed prior to initial concrete set.
4. Placing of concrete will not be permitted during rainfall or when rain appears imminent. If rain should fall subsequent to placement, the concrete shall be completely protected until curing is complete.
5. Cold-Weather Placement: Comply with provisions of ACI 306.1 "Standard Specifications for Cold-Weather Concreting" and as follows.
 - a. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - b. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature during the first 24 hours.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
 - d. Concrete shall not be placed on frozen ground or placed when the ambient temperature is 40 deg F or less and dropping.
 - e. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - f. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures using vented heaters and insulating blankets.
 - g. Vent heater exhaust gases that contain carbon dioxide outside of enclosed areas.
 - h. Concrete temperatures shall be maintained above 50 degrees F for the first 7 days of curing.
6. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305R "Standard Specification for Hot-Weather Concreting" and as specified.
 - a. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice of a size that will melt completely during mixing may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - b. Reject any concrete that has a temperature at the point of placement above 90 deg F, unless approved otherwise by the Engineer. When air temperatures are between 80 and 90 deg F the maximum mixing and delivery time is reduced to 75 minutes. When air temperatures

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exceed 90 deg F, the maximum mixing and delivery time is reduced to 60 minutes.

- c. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
- d. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
- e. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to the Engineer.
- f. Spray evaporative retardants, wind breaks, misters, or shade concrete when the rate of surface evaporation when calculated in accordance with ACI 305.5 exceeds 0.2 lb./sq. foot per hour.

B. Depositing Concrete

- 1. Deposit concrete as near its final position as possible to avoid segregation due to re-handling or flowing. Hoppers, tremies, pump line, ducts, chutes, or other methods approved by the Engineer shall be used to deposit concrete in its final position within the specified time limits and without segregation of the mix.
- 2. The sequence of concrete placement and the number, type, position, and design of joints shall be approved by the Engineer prior to concrete placement.
- 3. Place floor slabs-on-grade by "strip cast" method.
- 4. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to re-handling or flowing. No concrete shall have a free fall of over three feet from truck, mixer, or buggies.
- 5. The concreting shall be carried on at such a rate that the concrete is plastic at all times and flows readily into the spaces between reinforcing bars. No concrete that has partially hardened or been contaminated by foreign materials shall be deposited in the work.
- 6. When concreting is started, it shall be carried on as a continuous operation until the placing of the section is completed.
- 7. Except as intercepted by joints, concrete shall be placed in continuous layers. The depth of layers shall not exceed 20 inches. Succeeding layers shall be placed while the previous layer is still plastic. Concrete placement shall begin at the lowest point in each section of concrete to be placed.
- 8. Protect adjacent surfaces from concrete drippings, spillage, and splashes. Hardened or partially hardened splashes or accumulations of concrete on forms or reinforcement shall be removed before the work proceeds. Clean all damaged surfaces immediately.
- 9. All conveyances shall be thoroughly cleaned at frequent intervals during the placement of the concrete, and before the beginning a new run of concrete all hardened concrete and foreign materials shall be removed from the surfaces.

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10. The Superintendent or Foreman in charge of concrete work shall mark on the drawings the time and date of the placing of each concrete pour. Locations where concrete test cylinders are made shall also be noted on the drawings. Such drawings shall be kept on file at the job until its completion and shall be subject to the inspection of the Engineer at all times.

C. Conveyor Belts and Chutes

1. Chutes or conveyor belts shall not be used except as approved by the Engineer.
2. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation and loss of material.
3. Chutes longer than 50 feet and conveyor belts longer than 110 feet will not be permitted.
4. Equipment for conveying and chuting concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery point without separation of material.
5. Provide runways or other means for wheeled equipment to convey concrete to point of deposit. Construct runways so that supports will not bear upon reinforcement or fresh concrete.
6. The minimum slope of chutes shall enable concrete of the specified consistency to readily flow.
7. Ends of chutes, hopper gates, and other points of concrete discharge throughout the conveying, hoisting, and placing system shall be designed and arranged so that concrete passing from them will not fall separated into whatever receptacle immediately receiving the concrete. Adequate headroom provision must be made at such points for a vertical drop and for proper baffling.
8. If a conveyor belt is used, it shall be wiped clean by a device operated so that none of the mortar adhering to the belt will be wasted.

D. Pumping of Concrete

1. The type and operation of a concrete pump shall be subject to the approval of the Engineer. The equipment used in placing the concrete and the method of its operation shall introduce the concrete into the forms without high velocity.
2. During pumping, the Contractor shall have on-site a standby placing system, acceptable to the Engineer, to ensure that in the event of breakdown of the primary placing equipment, the concrete placement can continue without cold joints.
3. The minimum diameter of the hose or conduit shall be 4 inches unless otherwise approved by the Engineer. Aluminum conduits shall not be used for conveying the concrete. Pumping equipment, hoses, and conduits that are not functioning properly shall be replaced.

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E. Joints

1. Joints shall be vertical in walls and horizontal in slabs.
2. Dowel bars and tie bars shall be inspected
3. Control joints for controlling concrete shrinkage shall be provided in floor slabs, walls, decks, conduits, and channels as shown on the plans or approved by the Engineer.
4. Joint spacing and sawcut depth for slab-on-grade and concrete pavement shall conform to that shown on the pour sequencing plan and/or drawings.
 - a. Sawed control (contraction) joints for pavements and slab-on-grade shall be installed as soon as practical so as not to ravel the concrete but less than 12 hours.
 - b. The minimum sawcut joint depth shall be 1/4 of the slab thickness unless an early-entry SOFF-CUT saw is used in accordance with manufacturer recommendations (typically sawed between 1 to 4 hours after finishing to a 1-inch minimum depth.
 - c. Joint spacing shall in feet shall not exceed 2-1/2 times the slab thickness in inches unless otherwise approved by the Engineer.
 - d. The long dimension of a slab shall not exceed 1.5 times the short dimension unless otherwise approved by the Engineer.
5. Joints in slabs shall align with joints in adjoining walls unless otherwise approved by the Engineer or shown in the drawings. Joints shall also line up with architectural reveals and form lines. All corners shall be relieved by cutting joint to adjacent control joint.
6. When not otherwise shown on the drawings or specified, concrete placement for walls shall be constructed in segments no longer than 30 feet unless otherwise approved by the Engineer.
7. If there is a delay in casting but prior to concrete initial set, the concrete placed after the delay shall be thoroughly spaded and consolidated at the edge of that previously placed to avoid cold joints. Concrete shall then be brought to correct level and struck off with a straight edge. Bullfoats shall be used to smooth slab surfaces, leaving it free of humps or hollows.
8. Where placing concrete is interrupted long enough for the concrete to take its initial set, the working face shall be made a construction joint.
 - a. Preparation and disposition of unplanned cold joints in walls shall be approved by the Engineer.
 - b. For slab-on-grade, pavements, sidewalk, and curb and gutter, concrete shall be removed back to the nearest planned joint and a construction joint installed.
9. Unless otherwise noted on the drawings, where concrete is to be placed against existing concrete, except in the case of expansion joints, the joint face of the existing concrete shall be roughened.
 - a. Before new concrete is placed against hardened concrete, the bonding surface of the existing concrete shall be roughened to an amplitude of 0.25 inch using bush hammers, abrasive blasting, or high-pressure water blasting.

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- b. Fresh concrete may be green-cut with water blasting and hand tools to remove concrete laitance and spillage and to expose sound aggregate.
 - c. The prepared surfaces of hardened concrete shall be kept thoroughly wet during the 24-hour period immediately prior to the placement of the new concrete. Wetting shall be accomplished by continuous sprinkling or by covering exposed surfaces with wet burlap.
 - d. Where shown on the drawings or permitted by the Engineer, bond-preventing compound shall be applied by brush in accordance with the manufacturer's printed instructions.
10. Corner sections of walls shall not be placed until the adjoining wall sections have cured at least 14 days.

F. Consolidation

- 1. All concrete shall be thoroughly consolidated by internal mechanical vibrators during the placing operation and shall be thoroughly worked around the reinforcement and embedded fixtures and into corners of the forms.
- 2. Concrete for slabs 8 inches thick or less may be consolidated with vibrating screeds. Slabs between 8 to 12 inches thick shall be compacted with internal vibrators and (optionally) with vibrating screeds.
- 3. Concrete shall be consolidated by vibration to the maximum practicable density. The concrete shall be free from pockets of coarse aggregate and entrapped air.
- 4. Vibrators shall have a minimum diameter of 3 inches with a frequency of at least 7000 vibrations per minute and with an amplitude adequate to consolidate the concrete in the section being placed.
- 5. Forms shall contain sufficient windows or shall be limited in height to allow visual observation of the concrete during placement. Sufficient illumination shall be provided in the interior of forms so that at the places of concrete deposition the concrete shall be visible from the deck or runway.
- 6. Vibrators shall not be secured to forms or reinforcement.
- 7. Keep a minimum of two standby vibrators in operable condition on the job during concreting operations.
- 8. Consolidation shall be carried on continuously with the placing of concrete.
- 9. The number of vibrators employed shall be sufficient to consolidate the concrete within 15 minutes after it is deposited in the forms.
- 10. When consolidating each layer of concrete, the vibrator shall be operated at regular and frequent intervals 18 to 30 inches apart.
- 11. The vibrator shall be kept in nearly a vertical position as possible. The use of vibrators to shift or drag concrete after deposition will not be permitted. Vibrators shall not be laid horizontally or laid over.
- 12. The vibrator head shall penetrate 6 to 8 inches into the preceding layer and then be withdrawn at a slow rate. The top part of each layer shall be re-vibrated systematically at the latest time the concrete can be made plastic by means of vibration.

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13. Concrete shall not be placed until the previous layer has been vibrated.
14. Unless directed otherwise by the Engineer, the top 2 feet of walls shall be re-vibrated approximately 1 hour after placement of concrete and while a running vibrator will still sink under its own weight into the concrete and liquefy it momentarily.

G. Protection of cast concrete: Conform to ACI 301.

H. Repair of surface defects: ACI 301.

1. Inspect concrete surfaces and surfaces to be painted immediately upon removal of forms. Irregularities shall be immediately rubbed or ground to secure a smooth, uniform, and continuous surface.
2. Clean surfaces of tie holes. Tie holes shall be filled solid with patching mortar.
3. Surfaces to be smoothed shall not be plastered or coated.
4. Patch imperfections as needed or as directed by the Engineer. Repairs in accordance with Section 3.8 shall not be made until the surface has been inspected and repair methods have been approved by the Engineer.

3.6 FINISHING

A. Finishing of formed surfaces: ACI 301:

1. Tops of forms:
 - a. Strike concrete smooth at tops of forms.
 - b. Float to texture comparable to formed surfaces.
2. Formed surfaces:
 - a. Finished formed surfaces shall conform accurately to the shape, alignment, grades, and sections shown on the drawings or prescribed by the Engineer.
 - b. Surfaces shall be free from fins, bulges, ridges, honeycombing, or roughness of any kind and shall present a finished, smooth, continuous hard surface.
 - c. Permanently exposed surfaces: ACI 301 - "Smooth Form Finish" with the fins ground smooth and air holes shall be filled with a non-shrink mortar. The color of the patch material shall match the color of the surrounding concrete. Surfaces in unfinished areas unexposed to public view: ACI 301- "Rough Form Finish".

B. Slabs: Minimum slab surface tolerance must satisfy ACI 301 and ACI 302.1R as measured in accordance with ASTM E1155.

1. Slabs-on-grade:
 - a. For exposed slabs, install semi-rigid epoxy sealant in construction and contraction joints after slab has a minimum of 60 days or otherwise approved by the Engineer.

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- b. Separate slabs-on-grade from vertical surfaces with 1/2-inch-thick joint filler. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.
 - c. Allowable tolerance for slab on grade surfaces, measured in accordance with ACI 117 and ASTM E1155, shall meet or exceed an overall value of FF35/FL25, with minimum local value of FF24/FL17.
2. Concrete Finishes:
- a. The following will not be permitted on slab or floor finishes:
 - 1) Dusting dry cement or sand on the surface to absorb excess moisture.
 - 2) Use of a mortar finishing coat.
 - 3) Excessive troweling or manipulation that brings water or a large number of fines to the surface.
 - 4) Use of a Fresno.
 - 5) Addition of water to the surface during the finishing operation.
 - 6) Use of the floor during construction in a manner that leads to marring or staining the finish.
 - b. Surface preparation
 - 1) The concrete shall be brought up evenly to slightly above finished grade and shall be thoroughly compacted and consolidated. The top shall be struck off to accurately established grade strips or grade blocks. Complete screeding before any excess moisture or bleed water is present on the surface.
 - 2) After bull floating, defer additional finishing operations until the concrete has stiffened sufficiently to sustain foot traffic pressure with an indentation of not more than 1/4 inch.
 - c. Exposed concrete slabs shall be sealed or sealed and hardened using a liquid compound compatible with the curing method used as described in: 3.7 Curing, Protection, Liquid Hardeners and Sealers of this Section.
 - d. Exterior Concrete Finishes: Unless otherwise noted on the drawings, floors and walkways shall be sloped a minimum 0.125 inch per foot to drain water. A light steel trowel with medium broom finish unless otherwise noted on the plans. Apply exterior sealer to surfaces exposed to deicer chemicals that is compatible with the curing method used.
 - e. Exposed Ramps, Landings and Stair Treads: A light steel trowel with medium broom finish unless otherwise noted on the plans. Surfaces shall be sealed or sealed and hardened using a liquid compound compatible with the curing method used.
 - f. A heavy broom finish shall be provided on disabled person ramps.

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3.7 CURING, PROTECTION, LIQUID HARDENERS AND SEALERS

A. Temperature, Wind, and Humidity

1. When concrete slabs and other unformed concrete is placed in warm, dry, dusty, or windy conditions, concrete surfaces shall be protected from rapid drying by use of windbreaks, shading, fogging with properly designed nozzles, or a combination of these measures. Hot weather concreting procedures provided in ACI 305R shall be used when ambient conditions dictate.
2. Cold weather concreting procedures provided in ACI 306R shall be used when ambient conditions dictate.
3. Changes in air temperature immediately adjacent to the concrete during and immediately following the 7-day initial curing period shall be kept as uniform as possible and shall not exceed 5 deg. F in any 1 hour or 50 deg. F. in any 24-hour time period.

B. Curing Compound

1. All curing methods shall be placed immediately after final finishing (i.e., within two hours). Contractor's attention is directed to the fact that experience shows the most important time of curing is from three to four hours after placing and extending five to six hours thereafter. It is extremely important, therefore, to prevent loss of moisture, particularly during this period when concrete is especially vulnerable to plastic shrinkage cracks. All exposed surfaces of concrete including floor slabs, whether or not they receive a finish flooring, shall be protected from premature drying for a minimum of seven days.
2. Apply the specified curing compound in strict accordance with manufacturer's written instructions. Curing compound shall not be diluted by the addition of solvents or thinners, nor shall it be altered in any other manner. Curing compound that has become chilled and is too viscous for satisfactory application shall be heated by steam or hot water bath until it has proper fluidity. The temperature of the compound shall not exceed 100 °F. Curing compound shall not be heated by direct exposure of the container to fire.
3. When used on an unformed concrete surface, application of the first coat of curing compound shall commence immediately after finishing operations have been completed. When curing compound is used on a formed concrete surface, the surface shall first be moistened with a fine spray of water immediately after the forms have been removed. The spray shall be continued until the surface does not readily absorb further water. As soon as the surface film of water has disappeared and the surface is almost dry, the first coat of curing compound shall be applied. In the event that application is delayed on either formed or unformed surfaces, the surface shall be kept continuously moist until the compound has been applied or the specified period of water curing has elapsed.

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4. Surfaces shall be sprayed uniformly with 2 coats of curing compound. Each coat shall provide a minimum coverage of 1 gallon per 250 square feet of surface. As soon as the first coat has become dry, a second coat shall be applied in the same manner. The direction of application of the second coat shall be perpendicular to the first coat. The curing compound shall be sprayed using approved pneumatic or pump driven equipment having the following characteristics:
 - a. Separate lines to the nozzle for material and for compressed air
 - b. A filtering system for the removal or entrapment of contaminants
 - c. A constant application pressure
5. Curing compound shall not be used on any concrete surface specified to receive additional concrete, coatings, grout, and chemical treatment

C. Protection

1. Freshly placed concrete shall be protected against wash by rain.
2. Dust control shall be provided in the surrounding areas during placement. If, in the opinion of the Engineer, these conditions are not satisfactory met, concrete shall not be placed.
3. During the first 2-day period of curing, no traffic on or loading of the floors will be permitted.
4. The contractor shall allow no traffic and take precautions to avoid damage to the membrane of the curing compound for a period of not less than 28 days. Damage shall be repaired immediately to the satisfaction of the Engineer.
5. Special care shall be taken to prevent avoid damaging the surfaces and joints due to load stresses from construction equipment, heavy shock, and excessive vibration. During construction activities, concrete shall be protected against damage with plywood or other approved materials until final acceptance by the Engineer.
6. Precautions shall be taken to prevent overloading floors, pavements, slabs, beams, and other members. The Contractor shall comply with the Engineer's instructions regarding the loads that will be permitted on these members during construction.
7. Self-supporting structures shall not be loaded in such a way to overstress the concrete.

3.8 PATCHING AND REPAIR

- A.** Concrete will be considered by the Engineer as not conforming to the intent of the drawings and specifications for the following reasons:
1. Concrete this is not formed as shown on the drawings.
 2. Concrete this is not in true alignment or level.
 3. Concrete which exhibits a defective surface.
 4. Concrete with defects that reduce the structural integrity of a member or members.

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5. Concrete jointed slabs with uncontrolled random cracking.
- B. Non-conforming concrete to required thickness, lines, details, and elevations will be rejected by the Engineer and shall be modified or replaced with concrete that conforms to the contract requirements without a claim by the Contractor for additional cost or extension of contract time.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of District Engineer for each individual area. Should the District Engineer grant permission for the Contractor to attempt restoration of a defective area by patching or other repair methods, such permission shall not be considered a waiver of the Engineer's right to require complete removal of the defective area if, in the Engineer's opinion, the restoration does not provide the structural or aesthetic integrity of the member or members.
- D. All repairs of defective areas shall conform to ACI 301. On areas requiring treatment of defects and until such repairs have been completed, only water cure will be permitted.
- E. At any time prior to final acceptance, concrete found to be defective, damaged, or not in accordance with the specifications shall be repaired or removed and replaced with acceptable concrete.
- F. If approved by the Engineer, repair or replace concrete with excessive honeycombing due to improper placement.
 1. Honeycombed areas shall be removed down to solid concrete a minimum of 1 inch over the entire area. Feathered edges will not be permitted. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut.
 2. Laitance and soft material shall be removed prior to patching with a pea gravel concrete mix and bonding agent approved by the Engineer.
 3. The area to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching materials.
 4. If a cement slurry bonding grout is approved, the heavy-cream consistency grout shall then be rigorously brushed into the surface. The concrete patch material shall be installed prior to the bonding grout skimming over or drying.
 5. If approved, a bonding admixture, bonding compound, or epoxy adhesive may be used in strict accordance with the manufacturer's preparation and application recommendations. Comply with ACI 301 and ACI 503.2 for standard specifications for bonding plastic concrete to hardened concrete with a multiple component epoxy adhesive.
 6. The repair concrete shall be thoroughly consolidated in place and struck off so as to leave the patch slightly higher than the surrounding surface. The

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concrete shall be left undisturbed for at least 1 hour to permit initial shrinkage then finished.

7. The patched area shall be kept damp for 7 days.
8. The color of the patch material shall match the color of the surrounding concrete. Repairs shall be made promptly while the base concrete is less than 28 days old
9. Metal tools shall not be used in finishing a patch in a formed wall that will be exposed.

- G. Areas requiring patching shall not exceed 2 sq. ft. per 1000 sq. ft. of surface area and shall be widely dispersed. Areas showing excessive defects as determined by the Engineer shall be removed and replaced.
- H. High spots identified in the floor flatness and levelness survey may be removed with bump grinding. Areas to be ground shall not exceed more than 10 percent of any one slab nor more than 5 percent of the total slab-on-grade area. There are no limitations for exterior concrete pavement areas requiring grinding.
- I. If approved by the Engineer, concrete slab random cracking may be routed and sealed. The number of interior/exterior slabs to be routed and sealed shall not exceed more than 20 feet of any one slab nor more than 5 percent of the total number of slab-on-grade/pavement slabs. Slabs with more than one structural crack or with multiple cracks within a slab shall be removed and replaced. If random cracks are attributed to non-working sawcut control joints, uncracked joints parallel to the cracking shall be filled with a structural epoxy.
- J. Interior slab-on-grade subjected to lift truck traffic shall be routed and sealed with a semi-rigid epoxy sealant. Exterior slabs may be routed and sealed with the flexible joint sealant to be installed in pavement joints.
- K. Completed concrete work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected by the District Engineer. In this event, modifications may be required to assure that remaining work complies with the requirements.
- L. The costs of any additional tests or analysis, including additional architectural and engineering services, performed to prove the adequacy of the concrete work, shall be borne by the Contractor without extension of contract time.

3.9 FIELD QUALITY CONTROL

- A. Quality Requirements: Field testing and inspection.
- B. Requirements:

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1. Provide and maintain an adequate program of quality control for the materials, production methods, and workmanship to assure conformance of all work to the project contract documents. ACI 121R outlines the essential elements of the Material Control portion of the QA program.
2. All materials, equipment, and methods shall be subject to verification inspections and/or testing as specified herein; ACI 121R.

END OF SECTION

SECTION 04 0514
MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mortar and for unit masonry.
 - 2. Grout for unit masonry.
- B. Related Sections:
 - 1. Section 04 22 00 - Concrete Unit Masonry: Installation of mortar and grout, reinforcement and anchorages.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 94 - Specification for Ready-Mixed Concrete.
 - 2. ASTM C 143 - Test Method for Slump of Hydraulic Cement Concrete.
 - 3. ASTM C 144 - Specification for Aggregate for Masonry Mortar.
 - 4. ASTM C 150 - Specification for Portland Cement.
 - 5. ASTM C 207 - Specification for Hydrated Lime for Masonry Purposes.
 - 6. ASTM C 270 - Specification for Mortar for Unit Masonry.
 - 7. ASTM C 387 - Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
 - 8. ASTM C 404 - Specification for Aggregates for Masonry Grout.
 - 9. ASTM C 476 - Specification for Grout for Masonry.
 - 10. ASTM C 1019 - Method of Sampling and Testing Grout.
 - 11. ASTM C 1142 - Specification for Extended Life Mortar for Unit Masonry.
 - 12. ASTM C 90 – Standard Specifications for Load Bearing Concrete
- B. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Procedures for submittals.
 - 1. Samples: Submit two samples 3-inch x 3 inch in size illustrating mortar color and color range.
 - 2. Assurance/Control Submittals:
 - a. Design Data: Design mix in accordance with the Proportion specification of ASTM C 270 and required environmental conditions.
 - b. Test Reports: Submit the following reports directly to Engineer from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements.

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- 1) Conformance to Proportion specification of ASTM C 270.
- 2) Test and evaluation reports to ASTM C 780.
- c. Certificates: Submit manufacturer's certificate that Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company experienced in performing the Work of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect Products.
- B. Store sand for mortar on plastic sheeting to prevent contamination by extraneous chemicals in earth beneath.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 1. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
 2. Specific Cold Weather Requirements: When the ambient air temperature is below 40 degrees F, heat mixing water to maintain mortar temperature between 40 degrees F and 120 degrees F until placed. When the ambient air temperature is below 32 degrees F, heat the sand and water to maintain this mortar temperature.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C 150, normal-Type I or Type II; gray color. Fly ash, slag, and pozzolans not permitted as substitutes for Portland cement.
- B. Mortar Aggregate: ASTM C 144, standard masonry type; clean, dry, protected against dampness, freezing, and foreign matter.
- C. Grout Aggregate: ASTM C 404; use of blast furnace slag is not permitted. Maximum coarse aggregate size, 3/8 inch.

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MASONRY MORTARING AND GROUTING

- D. Calcium chloride is not permitted in mortar or grout. Admixtures or other chemicals containing Thiocyanates, Calcium Chloride or more than 0.1 percent chloride ions are not permitted.
- E. Hydrated Lime: ASTM C 207, Type S.
- F. Water: Potable.
- G. Admixtures: Not permitted unless approved by Engineer prior to construction.

2.2 MIXES - MORTAR

- A. Mortar: Type "N" or Type "S", as recommended by manufacturer, in accordance with the Proportion specification of ASTM C 270.
 - 1. Mixing of components on-site is acceptable.
 - 2. Mixing on-site water and packaged dry blended mix for mortar (ASTM C 387), that contains no masonry cement, is acceptable.
- B. Pointing Mortar: Duplicate original mortar proportions. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 Percent of Portland cement weight.
- C. Mortar Color: Match Existing

2.3 MIXING - MORTAR

- A. Thoroughly mix mortar ingredients in accordance with ASTM C 270, in quantities needed for immediate use.
 - 1. Maintain sand uniformly damp immediately before the mixing process.
 - 2. Provide uniformity of mix and coloration.
 - 3. Do not use anti-freeze compounds.
 - 4. If water is lost by evaporation, re-temper only within 2 hours of mixing. Do not re-temper mortar more than 2 hours after mixing.

2.4 MIXES - GROUT FILL

- A. Grout fill is for concrete masonry unit bond beams, lintels, and reinforced cells with reinforcing bars and embedded plates.
 - 1. Compressive Strength: 2000 psi minimum at 28 days, as determined in accordance with the provisions of ASTM C 1019.
 - 2. Slump: 8 inches, minimum; 10 inches, maximum, taken in accordance with ASTM C 143.
 - 3. Use coarse grout when grout space is equal to or greater than 4 inches in both directions.

SECTION 04 0514
MASONRY MORTARING AND GROUTING

4. Use fine grout when grout space is smaller than 4 inches in either direction.
5. Do not use air-entrainment admixtures.

2.5 MIXING - GROUT

- A. Grout: Batch and mix grout in accordance with ASTM C 94 or ASTM C476 for site batched and mixed grout. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. After reinforcing of masonry is securely tied in place, plug cleanout holes with masonry units. Brace against wet grout pressure.
- B. Install mortar and grout under provisions of Section 04 22 00 – Concrete Unit Masonry.

END OF SECTION

**SECTION 04 22 00
CONCRETE UNIT MASONRY**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete unit masonry veneer.
- B. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 04 05 14 - Masonry Mortaring and Grouting: Mortar and grout.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 530 - Building Code Requirements for Masonry Structures.
 - 2. ACI 530.1 - Specifications for Masonry Structures.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 2. ASTM C 55 - Specification for Concrete Brick.
 - 3. ASTM C 129 - Specification for Non-Load Bearing Concrete Masonry Units.
- C. International Masonry Industry All- Weather Council (IMIAC):
Recommended Practices and Guide Specifications for Cold Weather Masonry construction.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data for each masonry unit type, accessory, and other manufactured products indicated.
 - 2. Shop Drawings: Precast inserts and keys showing sizes, profiles, and locations of each precast unit required.
 - 3. Samples: Two samples of each masonry unit type to illustrate color, texture, and extremes of color range.
 - 4. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - 5. Submit layout of control joint placement for the Engineer's approval prior to starting any work.

**SECTION 04 22 00
CONCRETE UNIT MASONRY**

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect Products.
- B. Materials shall be delivered and stored so as to avoid damage from breakage, moisture, staining or damage of any kind.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
 - 2. Hot Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Lightweight units used for non-load bearing walls, meeting requirements of ASTM C129, Type I. Provide units meeting fire resistance ratings.
- B. Lightweight units used for load bearing walls, meeting requirements of ASTM C90, Grade N, Type I. Provide units meeting fire resistance ratings.
- C. Units to be high precision block or glazed. Sizes and colors as designated on Plans.
- D. Special shaped units, U-blocks, etc., shall meet same specifications as adjacent units.
- E. Concrete masonry veneer units shall match existing Concrete Masonry Units in size, texture, and color.

2.2 MORTAR

- A. Specified in Section 040514 – Masonry Mortaring and Grouting.

2.3 REINFORCING

SECTION 04 22 00
CONCRETE UNIT MASONRY

A. Horizontal reinforcing for concrete masonry units shall be mill galvanized, ladder type with 9-gauge parallel wires in each face and 9-gauge cross members a maximum of 24 inches on center, butt welded to side rods. Provide prefabricated corners and tees.

B. Reinforcing bars for lintels shall meet ASTM A615, Grade 60.

2.4 CONTROL JOINTS

A. Joint filler shall be pre-formed neoprene or poly-vinyl chloride.

B. Control joint placement in non-reinforced masonry:

1. Vertical control joints shall be generally be located:
 - a. At major changes in wall height.
 - b. At changes in wall thickness.
 - c. At control joints in foundations, in roof, and in floors.
 - d. At chases and recesses for piping, columns, fixtures, etc.
 - e. At one or both sides of wall openings.
 - f. Near wall intersections.
 - g. Near return angles in L, T, and U-shaped structures.
2. Maximum spacing of control joints shall be in no case exceed 24 feet or as otherwise indicated on the Plans.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 PREPARATION

- A. Provide temporary bracing during installation of masonry Work. Maintain in place until building structure provides permanent bracing.

SECTION 04 22 00
CONCRETE UNIT MASONRY

- B. Lay out work to avoid use of less than 8-inch x 8-inch faced units at jambs in exposed work.
- C. Lintel block shall extend into side walls at jambs, at least 8 inches.

3.3 INSTALLATION

- A. CMU Base Drainage Course: Lay base drainage course of CMU, consisting of 2 wythes separated by a cavity sized to accommodate through-wall flashing and mesh.
- B. Mortar shall be thoroughly mixed and kept moist but shall not be re-tempered for use after initial set.
- C. Lay only dry masonry units.
- D. Use masonry saw for cutting exposed surfaces. Cut units to provide 1/8-inch clearance around electrical boxes and similar items.
- E. Do not use chipped, cracked or broken units.
- F. Set units plumb, true to line, and level.
- G. Adjust units to final position while mortar is soft and plastic. If unit is displaced after mortar has stiffened, remove unit, clean joints and unit of mortar and reset with fresh mortar.
- H. When joining fresh work to set or partially set masonry clean exposed surface and remove loose mortar before laying fresh masonry.
- I. When necessary to stop a horizontal, run rack back one-half block length in each course, do not tooth.
- J. Unless indicated otherwise partitions shall extend from floor to bottom of floor or roof construction above.
- K. Where rated partitions run perpendicular to deck, fill voids at deck with grout.

3.4 BOND

- A. Lay units in running bond with vertical joints centered on unit in course below unless indicated otherwise on drawings.

**SECTION 04 22 00
CONCRETE UNIT MASONRY**

3.5 MORTAR BEDS

- A. Lay hollow units with full mortar coverage on horizontal and vertical face shells. Provide full mortar coverage on horizontal and vertical face shells and webs where adjacent to cells or cavities to be filled with grout and on starting courses.
- B. Lay block with full horizontal and vertical joints.

3.6 WIRE REINFORCEMENT

- A. Wire Reinforcements shall be placed as follows:
 - 1. Four-inch concrete block walls with ends adjoining other partitions
 - a. Concrete block on slab on grade – continuous horizontal reinforcements 24 inches on center vertically (every third course).
 - b. Concrete block on slabs above grade - Continuous horizontal reinforcement 16 inches on center vertically (every other course).
 - 2. Eight-inch concrete block walls
 - a. Concrete block walls on slab on grade - continuous horizontal reinforcement 16 inches on center vertically (every other course).
 - b. Concrete block walls on slabs above grade - continuous horizontal reinforcements 24 inches on center vertically (every third course).
 - 3. Wire reinforcement shall be completely embedded in mortar or grout. Joints with wire reinforcement shall be at least the thickness of the wire.
 - 4. Wire reinforcement shall be lapped at least 8 inches at splices and shall contain at least one cross wire of each piece of reinforcement in the lapped distance.

3.7 JOINTS

- A. Nominal thickness shall be 3/8 inch (9 mm) and uniform.
- B. Shove vertical joints tight.
- C. Strike joints flush in surfaces to be exposed or painted.
- D. Tool joints slightly concave in surfaces to be exposed or painted.

3.8 BUILT-UP WORK

- A. Cooperate with other trades in building in items in masonry work.
- B. Grout solid around built-in items and in door frames.

**SECTION 04 22 00
CONCRETE UNIT MASONRY**

3.9 CLEANING AND POINTING

- A. Dry brush masonry surfaces after mortar has set, at end of each day's work and after final points.
- B. Cut out and repoint defective joints.
- C. At final completion of masonry work fill holes in joints and tool to match adjacent work. Cut out and repoint defective joints.
- D. Leave work and surrounding surfaces clean and free of mortar spots and droppings.

3.10 MASONRY JOINT REINFORCEMENT, TIES, AND ANCHORS

- A. Embed joint reinforcement, ties, and anchors with minimum 5/8-inch cover to outside face.
- B. Place single wire joint reinforcement at maximum spacing of 18 inches on center vertically. Mechanically attach anchors to the joint reinforcement with clips or hooks.

3.11 CONTROL AND EXPANSION JOINTS

- A. Construct control joints as detailed in the drawings as masonry progresses.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Architecturally exposed structural steel.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 03 30 00 - Cast-In-Place Concrete.
 - 3. Section 04 22 00 - Concrete Unit Masonry.
 - 4. Section 05 50 00 - Metal Fabrications.
 - 5. Section 07 40 00 - Metal Roof Panels
 - 6. Section 07 84 13 - Penetration Fireproofing.
 - 7. Section 09 91 00 - Paints and Coatings.

1.2 REFERENCES

- A. CBC Chapter 22A.
- B. American Institute of Steel Construction (AISC):
 - 1. AISC – Steel Construction Manual:
 - a. AISC 360 Specifications for Structural Steel Buildings.
 - b. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - c. RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.
 - 2. AISC 341 - Seismic Provisions for Structural Steel Buildings, including Supplements.
 - 3. AISC 358 - Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications.

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

1. ASTM A36 – Standard Specification for Carbon Structural Steel.
2. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
4. ASTM A123 – Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
5. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength.
7. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 Ksi Minimum Tensile Strength.
8. ASTM A435 - Standard Specification for Straight-Beam Ultrasonic Examination of Steel Plates.
9. ASTM A490 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
10. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
11. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
12. ASTM A572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
13. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
14. ASTM A673 - Standard Specification for Sampling Procedure for Impact Testing of Structural Steel.
15. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
16. ASTM A992 – Standard Specification for Structural Steel Shapes.

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17. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).
18. ASTM E23 - Standard Test Methods for Notched Bar Impact Testing of Metallic Materials.
19. ASTM E112 - Standard Test Methods for Determining Average Grain Size.
20. ASTM F436 – Standard Specification for Hardened Steel Washers.
21. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
22. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-Ksi Yield Strength.
23. ASTM F1852 – Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tension Strength.

D. American Welding Society (AWS):

1. AWS D1.1 – Structural Welding Code - Steel.
2. AWS D1.8 – Structural Welding Code – Seismic Supplement.
3. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination.
4. AWS B2.1 – Specifications for Welding Procedures and Performance Qualification.

E. SSPC – Steel Structures Painting Council:

1. SP-2 - Hand Tool Cleaning.
2. PA-1 - Paint Application Specification No. 1.

1.3 REGULATORY REQUIREMENTS

- A. Structural steel shall conform to CBC requirements, except that steel manufactured by acid Bessemer process is not permitted for structural purposes.

1.4 SUBMITTALS

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

- A. Shop Drawings: Submit Shop Drawings, including complete details and schedules for fabrication and shop assembly of members, and details, schedules, procedures and diagrams showing the sequence of erection. Fully detail minor connections and fastenings not shown or specified in the Contract Documents to meet required conditions using similar detailing as shown in the Contract Documents. Include a fully detailed, well controlled sequence and technique plan for shop and field welding that minimizes locked in stresses and distortion; submit sequence and technique plan for review by the ARCHITECT.
1. Include details of cuts, connections, camber, and holes in accordance with Figure 4.5 of AWS D1.1 or AISC Chapter J, weld position plan and other pertinent data. Indicate welds by standard AWS symbols, and show size, length and type of each weld.
 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed for Work specified in other sections.
 3. Erection and Bracing Plan and Erection Procedure: Submit an erection and framing plan, including columns, beams, and girders, signed and sealed by a Structural or Civil Engineer registered in the State of California in accordance with Title 8 California Code of Regulations, Section 1710, Structural Steel Erection. Maintain a copy at the Project site as required by the California Division of Industrial Safety.
 4. Submit a list of steel items to be galvanized.
 5. Include identification and details of Architecturally Exposed Structural Steel (AESS) members, if applicable.
- B. Product Data: Submit copies of fabricator's specifications and installation instructions for the following products. Include laboratory test reports and other data required demonstrating compliance with these Specifications:
1. Structural steel, each type; including certified copies of mill reports covering chemical and physical properties.
 2. Welding electrodes.
 3. Welding gas.
 4. Unfinished bolts and nuts.
 5. Structural steel primer paint.
 6. High-strength bolts, including nuts and washers.

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- C. Manufacturer's Mill Certificate: Submit, certifying that products meet or exceed specified requirements.
- D. Mill Test Reports: Submit manufacturer's certificates, indicating structural yield and tensile strength, destructive and non-destructive test analysis.
- E. Welding Procedure Specifications (WPS): Submit weld procedures for all welding on project to District's testing laboratory for approval. After approval by testing laboratory, submit to ARCHITECT for Record. Weld procedures shall be qualified as described in AWS D1.5, AISC 341 and AISC 358, as applicable. Weld procedures shall indicate joints details and tolerances, preheat and interpass temperature, post-heat treatment, single or multiple stringer passes, peening of stringer passes for groove welds except for the first and the last pass, electrode type and size, welding current, polarity and amperes and root treatment. The welding variables for each stringer pass shall be recorded and averaged; from these averages the weld heat input shall be calculated. Submit the manufacturer's product data sheet for all welding material used.
- F. Welder's Certificates: Field welders shall be Project certified in accordance with AWS D1.1. Shop welders shall be Project certified for FCAW in accordance with AWS D1.1.
- G. Test Reports: Submit reports of tests conducted on shop and field welded and bolted connections. Include data on type of test conducted and test results.
- H. Welding Material Certification: Provide certificate that welding material complies with specifications. Submit to District's testing laboratory.

1.5 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement, except as otherwise indicated:
 - 1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges, modified as follows:
 - a. Replace "Structural Design Drawings" with "Contract Documents" throughout the document.
 - b. Paragraph 3.2 is hereby modified in it's entirety as follows: "Contract Documents including but not limited to architectural, mechanical, plumbing, electrical, civil and kitchen design drawings and specifications shall be used as supplement to the structural plans to define configurations and construction information."

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- c. Delete Paragraph 3.3.
 - d. In Paragraph 4.4, delete the following sentence: "These drawings shall be returned to the Fabricator within 14 calendar days."
 - e. Delete Paragraph 4.4.1.(a) in its entirety.
 - f. Paragraph 4.4.2 is hereby modified in its entirety as follows:
"No review action, implicit or explicit, shall be interpreted to authorize changes in the Contract Documents."
- 2. Perform welding in accordance with AWS Standards, AWS D1.1, and California Building Code Section 2204A.1 and approved Weld Procedure Specifications (WPS).
 - 3. Welding for moment frames shall be in compliance with AISC 341 and AISC 358.
- B. Shop fabrication shall be inspected in accordance with CBC.
 - C. Erect mock-up panel of fabricated structural steel meeting Architecturally Exposed Structural Steel (AESS) tolerances for exposed areas. Approval by ARCHITECT is required. Mock-up to remain for comparison but may not be left as part of the work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store structural steel above grade on platforms, skids or other supports.
- B. Protect steel from corrosion.
- C. Store welding electrodes in accordance with AWS D 12.1.
- D. Store other materials in a weather-tight and dry place until installed into the Work.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Stock Materials: Provide exact materials, sections, shapes, thickness, sizes, weights, and details of construction indicated on Drawings. Changes because of material stock or shop practices will be considered if net area of shape or section is not reduced thereby, if material and structural properties are at least equivalent, and if overall dimensions are not exceeded.

SECTION 05 12 00
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- B. Shapes, bars, plates, tubes and pipes shall be made of materials with at least 16 percent recycled content if produced from Basic Oxygen Furnace (BOF) or at least 67 percent recycled content if produced from Electric Arc Furnace (EAF).

2.2 MATERIALS

- A. Structural Steel: Wide flange shapes shall conform to ASTM A992 grade 50. Other steel shall conform to ASTM A36.
- B. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low carbon bolts and nuts.
- C. High-Strength Threaded Fasteners: ASTM A325, ASTM A490 ASTM F959 or ASTM F1852 quenched and tempered, steel bolts, nuts and washers.
- D. Primers: Lead-free metal primer:
 - 1. SSPC-Paint 20, Zinc-Rich Primer.
 - 2. SSPC-Paint 23, Latex Primer.
 - 3. SSPC-Paint 25 Zinc Oxide Primer.
- E. Steel Pipe: ASTM A53, Type E or S, Grade B.
- F. Structural Tubing:
 - 1. Hot-formed, ASTM A501.
 - 2. Cold-formed, ASTM A500, Grade B.
- G. Galvanizing: ASTM A123.
- H. Welding Electrodes: Provide electrodes recommended by manufacturer for seismic connections. Comply with AISC 341.
- I. Shear stud connectors: ASTM A108, Grade 1015 forged steel, headed, uncoated, granular flux filled shear connector or anchor studs by Nelson Stud Welding Division, or equal.
- J. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at seven days; of consistency suitable for application and a 30-minute working time.

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STRUCTURAL STEEL FRAMING

2.3 FABRICATION

- A. Fabricate in accordance to AISC Code of Standard Practice for Steel Buildings and Bridges and AISC 360.
- B. Cleaning and Straightening Materials: Materials being fabricated shall be thoroughly cleaned of scale and rust, and straightened before fabrication. Cleaning and straightening methods shall not damage material. After punching or fabrication of component parts of a member, twists or bends shall be removed before parts are assembled.
- C. Cutting, Punching, Drilling and Tapping: Unless otherwise indicated or specified, structural steel fabricator shall perform the cutting, punching, drilling and tapping of Work so that Work of other trades will properly connect to steel Work.
- D. Milling: Compression joints depending on contact bearing shall be furnished with bearing surfaces prepared to a common plane by milling.
- E. Use of Burning Torch: Oxygen cutting of members shall be performed by machine. Gouges greater than 3/16 inch that remain from cutting shall be removed by grinding. Reentrant corners shall be shaped notch free to a radius of at least 1/2 inch. Gas cutting of holes for bolts or rivets is not permitted.
- F. Galvanizing: After fabrication, items indicated or specified to be galvanized shall be galvanized in largest practical sizes. Fabrication includes operations of shearing, punching, bending, forming, assembling or welding. Galvanized items shall be free from projections, barbs, or icicles resulting from the galvanizing process.
- G. Welding:
 - 1. Type of steel furnished in welded structures shall provide chemical properties suitable for welding as determined by chemical analysis. Welds shall conform to the verification and inspection requirements of CBC Chapter 17A. Conform to AWS D1.1, and CBC Chapter 22A.
 - 2. Materials and workmanship shall conform to the requirements specified herein and to CBC requirements, modified as follows:
 - a. No welded splices shall be permitted except those indicated on Drawings unless specifically reviewed by the ARCHITECT.
 - b. Drawings will designate joints in which it is important that welding sequence and technique be controlled to minimize shrinkage stresses and distortion.

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3. Welding shall be performed in accordance with requirements of the AWS Structural Welding Code.
 - a. Welded Joint Details: Comply with AISC 341, AISC 358 and drawing details.
 4. Architecturally Exposed Structural Steel: Verify that weld sizes, fabrication sequence, and equipment used for Architecturally Exposed Structural Steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds ½ inch and larger. Grind flush butt welds. Dress exposed welds.
 5. Remove erection bolts on welded, Architecturally Exposed Structural Steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- H. Shop Finish:
1. Notify the Project Inspector when Work is ready to receive shop prime coat. Work shall be inspected by the Project Inspector before installation of primer.
 2. Structural steel and fittings shall receive a coat of primer, except:
 - a. Surfaces that will be galvanized.
 - b. Surfaces that will be fireproofed.
 - c. Surfaces that will be field welded.
 - d. Surfaces in contact with concrete.
 - e. Surfaces high strength bolted.
 3. The primer specified shall be spray applied, filling joints and corners and covering surfaces with a smooth unbroken film. The minimum dry film thickness of the primer shall be 2.0 mils.
- I. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.
- J. Fabricate Architecturally Exposed Structural Steel with exposed surfaces smooth, square, and free of surfaces blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating and shop priming.

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2. Comply with fabrication requirements, including tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for Architecturally Exposed Structural Steel.
- K. Architecturally Exposed Structural Steel: use special care in unloading, handling and erecting the steel to avoid marking or distorting the steel members. Minimize damage to any shop paint when temporary braces or erection clips are used. Avoid unsightly surfaces upon removal. Grind smooth tack welds and holes filled with weld metal or body solder. Plan and execute all operations in such a manner that the close fit and neat appearance of the structure will not be impaired.

2.4 SHOP AND FIELD QUALITY CONTROL

- A. A special inspector, approved by District to inspect the Work of this section, shall inspect high-strength bolted connections. District will provide a approved independent testing laboratory to perform tests and prepare test reports in accordance with CBC 1704A. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.
- B. An AWS CWI certified special inspector, approved by District to inspect the Work of this section, shall inspect welded connections in accordance with CBC 1705A.2.5. The District will provide a approved independent testing laboratory to perform tests and prepare test reports. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.
- C. The independent testing laboratory shall conduct and interpret test and state in each report whether test specimens comply with requirements, and specifically state any deviations there from.
- D. Provide access to all places where structural steel Work is being fabricated or produced so required inspection and testing can be performed.
- E. The independent testing laboratory may inspect or test structural steel at plant before shipment; however, ARCHITECT reserves the right at any time before Contract Completion to deem materials not in compliance with the specified requirements as defective Work.
- F. Correct defects in structural Work when inspections and laboratory test reports indicate noncompliance with specified requirements. Perform additional tests as may be required to reconfirm noncompliance of original Work, and as may be required to show demonstrate compliance of corrected Work.

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- G. Inspection of Structural Tube Steel/Hollow Structural Sections (HSS): Structural tube steel members (round, square, rectangular), disregarding steel origin, will be inspected during shop fabrication. Inspector will perform a visual examination of the seam weld area for visible discontinuities. When defects are suspected, non-destructive testing will be considered.
- H. Welding: Inspect and test during fabrication and erection of structural steel assemblies as follows:
1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the Work. Record Work required and performed to correct deficiencies.
 2. Inspect welds. Welds shall be visually inspected before performing any non-destructive testing. Groove weld shall be inspected by ultrasonic or other approved non-destructive test methods. Testing shall be performed to AWS D1.1 Table 6.3 cyclically loaded non-tubular connections.
 3. Ultrasonic testing shall be performed by a specially trained and qualified technician who shall operate the equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. Repair and test defective welds.
 4. Rate of Testing: Completed welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.
 5. Welds, when installed in column splices, shall be tested by either ultrasonic testing or radiography.
 6. Base metal thicker than 1 ½-inch, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected by shear wave methods for discontinuities directly behind such welds. Tests shall be performed at least 48 hours after completed joint has cooled down to ambient air temperature.
 7. Material discontinuities shall be reviewed based on the defect rating in accordance with the criteria of AWS D1.1 table 6.3 by the ARCHITECT and District.
 8. Other method of non-destructive testing and inspection, for example, liquid dye penetrate testing, magnetic particle inspection or radiographic inspection may be performed on weld if required.

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9. Lamellar Tearing: Lamellar-tearing resulting from welding is a crack (with zero tolerance) and shall be repaired in accordance with AWS D1.1.
 10. Lamination: The rejection criteria shall be based on ASTM A435.
 11. Where testing reveals lamination or conditions of lamellar tearing in base metal, the steel fabricator shall submit a proposed method of repair for review by the ARCHITECT. Test repaired areas as required.
 12. 1Magnetic Particle Testing: Magnetic particle testing when required shall be provided in accordance with AWS D1.1 for procedure and technique. The standards of acceptance shall be in accordance with AWS D1.1 – Qualification.
-
- I. Lamellar Tearing: Prior to welding plates 1 to 1 ½-inch thick and greater and rolled shapes within the distance from 6 inches above the top of the joint to 6 inches below the bottom of the joint shall be checked by ultrasonic testing for laminations in base metal which may interfere with the inspection of the completed joint. Should these defects occur, members will be reviewed by the ARCHITECT and District. Welding procedure specifications in sub-section 1.5G specify welding practices to minimize lamellar tearing.
 - J. Prior Testing of Base Material: Test material before fabrication.
 - K. Lines and levels of erected steel shall be certified by a State of California licensed surveyor as set forth in related Division 01 section.
 - L. Welded studs shall be tested and inspected by the special inspector in accordance with requirements of AWS D1.1 – Stud Welding.
 - M. Record Drawings: After steel has been erected, correct or revise Shop Drawings and erection diagrams to correspond with reviewed changes performed in the field.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify governing dimensions and conditions of the Work before commencing erection Work.
 1. Report discrepancies between drawings and field dimensions to ARCHITECT before commencing work.

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

2. Beginning of installation means erector accepts existing conditions and surfaces underlying or adjacent to work of this section.
- B. Provide temporary shoring and bracing, and other support during performance of the Work. Remove after steel is in place and connected, and after cast-in-place concrete has reached its design strength.
- C. Coordinate prime coat repair and application with requirements of Section 09 91 00.

3.2 ERECTION

- A. Install structural steel accurately in locations, to elevations indicated, and according to AISC specifications and CBC requirements.
- B. Clean surfaces of base plates and bearing plates.
 1. Install base and bearing plates for structural members on wedges, shims, or setting nuts as required.
 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims; cut off flush with edge of base or bearing plate before packing with grout.
- C. Maintain erection tolerances of structural steel within AISC Code of Standard Practice for Steel Buildings and Bridges.
 1. Architecturally Exposed Structural Steel members and components, plumbed, leveled and aligned to a tolerance not to exceed one-half the amount permitted for structural steel. CONTRACTOR to provide adjustable connections between Architecturally Exposed Structural Steel and the structural steel frame or the masonry or concrete supports, in order to provide the erector with means for adjustment.
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact after assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 1. Level and plumb individual members of structure.
- E. Do not permit thermal cutting during erection of structural steel.
- F. Where indicated for field connections, provide standard bolts complying with ASTM A307.
- G. Install high strength steel bolts at locations indicated. Assembly and installation shall be in accordance with CBC requirements.
 1. Allowable hole sizes: 1/16 inch larger than bolt size.
 2. Use friction type connection with standard hardened steel circular, square or rectangular washer under bolt nut.

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STRUCTURAL STEEL FRAMING

- 3. Thoroughly clean area under bolt head, nut and washer. Remove all paint, lacquer, oil or other coatings except organic zinc-rich paints in accordance with SSPC, SP-2.
- 4. Tighten bolts by power torque wrench or hand wrench until twist-off.
- H. CONTRACTOR shall be responsible for correcting detailing and fabrication errors and for correct fitting of all members and components.
- I. Erect structural steel plumb and level and to proper tolerances as set forth in the AISC Manual. Provide temporary bracing, supports or connections required for complete safety of structure until final permanent connections are installed.
- J. Install column bases within a tolerance of 1/8 inch of detailed centerlines, level at proper elevations. Support bases on double nuts and solidly fill spaces under bases with cement grout.
- K. Provide anchor bolts with templates and diagrams. CONTRACTOR shall be responsible for proper location and installation of bolts. Correct deficiencies and errors.
- L. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A780.

3.3 FITTING

- A. Closely fit members, finished true to line and in precise position required to allow accurate erection and proper joining in the field.
- B. Drilling to enlarge unfair holes will not be allowed. Allow only enough drifting during assembly to bring parts into position, but not enough to enlarge holes or distort the metal. Do not heat rolled sections, unless approved by ARCHITECT.

3.4 PUNCHING AND DRILLING

- A. Punch material 1/16 inch larger than nominal diameter of bolt, wherever thickness of metal is equal to or less than the diameter of the bolt plus 1/8 inch.
- B. Drill or sub-punch and ream where metal is equal to or more than the diameter of the bolt plus 1/8 inch. Make diameter for sub-punched and sub-drilled holes 1/16 inch larger than nominal diameter of bolt.
- C. Precisely locate holes to ensure passage of bolt through assembled materials without drifting. Enlarge holes when necessary to receive bolts

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

by reaming; flame cutting to enlarge holes is not acceptable. Structural Steel members with poorly matched holes will be rejected.

3.5 FINISHING

- A. After erection, spots or surfaces where paint has been removed, damaged, or burned off, and field rivets, bolts, and other field connections shall be cleaned of dirt, oil, grease, and burned paint and furnished with a spot coat of the same primer installed during shop priming.
- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Install paint to exposed areas with the same material installed during shop painting. Install by brush or spray to provide a minimum dry film thickness of 1.5 mils.

3.6 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project Site.

3.7 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.8 HANDLING

- A. Both in shop and in the field, transport, handle and erect to prevent damage or overstressing of any component.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Decorative Metal Fencing & Gates
 - 2. Sheet Metal
- B. Related Documents: The Contract Documents, as defined in Division 1 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A123, "Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."
 - 2. ASTM A153, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware."
 - 3. ASTM A307, "Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength."
 - 4. ASTM A568, "Specification for General Requirements for Steel Sheet, Carbon, and High-Strength, Low Alloy Hot-Rolled and Cold Rolled."
 - 5. ASTM A627, "Specification for Homogeneous Tool-Resisting Steel Bars for Security Applications."
 - 6. ASTM A780, "Practice for Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings."
- B. American Welding Society (AWS):
 - 1. AWS D1.1 - Structural Welding Code.
- C. Steel Structures Painting Council Specification (SSPC):
 - 1. Steel Structures Painting Manual.

1.3 SUBMITTALS

- A. Division 1 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Submit complete descriptive data for all stock items.
 - 2. Shop Drawings:
 - a. Prepare Shop Drawings under seal of professional structural engineer registered in state where Project is located for products requiring structural engineering.

**SECTION 05 50 00
METAL FABRICATIONS**

- b. Include profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories, erection drawings, elevations, welded connections using standard AWS welding symbol with net weld lengths.
- c. Take field measurements prior to preparation of shop drawings and fabrication when possible. Allow for trimming and fitting whenever taking of field measurements before fabrication might delay construction.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel plates, angles, and other structural shapes shall conform to ASTM A36.
- B. Steel pipe shall conform to ASTM A53, Grade B, Schedule 40.
- C. Galvanized steel pipe and tube shall conform to ASTM A53.
- D. Steel Tubing shall conform to ASTM A500.
- E. Sheet Steel Galvanized: ASTM A446.
- F. Sheet and Strip Steel Hot Rolled: ASTM A568.
- G. Welding Materials: AWS D1.1; type required for materials being welded.
- H. Stainless Steel Sheet: ASTM A 240/A 240M, type 304 with #4 finish.
- I. Fasteners
 - 1. Bolts, Nuts and Washers for Exterior Locations: ASTM A307, galvanized in accordance with ASTM A153.
 - 2. Bolts, Nuts and Washers for Interior Locations: ASTM A307, Grade A, regular hexagon head.
 - 3. Bolts, Round Head: ANSI B-18.5
 - 4. Wood Screws, Flat Head Carbon Steel: ANSI B-18.6.1.
 - 5. Plain Washers, Helical Spring Type Carbon Steel: FS FF-W-84.

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METAL FABRICATIONS**

- J. Primers:
1. Primer for Painting: One of following:
 - a. Tnemec, Kansas City, MO, (816) 474-3400: No. 99 red primer.
 - b. Chessman-Elliott Company: Ceco No. 15 Primox.
 - c. Rowe Products, Inc.: No. 7-C-19.
 - d. Section 01 60 00 – Product Requirements. Substitutions: Permitted.
 2. Touch-Up Primer for Galvanized Surfaces: FS TT-P-641.

2.2 FABRICATION

- A. Fabricate steel items according to approved shop drawings and to applicable portions of AISC Specifications. Conceal welds where possible; grind exposed welds smooth and flush with adjacent finished surface. Ease exposed edges to small uniform radius.
- B. Pre-assemble products in shop to greatest extent possible. Disassemble units to extent necessary for shipping and handling. Clearly mark units for re-assemble and installation.
- C. For exposed to view fabrications, use materials which are smooth and free of surface blemishes including pitting, seams marks, roller marks, roller trade names and roughness. Remove blemishes by grinding or by welding and grinding, prior to cleaning, treating and application of surface finishes including zinc coating.
- D. Fabricate items with joints tightly fitted and secured.
- E. Fit and shop assemble in largest practical sections for delivery to Project site.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.
- G. Make exposed joints butt tight, flush and hairline.
- H. Fabricate anchorage and related components of same material and finish as metal fabrication, unless indicated otherwise.

2.3 ROUGH HARDWARE

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete

**SECTION 05 50 00
METAL FABRICATIONS**

or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.

- B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.4 MISCELLANEOUS STEEL TRIM

- A. Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.
- B. Galvanize miscellaneous framing and supports in the following locations:
 - 1. Exterior locations.

2.5 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish metal fabrications after assembly.

2.6 STEEL AND IRON FINISHES

- A. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process compliance with the following requirements:
 - 1. ASTM A153 for galvanizing iron and steel hardware.
 - 2. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.
- B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning":
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or

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masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

2.7 SHOP PAINTING AND PROTECTIVE COATING

- A. Conform to Steel Structures Painting Council Specification 15-68T, Type 1, including preparation for painting.
- B. Hot-Dip galvanizing and zinc coatings applied on products fabricated from rolled, pressed, and forged steel shapes, plates, bars and strips shall comply with ASTM Specification A123. Galvanized surfaces for which a shop coat of paint is specified shall be chemically treated to provide a bond for the paint. Except for bolts and nuts, all galvanizing shall be done after fabrication.
- C. Clean surfaces of rust, scale, grease and foreign matter in accordance with SSPC SP-1 solvent cleaning, prior to finishing. Prepare surfaces for painting in accordance with SSPC-SP2 Hand Tool Cleaning, SSPC-SP3 Power Tool Cleaning or SSPC SP-7 Brush Off Blast Cleaning.
- D. Do not prime surfaces in direct contact bond with concrete or where field welding is required.
- E. Prime paint items scheduled with one coat.
- F. Protect aluminum surfaces in contact with steel with zinc chromate primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

**SECTION 05 50 00
METAL FABRICATIONS**

3.2 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.3 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut or abrade the surfaces of *exterior* units which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

3.4 ADJUSTING AND CLEANING

- A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with

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METAL FABRICATIONS

same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

SECTION 06 15 16
WOOD ROOF DECK REPAIR AND REPLACEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Wood deck repair and replacement associated with roof replacement.

1.2 RELATED SECTIONS

- A. Division 1 – Submittal Procedures
- B. Section 01 60 00 – Product Requirements
- C. Section 02 41 00 – Roof Removal and Substrate Preparation
- D. Related Documents: The Contract Documents, as defined in Division 1 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.3 UNIT PRICES

- A. Provide unit prices for the work described in Articles 3.2 and 3.3.

1.4 REFERENCES

- A. Reference standards of the following sources are applicable to products and procedures specified in Part 2 - Products and Part 3 – Execution of this Section:
 - 1. American Wood Preservers Association (AWPA)
 - 2. American Wood Preservers Institute (AWPI)
 - 3. American National Standard Institute (ANSI)
 - 4. Western Wood Products Association (WWPA)

1.5 SUBMITTALS

- A. Prior to the start of work, submit the following to the District for approval:
 - 1. Product submittals required within Division 1.
- B. Refer to Division 1 for procedural requirements related to the submittal process.

1.6 QUALITY ASSURANCE PROCEDURES

- A. Applicator Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive a manufacturer's warranty. Company shall

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WOOD ROOF DECK REPAIR AND REPLACEMENT

have a minimum of 5 years documented experience certified by roofing system manufacturer.

- B. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by roofing system manufacturer for specified roofing system and shall be in compliance with specified regulatory requirements.
- C. Examine the technical specifications and drawings. Verify all dimensions, detail conditions, roof plan notes and existing site conditions that may affect the work. Verification of existing dimensions and site conditions is the responsibility of the Contractor. No additional compensation will be considered for failure to verify existing dimensions, detail conditions, roof plan note callouts, and existing site conditions.
- D. Upon examination, if conflicts between the technical specifications and drawings, and those of federal, state or local regulatory agencies, the product manufacturer, industry roofing standards, or District-mandated requirements are discovered, notify the District immediately for resolution.
- E. During work, if conditions are discovered which do not allow for continuation of the work per the technical specifications and drawings, notify the District immediately for resolution.

1.7 PRODUCT DELIVERY, HANDLING AND STORAGE

- A. Refer to Section 01 60 00 for transport, handling, storage and product requirements.
- B. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.
- C. Store materials in weather protected environment, clear of ground and moisture. Protect foam insulation from direct sunlight exposure. Store roll materials standing on end.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not perform wood deck repair/replacement work during inclement weather. Refer to product manufacturer for outdoor temperature requirements for installation of materials. Do not install materials at times when the outdoor temperature does not fall within the minimum/maximum temperature requirements of the manufacturer.

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WOOD ROOF DECK REPAIR AND REPLACEMENT

- B. Material Safety Data Sheets (MSDS) of all specified products shall remain on site for the duration of this project.

PART 2 – PRODUCTS

2.1 WOOD DECK REPAIR/REPLACEMENT MATERIALS

- A. For use at “Wood Deck Inspection/Repair” outlined in Article 3.2:
1. Steel plate: 16-gauge galvanized with pre-drilled holes for fasteners and plates.
 2. For securing wood to wood and wood to steel: No. 14 fluorocarbon-coated screws; length as necessary to penetrate minimum 1-inch depth through the deck.
 3. For securing wood to underlying structural steel (1/2-inch-thick max.): 12-24 x 1-1/4-inch Hex Washer Head, Teks 5, or approved equal.
- B. For use at “Wood Deck Inspection/Replacement” outlined in Article 3.3:
1. Replacement wood plank:
 - a. Wood plank dimensions and type: As required by conditions encountered; Type, grade and species to match dimensions and type of existing wood plank deck.
 2. Replacement plywood:
 - a. Plywood dimensions and type: As required by conditions encountered; Type, grade and species to match dimensions and type of existing wood plank deck.
 3. Fasteners:
 - a. For securing wood to wood and wood to steel: No. 14 fluorocarbon-coated screws; length as necessary to penetrate minimum 1-inch depth through the deck.
 - b. For securing wood to underlying structural steel (1/2-inch-thick max.): 12-24 x 1-1/4-inch Hex Washer Head, Teks 5, or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. Refer to Section 02 41 00 for general work and substrate preparation requirements.

3.2 WOOD DECK INSPECTION AND REPAIR (*Unit Price Work*)

- A. Repair at openings caused by obsolete roof penetration removal or other

SECTION 06 15 16
WOOD ROOF DECK REPAIR AND REPLACEMENT

defects less than 12" by 12" in size:

1. At locations encountered and other locations indicated by the District, cover the existing opening with 16-gauge steel plate stock. Lap the plate a minimum of 8-inches beyond the opening on all sides. Fasten the steel plate with specified fasteners and plates 6-inches on center. Secure the plate a minimum of 2-inches in from the outside edge of the repair plate.

3.3 WOOD DECK INSPECTION AND REPLACEMENT (*Unit Price Work*)

- A. Inspect deck for structurally unsound or otherwise defective areas and for fastening deficiencies. Perform treatments as indicated:
 1. Remove defective decking and repair resultant openings:
 - a. Install replacement decking with the long dimension across the supports. Leave a 1/8-inch gap at all edges and end joints. Install shims as necessary between the replacement decking and the structural members to ensure that the replacement decking is flush with adjacent decking.
 - b. Mechanically attach the new wood decking to the underlying supports using the specified fasteners.
 2. Install additional fasteners where the existing fasteners missed the underlying supports or where the number of fasteners installed does not meet minimum code requirements.
 3. Remove loose or protruding nails or hammer them down flush with the deck surface.
- B. Sweep deck clean before installing new materials.

END OF SECTION

**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood Framing.
 - 2. Concealed blocking behind wall mounted items.
 - 3. Sheathing material.
 - 4. Wood treatment.
- B. Related Documents: The Contract Documents, as defined in Section 01 1000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

- A. American Lumber Standards Committee (ALSC):
 - 1. Softwood Lumber Standards.
- B. American Plywood Association (APA):
 - 1. Grades and Standards.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - 2. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
- D. American Wood Preservers Association (AWPA):
 - 1. AWPA - C1 - All Timber Products - Preservative Treatment by Pressure Process.
 - 2. AWPA - C15 - Wood for Commercial-Residential Construction Preservative Treatment by Pressure Processes.
 - 3. AWPA - C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
 - 4. AWPA - C27 - Plywood - Fire-Retardant Treatment by Pressure Processes.
 - 5. AWPA - P5 - Waterborne Preservatives.
- E. Underwriters' Laboratories, Inc. (UL):
 - 1. UL FR S - Fire Rated Treated Wood with Flame Spread and Smoke Developed Ratings of 25 or less in accordance with ASTM E84.
 - 2. UL 723 - Test for Surface Burning Characteristics of Building Materials.

**SECTION 06 10 00
ROUGH CARPENTRY**

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Certificates:
 - 1) Pressure Treated Wood: Certification from treating plant stating chemicals and process used and net amount of preservative retained are in conformance with specified standards.
 - 2) Preservative Treated Wood: Certification for water-borne preservative that moisture content was reduced to 19 percent maximum, after treatment.
 - 3) Fire-Retardant Treated Wood: Certification from treating plant stating that fire-retardant treatment materials comply with governing code, ordinances and requirements of local authority having jurisdiction, and treatment will not bleed through finished surfaces.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by ALSC.
 - 2. Plywood Grading Agency: Certified by APA.
- B. Regulatory Requirements: Conform to applicable codes for fire-retardant treatment of wood surfaces for flame/smoke ratings.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect products.
 - 1. Inspect wood materials for conformance to specified grades, species, and treatment at time of delivery to Project Site.
 - 2. Reject and return unsatisfactory wood materials.
- B. Provide facilities for handling and storage of materials to prevent damage to edges, ends and surfaces.
- C. Keep materials dry. Stack materials off ground minimum 12 inches or, if on concrete slab-on-grade, minimum 1-1/2 inches, fully protected from weather. Provide for air circulation within and around stacks and under temporary coverings.
- D. For materials pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

**SECTION 06 10 00
ROUGH CARPENTRY**

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Formaldehyde: Products containing urea-formaldehyde will not be permitted.
 - 2. Wood pressure treatment products: Products containing chromium will not be permitted. Products containing arsenic will not be permitted.
 - 3. Use exterior plywood only. Interior plywood is not permitted.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

- A. Lumber, finished 4 sides, 15 percent maximum moisture content. Each piece of lumber to be factory marked with type, grade, mill and grading agency.
 - 1. Light framing: Construction grade Douglas fir or southern pine, appearance grade where exposed.
 - 2. Structural framing and timbers: No. 2 grade Douglas Fir, Southern Pine, or Spruce, appearance grade where exposed.
 - 3. Boards: Construction grade.

2.2 NAILERS, BLOCKING, FURRING AND SLEEPERS

- A. Wood for nailers, blocking, furring and sleepers: Construction grade, finished 4 sides, 15 percent maximum moisture content. Pressure preservative treat items in contact with roofing, flashing, waterproofing, masonry, concrete or the ground.

2.3 BUILDING PAPER

- A. Asphalt saturated felt, non-perforated.

2.4 FASTENERS

- A. Fasteners: Provide manufacturers recommended power tools for each type of fastener.
 - 1. Bolts, Nuts, Washers, Lag Screws, and Wood Screws: ASTM A307, Medium carbon steel; size and type to suit application; galvanized for treated wood; plain finish for other interior locations, of size and type to suit application, unless otherwise noted.
 - 2. Expansion Shield Fasteners: For anchorage of non-structural items to solid masonry and concrete.

**SECTION 06 10 00
ROUGH CARPENTRY**

3. Powder or Pneumatically Activated Fasteners: For anchorage of non-structural items to steel.
4. Fasteners for Wood and Plywood (over 1/2 inch) to Light Gage Metal Framing and Metal Deck (up to 1/8 inch thick):
 - a. Hilti PWH #3 with wings.
 - b. ITW TEKS/4 with wings.
 - c. Or approved equal.
5. Fasteners for Wood and Plywood (up to 2 inches thick) to Metal (from 1/8 inch to 1/4 inch thick):
 - a. Hilti PFH #4 with wings.
 - b. ITW TEKS/4 with wings.
 - c. Or approved equal.
6. Fasteners for Non-Structural Wood Members to Masonry: 1/4-inch diameter x 3-1/4 inch with Philips flat head.
 - a. Tapcon masonry anchors, by ITW Buildex.
 - b. Kwik-Con II fastener, by Hilti.
 - c. Or approved equal
7. Fasteners for preservative treated lumber must be hot dipped galvanized, type 304 or 316 stainless steel, or zinc-polymer coated.

2.5 WOOD TREATMENT

- A. Preservative Pressure Treated Lumber, Alkaline Copper Quat (ACQ): Type B, Ammoniacal Copper Quat or Type D, Amine Copper Quat.
 1. Manufacturers:
 - a. Chemical Specialties, Incorporated,
 - b. Arch Wood Protection, Inc.,
 - c. Osmose Inc.,
 - d. Or approved equal.
 2. Products:
 - a. CSI: "Preserve".
 - b. Arch Wood: "Natural Select".
 - c. Osmose: "Nature Wood".
 - d. Or approved equal.
 3. Impregnate lumber with preservative treatment conforming to AWPA Standard C1 and P5. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.
 4. Retention of preservative:
 - a. Moderate service conditions (weather exposure): 0.25 pounds per cubic foot (oxide basis).
 - b. Severe conditions (constant contact with ground or water): 0.40 pounds per cubic foot (oxide basis).
 5. Remove excess moisture where shrinkage is a serious fault or where treated lumber will be in contact with plaster, or stucco, and where water-borne treated lumber is to be painted or stained.

**SECTION 06 10 00
ROUGH CARPENTRY**

6. Lumber shall be dried to 15 to 19 percent moisture content after treatment, and material to be painted or stained shall have knots and pitch streaks sealed as with untreated wood.
 7. Liberally brush freshly cut surfaces, bolt holes and machined areas with the same preservative in accordance with AWWPA Standard M4.
 8. Treatment material shall provide protection against termites and fungal decay and shall be registered for use as a wood preservative by the U. S. Environmental Protection Agency.
- B. Wood Requiring Treatment:
1. Lumber, Preservative Treated: Nailers, blocking, stripping, and similar items in conjunction with roofing, flashing, and other construction. Sills, blocking, furring, stripping, and similar items in contact with masonry or concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 1. Verify that spacing, direction and details of supports are correct to accommodate installation of blocking, backing, stripping, furring and nailing strips.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 INSTALLATION - FRAMING

- A. Set structural members level and plumb, in correct position.
- B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Place horizontal members, crown side up.

**SECTION 06 10 00
ROUGH CARPENTRY**

- D. Construct load bearing framing and curb members full length without splices.
- E. Double members at openings as indicated on Drawings. Space short studs over and under opening to stud spacing.
- F. Construct double joist headers at ceiling openings and under wall stud partitions that are parallel to roof trusses. Frame rigidly into roof trusses.
- G. Place full width continuous sill flashings under framed walls on cementitious foundations. Lap flashing joint 4 inches.
- H. Place sill gasket directly on sill flashing. Puncture gasket clean and fit tight to protruding foundation anchor bolts.
- I. Coordinate installation of wood decking and prefabricated wood trusses.
- J. Install miscellaneous blocking, nailing strips and framing where required as backing for attachment of wall mounted fixtures, cabinetwork, and other items, and as detailed on Drawings. Coordinate to allow proper attachment of work of other Sections.
 - 1. Secure in place using fasteners specified. Use only recommended power tools for placement of fasteners.
 - 2. Recess heads of fasteners below surface of wood members.
- K. Secure in place with appropriate fasteners. Use fasteners of correct size that will not penetrate members where opposite side will be exposed to view or require finishing. Do not split wood with fasteners; set panel products to allow expansion at joints.
- L. Construct members of continuous pieces of longest possible lengths.

3.3 SITE TREATMENT OF WOOD MATERIALS

- A. Apply preservative treatment in accordance with manufacturer's published instructions.
- B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials and roofing and related metal flashings. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

**SECTION 06 10 00
ROUGH CARPENTRY**

3.4 CONSTRUCTION

- A. Site Tolerances:
1. Framing Members: 1/4 inch from true position, maximum.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspection.
- B. Framing Inspection:
1. Inspect wood framing installation and connections at completion of each phase of wood construction for correct installation, nailing, connections, and fasteners.
 2. Inspect and verify that types and spacing of fasteners are installed in locations specified or indicated on Drawings.
 3. Inspect types, locations, and fasteners for structural metal framing connectors.
 4. Inspect types, locations, and connections of hold-down anchors.
 5. Inspect wood to steel beam connections.

3.6 SCHEDULE - NAILING

<u>CONNECTION</u>	<u>NAILING</u>
Joist to sill or girder, toenail	3 - 8d
Bridging to joist, toenail each end	2 - 8d
Bottom Plate to joist or blocking, face nail	16d at 16 inches o.c.
Top plate to stud, end nail	2-16d
Stud to bottom plate	4-8d, toenail or 2-16d, end nail
Double studs, face nail	16d at 24 inches o.c.
Double top plates, face nail	16d at 16 inches o.c.
Top plates, laps and intersections, face nail	2 - 16d
Continuous header, two pieces	16d at 16 inches o.c. along each edge
Ceiling joists to plate, toenail	3 - 8d
Continuous header to stud, toenail	4 - 8d
Ceiling joists, laps over partitions, face nail	3 - 16d
Ceiling joists to parallel rafters, face nail	3 - 16d
Rafter to plate, toenail	3 - 16d
Built-up corner studs	16d at 24 inches o.c.
Built-up beams	20d at 32 inches o.c. at top and bottom staggered 2 - 20d at ends and at each splice

**SECTION 06 10 00
ROUGH CARPENTRY**

Payment for items of work covered under Division 6 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

END OF SECTION

SECTION 07 01 50
PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof tear-off.
 - 2. Temporary roofing membrane.
 - 3. Roof replacement preparation.

1.3 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain District's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Existing Membrane Roofing System: Roofing system identified above, including roofing membrane, roof insulation, surfacing, and components and accessories between deck and roofing membrane.
- C. Roof Tear-Off: Removal of existing membrane roofing system from deck.
- D. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.
- E. Existing to Remain: Existing items of construction that are not indicated to be removed.
- F. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

**SECTION 07 01 50
PREPARATION FOR RE-ROOFING**

- G. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- H. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Temporary Roofing: Include Product Data and description of temporary roofing system. If temporary roof will remain in place, submit surface preparation requirements needed to receive permanent roof, and submit a letter from roofing membrane manufacturer stating acceptance of the temporary membrane and that its inclusion will not adversely affect the roofing system's resistance to fire and wind.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer
- B. Digital Images or Videos: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, which might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.
- C. Schedule of Re-Roofing Preparation Activities: Indicate the following:
 - 1. Detailed sequence of re-roofing preparation work, with starting and ending dates for each activity. Ensure occupants' on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination of District's continuing occupancy of portions of existing building.

1.7 QUALITY ASSURANCE

- A. Reroofing Conference: Conduct conference at Project site.
 - 1. Meet with District; Architect; roofing system manufacturer's representative; roofing Installer including project manager, superintendent, and foreman; and installers whose work interfaces with or affects reroofing including installers of roof accessories and roof-mounted equipment.

SECTION 07 01 50
PREPARATION FOR RE-ROOFING

2. Review methods and procedures related to roofing system tear-off and replacement including, but not limited to, the following:
 - a. Reroofing preparation, including membrane roofing system manufacturer's written instructions.
 - b. Temporary protection requirements for existing roofing system that is to remain during and after installation.
 - c. Existing roof drains and roof drainage during each stage of reroofing, and roof drain plugging and plug removal requirements.
 - d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - e. Existing deck removal procedures and District notifications.
 - f. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
 - g. Structural loading limitations of deck during reroofing.
 - h. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect reroofing.
 - i. Existing conditions that may require notification of Architect before proceeding.

1.8 PROJECT CONDITIONS

- A. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- C. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.
- D. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

**SECTION 07 01 50
PREPARATION FOR RE-ROOFING**

PART 2 - PRODUCTS

2.1 INFILL MATERIALS

- A. Use infill materials matching existing membrane roofing system materials unless otherwise indicated.

2.2 TEMPORARY ROOFING MATERIALS

- A. Design and selection of materials for temporary roofing are responsibilities of Contractor.

2.3 TEMPORARY ROOF DRAINAGE

- A. Design and selection of materials for temporary roof drainage are responsibilities of the Contractor.

PART 3 - EXECUTION

3.1 PREPARATION, GENERAL

- A. Temporary Weather Protection: During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- B. Roof Drain Protection: Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
 - 1. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new membrane roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter or under existing membrane roofing system components that are to remain.

3.2 ROOF TEAR-OFF

- A. General: Notify District each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.
- B. Roof Tear-Off: Remove existing roofing membrane, insulations, flashings, and other membrane roofing system components down to the deck.

3.3 DECK PREPARATION

- A. Inspect deck after tear-off of membrane roofing system.

SECTION 07 01 50
PREPARATION FOR RE-ROOFING

- B. Roof Deck: If broken or loose fasteners that secure deck panels to one another or to structure are observed or if deck appears or feels inadequately attached, immediately notify Architect. Do not proceed with installation until directed by Architect.
 - 1. Unsuitable Deck: If deck surface is not suitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect. Do not proceed with installation until directed by Architect.

3.4 TEMPORARY DISPLACEMENT OF ROOFTOP EQUIPMENT

- A. Temporary displacement of mechanical units:
 - 1. If mechanical units are to be temporarily displaced, shut off all affected electrical, plumbing and gas lines and disconnect all electrical, plumbing, gas lines and ventilation ducts where required to allow for lifting mechanical units prior to roof removal work. All disconnection of plumbing, gas lines, electrical conduit and ventilation ducts is to be performed by a licensed mechanical/electrical contractor. Coordinate all disconnections with the District.
 - 2. Lift units in a manner that will not cause damage to the mechanical unit, mechanical unit components or structural deck.
 - 3. Prior to leaving the site, return units to their original position, resulting in a watertight condition.
 - 4. Ensure mechanical units are returned to their previous operational condition prior to leaving the site.
- B. Temporary displacement of gas lines, conduit, junction boxes and condensate lines:
 - 1. Temporarily displace gas lines, conduit, junction boxes, condensate lines or other items that may interfere with roof replacement work. Any necessary disconnection of gas lines, conduit and junction boxes is to be performed by a licensed mechanical/electrical contractor as applicable to the work being performed. Coordinate all disconnections with the District.
- C. After completion of work, reinstall any mechanical units that have been temporarily displaced. Reconnect all electrical, plumbing, gas lines and ventilation ducts where required. All reconnection of plumbing, gas lines, electrical conduit and ventilation ducts is to be performed by a licensed mechanical/electrical contractor. Coordinate all reconnections with the District.
- D. After completion of work, reconnect any gas lines, conduit and/or junction boxes have been disconnected. Reconnection of gas lines, conduit and/or

**SECTION 07 01 50
PREPARATION FOR RE-ROOFING**

junction boxes is to be performed by a licensed mechanical/electrical contractor as applicable to the work being performed. Coordinate all reconnections with the District.

3.5 TEMPORARY ROOFING MEMBRANE

- A. Install approved temporary roofing membrane over area to be reroofed.
- B. Remove temporary roofing membrane before installing new roofing membrane.

3.6 DISPOSAL

- A. Collect demolished materials and place in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
 - 1. Storage or sale of demolished items or materials on-site is not permitted.
- B. Transport and legally dispose of demolished materials off District's property.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by preparation for re-roofing operations. Return adjacent areas to condition existing before operations began.

END OF SECTION

SECTION 07 10 00 DAMPPROOFING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

1.2 SCOPE OF WORK

- A. Provide all labor, materials, services and equipment required to complete the laminated sheet vapor barriers complete ready to receive concrete.
- B. Vapor barriers are to be placed under all new interior on grade concrete slabs.

1.3 QUALITY ASSURANCE

- A. The installer shall be experienced in placement of vapor barrier and shall be associated with waterproofing or roofing work.

1.4 SUBMITTALS

- A. Manufacturer's Data, Laminated Vapor Barriers: For information only, submit two copies of specifications, installation instructions and general recommendations from the vapor barrier materials manufacturer's certification or other data substantiating that the materials comply with requirements. Indicate by copy of transmittal form that Installer has received copy of manufacturer's specifications, instructions and recommendations.

1.5 JOB CONDITIONS

- A. Examination of Substrate: The Installer must examine the substrate and the conditions under which the vapor barrier work is to be performed and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected projections through the vapor barriers have been installed.
- B. Proceed with vapor barrier work only after substrate construction and framing of openings has been completed, and wood blocking, nailers, curbs, vents, drains and other projections through the vapor barrier have been installed.
- C. Weather Conditions: Proceed with installation only when existing and

SECTION 07 10 00 DAMPPROOFING

forecasted weather conditions will permit the work to be performed in accordance with manufacturer's instructions and will permit the immediate installation of other work to be placed over the vapor barrier.

PART 2 - PRODUCTS

2.1 LAMINATED PLASTIC VAPOR BARRIER

- A. Heavy Kraft papers laminated between sheets of inert polyethylene, reinforced with glass fibers, with vapor transmission of .10 perms or less (ASTM E-96).
- B. Products offered by manufacturers to comply with the requirements include the following: Moistop; as manufactured by Fortifiber Corp. or approved equal.

2.2 VAPOR BARRIER ACCESSORY MATERIALS

- A. Adhesives: Provide the types of adhesives recommended by the vapor barrier manufacturer for the application shown and condition of installation in each case.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
- B. Under Floor Slabs on Grade: Install the type indicated by the method indicated. Exercise care to avoid punctures. Extend coverage to extremity of areas to receive barrier. Attach wherever necessary with adhesive.
- C. Seal joints in vapor barriers, and seal to other surfaces at extremities of coverage, by lapping and bonding with adhesives. Where adhesively sealed joints are not effective, and where nails or staples have been installed, seal with vapor barrier tape. Use vapor barrier tape or strips of vapor barrier material with adhesive to seal punctures, tears and penetrations through the barrier.

3.2 PROTECTION OF VAPOR BARRIERS

**SECTION 07 10 00
DAMPPROOFING**

- A. Do not allow foot traffic on vapor barriers. Proceed with vapor barrier installation ahead of the installation of insulation or other covering material only to the extent required for proper sequencing of the work.
- B. The vapor-barrier installer shall advise the Contractor of required procedures for surveillance and protection of installed vapor barriers, so that continuing construction activities and the work of other trades will not result in punctures or other forms of damage or deterioration of the vapor barriers.

END OF SECTION

**SECTION 07 40 00
METAL ROOF PANELS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Preformed roof panels, including accessories and supplementary devices for a waterproof installation.
- B. Related Requirements:
 - 1. Division 1: General Requirements.
 - 2. Section 05 1200: Structural Steel Framing.
 - 3. Section 06 10 00: Rough Carpentry.
 - 4. Section 07 60 00: Flashing and Sheet Metal.
 - 5. Section 07 92 00: Joint Sealants.

1.2 SYSTEM DESCRIPTION

- A. Metal Roof System:
 - 1. Standing seam metal roofing over solid deck or over steel framing members, as indicated in the drawings, with a minimum pitch of 3:12.
 - 2. Standing seam metal roofing with a minimum pitch of 1/2-inch per foot.
- B. Performance Requirements:
 - 1. Structural Performance: System shall safely resist the CBC positive and negative loads, including appropriate safety factors, when tested in accordance with ASTM E1592.
 - 2. Wind Uplift Classification: Roof panel system shall be listed as a Class 90 rated system, as determined by UL 580.
 - 3. Air Infiltration: Maximum 0.06 cfm per lineal foot (0.33 m³/hr per linear meter) of seam at static pressure of 6.24 psf (3.0 kPa) when tested per ASTM E1680.
 - 4. Water penetration:
 - a. No uncontrolled water penetration through joints when tested in accordance with AAMA 501.2.
 - b. No uncontrolled water penetration through the joints at a static pressure of 6.24 psf (3.0 kPa) when tested in accordance with ASTM E1646.

**SECTION 07 40 00
METAL ROOF PANELS**

5. Finish Performance Requirements:
 1. a. Color change and fade resistance: No cracking, peeling, blistering or loss of adhesion when tested in accordance with ASTM D4214, Method A.
 - 1) Color: No more than 5 Hunter units at 20 years.
 - 2) Chalk: Rating not less than 8 at 20 years.
 - 3) Film Integrity: 25 years.
 - b. Humidity resistance: No blistering, peeling or loss of adhesion after 1,000 hours testing, in accordance with ASTM D2247.

1.3 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings, indicating panel and fastener layout, joints, corners, supports, anchorages, trim, flashing, closures and special details.
- B. Product Data:
 1. Submit catalog cuts, technical data sheets and descriptive literature on sheets, panels, accessories and fasteners.
 2. Submit complete installation recommendations.
 3. Recycled Content Data: Submit information regarding product post-industrial and post-consumer recycled content.
- C. Material Samples: Submit Samples showing full range of manufacturer's standard colors, minimum 3-inch by 5-inch.

1.4 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 1. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
 2. AISC - Steel Construction Manual.
 3. AISI - Cold Form Steel Design Manual.
 4. ASTM A653 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

**SECTION 07 40 00
METAL ROOF PANELS**

5. ASTM A792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.
6. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
7. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
8. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
9. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
10. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
11. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
12. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
13. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
14. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
15. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
16. ASTM G90 - Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight.
17. Cool Roof Rating Council (CRRC) - Product Rating Program Manual (CRRC-1).
18. SMACNA – Architectural Sheet Metal Manual.
19. UL 580 – Standard for Tests for Uplift Resistance of Roof Assemblies.
20. UL 790 - Test Methods for Fire Tests of Roof Coverings, Class

**SECTION 07 40 00
METAL ROOF PANELS**

- B. Qualifications of Installer:
 - 1. Minimum two years experience in the installation of roof panel systems of similar complexity as required by this section.
 - 2. Trained and certified by manufacturer to install the specified products.
- C. Regulatory Requirements:
 - 1. Conform to CBC Title 24 Part 6 and to the requirements for a Cool Roof under the Product Rating Program CRRC-1 of the Cool Roof Rating Council.
 - a. Solar Reflectance (albedo by 100): three-year aged minimum 0.23 percent when tested in accordance to C1549.
 - b. Emissivity: three-year aged minimum 0.85 percent when tested in accordance to ASTM E408 or ASTM C1371.
 - c. Solar Reflectance Index (SRI): Alternative minimum 20 on slopes greater than 2:12 using three-year aged values of solar reflectance and solar emittance.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver panels to the Project site without damage.
- B. Storage: Store materials and accessories above ground on skidded platforms. Store under waterproof covering. Provide proper ventilation to panels to prevent condensation build-up.
- C. Handling: The bending, warping, or twisting of panels is not permitted during unloading, storing or installation.

1.6 WARRANTY

- A. Manufacturer shall provide a 20-year material warranty.
- B. Installer shall provide a five-year labor warranty.
- C. Finish Warranty: 20-year warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. AEP-Span.
- B. Berridge Manufacturing Company.

**SECTION 07 40 00
METAL ROOF PANELS**

- C. Centria Architectural Systems.
- D. Firestone Metal Products, LLC/UNA-CLAD.
- E. McElroy Metal Inc.
- F. Peterson Aluminum Corporation.
- G. The Garland Company, Inc.
- H. Equal.

2.2 PANEL DESIGN

- A. Roofing Panel style and configuration:
 - 1. Field Seam Standing Seam (for low slope less than or equal to 3:12 applications).
- B. Replaceability: Panels shall have the ability to be replaced without removal of adjacent panels.

2.3 MATERIALS

- A. Roof panel materials:
 - 1. Galvanized Steel: ASTM A653, Coating Class G90 coating weight. Minimum thickness 22 gage.
 - 2. Galvalume (Zincalume): Steel sheets coated with 55 percent aluminum and 45 percent zinc/mischmetal by weight, conforming to ASTM A792, AZ55 coating weight. Minimum thickness 22 gage.
 - 3. Profiles and Panel Sizes: As indicated on the drawings.
- B. Accessory materials:
 - 1. Clips, flashings, ridge sections, closures and other accessories: Manufacturer's standard, finished to match roof sheets where exposed.
 - 2. Underlayment: W.R. Grace Ultra, or equal, high temperature resistant, butyl rubber-based adhesive-backed, high-density cross laminated polyethylene sheet, 30 mils thick, furnished in 34-inch-wide rolls.
 - 3. Slip sheet: Unsaturated building paper weighing not less than five pounds per 100 square feet.
 - 4. Sealant: Elastomeric type containing no oil or asphalt. Exposed sealant shall be colored to match the applicable building color

SECTION 07 40 00 METAL ROOF PANELS

and shall cure to a rubber-like consistency. Sealant placed in the roof panel standing seam ribs shall be provided in accordance with the manufacturer's recommendations.

5. Gaskets and insulating compounds: Non-absorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be non-running after drying.
- C. Recycled Content: Post-consumer recycled content plus half of the post-industrial content shall equal to a minimum of 25 percent.
- D. Finish: Polyvinylidene fluoride color coat, minimum 70 percent pvdf resin content, applied to sight-exposed face of sheet after pretreatment and priming in accordance with coating manufacturer's recommendations; Kynar 500 or Hylar 5000.

2.4 FABRICATION

- A. Roll form panels in continuous lengths, full length of detailed runs.
- B. Fabricate trim, flashing and accessories to detailed profiles.
- C. Fabricate trim and flashing from same material as panel.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examination: Examine substrates and other installed item to verify suitability for installation. Do not proceed until unsuitable conditions have been corrected.

3.2 INSTALLATION

- A. Install base sheet and eave protection sheet underlayment as recommended by manufacturer.
- B. Install panels weathertight, without waves, wraps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
- C. Install panels in accordance with manufacturer's installation instructions and Shop Drawings.
- D. Where elements of metal roof panel system come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- E. Provide concealed anchors at all panel attachment locations.

**SECTION 07 40 00
METAL ROOF PANELS**

- F. Install panels plumb, level and straight with seams and ribs/battens parallel, conforming to design indicated on Drawings.

3.3 CLEANING

- A. Comply with the requirements of the Waste Management Plan, section 01 74 19, Construction and Demolition Waste Management.
 - 1. Recycle excess materials.
 - 2. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.4 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 07 54 19
POLYVINYL-CHLORIDE (PVC/TPA) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Mechanically-fastened thermoplastic PVC/TPA roofing system on wood deck, including:
 - 2. Substrate board.
 - 3. Walkway material.

1.3 DEFINITIONS

- A. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Base flashings and membrane terminations.
 - a. Indicate details meet requirements of NRCA required by this Section.
 - 2. Cricket layout, including slopes.
 - 3. Fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Samples for Verification: For the following products:
 - 1. Sheet roofing, including T-shaped side and end lap seam.
 - 2. Walkway pads or rolls.

SECTION 07 54 19
POLYVINYL-CHLORIDE (PVC/TPA) ROOFING

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Product Certificate: Submit letter, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.
- B. Qualification Data: For Installer, Manufacturer, and Roofing Inspector.
 - 1. Include letter from Manufacturer written for this Project indicating approval of Installer.
- C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Product Compatibility: Indicate manufacturer has verified compatibility of roofing system components, including but not limited to: Roofing membrane, flashing sheets, adhesives, and sealants.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- E. Warranties: Unexecuted sample copies of special warranties.
- F. Inspection Reports: Daily reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions taken to correct defective work.

1.6 INFORMATIONAL SUBMITTALS

- A. Maintenance Data: To include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years' experience installing products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section, UL listed for roofing systems identical to that specified for this Project, with minimum five years' experience in manufacture of specified products in successful use in similar applications.

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1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations of specified products not less than five years old, with District and Architect contact information.
 - e. Sample warranty.
 2. Approved manufacturers must meet separate requirements of Submittals Article.
- C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:
1. An authorized full-time technical employee of the manufacturer.
 2. An independent party certified as a Registered Roof Observer by the Roof Consultants Institute, retained by the Contractor or the Manufacturer and approved by the Manufacturer.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products.
- E. Pre-installation Roofing Conference: Conduct conference at Project site.
1. Meet with District, Architect, roofing Installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 2. Review drawings and specifications.
 3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

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4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
5. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.
6. Review structural loading limitations of roof deck during and after roofing.
7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.9 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

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- B. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
1. Provide tie-offs at end of each day's work to cover exposed roofing and insulation with a course of roofing sheet securely in place with joints and edges sealed.
 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
 3. Remove temporary plugs from roof drains at end of each day.
 4. Remove and discard temporary seals before beginning work on adjoining roofing.

1.10 WARRANTY

- A. Warranty, General: Warranties specified 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.
- B. Manufacturer's Warranty: Manufacturer's standard or customized form, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
1. Manufacturer's warranty includes roofing membrane, base flashings, fasteners, roofing membrane accessories and other components of roofing system specified in this Section. One manufacturer must provide the warranties for specification sections 070150.72, 070150.73, and 075216.15.
 2. Warranty Period: 20 years from date of Substantial Completion.
- C. Installer's Warranty: Submit roofing Installer's warranty, covering the Work of this Section and related Sections indicated above, including all components of membrane roofing such as single ply roofing membrane, base flashing, fasteners, cover boards, substrate boards, and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.
- D. Manufacturer Inspection and Preventive Maintenance Requirement: By manufacturer's technical representative, to report maintenance responsibilities to District necessary for preservation of District's warranty rights. The cost of

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manufacturer's annual inspections and preventive maintenance is included in the Contract Sum. Inspections to occur in Years 2, 5, 10 and 15 following completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer/Product: The roof system specified in this Section is based upon products of Tremco, Inc., Beachwood, OH, (800) 562-2728, www.tremcoroofing.com that are named in other Part 2 articles.
- B. Approval of Other Manufacturers and Comparable Products: Submit in accordance with project substitution requirements, within time allowed for substitution review.
- C. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
 - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 - 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Flashings and Fastening: Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with requirements and recommendations of the following:
 - 1. NRCA Roofing Manual (Sixth Edition) for construction details and recommendations.
 - 2. SMACNA Architectural Sheet Metal Manual (Seventh Edition) for construction details.

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- D. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- E. Energy Performance: Roofing system shall have an initial solar reflectance index of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

2.3 THERMOPLASTIC MEMBRANE MATERIALS

- A. Thermoplastic PVC/TPA sheet, ASTM D4434 Type IV internally fabric reinforced, Energy Star qualified, CRRC listed, and California Title 24 Energy Code compliant.
 - 1. Basis of design product: Tremco, TPA FB Roof Membrane.
 - 2. Tensile Strength at 0 deg. F (-18 deg. C), minimum, ASTM D 6509: 300 lbf/in (52 kN/m).
 - 3. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D 6509: 100 lbf (440 N).
 - 4. Elongation at 0 deg. F (-18 deg. C), minimum at fabric break, ASTM D 6509: 25 percent.
 - 5. Minimum Thickness, nominal, ASTM D 751: 60 mils (1.5 mm).
 - 6. Exposed Face Color: White.
 - 7. Reflectance, ASTM C 1549: 86 percent.
 - 8. Thermal Emittance, ASTM C 1371: 0.86.
 - 9. Solar Reflectance Index (SRI), ASTM E 1980: 108.
 - 10. Recycled Content, minimum: 25 percent preconsumer.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, and color as PVC/TPA sheet membrane.

2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

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B. Membrane Bonding Adhesive:

1. Elastomeric low-VOC water-based contact-type adhesive for bonding TPA fleece-backed single ply membranes and flashings to substrates.
 - a. Basis of design product: Tremco, Fleece Back WB Single Ply Bonding Adhesive.
 - b. VOC, maximum, ASTM D 3960: 200 g/L.

C. Flashing Sheet Bonding Adhesive:

1. Elastomeric low-VOC solvent-based contact-type adhesive for bonding TPA non-fleece-backed single ply membranes and flashings to substrates.
 - a. VOC, maximum, ASTM D 3960: <200 g/L.

D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 mm by 3 mm) thick; with anchors.

E. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch (25 mm wide by 1.3 mm) thick, prepunched.

F. Coping and Fascia Cover: 24-gauge aluminum-zinc alloy coated steel, class AZ50 coating designation, grade 50, prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

G. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening components to substrate, and acceptable to membrane roofing system manufacturer.

H. Termination Joint Sealant: Silicone, S, NS, 25 or 50, NT: Single-component, nonsag, plus 25 to 50 percent and minus 25 to 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT, and compatible with adjacent materials.

I. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 SUBSTRATE BOARDS

A. Glass-mat-faced gypsum panel, ASTM C1177/C 1177M.

1. Thickness: 1/4 inch.

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- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.6 WALKWAY MATERIALS

- A. Rubber Blocks: 100% rubber blocks with steel channels and reflective strips designed for supporting conduit.
- B. Walkway roll, reinforced PVC/TPA membrane roll with serrated slip-resistant surface, fabricated for heat welding to compatible PVC/TPA membrane surface.
 - 1. Basis of design product: Tremco, TPA Walkway Roll.
 - 2. Roll Size: 36 inches by 60 foot (914 mm by 18.3 m).
 - 3. Thickness: 0.08 inch (2 mm).
 - 4. Color: Grey.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - 2. Wood Roof Deck: Verify that wood deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6 mm) out of plane relative to adjoining deck.
 - 3. Existing Prepared Roof Substrate: Verify that existing insulation and substrate is sound and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

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- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 INSTALLATION, GENERAL

- A. Install roofing system in accordance with manufacturer's recommendations.
- B. Install blocking and nailers. Perimeter nailers must match height of cricket material.
- C. NRCA Installation Details: Install roofing system in accordance with the following NRCA Manual Plates and NRCA recommendations:
 - 1. Perimeter Edge, Embedded Edge: Plate TP-4.
 - 2. Curb Detail at Rooftop HVAC Units, Premanufactured: Plates TP-13.
 - 3. Curb Detail at Rooftop HVAC Units, Job-Built, Wood: Plate TP-14.
 - 4. Penetration, Sheet Metal Enclosure: Plate TP-16.
 - 5. Penetration, Stack Flashing: Plate TP-18.
 - 6. Penetration, Plumbing Vent: Plate TP-20.
 - 7. Penetration, Plumbing Vent, Premanufactured Boot: Plate TP-20A.
 - 8. Roof Drain: Plate TP-27.
 - 9. Base Flashing at Through-wall Scupper: Plate TP-28.
 - 10. Base Flashing at Overflow Scupper: Plate-29.
 - 11. Gutter at Draining Edge: Plate TP-30.
 - 12. Guide for Clearances between Pipes / Walls / Curbs – Table 4.
 - 13. Guide for Crickets and Saddles – Table 5.

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3.4 SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - 1. Secure substrate board using mechanical fasteners.
 - 2. Adhere substrate board to decking where fasteners will be visible on the underside of the decking.

3.5 MECHANICALLY FASTENED MEMBRANE ROOFING INSTALLATION

- A. Mechanically fasten membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
 - 1. Install sheet according to ASTM D 5082.
- B. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Mechanically fasten securely at terminations, penetrations, and perimeter of roofing.
- E. Adhere membrane to substrate board over deck areas where mechanical fasteners will be visible on the underside of the decking.
- F. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- G. Welded Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

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3.6 FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing. Install umbrellas to counterflash.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Install raised edge metal system with fascia metal covering new wood nailers. Cover edge metal with metal matching fascia metal.
- F. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.7 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products surrounding serviceable equipment and in a continuous path from roof access points. Heat weld walkway products to substrate according to roofing system manufacturer's written instructions.
- B. Install rubber blocks under pipe/conduits sitting on the roof. Loosely clamp conduit to unistrut channel and install an oversized walkway section under block.
 - 1. Support lines every 8 feet on pipe runs along with support on each side of every union, junction, and direction change.

3.8 FIELD QUALITY CONTROL

- A. Roofing Inspector: District has the option to engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.
- B. Roofing Inspector: Contractor shall engage a qualified roofing inspector for a minimum of 2 full-time days on site to perform roof tests and inspections and to prepare start up, interim, and final reports. Roofing Inspector's quality assurance inspections shall comply with criteria established in ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

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- D. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- E. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and District.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

**SECTION 07 60 00
FLASHING AND SHEET METAL**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sheet metal flashings in connection with roofing.
2. Reglet and counter flashing assemblies.
3. Miscellaneous metal flashing and counter flashing as required, except where provided under Divisions 22, Plumbing, 23, HVAC, or 26, Electrical.
4. Metal edging.
5. Drip flashings.
6. Sheet metal covering at outside storage units.
7. Sheet metal wall coverings.
8. Roof pipe flashings.
9. Other sheet metal items, not necessarily specified herein or in other sections, but required to prevent penetration of water into building.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 06 15 16 – Wood Roof Deck Repair and Replacement.
3. Section 07 40 00 – Metal Roof Panels.
4. Section 07 5419 - Polyvinyl-Chloride Roofing.
10. Section 07 9200 - Joint Sealants.
12. Division 8 - Openings.
14. Division 22 – Plumbing.
15. Division 23 - HVAC.
16. Division 26 - Electrical.

1.2 SUBMITTALS

- A. Shop Drawings: Submit for fabricated sheet metal indicating shapes, details, methods of joining, anchoring and fastening, thicknesses and gages of metals, concealed reinforcement, expansion joint details, sections, and profiles.
- B. Samples: Submit Samples for materials or assemblies as requested.
- C. Product Data: Submit brochures of manufactured items.

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1.3 QUALITY ASSURANCE

- A. Drawings and requirements specified govern. Provide the Work of this section in conformance with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.
- B. Materials shall conform to following standards:
 - 1. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 2. ASTM A653 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM B370 - Copper Sheet and Strip for Building Construction.
- C. Pre-installation Meetings: Refer to Division 07 roofing sections as appropriate. Attend the pre-installation and inspection meetings for roofing Work.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Do not install bent or otherwise damaged materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Galvanized Sheet Steel: ASTM A653, coating designation G90, hot-dip galvanized.
- E. Fastenings:
 - 1. Galvanized Steel: Nails, rivets, and other fastenings furnished in connection with galvanized sheet steel Work shall be sealed with rust resistive coating. Rivets shall be tinned. Nails and other fastenings shall be zinc-coated.
- F. Soldering Flux: Raw muriatic acid for galvanized steel; rosin for tin, lead and tinned copper; non-corrosive soldering salts for uncoated copper and acid-type flux formulated for soldering stainless steel.
- G. Solder: ASTM B32, Grade 5A, composed of 95-5 tin-antimony. Name of product manufacturer and grade designation shall be labeled, stamped or cast onto each coil or bar.

2.2 FABRICATION

- A. General:
 - 1. Accurately form sheet metal Work to dimensions and shapes indicated and required. Cope finish molded and brake metal shapes with true, straight, sharp lines and angles and, where intersecting each other, to a precise fit. Unless otherwise specified, all

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FLASHING AND SHEET METAL

galvanized sheet steel shall be 22 gage. Exposed edges of sheet metal shall have a ½ inch minimum hemmed edge.

2. Soldering of sheet steel or copper shall be performed with well-heated copper soldering iron or soldering torch, joints full flowing, neat and consistent. Fill joint completely with solder. Clean materials at joints before soldering, and tin coppers before soldering. Exposed soldering on finished surfaces shall be scraped smooth. Lock seam work shall be fabricated flat and true to line and soldered along its entire length. Acid-fluxed Work shall be neutralized after fabrication.
 3. Form and install sheet metal Work to provide proper allowances for expansion and contraction, without causing undue stresses in any part of completed Work. Installation shall be water and weathertight.
- B. Reglet Type Counterflashing: Where roof comes in contact with vertical surfaces, provide counterflashing. Set top of counter flashing 8 inches above roof deck unless otherwise indicated, and extend down at least 5 inches or to top of cant strip. Counterflashing and reglet shall be 22 gage galvanized sheet steel. Lap counter flashing and reglet 3 inches minimum at splices and miter at angles, or supply special metal corner fittings. Reglet and method of securing flashing shall be so constructed that flashing is firmly locked in place, but may be readily removed for replacement.
- C. Roof Expansion Joint Covers: Fabricate of 22 gage galvanized sheet steel, as detailed. One side of joint shall be zee shaped, with 3-inch standing leg extended over the joint and turned down. The other side shall be box shaped, fabricated to extend over the joint, over the standing leg, and turn down to form a water barrier. Prefabricated bellows type joint covers are not permitted.
- D. Miscellaneous Flashing: Unless otherwise indicated, miscellaneous flashing shall be fabricated of galvanized steel. Exterior doors and windows, unless covered by overhangs shall be provided with 22 gage galvanized steel drip flashing as detailed. At wood construction, nail flashing to framing before paper backed lath is installed.
- E. Roof Pipe Flashings: Provide PVC flashings or prefabricated welded or seamless flashings.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Concrete and masonry materials in contact with sheet metal shall be painted with alkali resistant coating, such as heavy-bodied bituminous paint. Wood in contact with sheet metal shall be painted with two coats of aluminum paint or one coat of heavy-bodied bituminous paint.

3.2 INSTALLATION

- A. General: Coordinate with installation of underlayment indicated in the Drawings and specified in Section 09 2423.

SECTION 07 60 00
FLASHING AND SHEET METAL

- B. Reglets: Install reglets at constant height above cant or as indicated. Provide minimum 3-inch lap at end splices of reglets. Seal laps watertight.
- C. Counterflashing:
 - 1. Install at constant horizontal elevation across roof slope and slope at constant height above cant or as indicated.
 - 2. Provide minimum 3-inch lap at all end splices of counterflashing.
- D. Galvanized sheet steel parapet coping and flashing shall be continuous over top of parapet to form a watertight cap, with waterproof seams at approximately 10 feet on center, or as indicated. Anchor coping to outside of wall with a continuous cleat face nailed at 24 inch centers. Coping shall be fastened on inside wall with hex head screws and bonded sealing washers through oversized holes in the back of the coping. Corners and angles shall be lapped and soldered; do not install joint sealant.

3.3 TESTING

- A. Perform field water testing to demonstrate installation is watertight. Continue testing with a continuous hose stream applied at base of installation for at least 30 minutes. If leaking is observed, discontinue test and repair installation, then test until satisfactory results are obtained.

3.4 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.5 CLEANING

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 07 62 07
SHEET METAL FOR PVC ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements related to sheet metal fabrication and installation related to fully-adhered Polyvinyl Chloride (PVC) roofing.

1.2 RELATED SECTIONS

- A. Section 01 33 00 – Submittal Procedures
- B. Section 01 60 00 – Product Requirements
- C. Section 02 41 00 – Roof Removal and Substrate Preparation
- D. Section 07 54 20 – Fully-Adhered PVC Roofing
- E. Section 07 92 01 – Sealants for Roof Replacement
- F. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.3 REFERENCES

- A. Reference standards of the following sources are applicable to products and procedures specified in Part 2 - Products and Part 3 – Execution of this Section:
 - 1. American Society for Testing and Materials (ASTM)
 - a. ASTM A 653/653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 2. American National Standard Institute (ANSI)
 - 3. Factory Mutual Global (FM)
 - 4. National Roofing Contractors Association (NRCA)
 - 5. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).
 - a. SMACNA Architectural Sheet Metal Manual, 6th Edition
 - 6. Single Ply Roofing Industry (SPRI)
 - a. ANSI/SPRI/FM 4435/ES-1 – Wind Design for Edge Systems Used with Low Slope Roofing Systems

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SHEET METAL FOR PVC ROOFING

1.4 SUBMITTALS

- A. Prior to the start of work, submit the following to the District for approval:
 - 1. Product submittals required within Section 01 33 00.
- B. Refer to Section 01 33 00 for procedural requirements related to the submittal process.

1.5 QUALITY ASSURANCE PROCEDURES

- A. **Applicator Qualifications:** A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive a manufacturer's warranty. Company shall have a minimum of 5 years documented experience certified by roofing system manufacturer.
- B. **Single Source Responsibility:** Roofing system materials and components shall be supplied and warranted by roofing system manufacturer for specified roofing system and shall be in compliance with specified regulatory requirements.
- C. Examine the technical specifications and drawings. Verify all dimensions, detail conditions, roof plan notes and existing site conditions that may affect the work. Verification of existing dimensions and site conditions is the responsibility of the Contractor. No additional compensation will be considered for failure to verify existing dimensions, detail conditions, roof plan note callouts, and existing site conditions.
- D. Upon examination, if conflicts between the technical specifications and drawings, and those of federal, state or local regulatory agencies, the product manufacturer, industry roofing standards, or District-mandated requirements are discovered, notify the District immediately for resolution.
- E. During work, if conditions are discovered which do not allow for continuation of the work per the technical specifications and drawings, notify the District immediately for resolution.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 01 60 00 for transport, handling, storage and product requirements.
- B. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.

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- C. Store materials in weather protected environment, clear of ground and moisture. Protect foam insulation from direct sunlight exposure. Store roll materials standing on end.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not perform work during inclement weather. Refer to product manufacturer for outdoor temperature requirements for installation of materials. Do not install materials at times when the outdoor temperature does not fall within the minimum/maximum temperature requirements of the manufacturer.
- B. Cold weather precautions:
 - 1. NOTE: Do not install sealants, adhesives, primers and pressure-sensitive flashings associated with sheet metal flashing at temperatures below 40°F (5°C).
 - 2. When the outside temperature is forecast to fall below 40°F (5°C), store unused materials in a heated location. Remove these materials only when ready for installation. Sealants, adhesives, primers and pressure-sensitive flashings should be maintained at a temperature of 40°F (5°C), minimum, at all times. Do not use sealants, adhesives or primers that develop a gelled or lumpy texture to them. Return these materials to a heated location.
 - 3. Be aware of potential condensation formation on the PVC roof surface during application/flash-off of adhesives and primer. Remove condensation using a heat gun prior to adhesion to the insulation or cover board substrate. Do not use an open flame to remove condensation from the roof membrane or flashing materials.
 - 4. Refer to the PVC roofing manufacturer and NRCA requirements and recommendations for additional cold weather application recommendations and restrictions.
- C. Material Safety Data Sheets (MSDS) of all specified products shall remain on site for the duration of this project.

PART 2 – PRODUCTS

2.1 SHEET METAL ACCESSORIES

- A. Perimeter edge metal flashing system: Perimeter edge sheet metal

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flashing system consisting of a continuous inner clip and outer fascia piece, designed in accordance with the requirements of ANSI/SPRI/FM 4435/ES-1.

1. Inner clip/retention system and continuous cleats associated with perimeter edge metal flashing systems: Galvanized steel, 20-gauge, ASTM A 653/653M; G-90, maximum section length of 10-feet.
 2. Fascia piece/gravel stop associated with perimeter edge metal flashing systems: PVC-coated prefinished galvanized steel, 24-gauge, maximum section lengths of 10-feet; color as selected by the District.
- B. Reglet-mounted, surface-mounted and slip counter flashings: Prefinished galvanized steel, 24-gauge, with Kynar 500 coating, maximum section lengths of 10-feet; standard prefinished color as selected by the District.
- C. Pitch pans:
1. Pitch pans: PVC-coated sheet metal, 24-gauge minimum thickness, or pre-fabricated pitch pan approved by the roofing membrane manufacturer. Fabricate to dimensions shown on drawings, with a minimum 4-inch depth and other dimensions to be kept to the minimum size necessary to provide a 2-inch clearance all sides from the penetration.
 2. Tubular penetration hoods and pitch pan covers: Stainless steel, 22-gauge. Solder all seams and laps watertight. Fabricate to dimensions shown on drawings.
- D. Miscellaneous sheet metal accessories:
1. For terminating flashing: Anchor bar: 1-inch x 1/8-inch extruded aluminum with slotted holes spaced 6 inches o.c.
 2. For securement of tubular penetration flashings and sheet metal hoods at tubular penetrations: Stainless steel adjustable clamp.

2.2 FASTENERS

- A. For securing sheet metal flashings: Fasteners appropriate for the substrate encountered, and compatible with the sheet metal type to be secured. Where fastener heads are exposed, provide neoprene washers.
- B. For copper: Copper or bronze fasteners.
- C. For stainless steel: Stainless steel fasteners.
- D. For securing aluminum anchor bar: Fasteners appropriate for substrate encountered, and approved by the roofing manufacturer.

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2.3 SEALANT

- A. Refer to Section 07 92 01.

PART 3 - EXECUTION

3.1 SHEET METAL INSTALLATION

- A. Perimeter edge metal flashing system:
1. Install the metal system manufacturer to meet the requirements of ANSI/SPRI/FM 4435/ES-1. Provide a system matching the dimensions indicated on the drawings.
 2. For pre-fabricated parapet cap metal systems: Install in accordance with the metal system manufacturer.
 3. For shop-fabricated perimeter edge metal systems:
 - a. Secure the horizontal flange of the inner clip/continuous cleat with nails 6-inches o.c.
 - b. Secure the outer vertical face of the continuous cleat with minimum #14 fasteners 18-inches o.c. Decrease fastener spacing to 9-inches o.c. within 10-feet of a building corner.
 - c. Place the outer fascia/gravel stop piece. Fully crimp the fascia to the underlying continuous cleat. Secure the flange with nails 3-inches o.c. in two staggered rows.
- B. Interior parapet, area divider and expansion joint covers, and fascia extensions:
1. Install caps, as detailed, at locations indicated on the drawings.
 2. Fabricate with seams type indicated on drawings to dimensions indicated on drawings. Provide a 3/4-inch hemmed drip edge.
 3. Fastening: Secure faces of interior parapet, area divider and expansion joint covers with specified fasteners appropriate for the substrate encountered, fitted with neoprene washers, spaced 18-inches o.c. max., and within 2-inches of each end.
 4. Join adjacent interior parapet, area divider and sheet metal expansion joint cover sections using standing seams, with a 1" height.
 5. Where interior parapet, area divider, and expansion joint covers terminate at walls, turn cap piece up 4-inches, minimum. Install counterflashing over exposed end piece.
- C. Fascia extensions:
1. Secure fascia extensions with specified fasteners appropriate for substrate condition encountered, 12-inches o.c. max.
- D. Reglet-mounted and slip counterflashing: Provide counterflashing, as

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detailed, at locations indicated on the drawings:

1. Cut reglets into masonry walls to accommodate reglet-mounted counterflashing.
 2. Fabricate counterflashing to dimensions indicated on drawings. Fabricate the counterflashing with a 3/4-inch hemmed drip edge, and on surface mounted counterflashing, a 1/2-inch 45-degree angle sealant slot. Fabricate slip counterflashing to dimensions necessary to accommodate existing conditions, and as shown on drawings. Provide a minimum 4-inch face if conditions allow.
 3. Secure counterflashing with specified fasteners appropriate for substrate condition encountered, fitted with neoprene washers. Space fasteners 12-inches o.c. max.
 4. Provide a continuous bead of sealant along the top edge of reglet-mounted and surface-mounted counterflashing to shed water and provide a watertight seal.
- I. Anchor bar: Fasten the upper edges of modified bitumen flashings with an anchor bar installed in accordance with the requirements of the roofing membrane manufacturer.

END OF SECTION

SECTION 07 92 00 JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Joint sealants.
 - 2. Preparation for application of sealants.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 06 2000 - Finish Carpentry.
 - 3. Section 07 6000 - Flashing and Sheet Metal.
 - 4. Section 07 8413 - Penetration Firestopping.
 - 5. Division 08 - Openings.
 - 6. Division 09 - Finishes.
 - 7. Section 10 2813 - Toilet Accessories.

1.2 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating sealant joint locations, with full-size sealant joint details.
- B. Product Data: Submit manufacturer's literature for each sealant material.
- C. Material Samples: Submit Samples indicating color range available for each sealant material intended for installation in exposed locations.
- D. Certifications: Submit manufacturer's certification materials comply with requirements specified.
- E. Site Samples: At locations required, provide a Sample of sealant for each typical installation, approximately 24 inches long, including joint preparation, backing, sealant and tooling. Allow backing to extend 6 inches beyond end of sealant for inspection of substrate.
- F. Test Reports: Submit manufacturer's adhesion compatibility test reports according to ASTM C794 for each substrate.

SECTION 07 92 00 JOINT SEALANTS

1.3 QUALITY ASSURANCE

- A. Qualifications of Installer: The Work of this section shall be installed by a firm which has been in the business of installing similar materials for at least five consecutive years; and can show evidence of satisfactory completion of five projects of similar size and scope. Installer shall have applicators trained and approved by manufacturer for performing this Work.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store in accordance with manufacturer's recommendations. Provide a uniform ambient temperature between 60- and 80-degrees F.

1.5 WARRANTY

- A. Manufacturer: five-year material warranty.
- B. Installer: two-year installation/application warranty.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Furnish sealants meeting following in-service requirements:
 - 1. Normal curing schedules are permitted.
 - 2. Non-staining, color fastness (resistance to color change), and durability when subjected to intense actinic (ultraviolet) radiation are required.
- B. Furnish the products of only one manufacturer unless otherwise required, sealant colors as selected to match the adjoining surfaces.

2.2 MANUFACTURERS

- A. Sealants must be approved by LAUSD's Office of Environmental Health and Safety (OEHS). Check OEHS website for approved products. Not all products by a manufacturer are approved by OEHS.

2.3 MATERIALS

- A. Sealants:
 - 1. Sealant 1: Acrylic latex, one-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C834, Type S, Grade NS, formulated to be paintable.
 - a. Tremco Inc., Acrylic Latex Caulk.
 - b. Pecora Corporation, AC-20.

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JOINT SEALANTS**

- c. Equal.
- 2. Sealant 2: Butyl sealant, one-part, non-sag, solvent-release-curing sealant complying with ASTM C1311, gun grade and formulated with a minimum of 75 percent solids.
 - a. Tremco Inc., Tremco Butyl Sealant.
 - b. Pecora Corp., BC-158.
 - c. Equal.
- 3. Sealant 3: Silicone sealant, one-part non-acid-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.
 - a. Dow Corning Corp., Dow Corning 790, 791, 795.
 - b. General Electric Co., Silpruf.
 - c. Tremco, Inc., Spectrem 1.
 - d. Pecora Corp., 864.
 - e. Equal.
- 4. Sealant 4: One-part mildew-resistant silicone sealant, complying with ASTM C920, Type S, Grade NS, Class 25.
 - a. Dow Corning Corp., Dow Corning 786.
 - b. General Electric Co., Sanitary 1700.
 - c. Tremco, Inc., Proglaze White.
 - d. Equal.
- 5. Sealant 5: One-part non-sag urethane sealant, complying with ASTM C920, Type S, Grade NS, Class 25.
 - a. Sika Corporation, Sikaflex -221e.
 - b. Equal.
- 6. Sealant 6: Multi-part pouring urethane sealant, complying with ASTM C920, Type M, Grade P, Class 25.
 - a. Sika Corporation, Sikaflex 2C NS/SL.
 - b. Equal.
- 7. Sealant 7: Acoustical sealant, non-drying, non-hardening permanently flexible conforming to ASTM D217.

SECTION 07 92 00 JOINT SEALANTS

- a. Pecora Corp., BA-98 Acoustical Sealant.
 - b. Equal.
- B. See 07 8413 - Penetration Firestopping for rated sealants.
- C. Joint Backing: ASTM D1056; round, closed cell Polyethylene Foam Rod; oversized 30 to 50 percent larger than joint width, reticulated polyolefin foam.
- D. Primer: Non-Staining Type. Provide primer as required and shall be product of manufacturer of installed sealant.
- E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.
- F. Sealants shall have normal curing schedules, shall be nonstaining, color fast and shall resist deterioration due to ultraviolet radiation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that joint openings are ready to receive Work and field tolerances are within the guidelines recommended by sealant manufacturer.

3.2 SURFACE PREPARATION

- A. Joints and spaces to be sealed shall be completely cleaned of all dirt, dust, mortar, oil, and other foreign materials which might adversely affect sealing Work. Where necessary, degrease with a solvent or commercial degreasing agent. Surfaces shall be thoroughly dry before application of sealants.
- B. If recommended by manufacturer, remove paint and other protective coatings from surfaces to be sealed before priming and installation of sealants.
- C. Preparation of surfaces to receive sealant shall conform to the sealant manufacturer's specifications. Provide air pressure or other methods to achieve required results. Provide masking tape to keep sealants off surfaces that will be exposed in finished Work.
- D. Etch concrete or masonry surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.
- E. Perform preparation in accordance with ASTM C804 for solvent release sealants, and ASTM C962 for elastomeric sealants.

SECTION 07 92 00 JOINT SEALANTS

- F. Protect elements surrounding Work of this section from damage or disfiguration.

3.3 SEALANT APPLICATION SCHEDULE

Location	Type	Color
A. Exterior and Interior joints in horizontal surfaces of concrete; between metal and concrete masonry and mortar.	Sealant 6	To match adjacent material
B. Exterior door, entrance and window frames. Exterior and interior vertical joints in concrete and masonry metal flashing.	Sealant 3 or 5	To match adjacent material
C. Joints within glazed curtain wall system. Skylight framing system. Aluminum entrance system glass and glazing.	Sealant 3	Translucent or Black
D. Interior joints in ceramic tile and at plumbing fixtures.	Sealant 4	Translucent or White
E. Under thresholds.	Sealant 2	Black
F. All interior joints not otherwise scheduled	Sealant 1	To Match Adjacent Surfaces
G. Heads and sills, perimeters of frames and other openings in insulated partitions	Sealant 7	Match Adjacent Surfaces

3.4 APPLICATION

- A. Provide sealant around all openings in exterior walls, and any other locations indicated or required for structure weatherproofing and/or waterproofing.
- B. Sealants shall be installed by experienced mechanics using specified materials and proper tools. Preparatory Work (cleaning, etc.) and installation of sealant shall be as specified and in accordance with manufacturer's printed instructions and recommendations.
- C. Concrete, masonry, and other porous surfaces, and any other surfaces if recommended by manufacturer, shall be primed before installing sealants. Primer shall be installed with a brush that will reach all parts of joints to be filled with sealant.

SECTION 07 92 00 JOINT SEALANTS

- D. Sealants shall be stored and installed at temperatures as recommended by manufacturer. Sealants shall not be installed when they become too jelled to be discharged in a continuous flow from gun. Modification of sealants by addition of liquids, solvents, or powders is not permitted.
- E. Sealants shall be installed with guns furnished with proper size nozzles. Sufficient pressure shall be furnished to fill all voids and joints solid. In sealing around openings, include entire perimeter of each opening, unless indicated or specified otherwise. Where gun installation is impracticable, suitable hand tools shall be provided.
- F. Sealed joints shall be neatly pointed on flush surfaces with beading tool, and internal corners with a special tool. Excess material shall be cleanly removed. Sealant, where exposed, shall be free of wrinkles and uniformly smooth. Sealing shall be complete before final coats of paint are installed.
- G. Comply with sealant manufacturer's printed instructions except where more stringent requirements are indicated on Drawings or specified.
- H. Partially fill joints with joint backing material, furnishing only compatible materials, until joint depth does not exceed 1/2-inch joint width. Minimum joint width for metal-to-metal joints shall be 1/4 inch. Joint depth, shall be not less than 1/4 inch and not greater than 1/2-inch.
- I. Install sealant under sufficient pressure to completely fill voids. Finish exposed joints smooth, flush with surfaces or recessed as indicated. Install non-tracking sealant to concrete expansion joints subject to foot or vehicular traffic.
- J. Where joint depth prevents installation of standard bond breaker backing rod, furnish non-adhering tape covering to prevent bonding of sealant to back of joint. Under no circumstances shall sealant depth exceed 1/2 inch maximum, unless specifically indicated on Drawings.
- K. Prime porous surfaces after cleaning. Pack joints deeper than 3/4 inch with joint backing to within 3/4 inch of surface. Completely fill joints and spaces with gun applied compound, forming a neat, smooth bead.

3.5 MISCELLANEOUS WORK

- A. Sealing shall be provided wherever required to prevent light leakage as well as moisture leakage. Refer to Drawings for condition and related parts of Work.
- B. Install sealants to depths as indicated or, if not indicated, as recommended by sealant manufacturer but within following general limitations:
 - 1. For joints in concrete walks, slab and paving subject to traffic, fill joints to a depth equal to 75 percent of joint width, but not more than 3/4 inch deep or less than 3/8 inch deep, depending on joint width.

**SECTION 07 92 00
JOINT SEALANTS**

2. For building joints, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.

3.6 CLEANING

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.7 CURING

- A. Sealants shall cure in accordance with manufacturer's printed recommendations. Do not disturb seal until completely cured.

3.8 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

**SECTION 07 9201
SEALANTS FOR ROOF REPLACEMENT**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements related to the installation of sealants associated with sheet metal flashing work.

1.2 RELATED SECTIONS

- A. Section 01 33 00 – Submittal Procedures
- B. Section 01 60 00 – Product Requirements
- C. Section 02 41 00 – Roof Removal and Substrate Preparation
- D. Section 07 62 07 – Sheet Metal for PVC Roofing
- E. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.3 REFERENCES

- A. Reference standards of the following sources are applicable to products and procedures specified in Part 2 - Products and Part 3 – Execution of this Section:
 - 1. American Society for Testing and Materials (ASTM)
 - a. ASTM C 920 – Standard Specification for Elastomeric Joint Sealants

1.4 SUBMITTALS

- A. Prior to the start of work, submit the following to the District for approval:
 - 1. Product submittals required within Section 01 33 00.
- B. Refer to Section 01 33 00 for procedural requirements related to the submittal process.

1.5 QUALITY ASSURANCE PROCEDURES

- A. Applicator Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive a manufacturer's warranty. Company shall have a minimum of 5 years documented experience certified by roofing system manufacturer.

**SECTION 07 9201
SEALANTS FOR ROOF REPLACEMENT**

- B. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by roofing system manufacturer for specified roofing system and shall be in compliance with specified regulatory requirements.
- C. Examine the technical specifications and drawings. Verify all dimensions, detail conditions, roof plan notes and existing site conditions that may affect the work. Verification of existing dimensions and site conditions is the responsibility of the Contractor. No additional compensation will be considered for failure to verify existing dimensions, detail conditions, roof plan note callouts, and existing site conditions.
- D. Upon examination, if conflicts between the technical specifications and drawings, and those of federal, state or local regulatory agencies, the product manufacturer, industry roofing standards, or District-mandated requirements are discovered, notify the District immediately for resolution.
- E. During work, if conditions are discovered which do not allow for continuation of the work per the technical specifications and drawings, notify the District immediately for resolution.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 01 60 00 for transport, handling, storage and product requirements.
- B. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.
- C. Store materials in weather protected environment, clear of ground and moisture. Protect foam insulation from direct sunlight exposure. Store roll materials standing on end.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not perform work during inclement weather. Refer to product manufacturer for outdoor temperature requirements for installation of materials. Do not install materials at times when the outdoor temperature does not fall within the minimum/maximum temperature requirements of the manufacturer.
- B. Cold weather precautions:

SECTION 07 9201
SEALANTS FOR ROOF REPLACEMENT

1. Refer to the sealant manufacturer for cold weather application recommendations and restrictions.
- C. Material Safety Data Sheets (MSDS) of all specified products shall remain on site for the duration of this project.

PART 2 – PRODUCTS

2.1 SEALANT

- A. Sealant: Moisture-cured, non-sag, one-part polyurethane sealant, in compliance with ASTM C 920, Type S, Grade NS. Color to match sheet metal or as directed by District.
 1. Closed-cell backing materials, bond breakers, and primers as recommended by the sealant manufacturer for the joint conditions encountered.
- B. High temperature sealant: For use at high-temperature penetrations and other locations where high temperatures are anticipated: Product type approved by District for temperature and substrate condition encountered.
- C. Sealant primer: Type recommended and approved by sealant manufacturer for substrate encountered.
- D. Joint filler, backer rod and bond breaker tape:
 1. Product(s) recommended and approved by sealant manufacturer for substrate encountered.
 2. Size and configuration as necessary for condition encountered.

PART 3 - EXECUTION

3.1 SEALANT INSTALLATION

- A. Cleaning: Clean surfaces immediately before installation of sealants to provide surfaces suitable for the installation of sealant.
- B. Joint filler, backer rod, and bond breaker tape: Install joint filler and backer rods to result in minimum sealant depth of 1/4-inch and maximum of 1/2 the joint width. If joint is of insufficient depth to receive joint filler or backer rod, install bond breaker tape to the bottom of the joint to prevent sealant bonding to the joint bottom.
- C. Primer: Apply primer if required by the sealant manufacturer for the type of sealant and conditions encountered. Apply primer in accordance with the sealant manufacturer's requirements and recommendations.

**SECTION 07 9201
SEALANTS FOR ROOF REPLACEMENT**

- D. Sealant installation: Install sealant where required in accordance with the requirements and recommendations of the sealant manufacturer. Tool the joint immediately after installation.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hollow Metal doors and frames.
- B. Related Documents: The Contract Documents, as defined in Section 01 1000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 08 71 00 - Door Hardware: Hardware coordination.
 - 2. Section 09 91 00 - Painting: Field painting and finishing of doors and frames.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 152 - Methods for Fire Tests of Door Assemblies.
 - 2. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1996.
- B. Door Hardware Institute (DHI):
 - 1. DHI - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
 - 2. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware.
- C. Steel Door Institute (SDI):
 - 1. SDI-100 - Recommended Specifications Standard Steel Doors and Frames.
 - 2. SDI-105 - Recommended Erection Instructions for Steel Frames.

1.3 SUBMITTALS

- A. Section 01 3300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Indicate door materials, gauges, configurations, and location of cut-outs hardware reinforcement, and finish.

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HOLLOW METAL DOORS AND FRAMES

- a. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for louvers.

1.4 DELIVERY, STORAGE AND PROTECTION

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect products.
- B. Protect doors and frames with resilient packaging.
- C. Break seal on-site to permit ventilation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering items which may be incorporated in the Work include the following:
 - 1. Amweld Building Products, Incorporated,
 - 2. Ceco Door Products,
 - 3. Curries Company,
 - 4. Republic Builders Products,
 - 5. Steelcraft,
 - 6. Or approved equal

2.2 FRAMES MATERIALS

- A. Exterior Frames: 14 gage, cold-rolled steel, mitered and welded, 2-inch profile, for installation in a metal or wood stud and gypsum board partition.
- B. Interior Frames: 16 gage, cold-rolled steel, mitered and welded, 2-inch profile, for installation in a metal or wood stud and gypsum board partition.

2.3 DOORS CONSTRUCTION

- A. General: Custom-made, flush-panel "seamless type" with one-piece face panels; continuous weld, seamless edge construction with no visible seams or joints on faces or on vertical edges.
 - 1. Doors: SDI-100, Level II - Heavy-Duty - 1-3/4 inch, Model 1 - Full Flush Design, 16 gage cold-rolled steel.

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HOLLOW METAL DOORS AND FRAMES

- a. Exterior doors: Thermal Insulation: Exterior doors shall be insulated to R values scheduled or indicated on drawings.
- b. Interior Doors: Kraft Honeycomb, Phenolic treated.

2.4 ACCESSORIES

- A. Rubber Silencers: Resilient rubber.

2.5 PROTECTIVE COATINGS

- A. Bituminous Coating: Fibered asphalt emulsion.
- B. Primer: Exposed surfaces shall be cleaned, treated with Bonderite chemical and given one baked-on shop coat of grey rust inhibiting primer.

2.6 FABRICATION

- A. Fabricate unit's rigid, neat, and free from warp or buckle. Fabricate KD or welded as specified. Weld exposed joints continuously; grind, dress, and make smooth, flush and invisible.
- B. Reinforce units to receive surface applied finish hardware.
- C. Prepare frame for silencers. Provide three single rubber silencers for single doors and two single silencers on frame head at double doors without mullions.
- D. Primer: Air dried.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the City.

3.2 INSTALLATION

- A. Install frames in accordance with SDI-105.
- B. Install doors in accordance with DHI.
- C. Install doors in accordance with manufacturer's published instructions, of size, and at locations indicated.
- D. Coordinate with adjacent wall construction for anchor placement.
- E. Field paint doors and frames as specified in Section 09 91 00.
- F. The frame is to be mounted to the studding in such a manner to prevent a spreading of the frame from the studs of less than 1/2 inch.

3.3 CONSTRUCTION

- A. Interface with Other Work:
 - 1. Coordinate frame installation with size, location, and installation.
 - 2. Coordinate with door opening construction, door frame, and door hardware installation.
- B. Site Tolerances:
 - 1. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspection.
- B. Inspect metal door and frame installation, alignment, attachment to structure, and operation.

3.5 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth and balanced door movement.
- B. Section 01 73 00 - Execution: Cleaning installed Work.

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

Payment for items of work covered under Division 8 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

END OF SECTION

SECTION 08 7100 DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Door hardware
- B. Related Divisions:
 - 1. Section 07 9200 – Joint Sealants.
 - 2. Section 08 1113 – Hollow Metal Doors and Frames.
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
 - 1. Signs.
 - 2. Toilet accessories, including grab bars.
 - 3. Installation.

1.2 REFERENCES

- A. Use date of standard in effect as of Bid date.
 - 1. American National Standards Institute – ANSI 156.18 – Materials and Finishes.
 - a) ANSI A156.18 Materials and Finishes
 - 2. BHMA – Builders Hardware Manufacturers Association
 - 3. DHI – Door and Hardware Institute
 - 4. NFPA – National Fire Protection Association
 - a) NFPA 80 – Fire Doors and Windows
 - b) NFPA 105 – Smoke and Draft Control Door Assemblies
 - c) NFPA 252 – Fire Tests of Door Assemblies
 - 5. UL – Underwriters Laboratories
 - a) UL10C – Positive Pressure Fire Tests of Door Assemblies.
 - b) UL 305 – Panic Hardware
 - 6. WHI – Warnock Hersey Incorporated State of California Building Code
 - 7. Local applicable codes
- B. Abbreviations
 - 1. Manufacturers: see table at 2.1.A of this section

1.3 SUBMITTALS & SUBSTITUTIONS

- A. SUBMITTALS: Submit six copies of schedule per D. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Minimum 10pt font size. Include following information:

SECTION 08 7100 DOOR HARDWARE

1. Type, style, function, size, quantity and finish of hardware items.
 2. Use BHMA Finish codes per ANSI A156.18.
 3. Name, part number and manufacturer of each item.
 4. Fastenings and other pertinent information.
 5. Location of hardware set coordinated with floor plans and door schedule.
 6. Explanation of abbreviations, symbols, and codes contained in schedule.
 7. Mounting locations for hardware.
 8. Door and frame sizes, materials and degrees of swing.
 9. List of manufacturers used and their nearest representative with address and phone number.
 10. Catalog cuts.
 11. Point-to-point wiring diagrams.
 12. Manufacturer's technical data and installation instructions for electronic hardware.
- B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.
- C. Deviations: Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.
- D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Engineer for resolution.
- E. Substitutions per Section 01 60 00 – Product Requirements. Include product data and indicate benefit to the Project. Furnish operating samples on request. Engineer will make final determination of equivalency.
- F. Items listed with no substitute manufacturers have been requested by District to meet existing standard.
- G. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, riser and point-to-point wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.
- 1.4 QUALITY ASSURANCE:
- A. Qualifications
1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Engineer and Contractor.
 - a. Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

**SECTION 08 7100
DOOR HARDWARE**

- B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.
- C. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: coordinate delivery to appropriate locations (shop or field).
 - 1. Permanent keys and cores: secured delivery direct to District's representative.
- B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.
- C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION:

- A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Engineer's approval.
- B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:
 - 1. Location of embedded and attached items to concrete.
 - 2. Location of wall-mounted hardware, including wall stops.
 - 3. Location of finish floor materials and floor-mounted hardware.
 - 4. At masonry construction, coordinate with the anchoring and frame supplier prior to frame installation by placing a strip of insulation, wood, or foam, on the back of the hollow metal frame behind the rabbet section for continuous hinges, as well as at rim panic hardware strike locations, silencers, coordinators, and door closer arm locations. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.
 - 5. Manufacturers' templates to door and frame fabricators.
- C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.

**SECTION 08 7100
DOOR HARDWARE**

- D. Environmental considerations: segregate unused recyclable paper and paper product packaging, uninstalled metals, and plastics, and have these sent to a recycling center.

1.7 WARRANTY

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:
 - 1. Locksets: Three years.
 - 2. Closers: Ten years mechanical.
 - 3. Hinges: One year.
 - 4. Other Hardware: Two years.

1.8 REGULATORY REQUIREMENTS 2016 CALIFORNIA BUILDING CODE

- A. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 11B-404.2.7.
- B. Handles, pull, latches, locks, other operating devices: readily operable from egress side without tight grasping, tight pinching, or twisting of the wrist to operate. California Building Code 11B-309.4.
- C. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per California Building Code, Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
 - 1. Door latch shall release when subjected to a 15-pound force.
 - 2. Door shall be set in motion when subjected to a 30-pound force.
 - 3. Once set in motion, door shall swing to a full-open position when subjected to a 5-pound force.
- D. Adjust door closer sweep periods so that from an open position of 90 degrees, the time require to move the door to a position of 12 degrees from the latch is 5 seconds minimum, measured to the landing side of the door, per California Building Code Section 11B-404.2.8.1.
- E. Adjust delayed action spring hinge at accessible stalls for so that from the open position of 70 degrees, the door or gate shall move to the closed position in 1.5 seconds minimum, per California Building Code Section 11B-404.2.8.2.
- F. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per California Building Code Section 11B-404.2.10.
- F. Door opening clear width at accessible stalls no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and the hardware projects no more than 4 inches. California Building Code Section 11B-404.2.3.

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DOOR HARDWARE**

- G. Door opening clear height no less than 80 inches measured from top of sill to bottom of frame header stop. Projections into clear opening height not to exceed 2 inches. California Building Code Section 11B-307.4 Exception.
- H. Thresholds: floor or landing no more than 0.50 inches below the top of the threshold of the doorway. Change in level between 0.25 inches and 0.50 inches: beveled to slope no greater than 1:2 (50 percent slope). California Building Code Section 11B-404.2.5 & 11B-303.2.
- I. Floor stops: Do not locate in path of travel. Locate no more than 4 inches from walls.
- J. Meet California Building Code Sections 11B-404.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Listed acceptable alternate manufacturers in accordance with the Item Equivalency provisions:
 - 1. Hinges
 - a. (IVES) Ives.
 - b. Select.
 - c. Hager.
 - d. Or approved equal.
 - 2. Key System
 - a. (CLK) Clark Security
 - b. Schlage.
 - c. Or approved equal.
 - 3. Mechanical Locks
 - a. (SCH) Schlage.
 - b. Falcon.
 - c. Or approved equal.
 - 4. Closers
 - a. (LCN) LCN
 - b. Or approved equal.
 - 5. Push & Pull Plates
 - a. (IVES) Ives.
 - b. Trimco
 - c. Or approved equal.
 - 6. Kickplates
 - a. (IVES) Ives.
 - b. Trimco.
 - c. Or approved equal.
 - 7. Stops & Holders
 - a. (TRI) Trimco.
 - b. Rockwood.

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- c. Or approved equal.
- 8. Threshold
 - a. (PEM) Pemko.
 - b. Or approved equal.

2.2 HINGING METHODS:

- A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise Engineer if 8-inch width is insufficient.
- B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Engineer of deviation from scheduled hardware.
- C. Continuous Hinges:
 - 1. Pinned steel/stainless steel type: continuous stainless steel, 0.25-inch diameter stainless-steel hinge pin, 316 alloy.
 - a. Use engineered application-specific wide-throw units as needed to provide maximum swing degree of swing, advise architect if required width exceeds 8 inches.

2.3 LOCKSETS, LATCHSETS, DEADBOLTS

- D. Mortise Locksets and Latchsets: as scheduled.
 - 1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
 - 2. Universal lock case – 10 functions in one case.
 - 3. Floating mounting tabs automatically adjusts to fit a beveled door edge.
 - 4. Latchbolts: 0.75 inch throw stainless steel anti-friction type.
 - 5. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
 - a. Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
 - b. Inside lever applied by screwless shank mounting – no exposed trim mount screws.
 - c. Levers rotate up or down for ease of use.
 - d. Vandalgard locks: locked lever freely rotates down while remaining securely locked. This feature prevents damage to internal lock components when subjected to excessive force.
 - 6. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
 - 7. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
 - 8. Deadbolts: stainless steel 1-inch throw.

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9. Electric operation: Manufacturer-installed continuous duty solenoid.
10. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
11. Scheduled Lock Series and Design: Schlage L series, 03L design or approved equal.

2.6 CLOSERS

A. Surface Closers:

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
1. ISO 2000 certified. Units stamped with date-of-manufacture code.
2. Independent lab-tested 10,000,000 cycles.
3. Non-sized and adjustable. Place closers inside building, stairs and rooms.
4. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
5. Advanced Variable Backcheck (AVB): where scheduled, these units commence backcheck at approximately 45 degrees.
6. Adjustable to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per California Building Code, Section 1133B.2.5 and 1008.1.3, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units. EDA arms: rigid main and forearm, reinforced elbow.
9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
11. Non-flaming fluid, will not fuel door or floor covering fires.
12. Pressure Relief Valves (PRV) not permitted.

- #### **B. High Security Closers: Removable heavy gage metal case. Cylinders independent test lab certified to exceed 10,000,000 cycles. Vandal and tamper resistant forged steel arm. Exposed fasteners: pinned TORX type.**
1. Advanced Variable Backcheck (AVB): where scheduled, these units commence backcheck at approximately 45 degrees.

2.7 OTHER HARDWARE

- #### **A. Door Stops: Provide stops to protect walls, casework or other hardware.**

SECTION 08 7100 DOOR HARDWARE

1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
 2. Locate overhead stops for maximum possible opening. Consult with District for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.
- B. Through-bolts: Do not use. Coordinate with hollow metal frames and doors; ensure provision of proper embedded blocking to support wood screws for mounting door closers.
1. Exception: surface-mounted overhead stops, holders, and friction stays.
- 2.8 FINISH:
- A. Generally: BHMA 626 Satin Chromium.
1. Areas using BHMA 626: furnish push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise scheduled.
- B. Door closers: factory powder coated to match other hardware, unless otherwise noted.
1. Provide manufacturer's "SRI" special rust-inhibiting epoxy undercoat.
- 2.9 KEYING REQUIREMENTS:
- A. Key System: Clark Security Sargent "LA" keyway or approved equal utility-patented keyway, interchangeable core. Utility patent protection to extend at least until 2029. Key blanks available only from factory-direct sources, not available from after-market key blank manufacturers. Initiate and conduct meeting(s) with Engineer to determine system keyway(s), keybow styles, structure and degree of geographic exclusivity. Do not order keys or cylinders without written confirmation of actual requirements from the Engineer.
- B. Keys
1. Factory registered master key system.
 2. Construction keying: furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cylinders/cores in District's presence. Demonstrate that construction key no longer operates.
 3. Furnish 10 construction keys.
 4. Furnish 2 construction control keys.
- C. Key Cylinders: furnish utility patented, 6-pin solid brass construction.
- D. Cylinder cores: furnish keyed at factory of lock manufacturer where permanent records are maintained. Locks and cylinders same manufacturer.
- E. Permanent keys: use secured shipment direct from point of origination to District.

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1. For estimate: 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.
2. For estimate: VKC stamping plus "DO NOT DUPLICATE".
3. Bitting List: use secured shipment direct from point of origination to District upon completion.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS

- A. Can read and understand manufacturers' templates, suppliers' hardware schedule and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.2 PREPARATION

- A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation. Installation denotes acceptance of wall/frame condition.
- B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
 1. Notify Engineer of code conflicts before ordering material.
 2. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 1133B.2.5.2.
 3. Locate panic hardware between 36 inches to 44 inches above the finished floor.
 4. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
- C. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

3.3 INSTALLATION

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.
 1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.

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2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or equal anchoring device for screws.
 3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Engineer.
 4. Replace fasteners damaged by power-driven tools.
- B. Locate floor stops no more than 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Engineer for direction.
- C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.
- D. Locate overhead stops for minimum 90 degrees at rest and for maximum allowable degree of swing.
- E. Drill pilot holes for fasteners in wood doors and/or frames.
- F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to District items not scheduled for reuse.

3.4. ADJUSTING

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
1. Hardware damaged by improper installation or adjustment methods: repair or replace to Engineer's satisfaction.
 2. Adjust doors to fully latch with no more than 1 pound of pressure.
 3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.
 4. Adjust door closers per 1.9 this section.

3.5 DEMONSTRATION

- A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING:

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

**KESSLER PARK SNACK BAR 08 7100 - 10
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE**

SECTION 08 7100 DOOR HARDWARE

- A. See door schedule in drawings for hardware set assignments.
- B. Do not order material until submittal has been reviewed, stamped, and signed by Architect's door hardware consultant.

Hardware Group No. 001

For use on Door #(s):

1 5

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	3CB1 4.5 X 4.5 NRP		630	IVE
1	EA	ENTRANCE W/DEADBOLT	L9453L 03A L583-363		626	SCH
1	EA	MORTISE CYLINDER	TO MATCH BLDG STANDARD		626	TBD
1	EA	SURFACE CLOSER	4040XP EDA TBWMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18S/FS18L AS REQ'D		BLK	IVE
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	546A OR AS DETAILED OR AS DETAILED		A	ZER
1	EA	GASKETING	188SBK PSA		BK	ZER

NEW CYLINDER TO MATCH EXISTING BUILDING STANDARD - CONSULT BUILDING LOCKSMITH

Hardware Group No. 002

For use on Door #(s):

6 7 8

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	3CB1 4.5 X 4.5 NRP		630	IVE
1	EA	CLASSROOM LOCK	L9070T 03A		626	SCH
1	EA	MORTISE CYLINDER	TO MATCH BLDG STANDARD		626	TBD
1	EA	SURFACE CLOSER	4040XP EDA TBWMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D		626	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

NEW CYLINDER TO MATCH EXISTING BUILDING STANDARD - CONSULT BUILDING LOCKSMITH

SECTION 08 7100 DOOR HARDWARE

Hardware Group No. 003

For use on Door #(s):

3

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	3CB1 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	L9080T 03A		626	SCH
1	EA	MORTISE CYLINDER	TO MATCH BLDG STANDARD		626	TBD
1	EA	SURFACE CLOSER	4040XP EDA TBWMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18S/FS18L AS REQ'D		BLK	IVE
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	546A OR AS DETAILED OR AS DETAILED		A	ZER
1	EA	GASKETING	188SBK PSA		BK	ZER

NEW CYLINDER TO MATCH EXISTING BUILDING STANDARD - CONSULT BUILDING LOCKSMITH

Hardware Group No. 004

For use on Door #(s):

2

4

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	3CB1 4.5 X 4.5 NRP		630	IVE
1	EA	CLASSROOM DEAD LOCK	L9463L 626 XB11-720		626	SCH
1	EA	MORTISE CYLINDER	TO MATCH BLDG STANDARD		626	TBD
1	EA	PUSH PLATE	8200 4" X 16" CFC		630	IVE
1	EA	PULL PLATE	8302 8" 4" X 16" CFT		630	IVE
1	EA	SURFACE CLOSER	4040XP TBWMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS401/402CCV		626	IVE
3	EA	SILENCER	SR64		GRY	IVE

NEW CYLINDER TO MATCH EXISTING BUILDING STANDARD - CONSULT BUILDING LOCKSMITH
PUSH/PULL TO BE CUT FOR CYLINDER AND THUMB TURN WITHIN ADA HEIGHT REQUIREMENT

Payment for items of work covered under Division 8 of the plans and these specifications shall be based on the lump sum bid pricing for the various items identified under Door and Windows in the Bid Specifications.

END OF SECTION

**KESSLER PARK SNACK BAR
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE**

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SECTION 09 24 00
PORTLAND CEMENT PLASTER AND METAL LATH

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Lath and Portland cement plaster and stucco as indicated.
- C. Related Sections:
 - 1. Division 1 - General Requirements.
 - 2. Section 06 10 00: Rough Carpentry.

1.2 DESIGN REQUIREMENTS

- A. Provide pre-formulated finish coat products that require only addition of clean water for mixing.

1.3 SUBMITTALS

- A. Shop Drawings: Submit elevations and details indicating locations and types of components, splices, connections and accessory items. Indicate locations and types of framing substrates.
- B. Material Samples: Submit minimum 48-inch x 48-inch samples of each stucco and Portland cement plaster texture for review. Samples shall be representative of texture, color, and proposed workmanship. Maintain reviewed Samples on Project site for reference.
- C. Product Data: Submit manufacturer's catalog data for each material and component proposed for installation.
- D. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.
- E. Mock-ups: Provide a mock-up at least 10 feet x 10 feet x 1 foot. Include at least one control joint and, corner condition and one window opening flashing. Locate where required by the Architect.

1.4 QUALITY ASSURANCE

- A. Coordinate with related Work to provide backing support for items mounted on finished surfaces and to provide allowances for pipes and other items in wall cavities.
- B. Comply with the following ASTM Standard Specifications as a minimum requirement:

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PORTLAND CEMENT PLASTER AND METAL LATH

1. ASTM A641 – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM C150 – Standard Specification for Portland Cement.
4. ASTM C206 – Standard Specification for Finishing Hydrated Lime.
5. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring.
6. ASTM C842 – Standard Specification for Installation of Interior Gypsum Plaster.
7. ASTM C847 - Standard Specification for Metal Lath.
8. ASTM C897 – Standard Specification for Aggregate for Job Mixed Portland Cement-Based Plasters.
9. ASTM C926 – Standard Specification for Application of Portland Cement-Based Plaster.
10. ASTM C933 – Standard Specification for Welded Wire Lath.
11. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
12. ASTM C1032 - Standard Specification for Woven Wire Plaster Base.
 13. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
 14. ASTM C1509 - Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- C. Exterior and Interior Lath: Where lath is fastened to wood supports, comply with CBC requirements.
- D. Plaster: Conforming to requirements of the Portland Cement Plaster (Stucco) Manual published by the Portland Cement Association.
- E. Metal Lath: NAAMM Standard ML/SFA 920 Guide Specifications for Metal Lath and Furring.

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1.5 DELIVERY, STORAGE AND HANDLING

- A. Protect metal lathing and plastering materials before, during and after installation. In event of damage immediately provide required repairs and replacements.
- B. Deliver and store Portland cement materials on the Project site in a manner to provide protection from exposure and damage by moisture. Pile materials to permit easy access for proper inspection and identification of each shipment. Stockpile adequate supplies of sand on the Project site to permit sampling and testing before installation. Store to avoid inclusion of foreign material.
- C. Deliver plaster materials to the Project site in manufacturer's sealed and labeled packages.

PART 2 - PRODUCTS

2.1 LATH AND ACCESSORY MATERIALS

- A. Each bundle of lath shall be sealed with a metal tag bearing the lath designation, weight and manufacturer's name.
- B. Water Repellant Backing:
 - 1. Weather-exposed for Horizontal Surfaces: W.R. Grace & Co., "Bituthene 4000" sheet, 0.060-inch-thick, consisting of polyethylene sheet and rubberized asphalt, self-adhering, or equal.
 - 2. Flashing and back-up for joints and reveals: W.R. Grace Co. VYCOR 0.040-inch-thick rubberized asphalt, self-sealing and self-adhering, or equal.
- C. Adhesives and sealers for water repellant backing: Types as recommended by manufacturer for installation with specified membrane sheet.
- D. Expanded Metal Lath: ASTM C847, small diamond mesh expanded metal lath, 3.4 pounds per square yard, expanded from steel sheets with hot-dip galvanized coating G60 in accordance with ASTM A653. Lath shall be V-grooved self-furring type for installation over sheathing and flat type for installation over spaced framing. Install 3/8-inch ribbed lath when framing is over 24 inches on center.
- E. Weather Resistive Backing for Metal Lath: Laminated water resistant kraft paper backing conforming to Fed Spec UU-B-790A, Type 1, Grade D60, manufactured by Fortifiber, Davis Wire, Leather back or equal. Furnish for exterior plastering (except on soffits and ceilings), and for mortar-set ceramic wall tile.
- F. Cornerite and Striplath: Flat or shaped lath reinforcing units, galvanized expanded metal weighing no less than 2.5 pounds per square yard, with 3-

**SECTION 09 24 00
PORTLAND CEMENT PLASTER AND METAL LATH**

inch legs when formed for angle reinforcement and 2-inch minimum legs for galvanized wire type.

- G. Plastering Accessories: Minimum 0.0172-inch galvanized steel or 0.0207 zinc alloy with expanded wings. PVC is not permitted. Furnish casing beads, expansion and control joints, weep and vent screeds.
1. Exterior Stress Relief Joints: Sizes and profiles, indicated or required. Control joints shall have expanded wings. Manufactured by Amico, Cemco, Dietrich, Keene or Superior.
 - a. Expansion Joints: Two-piece sections designed to accommodate expansion, contraction and shear forces.
 - b. Control Joints: One-piece sections, with integral wings, installed as indicated on drawings, where cracks can be expected.
 2. Drip Screed: Similar to Superior No. 10.
 3. Casing Beads: Expanded flange type with minimum 7/8-inch grounds to establish plaster thickness.
 4. Exterior Corner Reinforcement: Welded-wire type as manufactured by Stockton Products, Tree Island Industries Ltd. or Jaenson Wire.
 5. Ventilating Screeds: Alabama Metal Industries, or equal, soffit vent screed, perforated web type, with integral plaster grounds.
 6. Foundation Weep Screeds: Alabama Metal Industries, or equal, integral plaster ground and weep screed.
- H. Fasteners:
1. Screws: USG corrosion resistant.
 - a. Type S or S-12 for metal studs.
 - b. Type A for wood and metal studs 20-25 gauge.
 2. Wire for fastening lath to metal framing, fastening lath together and fastening corner beads, metal grounds and base screeds to lath and framing shall be 18 gage, galvanized conforming with ASTM A641.
 3. Nails: 11 gage galvanized roofing nails, 7/16-inch head, barbed shanks, 1-1/2-inch-long for horizontal application and providing a minimum of 3/4 inch penetration for vertical surfaces. Furnish fiber wadded furring nails for attaching lath to wood sheathing unless self-furred type of plaster reinforcement is approved.

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4. Power driven nails shall be used for attaching lath to concrete and concrete masonry. Nails shall be a code recognized fastener such as Pneutek, Inc. fasteners or approved equal. Each fastener shall provide minimum withdrawal resistance of 50 pounds minimum.
5. Staples: Minimum 3/4-inch crown, 16-gauge galvanized steel. Staples shall have sufficient length to penetrate studs at least 3/4 inch.
- I. Wire: Galvanized soft-annealed steel wire in conformance to ASTM A641.
 1. Hanger wire for suspended ceilings, minimum 9 gauge.
 2. Wire for fastening metal channels together, 16 gauge.
 3. Wire for fastening lath to supports, tying ends and edges of lath sheets, and securing accessories to lath, 18 gauge.

2.2 PLASTER MATERIALS

- A. Portland Cement: ASTM C150, Type II, low alkali.
- B. Hydrated Lime: ASTM C206, Type S.
- C. Sand: Washed natural sand conforming to ASTM C897, except gradation of sand shall be as follows:

Percentage retained, each sieve, by weight:

Sieve Size	Maximum	Minimum
No. 4	0	0
No. 8	10	0
No. 16	40	10
No. 30	65	30
No. 50	90	70
No. 100	100	95

- D. Water: Clean, potable and from domestic source.
- E. Exterior Finish Coat Plaster: Shall consist of one of the following systems:
 1. Three Coat Systems: Mineral Stucco as fabricated by California Stucco, La Habra, Highland Stucco, Merlex, Omega Stucco, Inc, or equal. Furnish formulations requiring only addition of water for installation. Sand shall pass No. 20 sieve. Mix and sand shall provide specified finish. Furnish integral colored stucco in color as selected by Architect.
 2. Two or Three Coat Systems: Controlled pre-mix with manufacturer's additives, as fabricated by The Quikrete Companies, SPEC MIX, Omega, EXPO Stucco or OEHS approved equal. Furnish

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formulations requiring only addition of water for installation. Sand shall pass No. 20 sieve. Mix and sand shall provide specified finish. Furnish integral colored stucco finish coat in color as selected by Architect.

- F. Plaster Bonding Agent: "Weld-Crete", manufactured by Larsen Products Co., Upco/Div., Emhart Corp. Bonding Adhesive No. 705, or Merlex Stucco "Acrylex".
- G. Base Coat Reinforcement: Alkali resistant fiberglass shorts, 1/2-inch chopped strands, Type AR, manufactured by OCF, PPG Industries, or equal.
- H. Plaster Patching Materials:
 - 1. Bonding Agent: Acrylic resin type, Acryl 60, LHP Bonder, or equal.
 - 2. Patching Plaster: Manufactured by Merlex Stucco, Inc., Orange, CA, or equal. Furnish fast setting, compatible with existing plaster materials, "Exterior Pronto Patch," Portland cement base coat material, requiring only addition of water. Material shall provide initial set within 20 minutes, and final set within one hour.
- I. Underlayment: Single ply self-adhesive waterproofing membrane as manufactured by W.R. Grace Company, Jiffy-Seal by Protecto Wrap, or equal. Furnish for installation behind stress relief joints and backing on horizontal and vertical surfaces exposed to weather; under metal copings and flashings; and window jambs and sills.
- J. Miscellaneous Material: Provide additional components and materials required for a complete installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that overhead or concealed Work is finished, completed, tested and inspected as required before starting Work of this Section.

3.2 INSTALLATION-WEATHER BARRIER MEMBRANE

- A. Install one layer of underlayment over areas to receive lath with weather barrier membrane. Install horizontally with each course weather lapped 2 inches over layer below and 6 inches on ends. Install two layers of kraft paper over wood sheathing; second layer shall lap the first layer.
- B. Install lath over underlayment in accordance with manufacturer's instructions. Repair and seal tears and holes in weather barrier prior to applying plaster.
- C. Install single ply self-adhesive waterproofing membrane per manufacturer's recommendations in areas indicated on the Drawings.

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D. Flashing Around Openings: Install self-adhering, self-sealing membrane to make openings weather tight in accordance with details shown on drawings.

3.3 LATH INSTALLATION

- A. General: Where exterior and interior lath is fastened to horizontal wood supports, the current edition of the CBC shall be complied with.
- B. Exterior Lathing, General: Comply with requirements of ASTM C1063 and ML/SFA 920, whichever is more restrictive.
 - 1. Application of Metal Lath: Metal lath or wire fabric lath shall be installed in accordance with the provisions of CBC current editions. Lath shall be furred out from vertical supports or backing not less than 1/4 inch.
 - 2. Self-furring lath meets furring requirements. Furring of expanded metal lath is not required on supports providing a bearing surface width of 1-5/8 inch or less.
 - 3. Where external corner reinforcement is not installed, lath shall be furred out and carried around corners, extending and fastened to at least one support.
 - 4. A weep screed shall be provided at or below foundation plate line on exterior stud walls. Screed shall be installed a minimum of 4 inches above grade and shall be of a type permitting water to drain to exterior of building. Weather-resistant barrier and exterior lath shall cover and terminate on attachment flange of screed.
 - 5. Ends of lath on open framing (unsheathed) shall occur over supports. Where necessary, install additional studs to provide support for lath ends and support for separate flanges of stress relief joints.

3.4 PLASTER APPLICATION - GENERAL

- A. Proportion, mix, apply and cure plaster in conformance with ASTM C926.
- B. Install each plaster coat to an entire wall or ceiling panel without interruption to avoid cold joints and abrupt changes in uniform appearance of succeeding coats. Wet plaster shall abut existing plaster at naturally occurring interruptions in plane of plaster (such as corner angles, openings and control joints) wherever possible. Cut joining, where necessary, square and straight and at least 6 inches away from a joining in preceding coat.
- C. Provide sufficient moisture or curing methods to permit continuous and complete hydration of cementitious materials, considering climatic and Project site conditions. If water cured, each basecoat shall be continuously damp for at least 48 hours, including weekends and holidays. Other curing

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methods, spray applied curing compounds such as Expo-Cure, or OEHS approved equal are permitted.

- D. Provide sufficient time between coats to permit each coat to cure or develop enough rigidity to resist cracking or other damage when next coat is installed.

3.5 EXTERIOR PLASTERING

- A. Concrete surfaces, except where noted as "Exposed Concrete" or "Painted Concrete," shall be finished with stucco dash finish coats, as specified.

B. Preparation of Surfaces:

1. Exterior concrete and masonry surfaces to be plastered shall be free of oily or waxy substances, and loose or foreign material. Uniformly spray with nozzle-type water spray at least 12 hours before installation of plaster.
2. Concrete and masonry surfaces to receive two coat application of 5/8 inch thick Portland cement plaster shall be treated with bonding agent. This surface preparation shall not be installed instead of a brown coat of plaster.
3. Concrete surfaces to receive stucco dash finish shall be lightly sandblasted to provide a roughened surface.
4. Verify that lath has been installed securely and that grounds, screeds, casing beads and other accessories are straight, in correct position, and securely fastened in place.

- C. Number of Coats and Thickness: Exterior plaster shall be Portland cement as follows with minimum thickness from face of supports or surfaces to finish face of plaster as follows:

1. Lathed Surfaces:
 - a. 3 coats, scratch, brown and finish, 7/8-inch-thick, one inch thick where required by CBC.
 - b. 2 coats, controlled pre-mix single base coat and finish, 7/8-inch-thick, one inch thick where required by CBC.
2. Stucco Dash Finish Coats: 2 coats, 1/8 inch thick.
3. Concrete and Masonry Base: 2 coats, brown and finish, 5/8 inch thick.

D. Proportions:

1. Proportion ingredients for Portland cement. Calibrated boxes are required to determine the accuracy of proportioning. Proportions shall adhere to current edition of CBC.

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2. Dash Bond Coat: Mixed in the proportion of 1 cubic foot of standard Portland cement to 1-1/2 cubic feet of sand. Omit dash coat when bonding agent is used.
 3. Stucco Finish: Stucco shall be factory prepared, exterior type, colored stucco containing a Portland cement base, required aggregates and mineral pigments. Colors shall be as selected by the Architect. Selected colors are not limited to standard stock colors and certain Work, such as ceilings, soffits and walls, may be finished in non-standard colors as selected.
 4. Acrylic Based Stucco Finish: Shall be factory prepared exterior type, acrylic based colored stucco finish. Colors and textures shall be as selected by the Architect.
- E. Mixing: Provide plaster mix: cementitious materials and aggregate in proportions specified, furnishing only sufficient water to obtain proper consistency before installation. Do not mix any more material at any time than can be installed within 1/2 hour after mixing. Do not allow material to remain in mixer or mixing boxes overnight. Maximum allowable slump shall be 2-1/2 inch, based on a 2 inch by 4 inches by 6-inch slump cone.
- F. Application:
1. Dash Bond Coat: Dash on concrete or masonry surfaces, leave undisturbed, and maintain damp for at least 24 hours following installation. Omit Dash bond coat when liquid bonding agent is used.
 2. Scratch Coat: Install with sufficient material to completely cover laths and scratch across supports.
 3. Brown Coat: Rod to a straight, true, even within 1/8-inch tolerance in 5 feet of surface and float to receive finish coat.
 4. Single Base Coat: As an alternative to scratch and brown coats, apply in conformance to ASTM C926.
 5. Stucco Finish Coat: Install in 2 coats to a total thickness of 1/8 inch, each coat covering surface uniformly. First coat shall completely cover basecoat with uniform color. Second color shall provide a uniform texture.
 - a. First coat shall be installed by providing several passes with nozzle to completely cover surface.
 - b. The second coat shall be installed by doubling back same day, when first coat is sufficiently dry.
 - c. Over concrete surfaces, second coat shall be installed 24 hours after installation of first coat. In warm weather, first coat shall be cured by light water spray after material has set.

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- d. Protection: Protect those surfaces, which are not to receive dash finish coats. Such surfaces shall be shielded and shall have any sand left from dashing operation removed.
- G. Curing Exterior Plaster: Adhere to current edition of CBC for curing requirements.
- H. Option for Machine Application, Scratch and Brown Coats, or Single Base Coat: Instead of hand installed plaster, the furnishing of plastering machines for interior or exterior scratch and brown coats or single base coat is permitted. Machine installation shall be in accordance with the following:
 - 1. Qualifications: Provide proper equipment and apparatus.
 - 2. Apparatus: Pump shall be equipped with an air pressure gage and required safety devices. Hoses and connections shall be tight and pressure shall be maintained constant.
 - 3. Tests: Tests for determining proper consistency of plaster mix shall be taken at nozzle using slump cone method. Tests shall be observed by the IOR at least twice each day and as often as deemed necessary. Perform required tests and maintain an accurate log of such tests to ascertain compliance with material slump requirements. Material slump shall not exceed 2-1/2 inches at nozzle. Furnish an adequate number of standard 2-inch x 4-inch x 6-inch slump cones for testing. Cones shall be on the Project site before Work is started and at all times during performance of the Work of this section.
 - 4. Proportion and Application: Proportioning, mixing, number of coats and thickness shall be same as specified for hand application. Cement aggregate and water shall be mixed to plaster machine. Plaster mix shall be projected into and conveyed through a hose to the nozzle at end of hose and deposited by pressure in its final position ready for manual straightening and finishing.
 - 5. Follow-Up: Perform scoring operation of plaster, based on settings and drying conditions at time of installation. Curing shall be as previously specified.
 - 6. Protection: Before installing any plaster, thoroughly protect other adjacent Work.

3.6 QUALITY CONTROL

A. Finish interior and exterior plaster to a uniform texture, free of imperfections and flat within 1/8 inch in 5 feet. Form a suitable foundation for paint and other finishing materials. Avoid joining marks in finish coats.

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PORTLAND CEMENT PLASTER AND METAL LATH

3.7 TESTING

- A. Written certification of sand compliance is required. Samples of sand shall be obtained at the Project site. Tests may be performed as deemed necessary by the IOR.
- B. When plastering machine is used, provide a supply of 2-inch x 4-inch x 6-inch-high cones for slump testing of Portland cement plaster. Samples of plaster taken at nozzle shall have a maximum slump of 2-1/2 inches. Plaster material not complying with this requirement shall be deemed as defective Work.

3.8 REPAIR REQUIREMENTS FOR DAMAGED PLASTER

A. Plaster Detached from Framing:

- 1. Remove loose and broken plaster.
- 2. Repair or replace damaged water-resistant backing and lath in compliance with specified standards.
- 3. Remove stucco finish from surrounding area in the same plane by sandblasting.
- 4. Install a scratch coat and a brown coat mixed with liquid bonding agent instead of water to the areas devoid of plaster.
- 5. Install a coat of liquid bonding agent to entire wall plane.
- 6. Install a 1/8-inch-thick stucco finish coat to entire wall plane and match existing texture and color.

B. Cracked Plaster 1/8 inch to 1/2 inch:

- 1. Remove loose material from crack with a wire brush.
- 2. Fill crack with slurry of stucco and liquid bonding agent.
- 3. Install a coat of liquid bonding agent to entire wall plane.
- 4. Install 1/8-inch-thick stucco finish to entire wall plane and match existing texture and color.

C. Cracks Larger Than 1/2 inch - Painted:

- 1. Remove loose material from crack with a wire brush.
- 2. Fill crack with slurry of one-part Portland cement to 3 parts masonry/stucco sand and liquid bonding agent to match existing texture of adjacent surface.

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PORTLAND CEMENT PLASTER AND METAL LATH**

3. Paint entire wall plane, color to match existing.
4. Where patching of plaster over existing lath is feasible, fasten loose lath and install new lath with nails at 6-inch centers. Where metal is furnished, lap new lath over existing 6 inches and tie at 6-inch centers. Install paper backings as required, shingled into existing.
5. Patching of Holes, Cracks, and Gouges: Holes, cracks, gouges, missing sections, and other defects in existing improvements shall be patched. For holes over 1 inch in size, cut small sections of lath and place in opening attached to existing material. Install 3 coats of plaster. For holes one inch and smaller, install bonding agent to existing surfaces and neatly fill hole with plaster, installing necessary coats to match adjacent surfaces, eliminate cracks and match existing surface texture. Cracks, gouges, and other defects shall be filled with plaster or spackle as required and neatly finished to match adjacent existing improvements.

3.09 CLEANING

- A. Remove rubbish, debris, and waste material and legally dispose of off the Project site.

3.10 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09 2900 GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Walls and Ceilings.
 - 2. Cementitious backer board.
 - 3. Accessories.

1.2 RELATED SECTIONS

- A. Related Sections:
 - 1. Section 06 1000 – Rough Carpentry.
 - 2. Section 07 1000 – Dampproofing.
 - 3. Section 07 9200 – Joint Sealants.
 - 4. Section 09 9100 – Painting.

1.3 REFERENCES

- A. ASTM C1396 – 11 Standard Specifications for Gypsum Board.
- B. ASTM C473 – 12 Standard Test Methods for Physical Testing of Gypsum Panel Products.
- C. ASTM C1629 – Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

1.4 PERFORMANCE REQUIREMENTS

- A. Level 3 (highest) for hard- and soft-body impact when tested in accordance with ASTM C1629.
- B. Average water absorption for panels is not greater than (5) percent by weight after a two-hour immersion when tested in accordance with ASTM C473.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 3000 – Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

SECTION 09 2900 GYPSUM BOARD

1.6 QUALITY ASSURANCE

- A. Quality Standards: GA-216 – Recommended Specifications for the Application and Finishing of Gypsum Board.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering items which may be incorporated in the Work include the following:
 - 1. United States Gypsum Company.
 - 2. National Gypsum Properties, LLC.
 - 3. American Gypsum.
 - 3. Or approved equal.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000 – Product Requirements.

2.2 GYPSUM BOARD

- A. Water-Resistant Gypsum Backing Board: ASTM C630; 5/8 inch thick, ends cut square and finished smooth. 48-inch width, maximum permissible length; ends and edges straight and solid, edges tapered. Board consisting of a noncombustible water-resistant gypsum core, surfaced on face and back with water-repellent paper bonded to the core & face paper folded around long edges to reinforce and protect core, to be used at wet locations, see plans.
- B. Hi-impact XP Gypsum Board: 5/8" thick moisture and mold resistant with tapered edges; paper faced gypsum board with superior impact resistance & face paper folded around long edges to reinforce and protect core, ends cut square and finished smooth, typical at all locations. See plans for more info. Typical provide moisture resistant at wet locations.

SECTION 09 2900

GYP SUM BOARD

- a. Impact Resistant Gypsum Board, Type X (fire-resistant): 5/8 inch thick with tapered edges, face paper folded around long edges to reinforce and protect core, ends cut square and finished smooth.
- C. Fire resistant rated gypsum core with additives to enhance impact resistance, faced with moisture and mold resistant paper and reinforcing fiber mesh. Comply with ASTM C1629 level 3 hard body impact resistance.

2.3 ACCESSORIES

- A. Corner Beads and Edge Trim: GA 201 and GA 216.
- B. Joint Materials: Reinforcing tape and joint compound.
- C. Fasteners: Type S12 screws.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 – Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the City.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and as indicated on the Drawings.
- B. Fasten gypsum board to furring or framing with screws.
- C. Tape, fill, and sand joints.

3.3 FINISH LEVEL SCHEDULE

- A. Level 4: Walls and ceilings are scheduled to receive paint finish.
 - 1. Level 1, plus three (3) separate coats of compound at joints, angles, fasteners, and accessories. Compound shall be smooth and free of tool marks and ridges.

**SECTION 09 2900
GYPSUM BOARD**

3.4 PROTECTION

- A. Protect installed products until Substantial Completion.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

Payment for items of work covered under Division 9 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

END OF SECTION

SECTION 09 30 00

TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Tile and Accessories: Wall Glazed.
- B. Related Sections:
 - 1. Section 07 92 00 - Joint Sealant.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI A108.5, 1999 - Specifications for Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
 - 2. ANSI A108.10, 1999 - Specifications for Installation of Grout in Tilework.
 - 3. ANSI A118.1, 1999 - Standard Specification for Dry-Set Portland Cement Mortar.
 - 4. ANSI A118.4, 1999 - Latex-Portland Cement Mortar.
 - 5. ANSI A118.9, 1999 - Test Methods and Specifications for Cementitious Backer Units
 - 6. ANSI A137.1, 1988 - Specifications for Ceramic Tile.
- B. ASTM International (ASTM):
 - 1. ASTM C 50 - Standard Specification for Portland Cement.
 - 2. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes.
 - 3. ASTM C 847 - Standard Specification for Metal Lath.
- C. Tile Council of North America (TCNA): TCA Handbook for Ceramic Tile Installation, 2007.

1.3 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures: Procedures for submittals.
 - 1. Manufacturer's data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods.
 - 2. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
 - 3. Manufacturer's Certificate:
 - a. Certify that products meet or exceed specified requirements.
 - b. For each shipment, type and composition of tile provide a Master Grade Certificate signed by the manufacturer and the installer certifying that products meet or exceed the specified requirements of

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TILE

ANSI A137.1.

4. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company experienced in performing the Work of this Section.
- B. Single Source Responsibility: Obtain each type and color of tile from a single source. Obtain each type and color of mortar, adhesive and grout from the same source.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging until ready for installation.
- B. Protect adhesives and liquid additives from freezing or overheating in accordance with manufacturer's instructions.
- C. Store tile and setting materials on elevated platforms, under cover and in a dry location and protect from contamination, dampness, freezing or overheating.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not install adhesives in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during tiling and for a minimum of 7 days after completion.

1.7 EXTRA MATERIALS

- A. Provide for District's use a minimum of 2 percent of the primary sizes and colors of tile specified, boxed and clearly labeled.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering items which may be incorporated I the Work include the following:
 1. Dal-Tile Corporation.
 2. American Marazzi Tile, Inc.
 3. Roca Tile Group.
 4. Or approved equal as provided in Section 01 60 00 – Product Requirements.

2.2 TILE

- A. General: Provide tile that complies with ANSI A137.1 for types, compositions

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TILE

and other characteristics indicated. Provide tile in the locations and of the types colors and pattern indicated on the Drawings and identified in the Schedule and the end of this Section. Tile shall also be provided in accordance with the following:

1. Factory Blending: For tile exhibiting color variations within the ranges selected under Submittal of samples, blend tile in the factory and package so tile taken from one package shows the same range of colors as those taken from other packages.
2. Mounting: For factory mounted tile, provide back or edge mounted tile assemblies as standard with the manufacturer, unless otherwise specified.
3. Factory Applied Temporary Protective Coatings: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with a continuous film of petroleum paraffin wax applied hot. Do not coat unexposed tile surfaces.

B. Wall Glazed Tile:

1. Colors: As scheduled.
2. Trim Units: Matching cove base, cove base corner, bullnose, cove/inside finger cove, radius cap, sink rail incorner/outcorner, outside cove corner shapes in sizes coordinated with field tile.
3. Spacing: install with 1/16" spacing to accept un-sanded grout only.

2.3 SETTING MATERIALS

A. Mortar Bed Materials:

1. Portland cement: ASTM C150, type 1, gray or white.
2. Hydrated Lime: ASTM C207, Type S.
3. Sand: ASTM C144, fine.
4. Latex additive: As approved.
5. Water: Clean and potable.

B. Grout:

1. Standard Grout: Cement grout, sanded or unsanded, as specified in ANSI A118.6; color as selected.
2. Polymer modified cement grout, sanded or unsanded, as specified in ANSI A118.7; color as selected.

C. Cementitious Backing Units

1. ANSI A 118.9 or ASTM C 1325 (Type B).
2. 2" alkali – resistant glass fiber mesh type.

PART 2 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 – Execution: Verification of existing conditions before starting work.

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TILE

1. Verify that wall surfaces are free of substances which would impair bonding of setting materials, smooth and flat within tolerances specified in ANSI A137.1, and are ready to receive tile.

3.2 PREPARATION

- A. Protect surrounding work from damage.
- B. Remove any curing compounds or other contaminants.
- C. Vacuum clean surfaces and damp clean.
- D. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- E. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
- F. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.3 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.
- B. Lay tile to pattern indicated. Arrange pattern so that a full tile or joint is centered on each wall and that no tile less than 1/2 width is used. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- E. Form internal angles square and external angles bullnose.

3.4 INSTALLATION - WALL TILE

- A. Wall Tile: Over cementitious backer units on studs, install in accordance with TCA Handbook Method W244C-07, using membrane at toilet rooms.

3.5 CLEANING

- A. Clean tile and grout surfaces.

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TILE

3.6 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over finished floor surface for 72 hours after installation.
- B. Cover floors with Kraft paper and protect from dirt and residue from other trades.
- C. Where floor will be exposed for prolonged periods cover with plywood or other similar type walkways

Payment for items of work covered under Division 9 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

END OF SECTION

**SECTION 09 91 00
PAINTING AND COATING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior and exterior painting.

B. Following items shall not be painted:

1. Brass valves, chromium or nickel-plated piping and fittings.
2. Boiler control panels and control systems.
3. Fabric connections to fans.
4. Flexible conduit connections to equipment, miscellaneous name plates, stamping, and instruction labels and manufacturer's data.
5. Mechanical and electrical utility lines, piping and heating and ventilation ductwork in tunnels, under-floor excavated areas or crawl spaces, attic spaces and enclosed utility spaces.
6. Structural and miscellaneous steel, open web steel joists and metal floor decking, which will not be exposed in final construction, shall have no finish other than one coat of shop primer.
7. Brass, bronze, aluminum, lead, stainless steel and chrome or nickel-plated surfaces.

1.2 REGULATORY REQUIREMENTS

- A.** Paint materials shall comply with the Food and Drug Administration's (F.D.A.) Lead Law and the current rules and regulations of local, state and federal agencies governing the use of paint materials.

1.3 SUBMITTALS

- A.** List of Materials: Before submittal of samples, submit a complete list of proposed paint materials, identifying each material by distributor's name, manufacturer's name, product name and number, including primers, thinners, and coloring agents, together with manufacturers' catalog data fully describing each material as to contents, recommended installation, and preparation methods. Identify surfaces to receive various paint materials.
- B.** Material Samples: Submit manufacturer's standard colors samples for each type of paint specified. Once colors have been selected, submit Samples of each color selected for each type of paint accordingly:

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1. Samples of Paint and Enamel must be submitted on standard 8 ½" x 11" Leneta Opacity-Display Charts. Each display chart shall have the color in full coverage. The sample shall be prepared from the material to be installed on the Work. Identify the school on which the paint is to be installed, the batch number, the color number, the type of material, and the name of the manufacturer.
 2. Elastomeric shall be submitted in duplicate samples of the texture coating. Samples will be not less than 2 ½ by 3 ½ in size and installed upon backing. Finished Work will match the reviewed Sample in texture.
 3. Materials and color samples shall be reviewed before starting any painting.
- C. For transparent and stained finishes, prepare samples on same species and quality of wood to be installed in the Work, with written description of system used.

1.4 QUALITY ASSURANCE

- A. Certification of Materials: With every delivery of paint materials, the manufacturer shall provide written certification the materials comply with the requirements of this section.
- B. Coats: The number of coats specified is the minimum number. If full coverage is not obtained with the specified number of coats, install additional coats as required to provide the required finish.
- C. Install coats and undercoats for finishes in strict accordance with the recommendations of the paint manufacturer as reviewed by the Architect.
- D. Paint materials shall comply with the following as a minimum requirement:
1. Materials shall be delivered to Project site in original unbroken containers bearing manufacturer's name, brand number and batch number.
 2. Open and mix ingredients on premises in presence of the Project Inspector.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Storage and Mixing of Materials: Store materials and mix only in spaces suitable for such purposes. Maintain spaces clean and provide necessary precautions to prevent fire. Store paint containers so the manufacturer's labels are clearly displayed.

1.6 SITE CONDITIONS

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PAINTING AND COATING**

- A. Temperature: Do not install exterior paint in damp, rainy weather or until surface has thoroughly dried from effects of such weather. Do not install paint, interior, or exterior, when temperature is below 50 degrees F, or above 90 degrees F, or dust conditions are unfavorable for installation.

1.7 WARRANTY

- A. Manufacturer shall provide a three-year material warranty.
- B. Installer shall provide a three-year application warranty.

1.8 MAINTENANCE

- A. Provide at least one gallon of each type, color and sheen of paint coating installed. Label containers with color designation indicated on Drawings.

PART 2 - PRODUCTS

2.1 PAINT MATERIALS

- A. Furnish the products of only one paint manufacturer unless otherwise specified or required. Primers, intermediate and finish coats of each painting system must all be the products of the same manufacturer, including thinners and coloring agents, except for materials furnished with shop prime coat by other trades.
- B. Factory mix paint materials to correct color, gloss, and consistency for installation to the maximum extent feasible.
- C. Paint materials to be minimum "Architectural Grade".
- D. Gloss degree standards shall be as follows:
 - 1. SATIN 15 to 29
 - 2. EGGSHELL 30 to 47
 - 3. SEMI-GLOSS 48 to 69
 - 4. HIGH GLOSS 70 and above

2.2 MANUFACTURERS

- A. Acceptable manufacturers, unless otherwise noted:
 - 1. Dunn-Edwards Corporation Paints
 - 2. Frazee Paints and Wall coverings
 - 3. Vista Paints

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4. Sherwin Williams
5. ICI Paints
6. OR Equal.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine surfaces to receive paint finish. Surfaces which are not properly prepared and cleaned or which are not in condition to receive the finish specified shall be corrected before prime coat is installed.
- B. New woodwork shall be thoroughly cleaned, hand sandpapered, and dusted off. Nail holes, cracks or defects in Work shall be filled. On stained woodwork, fill shall be colored to match stain. Filling shall be performed after the first coat of paint, shellac or varnish has been installed.
- C. Plaster surfaces except veneer plaster shall be allowed to dry at least 3 weeks before painting. Veneer plaster shall be allowed to dry sufficiently to receive paint as determined by moisture meter tests.
- D. Metal surfaces to be painted shall be thoroughly cleaned of rust, corrosion, oil, foreign materials, blisters, loose paint, and provide a smooth surface.
- E. Do not install painting materials to wet, damp, dusty, dirty, finger marked, rough, unfinished or defective surfaces.
- F. Concrete surfaces shall be dry, cleaned of dirt and foreign materials and in proper condition to receive paint. Neutralize spots demonstrating effects of alkali.
- G. Mask off areas where necessary.

3.2 APPLICATION

- A. Backpainting: Immediately upon delivery to the Project site, finish lumber and millwork shall be backpainted on surfaces that will be concealed after installation. Items to be painted shall be backpainted with priming coat specified under "Priming".
- B. Priming: New wood and metal surfaces specified to receive paint finish shall be primed. Surfaces of miscellaneous metal and steel not embedded in concrete, and surfaces of unprimed plain sheet metal Work shall be primed immediately upon delivery to the Project site. Galvanized metal Work and interior and exterior woodwork shall be primed immediately after installation. Priming of surfaces and priming coat shall be as follows:
 1. Knots, Pitch and Sap Pockets: Shellac before priming.

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2. Exterior Woodwork and Wood Doors: Prime with one coat of exterior waterborne emulsion wood primer.
 3. Interior Woodwork: Where indicated to be painted, prime with one coat of waterborne wood primer.
 4. Stain: Woodwork indicated to receive a stain and varnish finish shall be stained to an even color with water borne stain. On open-grained hardwood, mix stain with paste filler and completely fill pores in wood.
 5. Galvanized Metal Work: Clean oil, grease and other foreign materials from surfaces. Install vinyl wash pretreatment coating. Follow manufacturer's instructions for drying time, and then prime with one coat of metal primer.
 6. Unprimed Iron, Steel, and Other Uncoated Metals: Where specified to be painted, prime with one coat of metal primer.
 7. Shop Primed Metal Items: Touch up bare and abraded areas with metal primer before installation of second and third coats.
 8. Coats shall be installed evenly and with full coverage. Finished surfaces shall be free of sags, runs and other imperfections.
- C. Allow at least 24 hours between coats of paint.
- D. Rollers shall not be used on wood surfaces.
- E. Each coat of painted woodwork and metal, except last coat, shall be sandpapered smooth when dry. Texture-coated gypsum board shall be sanded lightly to remove surface imperfections after first coat of paint has been installed.
- F. Each coat of paint or enamel shall be a slightly different tint as required. Each coat of paint, enamel, stain, shellac, and varnish will be inspected by the IOR before next coat is applied. Notify the Project Inspector that such Work is ready for inspection.
1. Tinting Guideline: The first coat, primer/undercoat(s) to be untinted or tinted up to 50 percent lighter or darker (at the discretion of the installer) than the finish coat. The second coat (or third coat if a seal coat and undercoat have been specified) is to be factory tinted in the range of 10 percent to 15 percent lighter or darker (at the discretion of the installer) than the finish coat. The final coat is to be factory tinted to the required color selected. These tinting guidelines shall be provided on all surfaces receiving paint.
- G. Do not "paint-out" UL labels, fusible links and identification stamps.
- H. Paint Roller, brush and spray.

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1. Only Paint rollers shall be used on interior plaster, drywall, masonry/plaster and plywood surfaces, nap shall not exceed one half inch in length.
 2. First coat on wood overhang and ceilings shall have material applied by roller and then brushed out in a professional manner to leave surface free of imperfections. Finish coat may be sprayed.
 3. Other surfaces shall have all coatings applied with brushes of proper size.
 4. Spray work is permitted only on radiators, acoustic plaster, masonry and plaster.
- I. Where ceilings are specified to be painted, beams, cornices, coves, ornamental features, plaster grilles, etc. shall be included.
 - J. Ceilings shall be white, including classrooms, storage rooms, offices, arcades, etc. Boiler room and fan room ceiling color shall match adjacent walls.

3.3 CLEANING

- A. Remove rubbish, waste, and surplus material and clean woodwork, hardware, floors, and other adjacent Work.
- B. Remove paint, varnish and brush marks from glazing material and, upon completion of painting Work, wash and polish glazing material both sides. Glazing material, which is damaged, shall be removed and replaced with new material.
- C. Clean hardware and other unpainted metal surfaces with recommended cleaner. Do not furnish abrasives or edged tools.

3.4 SCHEDULE

- A. Interior:
 1. Gypsum Board: 4 coats.
 - a. First Coat: Drywall sealer.
 - b. Second Coat: Enamel under coater.
 - c. Third and Fourth Coats: Interior enamel, semi-gloss or gloss as indicated.
 2. Concrete: 3 coats.
 - a. First: Concrete sealer.

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- b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.
 - 3. Concrete Block: 3 coats.
 - a. First: Concrete block filler.
 - b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.
 - 4. Metal: Shall be cleaned, pre-treated and painted with 3 coats. Items to be painted include, but are not limited to: exposed structural and miscellaneous steel, metal doors and frames, ladders, table and bench legs.
 - a. First Coat: Metal primer.
 - b. Second and Third Coats: Interior gloss enamel, except metal doors and frames which shall be semi-gloss or gloss to match adjacent wall.
- B. Exterior:
 - 1. Woodwork: 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior house and trim enamel.
 - 2. Plaster and Stucco: 3 coats. Flat 100 percent acrylic.
 - a. Prime Coat: Alkali resistant primer/sealer.
 - b. Exterior 100 percent acrylic.
 - 3. Concrete Block: 3 coats. Flat 100 percent acrylic.
 - a. First Coat: Concrete block filler.
 - b. Second and Third Coats: Exterior 100 percent acrylic.
 - 6. Metal: 3 coats. Shall be cleaned and pre-treated. Items to be painted include, but are not limited to: steel columns and miscellaneous steel items, gravel stops, metal doors and frames, hoods and flashings.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior gloss enamel.
- C. Mechanical and Electrical Work:

**SECTION 09 91 00
PAINTING AND COATING**

1. Except where interior mechanical and electrical Work to be painted is specified to receive another paint finish, Work occurring in finished rooms and spaces shall be cleaned, pre-treated, and painted with 3 coats. Items to be painted include, but are not limited to: steel and copper piping, pipes, vents, fittings, ducts, plenums, miscellaneous supports and hangers, electrical conduit, fittings, pull boxes, outlet boxes, unfinished surfaces of plumbing fixtures, miscellaneous metal cabinets, panels, and access doors and panels.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Interior enamel, semi-gloss or gloss to match adjacent wall or ceiling finish.
2. Insulation and Taping on Pipes and Ducts: 3 coats.
 - a. Finished Rooms:
 - 1) First Coat: Interior waterborne primer.
 - 2) Second and Third Coats: Interior semi-gloss or gloss enamel to match adjoining wall or ceiling finish.
 - b. Building Exterior:
 - 1) First Coat: Exterior waterborne primer.
 - 2) Second and Third Coats: Exterior gloss enamel.
3. Inside surfaces of ducts, vents, dampers and louvers as far back as visible from room in which they open shall be painted with 2 coats of flat black paint.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 10 14 00 SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Supply and installation of Interior Room Signs, and Geometric Signs.
- B. Related Sections:
 - 1. Project Signs, see Construction Facilities and Temporary Controls: Section 08 11 13, Hollow Metal Doors and Frames.
 - 2. Section 09 10 00, Finishes

1.2 SUBMITTALS

- A. Make submittals in accordance with section 01 33 00.
- B. Shop Drawings: Submit shop drawings showing sizes of signs and lettering, construction details of signs and anchoring details.
- C. Submittals: Submit color and texture samples of all materials to be used for signs.
- D. Samples: Submit 1 full size sample of each toilet room signs.

1.3 QUALITY ASSURANCE

- A. Manufacturers shall have been regularly engaged in manufacturing identifying devices for minimum of 5 years.
- B. Pre-Installation Conference: Notify OAR when signs are ready for installation. Arrange for conference at site. Do not proceed with installation until ARCHITECT'S approval of specific locations and methods of attachment has been obtained.
- C. Provide signs from one manufacturer.

1.4 PRODUCT HANDLING

- A. Use all means necessary to protect signs before, during and after installation. In event of damage, immediately make necessary repairs and replacements.

SECTION 10 14 00 SIGNAGE

PART 2 - PRODUCTS

2.1 MANUFACTURE

- A. Products of following manufacturers are acceptable and are the basis for intended design and quality.
1. Vomar Products Inc.
 2. ASI-Modulex, Inc.
 3. Mohawk Sign Systems, Inc.
 4. Accent Signage Systems.
 5. The Gruenke Company.
 6. Ada Sign Products.
 7. AccuBraille.
 8. Equal.

2.2 MATERIAL AND FABRICATION

- A. Interior Room Identification Sign Materials:
1. Substrate Panel: 1/8 inch minimum thick, integrally colored or clear acrylic plastic, or laminated acrylic. Conforming to ASTM D4802; non-glare (matte), UV stable, suitable for interior and exterior use.
 - a. Corners shall be square.
 - b. Edges shall be square and eased.
 - c. Colors as selected by ARCHITECT from manufacturer's custom color range.
 2. Fasteners:
 - a. Stainless steel tamper-proof screws and plastic anchors.
 - b. Signs mounted on fire-rated doors shall be secured with adhesive.
 - c. Adhesives and sealants shall comply with the limits for VOC content.
- B. Characters and Symbols: Shall be fabricated by one of the processes described below:

SECTION 10 14 00 SIGNAGE

1. Computer cut raised characters and graphics shall be cut from 1/16 inch integrally colored acrylic. Raised characters and graphics shall be inlaid 1/32 inch minimum into first surface of sign background, secured with adhesive so it cannot be removed without the use of tools. Raised characters and graphics shall have beveled, eased or rounded edges. Non-tactile text and graphics shall be applied to the second surface, and background color shall be applied to the second surface and protected with film or an additional backplate. Pictograms and other symbols including the International Symbol of Accessibility, which are included on signs with raised characters and Braille, are not required to be raised.
2. Raised characters and graphics including braille shall be integral to sign face and shall be formed into sign face by high pressure thermoforming using a negative mold. No applied, glued, welded tactile elements are acceptable. Raised characters and graphics shall have beveled, eased or rounded edges. No sharp, square edges are acceptable. Non-tactile text and graphics shall be applied to the second surface, and background color shall be applied to the second surface and protected with vinyl film. Pictograms and other symbols including the International Symbol of Accessibility, which are included on signs with raised characters and Braille, or other signs are not required to be raised.

2.3 COMMUNICATION ELEMENTS AND FEATURES

- A. Raised Characters Raised characters shall comply with CBC 11B-703.2.
 1. Character Type: Characters on signs shall be raised 1/32 inch minimum above their background and shall be sans serif uppercase characters duplicated in Braille. Characters and Braille shall be in a horizontal format.
 2. Character Height: Character height measured vertically from the baseline of the character shall be 5/8 inch minimum and 2-inch maximum based on the height of the uppercase letter "I".
 3. Character Proportions: Characters shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the letter "I".
 4. Stroke Thickness: Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the character.
 5. Character and Line Spacing shall be in conformance to CBC 11B-703.2.7 and 11B-703.2.8.
 6. Character Placement: Shall be placed in accordance to Section 2.3, C below.
- A. Visual Characters: Visual characters shall comply with CBC Section 11B-703.5. Characters shall be conventional in form, and shall be uppercase or lowercase or a combination of both, as indicated on the drawings.

SECTION 10 14 00 SIGNAGE

Characters shall not be italic, oblique, highly decorative, or of other unusual forms.

1. Finish and Contrast: Characters and their backgrounds shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or a dark character on a light background.
 2. Character Proportions: Characters shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase of the letter "I".
 3. Character Height: Minimum character height shall comply with CBC Table 11B-703.5.5.
 4. Height from Finish Floor or Ground: Visual characters shall be 40 inches minimum above the finish floor or ground
 5. Stroke Thickness: Uppercase letter "I" shall be 10 percent minimum and 20 percent maximum of the height of the character.
 6. Character and Line Spacing: Shall be in accordance to CBC 11B-703.5.8 and 11B-703.5.9.
- B. Braille: Contracted Grade 2 Braille, conforming to CBC 11B-703.3. Braille characters shall be inlaid optically correct acrylic Raster beads into computer drilled holes in the panel surface.
1. Dimensions and Capitalization: Braille dots shall have a domed or rounded shape and shall comply with CBC Table 11B-703.3.1. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.
 2. Position: Braille shall be positioned below the corresponding text in a horizontal format, flush left or centered. If text is multi-lined, Braille shall be placed below the entire line of text. Braille shall be separated 3/8 inch minimum and 1/2 maximum from any other tactile characters and 3/8 inch minimum from raised borders and decorative elements.
- C. Pictograms: In conformance to CBC 11B-703.6. Pictograms shall have a field height of 6 inches minimum. Characters and Braille shall not be located in the pictogram field.
1. Finish and Contrast: Pictograms and their field shall have a non-glare finish. Pictograms shall contrast with their field with either a light pictogram on a dark field or a dark pictogram on a light field.

SECTION 10 14 00 SIGNAGE

2. Text Descriptors: Pictograms shall have text descriptors located directly below the pictogram field, and shall comply with CBC 11B-703.2, 11B-703.3 and 11B-703.4.
- D. International Symbol of Accessibility (ISA): Shall comply with CBC 11B-703.7 and CBC Figure 11B-703.7.2.1. The ISA shall consist of a white figure on a blue background. The blue color shall be approximate to FS. 15090 in Federal Standard 595C.
- E. Mounting Locations and Height: Signs with tactile characters shall be as indicated on the drawings and in conformance to CBC 11B-703.4.
 1. Mounting Locations:
 - a. Identification signs for rooms and spaces shall be located on the wall adjacent to the latch side of the door, as one enters the room or space.
 - b. Signs that identify exits shall be located at the exit door when approached in the direction of egress travel.
 - c. Signs containing tactile characters shall be located so that a clear floor space 18-inches minimum by 18-inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45-degree open position.
 - d. Where a tactile sign is provided at a door, the sign shall be located alongside the door at the latch side.
 - e. Where a tactile sign is provided at double doors with one active leaf, the sign shall be located at the inactive leaf.
 - f. Where a tactile sign is provided at double doors with two active leaves, the sign shall be located to the right of the right-hand door.
 - g. Where there is no wall space at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall.
 2. Mounting height above finish floor or ground: Tactile characters on signs shall be located 48 inches minimum above the finish floor or ground surface, measured from the baseline of the lowest Braille cells and 60 inches maximum above the finish floor or ground surface, measured from the baseline of the highest line of raised characters.

2.4 RESTROOM SIGNAGE

- A. Multiple-Occupancy restrooms shall be provided with geometric symbols and wall mounted pictograms with text descriptors.

**KESSLER PARK SNACK BAR 10 14 00 - 5
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE**

SECTION 10 14 00 SIGNAGE

B. Geometric Symbols:

1. Doorways leading to toilet rooms shall be identified by a geometric symbol complying with CBC Section 11B-703.7.2.6.
2. Male Restroom Door Symbol: 1/4-inch-thick equilateral triangle with edges 12 inches long, with vertex pointing upward, the triangle symbol shall contrast with the door, either light on a dark background or dark on a light background. A male silhouette shall appear within the equilateral triangle in contrasting color to it.
3. Female Restroom Door Sign: 1/4-inch-thick circle 12-inch diameter, the circle symbol shall contrast with the door, either light on a dark background or dark on a light background. A female silhouette shall appear within the circle in contrasting color to it.
4. Edges and Vertices on Geometric Symbols: Shall be eased or rounded at 1/16 inch minimum, or chamfered at 1/8 inch maximum. Vertices shall be radiused between 1/8 inch minimum and 1/4 inch maximum.
5. Location and Mounting Height: Symbols shall be mounted at 58 inches minimum and 60 inches maximum above the finish floor or ground surface measured from the centerline of the symbol. Where a door is provided the symbol shall be mounted within one inch of the vertical centerline of the door.

- C. Room Identification for Multiple-Occupancy Restrooms: Provide a 16-inch-long by 6-inch-tall room identification sign, including a pictogram of the International Symbol of Accessibility on a side. Restroom names shall be "Women" or "Men". Characters, Braille, pictograms and mounting locations and height shall be in conformance to section 2.3.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts condition of existing surfaces.

3.2 INSTALLATION

- A. Interior Identification Signs and Interior Directional Signs:
 1. Anchor signs to wall using 4 tamperproof, round head screws, one at each corner of sign. Furnish plastic anchors.

SECTION 10 14 00

SIGNAGE

2. In addition to screws, signs shall be secured to wall with high-bond two-faced tape.
 3. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.
- C. Geometric Signs: Toilet room signs shall be anchored to doors with 3 tamperproof countersunk screws, designed for anchoring to material of wall.

3.3 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.4 PROTECTION

- A. Protect Work of this section until Substantial Completion.

Payment for items of work covered under Division 10 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

END OF SECTION

**SECTION 10 21 00
FENCE SCREEN**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fence Screens.
2. Screen Fasteners.
3. Reinforced Center Binding Strip.

B. Related Requirements:

1. Division 01 - General Requirements.

1.2 REFERENCES

A. Design Requirements:

1. Fence Screens shall be colorfast, washable, mildew resistant, anti-static, anti-microbial, and dimensionally stable.
2. Fence Screens shall be inherently and permanently flame-resistant and shall bear manufacturer's label indicating flame-resistance.

B. Regulatory Requirements:

1. Provide certificates indicating the fabrics have been flame-proofed in accordance with requirements of the laws of the State of California and rules of the State Fire Marshal. Flame proofing shall be of a quality to withstand multiple washings without destroying its properties.

1.3 SUBMITTALS

A. Provide the following submittals in accordance with Division 01:

1. Shop Drawings: Submit Shop Drawings indicating complete floor layout, elevations and sections, heights of fence/track and Screens, and the arrangement of the connection details.
2. Material Samples: Submit manufacturer's standard color Samples of each type of fabric proposed for installation.
3. Certificates: Submit certification materials have been flame proofed as required by regulatory authorities having jurisdiction.
4. Manufacturer's Installation Instructions: Submit manufacturer's conditions and limitations of use. Include instructions for installation.

**SECTION 10 21 00
FENCE SCREEN**

5. Manufacturer's Maintenance Data: Provide manufacturer's care instructions for cleaning and maintaining curtains.

1.4 QUALITY ASSURANCE

- A. Qualifications of Installer: Work shall be performed by installers with a minimum of five years' experience installing work of similar scope and complexity.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. FenceScreen.
- B. Uline.
- C. Coversports.
- E. OR Equal.

2.2 MATERIALS

Screen: Commercial Block 95%, closed woven polypropylene, panels with 2" polypropylene webbing for edge reinforcement. 3/8" brass grommets at 24" on center attach to fence with fencescreen fasteners or galvanized hog rings.

- A. Fasteners: Industrial grade 8" HD Screen fasteners.
 1. Wind: Screen provided with reinforced windows.
 2. Reinforced Center Binding Strip.

2.3 PROPERTIES

- A. Weight: 400g/sq.m
- B. Grab Tensile: 420/256 lbs.
- C. Burst Strength: 469 psi
- D. Shade Percentage: 95%

2.4 FABRICATION

- A. Screen Size: Custom width to fit each bay of aluminum fence. Height to be determined by aluminum fence height. Verify with District sizes prior to ordering.
 1. Grommets: Rust proof grommets, placed 24-inch on center.

**SECTION 10 21 00
FENCE SCREEN**

2. Fabric Color: To be selected by Architect from full range of manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Work before installation. Proceed with installation only after unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install fence screen in accordance with manufacturer's installation instructions and Shop Drawings, to provide an installation that is plumb, level, and complete.
- B. Hang fence screen straight and even, employing hand sewing of seams and hems as necessary for a carefully matched installation with even hems, smooth operation and quiet mechanism movement.
- C. Install fence screen to prevent abrasion damage caused by rubbing the track and/or adjacent surfaces.

3.3 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.4 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 10 21 15 TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid phenolic toilet compartments, urinal screens, hardware, and vision screens.
- B. Related Sections:
 - 1. Division 01 – General Requirements.
 - 2. Section 06 10 00 – Rough Carpentry.
 - 3. Section 10 28 13 – Toilet Accessories.

1.2 DESIGN REQUIREMENTS

- A. Compartments: Floor supported overhead braced type units consisting of solid phenolic pilasters, panels and doors; plated steel leveling devices with stainless steel covers; and stainless-steel fittings, hardware and fastenings.
- B. Urinal Screens: Floor supported and wall hung type consisting of solid phenolic screen panels and plated steel leveling devices with stainless steel covers, stainless steel fittings and fastening.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit manufacturer's data sheets for each product specified.
 - 2. Shop Drawings: Submit manufacturer's shop drawings for each product specified, including the following:
 - a. Plans, elevations, details of construction and attachment to adjacent construction.
 - b. Show anchorage locations and accessory items.
 - c. Verify dimensions with field measurements prior to final production of toilet compartments.
 - 3. Material Samples:
 - a. Submit full range of Samples of phenolic chips for initial color selection. Chips shall be at least 2-inch by 3-inch.
 - b. Submit Samples of hardware and fasteners.
 - 4. Closeout documents: Submit operation and maintenance data and warranty.

SECTION 10 21 15 TOILET COMPARTMENTS

1.4 QUALITY ASSURANCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 167 - Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 2. ASTM E-84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. Chemical Resistance: Panels to meet or exceed Scientific Equipment Furniture Association's (S.E.F.A.) list of 49 standard chemicals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

1.7 WARRANTY

- A. Toilet Compartment Manufacturer shall provide a 25-year material warranty for solid phenolic panels and hardware.

PART 2 - PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Bobrick Washroom Equipment, Inc.
 - 2. Capitol Partitions.
 - 3. Comtec Industries.
 - 4. Metpar Corporation.
 - 5. Scranton Products.
 - 6. Or approved equal.

2.2 MATERIALS

- A. Stiles, Panels, Doors, and Screens
 - 1. Solid phenolic material constructed of solidly fused plastic laminate with matte-finish melamine surfaces, colored face sheets, and black phenolic resin core that are integrally bonded. Edges shall be black.
 - 2. Color: as noted on Drawings.
 - 3. Option to provide gap-Free Privacy Design.
 - 4. Finish Thickness:
 - a. Stiles and doors shall be 3/4 inch.
 - b. Panels shall be 1/2 inch.

**SECTION 10 21 15
TOILET COMPARTMENTS**

- B. Heavy Duty Hardware
 - 1. All hardware to be Institutional Hardware, 18-8, type-304 stainless steel with satin finish.
 - 2. All hardware concealed inside compartments with the exception of out-swinging doors.
- C. Latch with Vandal-Resistant Option
 - 1. Sliding door latch 14 gauge and slide on nylon track.
 - 2. Sliding door latch shall require less than 5-pound force to operate. Twisting latch operation will not be acceptable.
 - 3. Latch track attached to door by flathead machine screws into factory installed threaded brass inserts.
 - 4. Latch handle shall have rubber bumper to act as door stop.
 - 5. Latch shall allow door to be lifted over 8-gauge keeper for emergency access.
 - 6. Metal-to-metal connection shall withstand a direct pull of over 1000 pounds per screw.
 - 7. ADA approved latch.
- D. Hinges with Vandal-Resistant Option
 - 1. Hinge 16 gauge continuous piano hinge.
 - 2. All doors equipped with self-closing hinge.
 - 3. Continuous piano hinge attached to door and stile by theft-resistant, one-way, stainless steel machine screws into threaded brass inserts.
 - 4. Door furnished with two 11-gauge vinyl-coated door stops to resist door from being kicked out of compartment.
 - 5. Door stops and keeper secured with stainless steel, one-way, machine screws from inside of compartment to threaded brass inserts.
- E. Mounting brackets 18-gauge stainless steel and extend full height of panel. U-channels furnished for panel to stile mounting. Angle brackets furnished for stile to wall and stile to panel mounting. Angle brackets furnished for panel to wall mounting.
- F. Leveling Device 3/16 inch hot rolled steel bar; chromate-treated and zinc-plated; through-bolted to base of solid phenolic stile.
- G. Stile Shoe one-piece, 4 inch high, type-304, 22-gauge stainless steel with satin finish. Top shall have 90 degree return to stile. One-piece shoe capable of adapting to 3/4 inch or 1 inch stile thickness and capable of being fastened (by clip) to stiles starting at wall line.
- H. Overhead Braced Headrail satin finish, extruded anodized aluminum 0.125 inches thick with anti-grip profile.

SECTION 10 21 15 TOILET COMPARTMENTS

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 – Execution: Verification of existing conditions before starting work.
 - 1. Check areas scheduled to receive compartments for correct dimensions, plumbness of walls, and soundness of surfaces that would affect installation of mounting brackets.
 - 2. Verify spacing of plumbing fixtures to assure compatibility with installation of compartments.
 - 3. Do not begin installation of compartments until conditions are satisfactory.

3.2 INSTALLATION

- A. Install compartments rigidly, straight, plumb, and level and in accordance with manufacturer's installation instructions.
- B. Installation methods shall conform to manufacturer's recommendations for backing and proper support.
- C. Conceal evidence of drilling, cutting, and fitting to room finish.
- D. Maintain uniform clearance at vertical edge of doors.

3.3 ADJUSTMENT AND CLEANING

- A. Adjust hardware for proper operation after installation.
- B. Set hinge cam on in-swinging doors to hold doors open when unlatched.
- C. Set hinge cam on out-swinging doors to hold unlatched doors in closed position.
- D. Clean exposed surfaces of compartments, hardware, and fittings.

END OF SECTION

SECTION 10 28 13 TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Toilet Accessories.
 - 2. Attachment hardware.
- B. Related Documents: The Contract Documents, as defined in the General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 06 10 00 - Rough Carpentry: Placement of backing and blocking for attachment of accessories.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A 167 - Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - 3. ASTM A 366 - Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data for each accessory describing size, finish, details of function, and attachment methods.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to California Building Code, 2016 Edition and Federal ADA for mounting heights and locations of accessories.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect products.

**SECTION 10 28 13
TOILET ACCESSORIES**

- B. Deliver accessories in original labeled packaging, bearing manufacturer's name and type of accessory.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. American Specialties Company,
 - 2. Bobrick Washroom Equipment,
 - 3. Bradley Corporation,
 - 4. McKinney Parker,
 - 5. Or approval equal as permitted in Section 01 60 00 - Product Requirements: Product options and substitutions.

2.2 MATERIALS

- A. Sheet Steel: ASTM A 366.
- B. Galvanized Sheet Steel: ASTM A 366, ASTM A 123 to 1.25 ounces per square yard.
- C. Stainless Steel Sheet: ASTM A167, Type 304.
- D. Fasteners, Screws, and Bolts: Stainless Steel, tamper-proof.
- E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 MANUFACTURED UNITS – See Drawings

2.4 FABRICATION

- A. Weld and grind smooth joints of fabricated components.
- B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.
- C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges.

SECTION 10 28 13 TOILET ACCESSORIES

- D. Shop assemblies components and package complete with anchors and fittings.
- E. Provide steel anchor plates, adapters, and anchor components for installation.
- F. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify correct location of opening in wall for recessed accessories.
 - 2. Verify that attachment blocking and backing plates are in place in the correct location for accessory connections.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the City.

3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site for scheduled installation.
- B. Provide and use templates and rough-in measurements as required.

3.3 INSTALLATION

- A. Install fixtures, accessories, and items in accordance with manufacturer's instructions, and as indicated on Drawings. Use tamper-proof fasteners.
- B. Install plumb and level, securely and rigidly anchored to substrate.

**SECTION 10 28 13
TOILET ACCESSORIES**

3.4 ADJUSTING AND CLEANING

- A. Adjust accessories for proper operation and verify mechanisms function smoothly.
- B. Remove temporary labels and protective coatings. Clean and polish exposed surfaces.

Payment for all items of work identified under Division 10 of the plans and these specifications shall be based on the lump sum pricing for the various bid items identified as Building Specialties on the Bid Schedule.

END OF SECTION

SECTION 11 40 00
FOOD SERVICE EQUIPMENT AND FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work of this section, as shown or specified, shall be provided by the Contractor and shall be in accordance with the requirements of the Contract Documents.
- B. Work includes all labor, materials, equipment, accessories and appliances required to Furnish and install food service equipment as indicated on the drawings and herein specified.
- C. Related work in other Sections:
 - 1. Section 061000 – Rough Carpentry.
 - 2. Division 22 - Plumbing.
 - 3. Division 26 - Electrical.
- D. Contractor shall provide cutting of holes in equipment or fixtures for pipes and drains as required for their installation.
- E. Contractor shall provide adequate raceways and accesses in fixtures for the plumbing lines and for Electrical Contractor to install his work. Where there is neglect by the Contractor to provide for such space, he shall make the necessary revisions/repairs to the work without expense to the District. Cutting and patching required by such work shall be reworked to its original finish.
- F. Contractor shall provide and locate outlet boxes, receptacles, device plates, and switches, junction boxes, where they are a part of the fixture and indicated on equipment electrical layout sheets. All other electrical work shall be furnished and installed by the Electrical Contractor, including installation of conduits in fixtures, connection to boxes, and the wiring of electrical outlets and equipment.
- G. The drawings indicate the desired basic arrangement and dimensions of the equipment; minor deviations therefore may be substituted for approval according to Section 01 2513, and provided basic requirements are met and no major rearrangements of services to the equipment are required to affect the proposed alteration, such deviations shall be made without expense to District.
- H. The Contractor shall be responsible for the satisfactory operation of the assembled equipment. Tests of the installed equipment shall be required. Defects or deficiencies noted as a result of tests shall be corrected to the entire satisfaction of the District and/or his agent at the expense of the Contractor. The Contractor shall consult the mechanical and electrical drawings and their accompanying specifications to determine additional requirements of the work, and shall cooperate with all trades to insure a completely satisfactory installation.

KESSLER PARK SNACK BAR 11 40 00 - 1
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE

SECTION 11 40 00
FOOD SERVICE EQUIPMENT AND FIXTURES

- I. Required voltages, cycles and phase and electrical requirements shall be checked before ordering equipment.

1.2 SUBMITTALS

- A. All submittals shall be made according to Section 01 3300 and as described herein.
- B. Submit the following for each item:
 - 1. The Contractor shall submit for approval two (2) copies of 1/4" scale plans showing location of all plumbing, and electrical with elevations and sections of all special equipment for use of the respective trades. The Contractor shall be responsible for the accuracy of the outlets in the building in connection with his work. One copy with approved corrections shall be returned to the Contractor who shall revise such drawings and re-submit two (2) additional copies for final approval.
 - 2. The Contractor shall submit two (2) copies for approval of 3/4" (20mm) scale shop drawings covering all items of work included; detail drawings shall show all dimensions and all details of construction installation and the relation to adjoining and related work; all reinforcements, anchorages and other work required for complete installation. One copy with approval or corrections shall be returned to the Contractor who shall revise such drawings and resubmit two (2) additional copies for final approval. (Scale: 3/4" (20mm) and larger, as required.) Shop drawing blueprints shall not be larger than 30" x 42" (760 x 1060mm).
- C. After final approval Contractor shall print and distribute four (4) copies of shop drawings to other interested parties, or as directed by the District.
- D. Approval of such drawings shall not relieve the Contractor from responsibility for any deviations from the drawings and specifications, unless such deviations are approved in writing by the District or his agent.

1.3 WORK NOT INCLUDED

- A. Plumbing and electrical trims, including stainless steel cover plates for outlets and pull boxes, and connections shall be furnished by the respective trades involved, unless otherwise specified.
- B. Connections to the mechanical and electrical services are specified under the General Contractor specifications and shall not be considered as part of the

SECTION 11 40 00
FOOD SERVICE EQUIPMENT AND FIXTURES

work of this section, unless specifically indicated otherwise on drawings or specifications.

1.4 QUALITY ASSURANCE

- A. All Food Service Equipment and Fixtures shall be provided and installed using experienced, skilled workmen to the highest standard of workmanship and shall be free of any defects due to faulty workmanship.
- B. All work and materials shall conform to the drawings and specifications; any changes or deviations in materials or methods must be approved by the Architect.
- C. Food Service Equipment and Fixtures shall meet requirements of local and state codes where applicable. Comply with all laws, ordinances, rules and regulations and orders of any public authority having jurisdiction over this part of the Work.
- D. The Contractor shall be responsible for taking accurate job-site measurements for all dimensions related to the Work.
- E. The Contractor shall examine all conditions pertaining to the installation of Food Service Equipment and Fixtures and shall provide all coordination as required to achieve the proper and timely completion of the installation.
- F. The Contractor will not change brands of materials during the course of the work unless approved by the Architect.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. All equipment and fixtures shall be provided as indicated on drawings and specifications and as described herein.
- B. All electrically operated or heated equipment shall be in full accordance with and will conform to the latest standard of the National Board of Fire Underwriters, National Electrical Manufacturer's Association and Underwriters Laboratories, Inc. Where applicable standards have been set up by that agency and are acceptable to authorities having jurisdiction.
- C. All steam-heated equipment shall be manufactured in accordance with A.S.M.E. code requirements and shall carry the A.S.M.E. stamp.

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FOOD SERVICE EQUIPMENT AND FIXTURES

- D. Food service equipment, electric commercial cooking and warming equipment and soda fountain equipment shall conform to standards of the National Sanitation Foundation, standards.
- E. "Cord and plug" shall mean a sufficient length (from item to receptacle) of grease resistant insulated cord with cap of sufficient size and capacity to carry the connected load. Plug shall match receptacles.
- F. Contractor to verify all pertinent data with District before ordering all items listed in the construction documents Food Service Specialty Equipment Schedule.
- G. Contractor to verify the exact voltage and phase to be used prior to ordering any equipment.

PART 3 - EXECUTION

3.1 DELIVERIES AND STORAGE

- A. The equipment and fixtures shall be delivered and installed on schedule.
- B. The Contractor shall submit to the District within five (5) days of execution of contract, a Progress Schedule, showing the order of expected progress of the job with the expected starting and completion dates of the various parts of the job.
- C. Insofar as possible, work shall be fabricated and finished in the shop and delivered complete to the jobsite ready to set in place.
- D. Follow manufacturers' recommendations for all handling and storage of equipment.

3.2 INSTALLATION

- A. Manufacturer's directions shall be followed in all cases where manufacturers of articles used in this contract furnish directions or prints covering points not shown on the drawings or specifications.
- B. Installation of equipment shall be in strict accordance with manufacturer's approved shop and installation drawings.

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FOOD SERVICE EQUIPMENT AND FIXTURES

- C. State and local health regulations and ordinances and minimum standards of the National Sanitation Foundation Standards Nos. 1, 2, 3, and 4 shall be fully adhered to and other additional requirements which might develop shall be included to insure a complete sanitary installation.
- D. All equipment and fixtures installed against walls shall be sealed off with mastic approved by the Health department to prevent vermin harborage.
- E. Contractor shall provide a competent representative to be present when installation is complete and ready to put into operation, and to instruct District's employees in the proper use and maintenance of items and to set up a maintenance schedule.
- F. Repair damage done to the premises as a result of installation of equipment and fixtures.
- G. During and upon completion of work, remove excess materials, rubbish, and debris from site. Fixtures and equipment shall be wiped clean and floors swept broom clean.

END OF SECTION

SECTION 22 00 00 PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Waterproofing.
 - 2. Electrical Connections and Protection.
 - 3. Supports and anchors.
 - 4. Cleaning, Protection and Adjustment.
 - 5. Dielectric Fittings.
 - 6. Piping connections.
 - 7. Mechanical Identification.
 - 8. Sleeves and Seals.
- B. Related Documents: The Contract Documents, as defined in Section 01 1000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. 07 92 00 - Joint Sealants: Sealants.
 - 2. 09 91 00 - Painting: Field painting.

1.2 WATERPROOFING

- A. Where work penetrates waterproofing, including waterproof concrete, the method of installation shall be approved by the Engineer prior to performing the work. Furnish necessary sleeves, caulking and flashing required to make openings absolutely watertight.

1.3 ELECTRICAL CONNECTIONS AND PROTECTION

- A. Regardless of voltage, provide control wiring, interlock wiring, and equipment control wiring for the equipment provided under this division of the specifications.
- B. Furnish electrical disconnect switches, starters and combination starter disconnects required for equipment provided under this division of the specifications. Circuit breakers furnished shall be rated for motor protection.
- C. Power wiring not used for control functions, complete from power source to motor or equipment junction box, including power wiring through starters, shall be provided under Division 26.

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- D. Coordinate to ensure that electrical devices furnished or provided are compatible with the electrical systems used.
- E. Confirm final location of electrical equipment to be installed in the vicinity of piping.

1.4 PAINTING

- A. Painting requirements of this section shall conform to Division 9 – Finishes: Painting.
- B. Provide surface preparation, priming, and final coat application in strict accordance with manufacturer's recommendations.
- C. Provide field painting of systems, equipment and miscellaneous metals located outdoors. Application shall be in strict accordance with manufacturer's recommendations.
- D. Provide painting of plumbing piping and equipment exposed in mechanical equipment room and in occupied spaces. Plumbing items to be painted are as follows:
 - 1. Piping, pipe hangers, pipe insulation, and supports
 - 2. Equipment and supports.
 - 3. Accessory items.

1.5 CLEANING, PROTECTION AND ADJUSTMENT

- A. Cleaning
 - 1. General cleaning requirements are specified in Division 1 – General Requirements.
 - 2. Upon completion of the work, clean the exterior surface of equipment, accessories, and trim installed. Clean, polish, and leave equipment, accessories, and trim in first-class condition.
- B. Protection of Surfaces
 - 1. Protect surfaces from damage during the construction period.
 - 2. Provide plywood or similar material under equipment or materials stored on floors or roofs. Provide protection in areas where construction may damage surfaces.
 - 3. Surfaces damaged during the construction shall be repaired or replaced at no additional cost to the District. The method of repairing or replacing the surface shall be approved by the Engineer.
- C. Protection of Services
 - 1. Protect services from damage during the construction period.

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2. Repair, replace and maintain utilities, facilities or services (underground, above ground, interior or exterior) damaged, broken or otherwise rendered inoperative during the course of construction.
3. Services damaged during the construction shall be replaced at the cost of the Contractor at fault. The method used in repairing, replacing or maintaining the services shall be approved by the Engineer.

D. Protection of Equipment and Materials

1. Equipment and materials shall be stored in a manner that shall maintain an orderly, clean appearance. If stored on-site in open or unprotected areas, equipment and material shall be kept off the ground and out of standing water by means of pallets or racks, and covered with tarpaulins.
2. Equipment and material, if left unprotected and damaged, shall be repainted or otherwise refurbished at the discretion of the District. Equipment and material are subject to rejection and replacement if, in the opinion of the Engineer or manufacturer the equipment has deteriorated or been damaged to the extent that its immediate use or performance is questionable, or that its normal life expectancy has been curtailed.
3. During the construction period, protect piping, fittings, valves, equipment, and associated appurtenances from damage and dirt. Each system of piping shall be flushed to remove grit, dirt, sand, and other foreign matter for as long a time as required to thoroughly clean the systems.

E. Adjustment

1. After the entire installation has been completed, make required adjustments to balancing valves, circulating systems, pressure reducing valves and similar devices until performance requirements are met.
2. Provide factory-lubricated bearings for equipment. Before initial startup of equipment, inspect and verify bearings for proper amounts of lubricant. If required, provide proper amounts of lubricant in accordance with manufacturer's recommendations.

1.6 DIELECTRIC FITTINGS

- A.** Ferrous to non-ferrous pipe connections shall be made with threaded, soldered, plain, or welded end connections that match piping system material. Dielectric fittings shall prevent any electrolytic action between dissimilar materials.

1.7 PIPING CONNECTIONS

- A.** Make pipe connections according to the following
1. Provide unions in supply piping systems 4 inches and smaller:
 - a. Adjacent to each side of valve
 - b. At final connection to equipment

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2. Provide flanged connections for supply piping systems 4 ½ inches and larger:
 - a. Adjacent to each side of valve
 - b. At final connection to equipment
3. Provide sewer lateral cleanout:
 - a. As indicated on Plans.

1.8 SLEEVES AND SEALS

- A. Sleeves for Pipes Through Non-Fire Rated Floors: 18 gage (1.2 mm thick) galvanized steel.
- B. Sleeves for Pipes Through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage (1.2 mm thick) galvanized steel.
- C. Sleeves for Round Ductwork: Galvanized steel.
- D. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- E. Sealant: refer to Section 07 92 00 – Joint Sealants.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Grinnell.
 2. Elcen.
 3. Fee and Mason.
 4. Kin-Line.
 5. Michigan.
 6. Unistrut.
 7. Or approved equal.
- B. Plumbing Piping - DWV:
 1. Conform to ASTM F708.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Malleable iron, adjustable swivel, split ring.
 3. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 5. Wall Support for Pipe Sizes to 3 Inches (75 mm): Cast iron hook.

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6. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:

1. Conform to ASTM F708.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Malleable iron adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 Inches (50 to 100 mm): Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 Inches (150 mm) and Over: Adjustable steel yoke, cast iron roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches (150 mm) and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches (76 mm): Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
10. Wall Support for Hot Pipe Sizes 6 Inches (150 mm) and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast-iron roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches (100 mm): Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches (150 mm) and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.2 PIPE HANGER AND SUPPORT SCHEDULE

PIPE HANGER AND SUPPORT SCHEDULE		
PIPE SIZE Inches (mm)	MAX. HANGER SPACING Feet (m)	HANGER ROD DIAMETER - Inches (mm)
1/2 to 1-1/4 (12 to 32)	6.5 (2)	3/8 (9)
1-1/2 to 2 (38 to 50)	10 (3)	3/8 (9)

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2-1/2 to 3 (62 to 75)	10 (3)	1/2 (13)
4 to 6 (100 to 150)	10 (3)	5/8 (15)
8 to 12 (200 to 300)	14 (4.25)	7/8 (22)
PVC (All Sizes)	6 (1.8)	3/8 (9)
C.I. Bell and Spigot (or No-Hub) and at Joints	5 (1.5)	1/2 (13)

2.3 PROTECTION OF ELECTRICAL EQUIPMENT

- A. Plan and arrange overhead piping to avoid dedicated electrical space that may include motors, controllers, switchboards, panel boards, or similar equipment.
 - 1. Dedicated electrical space is equal to the width and depth of the electrical components and extends from the floor to a height of 6 feet above the electrical components or to the structural ceiling, which ever is lower. No piping, leak detection apparatus, equipment, components or associated appurtenances foreign to the electrical installation shall be located in the dedicated electrical space.
 - 2. Dropped, suspended, or any other type of ceiling that does not add strength to the building structure can not be provided as a separation between dedicated electrical space for the installation of foreign components within the dedicated electrical space.
- B. Where the installation of foreign components occurs above the dedicated electrical space (6 feet above the electrical systems), contractor shall provide a means of secondary containment to prevent damage to the electrical systems.
- C. Secondary Containment Piping System
 - 1. Piping system shall consist of clear unpigmented Polyvinyl Chloride pipe and fittings. The containment piping system shall be longitudinally split. The pipe shall align via a tongue and groove and the fittings shall be manufactured in two halves.
 - 2. The pipe and fitting shall be temporarily held together by clips affixed over top of integral fitting clip locators. Final system joining shall be provided by welding components together via an injection bonding process.
 - 3. Final containment inspection shall be provided via a low-pressure air test per manufacturer's requirements.

2.4 DIELECTRIC FITTINGS

- A. Dielectric unions shall be factory – fabricated assemblies with a minimum working pressure as required to suit system pressures.
- B. Dielectric flanges shall be factory – fabricated, companion flange assemblies with a minimum working pressure as required to suit system pressures.

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- C. Dielectric flange kits shall be field – fabricated with a minimum working pressure as required to suit system pressures. Kit shall include flanges, full face type phenolic gasket, phenolic bolt sleeves, phenolic washers, and steel backing washers.
- D. Dielectric couplings shall be galvanized steel with inert and noncorrosive, thermoplastic lining, threaded ends and a minimum working pressure as required to suit system pressures.
- E. Dielectric nipples shall be electroplated steel nipple with unert and noncorrosive, thermoplastic lining, plain, threaded, or grooved ends and a minimum working pressure as required to suit system pressures.
- F. Acceptable Manufacturers:
 - 1. Watts Industries
 - 2. Zurn Industries
 - 3. Sioux Chief Industries
 - 4. Or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 PREPARATION - MECHANICAL IDENTIFICATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

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PLUMBING**

3.3 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

3.4 INSTALLATION - PIPE HANGER AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2-inch (13 mm) space between finished covering and adjacent work.
- C. Place hangers within 12 inches (300 mm) of each horizontal elbow.
- D. Use hangers with 1-1/2 inch (38 mm) minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet (1.5 m) maximum spacing between hangers.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.
- H. Provide copper plated hangers and supports for copper piping.
- I. Design hangers for pipe movement without disengagement of supported pipe.
- J. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.5 INSTALLATION - MECHANICAL IDENTIFICATION

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install tags using corrosion resistant chain. Number tags consecutively by location.
- D. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.

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- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify valves in main and branch piping with tags.
- G. Identify piping, concealed or exposed, with plastic pipe markers and plastic tape pipe markers. Use tags on piping 3/4-inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

Payment for all items of work identified in Division 22 in the plans and these specifications will be based on the lump sum pricing for items identified as Plumbing in the Bid Schedule. No additional Compensation will be allowed.

END OF SECTION

SECTION 22 11 16 DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Below ground (outboard of building footprint) and above ground domestic water pipes, fittings, and valve above grade and inside the building.
2. Valves.
3. Dielectric Fittings.
4. Escutcheons.

1.2 SUBMITTALS

- A. Product Data:** For each type of product indicated.
- B. Field quality-control reports.**

1.3 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.**
- B. Comply with NSF 61 for potable domestic water piping and components.**

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube:** ASTM B 88, Type L water tube, drawn temper.
1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint ends.

2.2 PIPING JOINING MATERIALS

- A. Metal, Pipe-Flange Bolts and Nuts:** ASME B18.2.1, carbon steel unless otherwise indicated.

SECTION 22 11 16
DOMESTIC WATER PIPING

- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

2.3 BALL VALVES

- A. Manufacturers:
 - 1. Grinnell Corporation.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - c. Red-White Valve Corporation.
 - d. Nibco.
 - e. Apollo.
 - f. Or equal.
- B. Up to 2 Inches: Bronze two-piece body, stainless or chrome plated steel ball, Teflon seats and stuffing box ring, lever handle solder or threaded ends. Note: Three-piece full port ball valves are recommended up to 3". Also recommended to add option for extended handle stem for insulated pipes.
- C. Over 2 Inches: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, flanged.

2.4 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
 - 1. Description:
 - a. Pressure Rating: 150 psig at 180 deg F.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous.

2.5 ESCUTCHEONS

- A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
- B. One Piece, Cast Brass: Polished, chrome-plated finish with setscrews.

SECTION 22 11 16
DOMESTIC WATER PIPING

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install domestic water piping level and plumb.
- D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated.
- E. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Provide water source up through roof to MAU-1 to include isolation valve.

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

SECTION 22 11 16
DOMESTIC WATER PIPING

- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 64: Use dielectric flanges or flange kits.

3.4 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.
- B. Escutcheons for New Piping:
 - 1. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
 - 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Piping Inspections:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - 3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Piping Tests:
 - 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. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

SECTION 22 11 16
DOMESTIC WATER PIPING

4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 6. Prepare reports for tests and for corrective action required.
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.6 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION

SECTION 22 13 19
SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following sanitary drainage piping specialties:
 - 1. Cleanouts.
 - 2. Floor drains.
 - 3. Roof flashing assemblies.
 - 4. Miscellaneous sanitary drainage piping specialties.
 - 5. Flashing materials.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 CLEANOUTS

- A. Cast-Iron Floor Cleanouts:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company; Josam Div.
 - b. Oatey.
 - c. Sioux Chief Manufacturing Company, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Zurn Plumbing Products Group; Light Commercial Operation.
 - h. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASME A112.36.2M for adjustable housing cleanout.
 - 3. Size: Same as connected branch.
 - 4. Closure: Brass plug with straight threads and gasket OR cast-iron plug.
 - 5. Top Loading Classification: Light Duty.
 - 6. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

SECTION 22 13 19
SANITARY WASTE PIPING SPECIALTIES

B. Cast-Iron Wall Cleanouts:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
5. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains :

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Commercial Enameling Co.
 - b. Josam Company; Josam Div.
 - c. MIFAB, Inc.
 - d. Prier Products, Inc.
 - e. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - f. Tyler Pipe; Wade Div.
 - g. Watts Drainage Products Inc.
 - h. Zurn Plumbing Products Group; Light Commercial Operation.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.6.3 with backwater valve, if required.
3. Body Material: Gray iron.
4. Backwater Valve: Integral, ASME A112.14.1, swing-check type, if required.
5. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel, where required. .
6. Sediment Bucket:
7. Top or Strainer Material: Nickel bronze.
8. Top of Body and Strainer Finish: [Nickel bronze] [Polished bronze] [Rough bronze] <Insert finish>.
9. Top Shape: Square.
10. Top Loading Classification: Light Duty.

SECTION 22 13 19
SANITARY WASTE PIPING SPECIALTIES

2.3 ROOF FLASHING ASSEMBLIES

- A. Roof Flashing Assemblies:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Acorn Engineering Company; Elmdor/Stoneman Div.
 - b. Thaler Metal Industries Ltd.
- B. Description: Manufactured assembly made of 6.0-lb/sq. ft., 0.0938-inch-thick, lead flashing collar and skirt extending at least 10 inches from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.
 - 1. Open-Top Vent Cap: Without cap.
 - 2. Low-Silhouette Vent Cap: With vandal-proof vent cap.
 - 3. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

- A. Air-Gap Fittings:
 - 1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
 - 2. Body: Bronze or cast iron.
 - 3. Inlet: Opening in top of body.
 - 4. Outlet: Larger than inlet.
 - 5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.
- B. Vent Caps :
 - 1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
 - 2. Size: Same as connected stack vent or vent stack.

2.5 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 - 1. General Use: 6-lb/sq. ft., 0.0938-inch thickness.
- B. Fasteners: Metal compatible with material and substrate being fastened.
- C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- D. Solder: ASTM B 32, lead-free alloy.
- E. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

SECTION 22 13 19
SANITARY WASTE PIPING SPECIALTIES

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4." Use NPS 4" for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping NPS 4" and smaller and 100 feet for larger piping.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- H. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
 - 1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
 - 2. Size: Same as floor drain inlet.

SECTION 22 13 19
SANITARY WASTE PIPING SPECIALTIES

- I. Install air-gap fittings on draining indirect-waste piping discharge into sanitary drainage system.
- J. Install vent caps on each vent pipe passing through roof.
- K. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

- A. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
- B. Set flashing on floors and roofs in solid coating of bituminous cement.
- C. Secure flashing into sleeve and specialty clamping ring or device.
- D. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."
- E. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 22 40 00
PLUMBING FIXTURES AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hose Bibb.
 - 2. 3 – Compartment Sink.
 - 3. Access Panel.
 - 4. Expansion Tank.
 - 5. Floor Drain.
 - 6. Floor Sink.
 - 7. Garbage Disposal.
 - 8. Grease Interceptor.
 - 9. Ice Maker.
 - 10. Hand Sink.
 - 11. Handicap Lavatory.
 - 12. Mop Sink.
 - 13. Sample Box.
 - 14. Trap Primer.
 - 15. Urinal.
 - 16. Water Closet.
 - 17. Water Heater.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 07 92 00 - Joint Sealants: Seal fixtures to walls and floors.
 - 2. Section 22 05 00 - Plumbing

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.

1.3 SUBMITTALS

- A. Section 01 60 00 – Product Requirements, Product Data, and Samples: Procedures for submittals.

SECTION 22 40 00
PLUMBING FIXTURES AND EQUIPMENT

1. Product Data:
 - a. Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
 - b. Provide submittals for all fixtures and equipment, and all associated trim and hardware.
 - B. Section 01 77 04 – Closeout Procedures and Training: Procedures for closeout submittals.
 1. Project Record Documents: Accurately record the following:
 - a. Operation and Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- 1.4 DELIVERY, STORAGE, AND HANDLING
- A. Section 01 60 00 – Product Requirements: Transport, handle, store, and protect Products.
 - B. Only accept fixtures on site in factory packaging. Inspect for damage.
 - C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 1. Hose Bibb:
 - a. Acorn 8151.
 - b. Or approved equal.
 2. 3 – Compartment Sink:
 - a. Regency 600S31717G.
 - b. Or approved equal.
 3. Access Panel:
 - a. JL Industries TMS.
 - b. Or approved equal.
 4. Expansion Tank:
 - a. Amtrol ST-5.
 - b. Or approved equal.
 5. Floor Drain:
 - a. J. R. Smith Fig. 2115-1.

SECTION 22 40 00
PLUMBING FIXTURES AND EQUIPMENT

- b. Or approved equal.
- 6. Floor Sink:
 - a. J. R. Smith.
 - b. Or approved equal.
- 7. Garbage Disposal:
 - a. Insinkerator Model Evolution Excel.
 - b. Or approved equal.
- 8. Grease Interceptor:
 - a. Jensen Precast Model JP750G.
 - b. Or approved equal.
- 9. Ice Maker:
 - a. By Architect.
 - b. Or approved equal.
- 10. Hand Sink:
 - a. Regency 600HS172HDM.
 - b. Or approved equal.
- 11. Handicap Lavatory:
 - a. American Standard Lucerne Wall-Hung Lavatory.
 - b. Or approved equal.
- 12. Mop Sink:
 - a. John Boos PBMS2016-12.
 - b. Or approved equal.
- 13. Sample Box:
 - a. Jensen Precast Model 2432-Z.
 - b. Or approved equal.
- 14. Trap Primer:
 - a. PPP Model P-2.
 - b. Or approved equal.
- 15. Urinal:
 - a. American Standard Washbrook Flowise 6590.503.
 - b. Or approved equal.
- 16. Water closets:
 - a. American Standard Madera Flowise 16-1/2" Height Elongated Flushometer Toilet.
 - b. Or approved equal.
- 17. Water Heater:
 - a. Rheem E30A-36-G.
 - b. Or approved equal.

B. Furnish and install Products as indicated in Drawings.

SECTION 22 40 00
PLUMBING FIXTURES AND EQUIPMENT

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
 - 2. Verify that electric power is available and of the correct characteristics.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Plumbing Fixtures:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Install each fixture with trap, easily removable for servicing and cleaning.
 - 3. Provide chrome plated rigid or flexible supplies to fixtures with screwdriver stops, reducers, and escutcheons.
 - 4. Install components level and plumb.
 - 5. Install and secure fixtures in place with wall carriers and bolts.
 - 6. Seal fixtures to wall and floor surfaces with sealant.
 - 7. Water Closets, Urinals and Lavatories: Provide adjustable cast iron fixture supports for all wall hung water closets, except where single vertical carriers in shallow walls occur.
 - 8. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.
- B. Trap Primers

SECTION 22 40 00
PLUMBING FIXTURES AND EQUIPMENT

1. Install primers under sinks and/or lavatories, and behind access panels out of line of sight. Provide access panels
2. Trap primers to have approval of plumbing and drainage institute.
3. Install trap primers in accordance with manufacturer's recommendations.

C. Backflow Preventers

1. Install in accordance with manufacturer's recommendations.
2. Pipe relief through fixed air gap and discharge to sewer.
3. Install adjacent to wall and/or floor utilizing stand-off brackets, angle frame, and/or concrete piers.
4. Test unit for leaks and pressure drop. Clean and/or replace soiled strainer media.

D. Protective Shielding Guards

1. Manufactured, plastic enclosure for covering hot- and cold-water supplies, trap and drain piping, and complying with ADA requirements and meeting ANSI code for barrier-free design. Provide at all accessible sinks and lavatories.

3.4 ADJUSTING

- A. Refer to Specification Section 01 73 00 – Execution.
- B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.5 CLEANING

- A. At completion clean plumbing fixtures and equipment.

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field testing and inspection.

Payment for items of work covered under Division 22 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

END OF SECTION

KESSLER PARK SNACK BAR 22 40 00 - 5
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE

**SECTION 23 05 00
COMMON WORK RESULTS FOR HVAC**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic mechanical methods.
 - 2. Supports and anchors.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 SUBMITTALS

- A. Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Provide test and balance report.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to applicable local code for support of ductwork.

1.4 BASIC MECHANICAL METHODS

- A. Comply with manufacturer's published instructions for delivery, storage, protection, installation, and materials.
- B. When equipment is operable, and it is to the advantage of the Contractor to operate the equipment, he may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install new filter media, make all required adjustments, and complete all punch list items before final acceptance by the Construction Manager and State Representative.
- C. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and

SECTION 23 05 00
COMMON WORK RESULTS FOR HVAC

- doors. Allow ample space for removal of all parts that require replacement or servicing.
- D. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.
 - E. Items exposed (in areas without ceilings) shall be installed in a neat, orderly manner. Elements shall be perpendicular and parallel to building lines.
 - F. In those conditions where ductwork is exposed in finished areas, careful craftsmanship and only the highest standards of installation will be acceptable. All routing of exposed ducts, pipes, conduits, shall be approved in advance by the State Representative prior to installation.
 - G. Drawings and Specifications:
 - 1. The Drawings indicate the general arrangement of systems and are to be followed insofar as possible. If deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the District's Representative, for approval before proceeding with the work.
 - 2. This Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. Contractor shall coordinate this work with all other branches in such a manner as to cause a minimum of conflict or delay.
 - 3. Where any work is so placed as to cause or contribute to a conflict it shall be readjusted at the expense of the Contractor causing the conflict. The decision shall be final in regard to the arrangement of ducts, piping, etc., where conflict arises.
 - 4. Where offsets in systems are required to complete the installation, or for the proper operation of the system, these shall be deemed to be included in the Contract.
 - 5. Significant deviations from Drawings must be approved by the Engineer of Record.
 - H. Locations:
 - 1. Mechanical layouts indicated on drawings are diagrammatic. Exact locations of ducts, pipes, and equipment may vary because of conflicts with work of other trades. Work out conflicts where relocations will not affect operation or appearance of systems.
 - 2. Locate equipment requiring periodic servicing so that it is readily accessible. Do not back up service sides to walls, nor place it too close to other equipment to make service impractical.

**SECTION 23 05 00
COMMON WORK RESULTS FOR HVAC**

PART 2 - PRODUCTS

2.1 SLEEVES AND SEALS

- A. Sleeves for Round Ductwork: Galvanized steel.
- B. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- C. Sealant: refer to Section 07 92 00.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to State Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the State.

3.2 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Testing, adjustment, and balancing of air systems.
 - 2. Measurement of final operating condition of HVAC systems.
 - 3. Sound measurement of equipment operating conditions.
 - 4. Vibration measurement of equipment operating conditions.
- B. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. Associated Air Balance Council (AABC):
 - 1. AABC - National Standards for Total System Balance.
- B. National Environmental Balancing Bureau.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Test Reports: Submit the following reports directly to State Representative from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 01 40 00 - Quality Requirements:
 - 1) Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 2) Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for inclusion in operating and maintenance manuals.
 - 3) Provide reports in binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

SECTION 23 05 93
TESTING, ADJUSTING AND BALANCING FOR HVAC

- 4) Indicate data on AABC National Standards for Total System Balance forms.
- b. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
- c. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Company specializing in testing, adjusting, and balancing of specified with minimum 5 years documented experience. Company to be certified by one of the following.
 - a. AABC Certified Independent Testing and Balancing Agency.
 - b. National Environmental Balancing Bureau Certified Independent Agency. (NEBB).
- B. Certification: Certify the testing, adjusting, and balancing field data reports.
- C. Testing, Adjusting, and Balancing Reports: Use testing, adjusting, and balancing Agent's standard forms.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Duct systems are clean of debris.
 - 5. Air outlets are installed and connected.
 - 6. Duct system leakage is minimized.

3.2 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to State Representative to facilitate spot checks during testing.

SECTION 23 05 93
TESTING, ADJUSTING AND BALANCING FOR HVAC

- B. Provide additional balancing instruments as required.

3.3 INSTALLATION TOLERANCES

- A. Fan Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.4 ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by State Representative.
- F. Check and adjust systems approximately six months after final acceptance and submit report.

3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities. Perform this work with cooling system energized where applicable to obtain the extra resistance of wet coils.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.

SECTION 23 05 93
TESTING, ADJUSTING AND BALANCING FOR HVAC

- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Open volume control devices to 100%.
- F. Vary total system air quantities by duct static pressure set point. Provide adjustment to set point as necessary to achieve air flows.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

END OF SECTION

SECTION 23 07 13 DUCT INSULATION

1.1 SUMMARY

- A. Section Includes:
 - 1. Ductwork insulation.
 - 2. Duct liner.
 - 3. Insulation jackets.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 3. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
 - 4. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 5. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - 6. ASTM C547 - Mineral Fiber Pipe Insulation.
 - 7. ASTM C553 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 8. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
 - 9. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 - 10. ASTM E84 2007 Edition - Surface Burning Characteristics of Building Materials.
 - 11. ASTM E96 - Water Vapor Transmission of Materials.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- D. Underwriters Laboratories, Inc. (UL):
 - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- E. California Energy Code (for materials and installation)

SECTION 23 07 13 DUCT INSULATION

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 3 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.
- B. Materials:
 - 1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Store insulation in original wrapping and protect from weather and construction traffic.
- D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements
 - 1. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
 - 2. Maintain temperature during and after installation for minimum period of 24 hours.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Energy efficiency:

SECTION 23 07 13 DUCT INSULATION

1. Insulation: Minimum thickness in accordance with ASHRAE 90.1. Provide additional thickness to ensure surface temperatures are below 100 degrees and to prevent condensation on cold surfaces.

PART 2 - PRODUCTS

2.1 DUCTWORK INSULATION

A. Glass Fiber, Flexible Duct Wrap

1. Manufacturers:
 - a. Owens/Corning, Toledo, OH (800) 438-7465.
 - b. Other acceptable manufacturers offering equivalent products.
 - 1) CertainTeed.
 - 2) Schuller (Manville).
 - 3) Knauf.
 - 4) Or equal.
2. Insulation: ASTM C553 flexible, noncombustible blanket.
 - a. 'K' ('Ksi') value: ASTM C518, 0.30 at 75 degrees F.
 - b. Maximum service temperature: 250 degrees F.
 - c. Maximum moisture absorption: 0.20 percent by volume.
 - d. Density: 0.75 lb./cu ft.
3. Vapor Barrier Jacket
 - a. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 - b. Moisture vapor transmission: ASTM E96; 0.02 perm.
 - c. Secure with pressure sensitive tape.
4. Vapor Barrier Tape
 - a. Manufacturers:
 - 1) Owens/Corning.
 - 2) CertainTeed.
 - 3) Schuller (Manville).
 - 4) Or equal.
 - b. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber-based adhesive.
5. Tie Wire: Annealed steel, 16 gage.

B. Glass Fiber Duct Liner, Flexible

1. Manufacturers:
 - a. CertainTeed.
 - b. Other acceptable manufacturers offering equivalent products.
 - 1) Knauf.
 - 2) Schuller (Manville).
 - 3) Owens Corning.
 - 4) Or equal.
2. Insulation: ASTM C553; flexible, noncombustible blanket.

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- a. 'K' ('Ksi') value: ASTM C518, 0.28 at 75 degrees F.
 - b. Maximum service temperature: 250 degrees F.
 - c. Density: 1.5 lb./cu ft.
 - d. Maximum Velocity on Coated Air Side: 4,000 ft./min.
 - 3. Adhesive
 - a. Waterproof fire-retardant type.
 - 4. Liner Fasteners: Galvanized steel, impact applied with integral head.
- C. Glass Fiber, Rigid Board
- 1. Manufacturers:
 - a. CertainTeed.
 - b. Other acceptable manufacturers offering equivalent products.
 - 1) Knauf.
 - 2) Schuller (Manville).
 - 3) Owens Corning.
 - 4) Or equal.
 - 2. Insulation: Glass fibers bonded with a thermosetting resin for rigidity. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
 - a. 'K' ('Ksi') value: ASTM C518, 0.28 at 75 degrees F.
 - b. Maximum service temperature: 250 degrees F.
 - c. Density: 1.5 lb./cu ft.
 - 3. Vapor Barrier Jacket
 - a. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 - b. Moisture vapor transmission: ASTM E96; 0.02 perm.
 - c. Overlap seams with pressure sensitive tape.
 - 4. Vapor Barrier Tape
 - a. Manufacturers:
 - 1) Owens/Corning.
 - 2) CertainTeed.
 - 3) Schuller (Manville).
 - 4) Or equal.
 - b. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber-based adhesive.
 - 5. Pin to ductwork below 8 feet and seal all perforations hardcast mastic.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that piping has been tested before applying insulation materials.

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2. Verify that ductwork has been tested before applying insulation materials.
 3. Verify that surfaces are clean, foreign material removed, and dry.
- B. Report in writing to District's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the State.

3.2 INSTALLATION - DUCTWORK INSULATION

- A. Install materials in accordance with manufacturer's instructions and ASHRAE 90.1.
- B. Insulated ductwork conveying air below ambient temperature:
1. Provide insulation with vapor barrier jackets.
 2. Finish with tape and vapor barrier jacket.
 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. Insulated ductwork conveying air above ambient temperature:
1. Provide with or without standard vapor barrier jacket.
 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. For ductwork exposed in finished spaces below 10 feet above finished floor, finish with aluminum jacket.
- E. For exterior applications, provide insulation with vapor barrier jacket. Cover with caulked aluminum jacket with seams located on bottom side of horizontal duct section.
- F. External Duct Insulation Application:
1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 2. Secure insulation without vapor barrier with staples, tape, or wires.
 3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.

**SECTION 23 07 13
DUCT INSULATION**

5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

G. Duct and Plenum Liner Application:

1. Adhere insulation with adhesive for 100 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing.
3. Seal and smooth joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.3 CONSTRUCTION

- A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.4 DUCTWORK INSULATION SCHEDULE

- A. Flexible Glass Fiber Duct Wrap Insulation Schedule:

DUCTWORK	THICKNESS	FINISH
Supply Ducts	1-1/2 INCH	Aluminized Film
Return Ducts	1-1/2 INCH	Aluminized Film
Outdoor Air Intake Ducts	1-1/2 INCH	Aluminized Film

- B. Flexible Glass Fiber Duct Liner Insulation Schedule:

DUCTWORK	THICKNESS	FINISH
Plenums (Cooling System)	1 INCH	Black Pigmented, UL
Supply Ducts	1 INCH	Black Pigmented, UL
Return Ducts	1 INCH	Black Pigmented, UL
Outdoor Air Intake Ducts	1 INCH	Black Pigmented, UL
Ducts Exposed to Outdoors	2 INCH	Black Pigmented, UL

END OF SECTION

HVAC DUCTS
SECTION 23 31 00

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal ductwork.
 - 2. Volume control dampers.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
 - 2. Section 23 07 13 - Duct Insulation: Duct Insulation.
 - 3. Section 23 37 13 - Diffusers Registers and Grilles.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 36 - Structural Steel.
 - 2. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
 - 3. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 4. ASTM A 480 - General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - 5. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanized) by the Hot-Dip Process.
 - 6. ASTM A 568 Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
- B. American Welding Society (AWS):
 - 1. AWS D9.1 - Welding of Sheet Metal.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
 - 2. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
 - 3. NFPA 91 - Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying.

HVAC DUCTS
SECTION 23 31 00

4. NFPA 96 - Installing of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.
- D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 1. SMACNA - HVAC Air Duct Leakage Test Manual.
 2. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- E. Underwriters Laboratories, Inc. (UL):
 1. UL 181 - Factory-Made Air Ducts and Connectors.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Procedures for submittals.
 1. Product Data:
 - a. Duct materials, duct liner, duct connectors, and flexible duct.
 - b. Factory or shop manufactured assemblies including volume control dampers. Include electrical characteristics and connection requirements.
 2. Project Record Documents: Accurately record the following:
 - a. Actual locations of ducts and duct fittings.
 - b. Record changes in fitting location and type.
 - c. Show additional fittings used.
 - d. Actual locations of access doors, test holes, and fire dampers.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- B. Qualifications:
 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

HVAC DUCTS
SECTION 23 31 00

- C. Regulatory Requirements: Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96 standards.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect Products.
- B. Protect dampers from damage to operating linkages and blades.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 - 1. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
 - 2. Maintain temperatures during and after installation of duct sealants.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Indoor Air Quality: Install insulation so that unfazed fiberglass and mineral fiber insulation are not in the interior of the ductwork.

PART 2 - PRODUCTS

2.1 DUCTS

- A. Galvanized Steel Ducts: ASTM A653 having zinc coating in conformance with ASTM A90.
- B. Steel Ducts: ASTM A569 and A568.
- C. Sealant:
 - 1. Manufacturers:
 - a. Duro Dyne Corporation, Farmingdale, NY (800) 899-3876.
 - b. H.B. Fuller Co, St. Paul, MN (888) 423-8553.
 - c. Hardcast, Inc., Wylie, TX (800) 527-7092.
 - d. Or equal.
 - 2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.

HVAC DUCTS
SECTION 23 31 00

2.2 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 - 1. Louvers and Dampers, Inc., Florence, KY (606) 647-2299.
 - 2. Prefco Products, Inc., Buckingham, PA (800) 437-6653.
 - 3. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
 - 4. Or equal.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Splitter Dampers:
 - 1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
 - 2. Blade: Fabricate of double thickness sheet metal to streamline shape, secured with continuous hinge or rod.
 - 3. Operator: Minimum 1/4-inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.
- D. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- E. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inches. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- F. End Bearings: Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- G. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 - 3. Where rod lengths exceed 30 inches provide regulator at both ends.

2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide turning vanes.

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SECTION 23 31 00

- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that electric power is available and of the correct characteristics.
- B. Report in writing to State Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 INSTALLATION - DUCTWORK

- A. Install in accordance with manufacturer's instructions.
- B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Duct Sizes are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- D. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inches and smaller with crimp in direction of air flow.

HVAC DUCTS
SECTION 23 31 00

- G. Use double nuts and lock washers on threaded rod supports.
- H. Connect diffusers or light troffer boots to low pressure ducts directly.
- I. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- J. Install so that unfazed fiberglass and mineral fiber insulation are not in the interior of the ductwork.
- K. Provide transitional hardware at every tap and take-off.
- L. Provide flex duct connection at HP-1, MAU-1 with weather covers (eyebrows).

3.3 INSTALLATION - DUCTWORK ACCESSORIES

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

3.4 PROTECTION OF INSTALLATION

- A. Protect installation in place prior to acceptance.
- B. Clean duct work at necessary prior to acceptance.

END OF SECTION

SECTION 23 31 10
HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal ductwork.
 - 2. Air turning devices.
 - 3. Volume control dampers.
 - 4. Duct cleaning.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 23 05 00 - Common Work Results for HVAC
 - 2. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
 - 3. Section 23 07 13 - Duct Insulation or HVAC Insulation
 - 4. Section 23 37 13 - Diffusers Registers and Grilles

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 36 - Structural Steel.
 - 2. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
 - 3. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 4. ASTM A 480 - General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - 5. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - 6. ASTM A 568 Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
- B. American Welding Society (AWS):
 - 1. AWS D9.1 - Welding of Sheet Metal.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
 - 2. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.

SECTION 23 31 10
HVAC DUCTS AND CASINGS

3. NFPA 91 - Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying.
4. NFPA 96 - Installing of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.
- D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 1. SMACNA - HVAC Air Duct Leakage Test Manual.
 2. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- E. Underwriters Laboratories, Inc. (UL):
 1. UL 181 - Factory-Made Air Ducts and Connectors.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.4 SUBMITTALS

- A. Division 1 - Submittal Procedures: Procedures for submittals.
 1. Product Data:
 - a. Duct materials, duct liner, duct connectors, and flexible duct.
 - b. Factory or shop manufactured assemblies including volume control dampers. Include electrical characteristics and connection requirements.
 2. Project Record Documents: Accurately record the following:
 - a. Actual locations of ducts and duct fittings.
 - b. Record changes in fitting location and type.
 - c. Show additional fittings used.
 - d. Actual locations of access doors, test holes, and fire dampers.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- B. Qualifications:
 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

SECTION 23 31 10
HVAC DUCTS AND CASINGS

- C. Regulatory Requirements: Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96 standards.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect Products.
- B. Protect dampers from damage to operating linkages and blades.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
 - 1. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
 - 2. Maintain temperatures during and after installation of duct sealants.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Indoor Air Quality: Install insulation so that unfaced fiberglass and mineral fiber insulation are not in the interior of the ductwork.

PART 2 - PRODUCTS

2.1 DUCTS

- A. Galvanized Steel Ducts: ASTM A653 having zinc coating in conformance with ASTM A90.
- B. Steel Ducts: ASTM A569 and A568.
- C. Stainless Steel Ducts: ASTM A 167, Type 304.
- D. Fasteners: Rivets, bolts, or sheet metal screws.
- E. Sealant:
 - 1. Manufacturers:
 - a. Duro Dyne Corporation, Farmingdale, NY (800) 899-3876.
 - b. H.B. Fuller Co, St. Paul, MN (888) 423-8553.
 - c. Hardcast, Inc, Wylie, TX (800) 527-7092.

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HVAC DUCTS AND CASINGS

- d. Or equal.
- 2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.
- F. Hanger Rod: ASTM A36; steel threaded both ends, threaded one end, or continuously threaded.

2.2 AIR TURNING DEVICES/EXTRACTORS

- A. Manufacturers:
 - 1. Semco, Inc, Columbia, MO (888) 473-6264.
 - 2. Metal-Fab, Inc, Wichita, KS (800) 835-2830.
 - 3. United McGill Corp, Groveport, OH (614) 836-9981.
 - 4. Or equal.
- B. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

2.3 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers:
 - 1. Ductmate Industries, Inc, East Monongahela, PA (800) 245-3188.
 - 2. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
 - 3. Semco Inc, Columbia, MO (888) 473-6264.
 - 4. Or equal.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Connector: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30oz per sq. yd.
 - 2. Net Fabric Width: Approximately 3 inches wide.
 - 3. Metal: 3 inches wide, 24 gage thick galvanized steel.

2.4 VOLUME CONTROL DAMPERS.

- A. Manufacturers:
 - 1. Louvers and Dampers, Inc, Florence, KY (606) 647-2299.
 - 2. Prefco Products, Inc, Buckingham, PA (800) 437-6653.
 - 3. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
 - 4. Or equal.

SECTION 23 31 10
HVAC DUCTS AND CASINGS

- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Splitter Dampers:
 - 1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
 - 2. Blade: Fabricate of double thickness sheet metal to streamline shape, secured with continuous hinge or rod.
 - 3. Operator: Minimum 1/4-inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.
- D. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- E. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- F. End Bearings: Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- G. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 - 3. Where rod lengths exceed 30 inches provide regulator at both ends.

2.5 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide turning vanes.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

SECTION 23 31 10
HVAC DUCTS AND CASINGS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that electric power is available and of the correct characteristics.
- B. Report in writing to District Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 INSTALLATION - DUCTWORK

- A. Install in accordance with manufacturer's instructions.
- B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Duct Sizes are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- D. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- G. Use double nuts and lock washers on threaded rod supports.
- H. Connect diffusers or light troffer boots to low pressure ducts directly.
- I. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

SECTION 23 31 10
HVAC DUCTS AND CASINGS

- J. Install so that unfaced fiberglass and mineral fiber insulation are not in the interior of the ductwork.
- K. Provide transitional hardware at every tap and take-off.
- L. Provide flex duct connection at HP-1, MAU-1 with weather covers (eyebrows).

3.3 INSTALLATION - DUCTWORK ACCESSORIES

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- C. Use splitter dampers only where indicated.
- D. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

3.4 PROTECTION OF INSTALLATION

- A. Protect installation in place prior to acceptance.
- B. Clean duct work at necessary prior to acceptance.

3.5 CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION

SECTION 23 37 13
DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Diffusers.
 - 2. Registers/grilles.
- B. Related Sections:
 - 1. Section 09 91 00 - Painting: Painting of ductwork visible behind outlets and inlets.

1.2 REFERENCES

- A. Air Diffusion Council (ADC):
 - 1. ADC 1062 - Certification, Rating and Test Manual.
- B. Air Movement and Control Association (AMCA):
 - 1. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
- C. Air Conditioning and Refrigeration Institute (ARI):
 - 1. ARI 650 - Air Outlets and Inlets.
- D. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
 - 1. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
- F. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code.
 - 2. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

1.3 SUBMITTALS

- A. Procedures for submittals.
 - 1. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

SECTION 23 37 13
DIFFUSERS, REGISTERS AND GRILLES

1.4 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate louver performance in accordance with AMCA 500.
- C. Qualifications
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Titus, Richardson, TX (214) 899-1030.
 - 2. Accutherm, Hayward, CA (510) 785-0510
 - 3. Or equal.

2.2 CEILING DIFFUSERS – CD-1

- A. Type: Modular core diffuser to discharge air in four-way pattern, adjustable.
- B. Frame: T-bar as scheduled on plans.
- C. Fabrication: Steel with baked enamel, “off-white” finish.
- D. Accessories: Opposed blade damper with damper adjustable from diffuser face. As specified on drawings.

2.3 VARIABLE AIR DIFFUSER – CD-2

- A. Type: Mechanical thermostat within hardware.
- B. Frame: T-Bar as scheduled on plans.
- C. Fabrication: Steel with baked enamel, “off-white” finish.
- D. Auto changeover for heating and cooling, self-adjustable plate to control air flow.

SECTION 23 37 13
DIFFUSERS, REGISTERS AND GRILLES

2.4 CEILING RETURN GRILLE – CRG-1

- A. Type: Egg crate ½" x ½" x 1" core.
- B. Fabrication: Aluminum, "off-white" finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate location of outlets and inlets with Architectural reflected ceiling plan and make necessary adjustments in position to conform with architectural features, symmetry, and electrical lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 91 00.

END OF SECTION

SECTION 23 57 32 HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Packaged Rooftop Heat Pump (HP-1).
 - 2. Make-up Air Unit (MAU-1).
 - 3. Grease Exhaust Fan (GEF-1).
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 23 31 00 – HVAC Ducts
 - 2. Section 23 59 00 – HVAC Instrumentation and Controls
 - 3. Division 26 - Electrical

1.2 REFERENCES

- A. ARI 210 - Unitary Air Conditioning Equipment
- B. NFPA 70 - National Electrical Code
- C. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- D. UL 465 - Central Cooling Air Conditioners

1.3 DEFINITIONS

- A. Packaged Rooftop Heat Pump (HP-1): Single-packaged, self-contained, factory-assembled, pre-wired unit consisting of cabinet and frame, evaporator fan, evaporator-coil, condenser coil, condenser fan, compressor, controls and filters in draw-through air flow configuration.
- B. Roof Ventilator Exhaust Fan (EF): Spun aluminum shroud, curb-mounted unit, consisting of motor and fan on mounts, wiring and terminations, and for rooftop installation and application associated with commercial grease exhaust hood.
- C. Ceiling Cabinet Exhaust Fan (EF): Ceiling-mounted cabinet, consisting of motor and fan on mounts, wiring and terminations, in-line installation.

SECTION 23 57 32 HVAC EQUIPMENT

- D. Make-Up Air Unit (MAU-1): Platform-mounted unit, consisting of motor and fan on mounts, evaporative cooling section, wiring and terminations, associated controls and interlocks with hood and exhaust fan, for rooftop installation.

1.4 SUBMITTALS

- A. Section 01 60 00 – Product Requirements, Product Data, and Samples: Procedures for submittals.
 - 1. Product Data: Provide product data for manufactured Units. Indicate performance capacities, energy-efficiency ratings and electrical characteristics.
 - 2. Shop Drawings: Provide shop drawings for manufactured Units. Indicate pipe connections, ductwork connections, filter and media size and quantity, condensate drain connection, thermostatic valves, temperature controls connections and electrical rough-in connections with electrical characteristics and connection requirements.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- B. Section 01 77 00 – Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Plan view of installed location of Units
 - b. Elevation or section view of installed Units.
 - 2. Warranty: Submit written minimum five (5) years warranty to include coverage for refrigeration compressors condenser and evaporator with forms completed in District name and registered with manufacturer as specified in this Section.
 - 3. Extra Products: Submit extra products as specified in this Section.
 - 4. Operating instruction: Document training by furnishing a sign-in sheet with a description of the training provided instructors name and organization, and those who received training. Refer to 01780 1.3, 1.4, and 1.5 for more specific training

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum five (5) years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum five (5) years documented experience.

SECTION 23 57 32 HVAC EQUIPMENT

- B. Regulatory Requirements:
 - 1. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 – Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Packaged Rooftop Heat Pump (HP-1).
 - a. Carrier.
 - b. Approved equal.
 - 2. Make-Up Air (MAU-1).
 - a. CaptiveAire.
 - b. Approved equal.
 - 3. Grease Exhaust Fan (GEF-1).
 - a. CaptiveAire.
 - b. Approved equal.
- B. Section 01 60 00 – Product Requirements: Product options and substitutions. Substitutions: Permitted providing equal quality and performance, and as agreed to by Engineer.

2.2 MATERIALS

- A. Grade of equipment as manufactured by respective manufacturer's, for products as identified herein and on drawings, and for performances and capacities and efficiencies as scheduled, and with accessories, options, ancillaries, and trim as noted.
- B. Provide additional hardware as required for complete operating system as identified on plan.

**SECTION 23 57 32
HVAC EQUIPMENT**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that proper power supply is available.
- C. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- D. Report in writing to District prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 INSTALLATION

- A. Mount equipment and hardware with exterior components to provide water-tight installations.
- B. Install equipment level and square and plumb and in accordance with manufacturer's instructions.
- C. Provide ancillaries and trim as required for complete system operation, to include refrigerant piping, control wiring and cable, et al.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field testing and inspection.
- B. Operating Instruction
 - 1. Provide on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance that is required to ensure normal operation.
 - 2. Provide one complete set of equipment operating, installation, and programming manuals that will remain at the installed location.

END OF SECTION

SECTION 23 59 00
HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. HP-1 system thermostat.
 - 2. MAU-1 / GEF-1 control circuiting.
- B. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 23 57 32 – HVAC Equipment.
 - 2. Division 1 - Commissioning Requirements.

1.2 SUBMITTALS

- A. Section 01 60 00 – Product Requirements, Product Data, and Samples: Procedures for submittals.
 - 1. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module
 - 2. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system. Submittals shall be furnished as a complete package prior to installation.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
 - 4. Operating Instruction: Document training by furnishing a sign-in sheet with a description of the training provided; instructors name and organization, and those who received training. Refer to 0780 1.3, 1.4, and 1.5 for more specific training requirements.
- B. Section 01 77 00 – Closeout Procedures and Training: Procedures for close-out submittals.
 - 1. Project Record Documents: Accurately record the following:

KESSLER PARK SNACK BAR 23 59 00 - 1
AND RESTROOM REMODEL
AND NEW SHADE STRUCTURE

SECTION 23 59 00
HVAC INSTRUMENTATION AND CONTROLS

- a. Actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
2. Submit written special warranty with forms completed in District name and registered with manufacturer as specified in this Section.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements:
 1. Conform to requirements of NFPA 70 (National Electrical Code).
 2. Products: Listed and classified by Underwriters Laboratories, Incorporated and suitable for the purpose specified and indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 – Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 1. Carrier (for HP-1).
 2. CaptiveAire (for MAU-1, GEF-1 and associated proprietary control hardware, to include manufactured hardware and field supplied elements.
 3. Approved Equal.
- B. Section 01 60 00 – Product Requirements: Product options and substitutions. Substitutions: Permitted providing equal quality and performance, and as agreed to by Engineer.
- C. Submit proposed hardware and material, and sequence of operations to District for approval as part of bid submittal.

SECTION 23 59 00
HVAC INSTRUMENTATION AND CONTROLS

2.2 SYSTEM REQUIREMENTS

- A. System shall provide equipment and hardware as indicated on the points list and in the system schematics, and as necessary to execute functions as indicated in the sequence of operations as indicated on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to District prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. At contract award, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

3.2 INSTALLATION:

- A. Provide new control wiring as required for proper operation. All control wires installed under this contract shall be color coded, numbered or otherwise labeled for easy identification. All control wiring exposed to damage in workrooms shall be installed in conduit painted to match the mounting surface. All control wiring exposed in offices or other public spaces shall be installed in wiremold painted to match the mounting surface. All concealed control wiring shall be plenum rated. Provide and install batteries as required for proper operation. New installation shall be in accordance with manufacturer's recommendations.
- B. Provide all necessary transformers, relays, contactors and other options as required for proper operation.
- C. Provide line voltage (115v) service (conduit and wire) to control panels extended from available service in vicinity.
- D. Provide low-voltage and signal wire and communication buss cable and associated conduit. All exposed wire and cable shall be installed in conduit.
- E. Coordinate requirements for mounting window operators with window Contractor. Provide low voltage wire from pigtails at operators to vicinity of

SECTION 23 59 00
HVAC INSTRUMENTATION AND CONTROLS

window controllers. Provide conduit or wiremold as dictated by District, or route wires concealed with finish hardware from motors to controllers via raceways in mullions and in walls, grommet and junction box hardware, and additional measures (i.e. conduit and wiremold).

- F. Microprocessor control panels installed in ambient conditions shall be provided in a nema 3r cabinet. Work shall be performed by supplier/installer.
- G. District shall provide a workstation to meet the Supplier's specification (located in server room, unless otherwise agreed upon) for installation of the User Interface. Additional ancillaries shall be provided by the District.

3.3 SYSTEM PERFORMANCE

- A. Supplier shall demonstrate system operability on a point-by-point basis to the District's representative prior to acceptance by the District.
- B. The temperature control system is to maintain space temperature settings, within plus or minus 1-degree F. of space thermostat settings; inside air.
- C. Where outside air capability is provided, set minimum position to be at 5 percent when fan is ON.
- D. Operation Instruction
 - 1. Provide 16 hours of structured on-site instruction to review the operation of the system and detail any common troubleshooting or maintenance required to ensure normal operation.
 - 2. Provide one complete set equipment operating, installation, and programming manuals that will remain at the installed location.
 - 3. Develop trending measures upon turnover of system by which the system automatically archives on-going information of all characteristics of the building operation.
 - 4. Provide 80 hours of support for District's representative for modification of operating strategies

END OF SECTION

**SECTION 26 0000
ELECTRICAL**

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The work covered by this section consists of furnishing and installing all I, materials, equipment, fixtures and performing all labor and operations for complete and operable systems.
- B. Provide all new materials, unless noted otherwise, of the best quality, and in perfect condition, and materials of the same make and quality throughout the work and as hereinafter specified. Comply with the requirements of ASTM, NEMA, U.L., and NBFM for materials and equipment.
- C. The intent of these specifications is to establish a standard of quality of materials installed. Include materials as specified without exception in the Base Bid. Submit for approval any proposed substitution, complete descriptive, technical, and cost comparison data and test reports. Do not furnish or install any substitute items without written approval at the time of contract signing. Reimburse the District for any additional engineering charges and for any changes in the work of other trades resulting from substitutions. List proposed substitutions on the Bid Form, stating the reasons for substitution. When requested by the Architect or Electrical Engineer, samples, electrically wired at 120V. with plug, or system demonstrations of both specified and proposed items will be submitted for inspection at the Electrical Engineer's office and at a time convenient to all concerned parties.
- D. Where a substitution alters the design or space requirements indicated on the plans, Contractor is responsible for all additional cost for Engineering to revise plans.
- E. Verifying Drawings and Job Conditions:
 - 1. Examine all drawings and specifications in a manner to be fully familiar of all work required.
 - 2. Visit the site and verify existing conditions. Where existing conditions differ from drawings, make adjustments and allowances for all necessary equipment to complete all parts of the drawings and specifications.

**SECTION 26 0000
ELECTRICAL**

F. Shop Drawings:

1. Submit drawings in six sets accompanied by letter of transmittal listing the number and dates of the drawings submitted.
2. Mark the drawings submitted with the name of the project, numbered consecutively, and bearing approval as evidence that the drawings have been checked. Any drawings submitted without this approval will be returned for resubmission.
3. Submit Shop drawings on, but not limited to, the following:
 - a. Panels
 - b. Lighting Fixtures
 - c. Transformer
 - d. Product List
 - e. Time switches

G. Drawings of Record:

Provide and keep up-to-date, a complete record set of blue line prints. Show every change from the original drawings. Keep this set of prints on the job site, and use only as a record set. Do not make changes in the layout without definite instruction in each case. Obtain a set of Contract Drawings from Architect and incorporate all changes as noted on the record set of prints. Deliver this set to the Architect upon completion and acceptance of work.

H. Accuracy of Plans and Specifications:

Plans and/or specifications showing deviation from standard practice methods or from compliance with codes, and/or any omissions, does not relieve the responsibility of furnishing, making or installing all items required by code and/or intended for the function of the system.

I. Permits, Fees and Insurance:

Obtain and pay for all insurance, permits, etc. necessary for this Contract.

J. Codes and Regulations:

All work performed under this Section of the Specifications complies with the rules and regulations of the Division of Industrial Safety, State of California, as set forth in the latest edition of the Electrical Safety Orders, the National Electrical Code, NFPA, and all rules and regulations of local codes having jurisdiction, including the presently adopted edition Title 21 and 24 California Administrative Code.

**SECTION 26 0000
ELECTRICAL**

K. Testing and Adjustment:

Test all circuits, outlets, switches, lights, motors, circuit breakers and any other electrical equipment, upon completion of all electrical work.

L. Guarantees of Materials and Workmanship:

Furnish and install all materials under this Contract, new and free from all defects, and guaranteed for a period of two years from the date of acceptance of the work. Should any trouble develop during this period due to defective material or faulty workmanship, furnish all necessary labor and materials to correct the trouble without additional cost to the Contract. Correct any defective material or inferior workmanship noticed at the time of installation immediately, to the satisfaction of the Architect.

M. Removal of Rubbish:

Remove rubbish, excess materials, tools or equipment related to this portion of the work, frequently during construction and upon completion of the work.

N. Drawings and Specifications:

1. The electrical drawings are considered as part of these specifications, and any work or materials shown on the drawings and not mentioned in the specifications, or vice versa, shall be as if specifically mentioned in both.
2. The data herein specified and shown on the drawings is as exact as could be prepared, but their extreme accuracy is not guaranteed. The drawings and specifications are for assistance and guidance. The installation is essentially as shown and specified. The exact location of the equipment, material, apparatus and devices as well as the distances and levels, are more or less governed by the physical conditions and arrangements of the building. Accept this Contract with this understanding.
3. Make minor changes, when ordered by the Architect, accommodating the installation of the work with other sections of the Contract without additional cost to the Contract.

SECTION 26 0000 ELECTRICAL

O. Safety Conditions:

It is the Contractor's responsibility to prevent any damages to personnel and/or property resulting from contact with new or existing energized circuits, switches, circuit breakers, or other electrical apparatus. All electrical work to be constructed with electrical systems de-energized in the area of work.

P. Final Inspection and Acceptance:

After all requirements of the specifications and drawings have been fully completed, a representative of the District will inspect the work. Provide competent personnel to demonstrate the operation of any item or system involved to the complete satisfaction of each representative.

PART 2 - PRODUCTS

2.1 PANELBOARDS:

- A.** Provide the automatic circuit breaker type, quick-make and quick-break panelboards. Provide wiring gutter sides, top and bottom.
- B.** Provide panelboards from the same manufacturers as the main switchboard; type, mounting, and size as noted on the drawings with silver-plated copper bussing.
- C.** Where space is called for on the panelboard schedules, provide space and mounting for future circuit breaker installation as indicated.
- D.** Use trims having doors equipped with flush type combination lock and catch, two milled type keys supplied with each panel, all locks are keyed alike. Provide a clear covered directory frame with a typed identification card, indicating type of circuit and location, in accordance with final circuitry and panel designation on each door. Completely fill in all panel directories, using actual connections, Districts designations or other factual information. Key all doors to Yale LL803, or as directed by District.
- E.** Where called for on the drawings, provide a separate compartment within the panelboards for contactors and/or time switches.

SECTION 26 0000 ELECTRICAL

2.2 CIRCUIT BREAKERS:

Provide circuit breakers with inverse time characteristic thermal and magnetic tripping elements, with an interrupting capacity of not less than 10,000 amperes, UL labeled, NEMA rated, molded case type. Use common trip single handle multi-pole breakers. Handle extensions are not permitted. All circuit breakers will have covers sealed on non-interchangeable trip breakers and trip unit covers sealed in interchangeable trip breakers to prevent tampering. Be sure the circuit breaker current rating markings clearly visible after breaker is installed. One manufacturer for all circuit breakers for a given panel. Provide bolt-on circuit breakers unless specifically noted on electrical drawings.

2.3 TRANSFORMERS:

- A. Provide copper transformers manufactured with the minimum following attributes:
 - 1. Dry type, with the ratings shown on the Drawings.
 - 2. Provide standard taps FCAN/FCBN.
 - 3. Adjust all taps to nominal 120V., 208V., or 480V., as close as practicable and as required for the voltage indicated.
- B. Provide insulation with temperature rise not exceeding 150 degrees C, under full load, in an ambient temperature of 40 degrees C.
- C. Provide transformers manufactured in accordance with current standards of IEEE, ANSI, and NEMA, and provide UL listing and label.
- D. Install the transformer case on suitable vibration isolators, and connect on primary and secondary sides with minimum of 18" of liquidtight flexible metallic conduit.
- E. Where drawings specify transformers suitable for non-sinusoidal current load of specified "K Factor", the transformer shall be U.L. listed specifically for that application.

2.4 POWER DISCONNECT SWITCHES:

- A. Provide power disconnect switches having product construction requirements as specified and/or indicated. Where not otherwise indicated, the following requirements apply:
 - 1. Enclosure: NEMA I, surface type in dry locations. Use NEMA 3R for exterior locations.

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2. Ratings: Voltage, ampacity, horsepower and inductive ratings complying with power source voltage and characteristics of load controlled.
 3. Mechanism: Heavy-duty, quick-make, quick-break, with voidable interlock to prevent opening enclosure in "ON" position. External lockable handle operation with provision for not less than two padlocks.
 4. Poles and Fusing: Comply with load requirements. Provide unfused switches except where fusing is indicated or required to comply with Code Requirements. Where fuses are installed, use dual-element time delay fuses.
- B. Provide power disconnect switches of the following manufacturers with characteristics complying with load and power source indicated:
1. Westinghouse: Type HF or HU.
 2. General Electric: Type TH.
 3. Square D: Type HD or HU.
- C. Provide the number of poles necessary to include a pole for each ungrounded conductor. Equip switch with neutral terminal point where neutral is present. Do not switch neutral unless indicated.

2.5 PUSHBUTTON STATIONS AND CONTROL DEVICES:

The type and size of all pushbutton stations, switches, pilot lights and other control devices are as indicated on the drawings.

2.6 RELAYS:

Install control relays for automatic controls or for interlocking as indicated in the drawings. Provide relays with the number and type of poles and with operating coils as indicated. Equip relays with contacts rated not less than 15 amperes for continuous inductive load, unless otherwise shown or specified. Rate operating coils for continuous duty at the operating voltage shown on the drawings.

2.7 FUSES:

- A. Provide (in a location designated by the District) a spare fuse cabinet with the following:

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1. Nameplate "spare fuses".
 2. Necessary fuse holders.
 3. Spare set of each size and type of fuses.
- B. Provide dual element fuses for all 600 volt or lower voltage requirements unless otherwise indicated or specified. Where fuses are not made for this application, furnish Buss "Limitron" or approved equal fuses.
- C. Provide Bussman Fuses as indicated on plans.
- D. Replace fuses "blown" or damaged during construction with new fuses of proper rating and type for the particular use, replace spare sets.

2.8 LIGHTING FIXTURES:

Furnish, install and connect lighting fixtures of type designed on the plans.

- A. Verify all fixture locations with Architectural drawings prior to rough in.
- B. Where there is conflict in fixture quantities on any of the plans the greatest amount will prevail. The description of the lighting fixture supersedes the catalog number and is to be furnished and installed with type to fit description.

2.9 CONDUIT AND FITTINGS:

- A. Rigid Conduit (RGS): Hot dipped galvanized or sherardized steel. Republic Steel Co. or approved equal. Intermediate metal conduit may be used, where CEC allows, in lieu of RGS.
- B. Electrical metallic tubing (EMT): Welded, electro-galvanized thin wall steel tubing. All couplings are gland compression type.
- C. Non-metallic conduit (PVC): Polyvinyl chloride Schedule 40 or 80. Install a copper ground wire, sized per National Electrical Code, in all non-metallic conduit power raceways. Use PVC in underground installations only.
- D. Liquidtight Flexible Metal Electrical Conduit: Hot-dipped galvanized steel with exterior, molded polyvinyl jacket. Use for all final connections to all vibrating equipment, transformers and the like. 18" maximum. Provide a code sized ground wire.
- E. Flexible metallic steel tubing: Liquid tight without a nonmetallic jacket. Use as allowed by code and where permitted by this Specification, section

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3.06.C. Provide a code sized ground conductor.

- F. Condulet Type Fittings: As manufactured by Crouse Hinds Company, Appleton Electric Company or Pyle National or approved equal, smooth inside and out, taper threaded with integral bushings.

2.10 CONDUCTORS:

- A. Provide copper conductors, 600 volt A.C. unless noted otherwise. Aluminum conductors are not permitted.
- B. Use THWN conductors for underground and damp locations, THHN for dry areas.
- C. Deliver conductors to the site in unbroken packages, marked with the manufacturer's name, date of manufacture, voltage and classification letters. Use only wire recently manufactured (10 months or less).
- D. Provide signal service and low voltage control conductors as specified or noted on the drawings.
- E. No conductor supplying 120 volts or more will be smaller than No. 12 AWG unless otherwise noted on the drawings.
- F. Fixture wire to comply with latest requirements of the National Board of Fire Underwriters. The carrying capacity of the wire as per the latest requirements of the National Electrical Code. No fixture wire may be smaller than #18 gauge. Protect wiring with tape or tubing at all points where abrasion is likely to occur.
- G. Install all conductors of each electrical system in an approved raceway. Factory assemblies, non-metallic/pliable/corrugated raceways, type UF cable or multi-conductor assemblies are not approved.
- H. Use solid conductor, size #10 AWG and smaller, stranded for #8 AWG and larger.

2.11 JUNCTION AND PULL BOXES:

Above grade level, provide galvanized junction and pull boxes with removable covers, secured with machine screws. The sizes of all boxes determined by the number and size of conductors entering the box, and by the sizes of conduit terminating in the box. All boxes conform to the applicable Electrical Safety Orders, State of California. Pullboxes flush with grade shall be concrete, with bolt down concrete or steel covers, per plans, with engraved or beadweld identification.

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2.12 OUTLET BOXES:

- A. Provide galvanized outlet boxes and covers, one piece pressed steel, knockout fixture outlets equipped with 3/8" fixture studs and plaster rings.
- B. Where standard boxes are not suitable, provide boxes of special design to fit space.
- C. Cast aluminum or cast iron for outlet boxes exposed to weather, in damp locations, or surface mounted with threaded hubs for conduit connections; cover made watertight with gasket and non-ferrous screws.
- D. Provide outlet boxes in plaster covered walls with raised covers or plaster rings to finish flush with plaster.

2.13 SWITCHES:

- A. Local single pole switches: Flush tumbler type A.C. rated quiet type, heavy duty, back or side wired with binding screws, 20A, 120/277V rated switches, Bryant #4901, Hubbell or Leviton #1221, Sierra #5021 or Arrow Hart #1991. Two pole, three-way and lock type of the same manufacturer, white.
- B. Horsepower rated and approved for motor control service on switches controlling or disconnecting single-phase motor loads in excess of 1/3 h.p. Switches complete with overload devices of proper motor nameplate rating.
- C. Local single pole dimmer switches: Flush tumbler type with slide adjustment. 0-10 volt, back or side wired with binding screws, 20A, 120/277V rated

2.14 RECEPTACLES:

- A. Convenience outlets consist of a duplex convenience receptacle mounted in an outlet box in the wall, flush with the finish surface and complete with plate.
- B. Receptacles for convenience outlets: Standard duplex, 3-wire grounding type 15 ampere, 125 volt, Hubbell, Bryant, Leviton or Arrow Hart #5262 white, unless otherwise indicated.
- C. Weatherproof G.F.C.I. receptacles: 15 ampere, 2P 3-wire grounding type, 125 volt with gray fiberglass lift cover plate, Hubbell #GF5262, unless otherwise shown on plans.

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2.15 PLATES:

Provide stainless steel plates for all switches, convenience outlets, telephone outlets and all other similar outlets, unless otherwise specified or noted.

2.16 NAMEPLATES:

Shall be micarta or lamacoid plate, 1/8" thick and have approved size, with beveled edges and engraved white letters on black background. Provide nameplates for all items of electrical equipment as well as circuits in the service distribution and power distribution panelboards; lighting distribution panelboards; separately mounted motor starting switches; disconnect switches; motor control pushbutton stations and other similar devices. Each nameplate as approved by the Architect. Use two machine screws for attachment. Cement/adhesive is not approved.

PART 3 EXECUTION

3.1 If construction of building reveals that any part of the Electrical Work would not be readily accessible if installed according to drawings, notify the Architect before proceeding with such installation.

3.2 All concrete work such as pull boxes, raised pads, conduit envelopes and other areas where affecting Electrical Work are the responsibility of the Electrical Contractor.

3.3 Coordinate layout and installation of electrical work with the overall construction schedule and work schedules of various trades to prevent delay in completion of the project.

A. Verify dimensions and information regarding accurate location of equipment, structural limitations, and finish with other affected sections.

B. Job Conditions:

The drawings do not always show offsets, bends, special fittings or junctions or pull boxes necessary to meet job conditions. Provide the items as required at no cost to the District.

C. Weatherproof Equipment:

Use weather resistant electrical devices or equipment located in damp, semi-exposed areas. Comply with NEMA Type 3R requirements for enclosures.

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- D. Where devices are shown diagrammatically in the same location, neatly group them together in a reasonable manner. Provide one-piece plate where such is manufactured.

3.4 Equipment requiring electrical under other sections is part of the Contract. Work includes all necessary connections.

3.5 EXCAVATION AND BACKFILLING:

Excavate and backfill in accordance with section in these documents covering that work.

3.6 CONDUIT:

- A. Install all conduit concealed, except where specifically indicated as exposed. Use rigid galvanized steel or I.M.C. for all exposed conduit. Paint with two coats to match adjacent surroundings, if viewed by the public.
- B. Use galvanized rigid steel on all conduit installed in concrete and masonry walls, 3/4 inch trade size minimum, unless otherwise specified and/or noted on the plans. Verify conduit runs in concrete slab, prior to placement. Otherwise, do not run conduits in slabs.
- C. All conduit installed in the dry walls or dry ceilings of the building structures, shall be steel tube (EMT), except that in certain locations and for certain runs where it is impractical to install EMT, and where permission to do so has been given by the Architect, galvanized flexible steel conduit may be used, with a code sized ground conductor.
- D. Run conduit so as not to interfere with or contact other piping, fixtures or equipment. Maintain 6" separation from water piping.
- E. Cut the ends of all conduit square and carefully ream out to full size, and shoulder in fitting.
- F. No running threads will be permitted in locations exposed to the weather, in concrete or underground. Use special watertight union fittings in these locations.
- G. Use PVC Schedule 40 or 80 for all underground conduits. Install all underground conduit at a depth of not less than 24 inches below the final finish grade, unless under concrete slabs or otherwise noted and/or specified. provide metallic high voltage tape buried 12" above conduit, except under floor slab or under concrete walk, in which case, install 6" below bottom of slab. Use IMC for all horizontal and vertical sweeps or

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risers with factory applied PVC coating. Verify with serving utilities for service conduits, bends, depth below grade, backfill, etc. for specific types. Schedule 80 PVC sweeps are permitted for conduits 4" diameter and greater.

- H. Cut and patch all pavements, curbs, sidewalks and gutters, whenever necessary for laying conduit, or whenever damaged by the operations of this trade. Replace materials with quality and finish equal to that removed or damaged.
- I. Where conduit extends through roof to equipment on roof areas, provide weatherproofing as specified in the appropriate section of these Specifications.
- J. Support all conduit in intervals not less than 10'-0" and within 36 inches from any outlet and at each side of bends and elbows. Use galvanized, concealed conduit supports, heavy stamped, one hole malleable conduit clamps secured with nails. On exposed conduit supports, use two hole clamps with screws, or galvanized steel framed channels secured by screws may be used for conduit supports. Perforated iron for supporting conduit is not permitted.
- K. Use rigid galvanized steel or I.M.C., threaded, for exposed conduit runs. Install parallel or perpendicular to walls, structural members or intersection of vertical plane and ceilings. Avoid field made bends and offsets where possible. Do not install crushed or deformed raceways.
- L. Provide metal sleeves and install where conduit passes through masonry or concrete walls. Use No. 20 gauge galvanized steel sleeves, no more than 1/2 inch greater in diameter than the outside diameter of the conduit. Caulk conduit into sleeves with stone wool, Duseal or Oakum and weatherproof below grade. Where conduit passes through fire resistive walls, partitions, and floors, pack void spaces between conduits with U.S.G. Thermafiber or equal, as approved by the State Fire Marshal.
- M. Provide a heavy nylon cord pull rope in all empty conduits for future use. Leave in place for future use in all runs and tagged with plastic tag at terminating end indicating the location of the opposite end of the conduit.
- N. Use factory-manufactured ells, except where noted otherwise. Field bends are permitted for EMT conduit less than 1" diameter. Conduit radius for signal system is ten times the internal diameter of the conduit.
- O. Cap or seal all conduit ends until wires are pulled.
- P. Use watertight gland compression type connectors and couplings on fittings

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- for thin wall metallic conduit. Screw type or crimp type are not permitted.
- Q. Wire all rotating electrical equipment with flexible, liquid-tight conduit with appropriate slack from disconnect switch to equipment.
 - R. Install expansion coupling at all expansion joint locations, refer to Architectural. Drawings for locations.
 - S. Use approved type-bending machines for PVC conduits. Use of blow torch is prohibited.
 - T. For grouping, use conduit trapezes made up of suitable Unistrut or Kindorf hangers.
 - U. Seal or cap all conduit for a watertight installation.
 - V. Use approved conductor pulling machines for all underground conduits. Use of truck is prohibited.

3.7 OUTLET BOXES:

- A. Attach outlet boxes on metal studs with TEC screws. Use wood screws for attachment on wood studs. Nails are not acceptable.
- B. Cover all boxes with outlet box protector, Appleton SB-CK or approved equal. Keep plaster and dirt from entering box or panels. If plaster does get in, removed it prior to pulling in wires.
- C. Close all unused openings with plugs.

3.8 INSTALLATION OF CONDUCTORS:

- A. Unless otherwise indicated or specified, do not install conductors of less than No. 12 AWG size. For control conductors protected by 15 ampere or lower overcurrent protection, No. 14 AWG conductors will be installed. Where approved by Code, remote control and signal circuits utilize No. 18 or No. 16 AWG sizes. Increase No. 12 to No. 10 AWG for 120 volt home runs exceeding 75 feet.
- B. Color code power wire and cable for feeders and branch circuits.
- C. Install all electrical conductors, including signal and communications circuits in an approved raceway.
- D. Neatly group conductors in panels, switchgear and terminal cabinets, etc., and form in a manner to fan into terminals with regular spacing. Lace formed groups of conductors with No. 12 waxed twine, or Panduit Co. Nylon

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Straps Numbers "SST-4-H" or "SST-2". Lace larger conductors with marlin and secure with cleats, or Panduit Co. Nylon Sta-Straps Numbers "SSC-4-H" and tie anchors ETA-1, TA-2 or TM-1-2-3.

- E. Install U.L. approved covered wire from all lighting fixture lamp sockets into outlet or junction box.

3.9 WIRING COLOR CODE

A. 208Y/120 Volt System

Phase A - Black.
Phase A Switch Leg - Black with "S" tag.
Phase B - Red.
Phase B Switch Leg - Red with "S" tag.
Phase C - Blue.
Phase C - Switch Leg - Blue with "S" tag.
Travelers - Yellow.
Neutral - White.
Equipment Ground - Green.

B. 480Y/277 Volt System

Phase A - Brown Phase A - Brown.
Phase A Switch Leg - Brown with "S" tag.
Phase B - Orange.
Phase B Switch Leg - Orange with "S" tag.
Phase C - Yellow.
Phase C Switch -Leg- Yellow with "S" tag.
Travelers - Yellow with "T" tag.
Neutral - Grey.
Equipment Ground - Green with Yellow stripe.

- C. Provide identification tags on each conductor entering panel, switch, junction box and pull box to identify conductor.

3.10 UNDERGROUND PULL BOXES:

- F. Set underground pull boxes at +3" above highest adjacent grade level.
- G. No splices in Fire Alarm or Signal System conductors are permitted.
- H. Size per NEC.
- I. Provide nameplate on all covers.

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1. "ELEC"
2. "LOW VOLTAGE"

3.11 CONDUCTOR JOINTS AND TAPING:

Make joints in conductors smaller than No. 6 AWG with solderless, tapeless, wing nut type pressure cable connector. Join conductors No. 6 AWG and larger together with approved type or pressure connector and tape to provide insulation not less than that of the conductor. Make connections to switch or bus bar with one-piece copper lugs for conductors No. 8 AWG or larger.

3.12 GROUNDING:

Provide grounding for entire electrical installation as required by the serving utility and codes mentioned in these specifications. Including:

- J. Conduit.
- K. Neutral or identified conductor of interior wiring system.
- L. Power and lighting panelboards.
- M. Non-current carrying metal parts or fixed equipment.
- N. Electrical panels in separate buildings.

END OF SECTION

**SECTION 26 0500
COMMON WORK RESULTS FOR ELECTRICAL**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 26. It expands and supplements the requirements specified in sections of Division 01.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 03 30 00 - Cast-in-Place Concrete.
 - 3. Section 09 91 00 - Painting and Coating.
- C. Applicable Standards
 - 1. ASTM D 709 (2007) – Laminated Thermosetting materials.
 - 2. ANSI/NEMA FB-1 (2010) – Standard for Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
 - 3. ANSI/NEMA 250 (2008) – Enclosure for Electrical Equipment (1000 Volts Maximum).
 - 4. California Electrical Code (CEC).
 - 5. IEEE C57.12.28 (2005) – Standard for Pad-Mounted equipment (Enclosure Integrity).
 - 6. UL 1 (2005) – Standard for Flexible Metal Conduit.
 - 7. UL 1242 (2007) – Standard for Electrical Intermediate Metal Conduit.
 - 8. UL 506 (2008) – Specialty Transformers.
 - 9. UL 6 (2010) – Electrical Rigid Metal Conduit-Steel.
 - 10. UL 797 (2007) – Electrical Metallic Tubing-Steel.
 - 11. UL 870 (2008) – Standard for Wireways, Auxiliary Gutters, and Associated Fittings

**SECTION 26 0500
COMMON WORK RESULTS FOR ELECTRICAL**

1.2 BASIC ELECTRICAL REQUIREMENTS

A. Quality Assurance:

1. Workers possessing the skills and experience obtained in performing work of similar scope and complexity shall perform the Work of this Division.
2. Refer to other sections of the Specifications for other qualification requirements.

B. Drawings and Specifications Coordination:

1. For purposes of clearness and legibility, Drawings are essentially diagrammatic and the size and location of equipment is indicated to scale whenever possible. Verify conditions, dimensions, indicated equipment sizes, and manufacturer's data and information as necessary to install the Work of this Division. Coordinate location and layout with other Work.
2. Verify final locations for rough-ins with field measurements and with the requirements of the equipment to be connected.
3. Drawings indicate required size and points of termination of conduits, number and size of conductors, and diagrammatic routing of conduit. Install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and comply with applicable code requirements.
4. Routing of conduits may be changed provided that the length of any conduit run is not increased more than 10 percent of length indicated on the Drawings.
5. Outlet locations shall be coordinated with architectural elements prior to start of construction. Locations indicated on the Drawings may be distorted for clarity.
6. Coordinate electrical equipment and materials installation with building components and the Work of other trades
7. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
8. Coordinate connection of electrical systems with existing underground utilities and services.

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C. Terminology:

1. Signal Systems: Applies to clock, bell, fire alarm, annunciator, sound, public address, buzzer, telephone, television, inter-communication, elevator access controls, lighting control systems and security systems.
2. Low Voltage: Applies to signal systems operating at 120 volts and less, and power systems operating at less than 600 volts. Medium voltage: Applies to power systems operating at more than 600 volts.
3. UL: Underwriter's Laboratories Inc, Nationally Recognized Testing Laboratory (NRTL), or equal.

D. Regulations: Work shall comply with the requirements of authorities having jurisdiction and the California Electrical and Building Codes. Material shall conform to regulations of the National Board of Fire Underwriters for electrical wiring and apparatus. Materials shall be new and listed by UL, or another NRTL.

E. Structural Considerations for Conduit Routing:

1. Where conduits pass through or interfere with any structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other buildings elements, conform to CBC, Part 2, Title 24, Section 1906.3 for conduits and pipes embedded in concrete and Sections 2308.9.10 and 2308.9.11 for notches and bored holes in wood; for steel, as detailed on the structural steel Shop Drawings.
2. Where a concrete encasement for underground conduit abuts a foundation wall or underground structure which the conduits enter, encasement shall rest on a haunch integral with wall or structure, or shall extend down to footing projection, if any, or shall be doweled into structure unless otherwise indicated. Underground structures shall include maintenance holes; pull boxes, vaults, and buildings.
3. Holes required for conduit entrances into speaker poles, floodlight poles or other poles, shall be drilled with the conduit nipple or coupling welded to poles. Welds shall be provided by the electric arc process and shall be continuous around nipple or coupling.

F. Electrically Operated Equipment and Appliances:

1. Furnished Equipment and Appliances:
 - a. Work shall include furnishing and installing wiring enclosures for, and the complete connection of electrically operated

SECTION 26 0500
COMMON WORK RESULTS FOR ELECTRICAL

equipment and appliances and electrical control devices which are specified to be furnished and installed in this or other sections of the Specifications, wiring enclosures shall be concealed except where exposed Work is indicated on the Drawings.

- b. Connections shall be provided as necessary to install equipment ready for use. Equipment shall be tested for proper operation and, if motorized, for proper rotation. If outlets are of incorrect electrical characteristics or any specified equipment fails to operate properly, repair and/or replace the outlet and/or equipment.

2. Equipment and Appliances Furnished by Others:

- a. Equipment and appliances indicated on Drawings as "not in contract" (NIC), "furnished by others," or "furnished by the District," will be delivered to the Project site. Required electrical connections shall be performed for such equipment and appliances. Motorized equipment will be furnished factory-wired to a control panel or junction box unless otherwise indicated. Appliances will be furnished equipped with portable cord and cap. Provide disconnect switches where required.
- b. Connections to equipment furnished under this Division shall be part of the Work of this section. Work shall include internal wiring, installation, connection and adjustment of bolted drive motors in which the motor is supplied as a separate unit, and connections only for equipment furnished with factory installed internal wiring, except as further limited by Drawings and this Specification. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push-button stations, selector switches, conduit, junction boxes, and wiring necessary for a complete electrical installation. Work shall also include furnishing and installing conduit and boxes for HVAC control systems, furnished under Division 23. Devices and equipment furnished shall be of same type used elsewhere on the Work or as specified.
- c. Electrical equipment furnished under other sections, for installation and connection under Work of this section, will be delivered to the Project site ready for installation.
- d. Mechanical equipment furnished under other sections, and requiring electrical connection under this section, will be set in place as part of the Work of the section furnishing such equipment unless noted otherwise.

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COMMON WORK RESULTS FOR ELECTRICAL**

- e. Suitability and condition of equipment furnished under other sections shall be determined in advance of installation. Immediate notice of damage, unsuitability, or lack of parts shall be given to the entity providing such equipment.
- G. Protection of Materials:
 - 1. Protect materials and equipment from damage and provide adequate and proper storage facilities during progress of the Work. Damaged materials and/or equipment shall be replaced.
- H. Cleaning:
 - 1. Exposed parts of Work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.
 - 2. Thoroughly clean parts of apparatus and equipment. Exposed parts to be painted shall be thoroughly cleaned of cement, plaster, and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped and corners and cracks scraped out. Exposed rough metal shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.
 - 3. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- I. WARRANTIES
 - 1. Provide one-year warranty on all material and labor performed, unless noted otherwise in specific sections.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Advise the Inspector before starting the Work of this Division.
- B. Exposed conduits shall be painted to match the surfaces adjacent to installation.
- C. Salvaged materials removed from buildings shall be removed from the Project site as required by the OAR.

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- D. Electrical equipment shall be braced and anchored for CBC Seismic Design requirements, or as otherwise indicated on the Drawings.

3.2 DELIVERY STORAGE AND HANDLING

- A. Deliver products to project site with proper identification, which shall include names, model numbers, types, grades, compliance labels, and similar information needed for District identification; all products and materials shall be adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

3.2.1 CUTTING AND PATCHING

- A. Cutting and patching of electrical equipment, components, and materials shall include the removal and legal disposal of selected materials, components, and equipment.
- B. Do not endanger or damage installed Work through procedures and processes of cutting and patching.
- C. Repair or restore other work, or surfaces damaged as a result of the work performed under this contract.

3.3 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose off the Project site.
- B. Remove equipment and implements of service, and leave entire work area neat and clean, to the satisfaction of the District Authorized Representative.

3.4 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 26 0513
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Basic electrical methods.
2. Grounding.
3. Hangers and supports.
4. Electrical identification.
5. Electrical system testing and inspection.

B. Related Documents: The Contract Documents, as defined in Section 01 110 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 BASIC ELECTRICAL METHODS

- A.** Drawings are schematic and diagrammatic. Use judgment and care to install electrical Work to function properly and fit within building construction and finishes. Electrical conductors, conduit, components, not shown or specified, which are required for any device or system to produce a complete and operative system are required to be furnished and installed.
- B.** Exact locations of fixtures are determined from dimension on Drawings, manufacturer's shop drawings, or as may be determined at Project Site. Do not scale Drawings for exact location of any item. Verify item mounting heights as required by project conditions prior to rough-in.
- C.** Surface mounted raceways or conduit permitted only at locations directed by.
- D.** Circuit grouping, conduit or cable runs and home runs with number of conductors required by code in each raceway to clarify operation and function of various systems. Provide proper number of conductors and conduits or cables to provide operative system as indicated on Contract Documents. Do not regroup any feeder circuits, branch circuits, home runs, and zone alarms at any point, from that shown on Contract Documents.

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BASIC ELECTRICAL MATERIALS AND METHODS

- E. Do not connect two ungrounded conductors to same circuit breaker/fused switch in any panel. Circuit runs consist of a maximum of five conductors; 3 phase conductors, 1 neutral conductor, and 1 equipment ground conductor, unless otherwise noted. Do not splice branch circuit conductors in any panels, safety switches, or non-automatic circuit breakers in separate enclosures.
- F. Seal and make permanently watertight penetrations by electrical raceways or equipment through ceilings, walls or floors.
 - 1. Seal penetrations in non-fire rated ceilings, walls or floors material specified in Section 07 9200 - Sealants.
- G. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A, and NFPA 70.
- H. Install equipment and materials to provide required maintenance and code working clearance for servicing and maintenance. Coordinate final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow required space for removal of parts that require replacement or servicing.
- I. Remove existing equipment, lighting fixtures, switches, and receptacles as required to facilitate new installation. Remove existing wiring and conduit serving items to be removed. Conduit in inaccessible areas shall be cut off below finished surfaces and existing surface patched to match existing. Provide blank plates on existing flush mounted outlet boxes that will be abandoned. Remove all abandoned conductors from raceways.

PART 2 - PRODUCTS

2.1 GROUNDING

- A. Wire:
 - 1. Material: Stranded copper.
 - 2. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

SECTION 26 0513
BASIC ELECTRICAL MATERIALS AND METHODS

2.2 HANGERS AND SUPPORTS

- A. Product Requirements: Furnish and install approved materials, sizes, and types of anchors, fasteners, and supports to carry loads of equipment and conduit, including weight of wire in conduit plus 300 pounds.
- B. Materials and Finishes: Corrosion resistive.
- C. Anchors and Fasteners:
 - 1. Steel Structural Elements: Beam clamps and welded fasteners.
 - 2. Concrete Surfaces: Self-drilling anchors and expansion anchors.
 - 3. Hollow Masonry, Plaster, and Gypsum Board Partitions: Toggle bolts and hollow wall fasteners.
 - 4. Solid Masonry Walls: Expansion anchors.
 - 5. Sheet Metal: Sheet metal screws.
 - 6. Wood: Wood screws.

2.3 ELECTRICAL IDENTIFICATION

- A. Wire and Cable Markers:
 - 1. Description: Cloth tape or tubing type wire markers.
 - 2. Locations: Each conductor at panel board gutters, pull boxes, outlet and junction boxes, and each load connection.
 - 3. Legend:
 - a. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings.

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BASIC ELECTRICAL MATERIALS AND METHODS

PART 3 - EXECUTION

3.1 INSTALLATION - GROUNDING

- A. Provide grounding in conformance with NFPA 70.
- B. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- C. Testing and Inspection:
 - 1. Inspect and test in accordance with NETA ATS, except Section 4.
 - 2. Perform inspections and tests listed in NETA ATS, Section 7.13.

3.2 INSTALLATION - HANGERS AND SUPPORTS

- A. Install products in accordance with manufacturer's published instructions.
- B. Furnish and install anchors, fasteners, and supports in accordance with NECA SI.
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Do not use spring steel clips and clamps.
- E. Do not use powder-actuated anchors.
- F. Obtain permission from District Engineer before drilling or cutting structural members.

- 3.3 INSTALLATION:** Installation of materials and equipment shall be in strict accordance with manufacturer's recommendations, instructions, industry standards, as indicated on the drawings and as specified herein. Provide all mounting facilities for securing or hanging fixtures, equipment and outlets to the satisfaction of the Engineer. Details shown on the plans are for the purpose of establishing the extent and general methods required. Provide all sleeves, inserts, expansion joints, vibration fitting, etc. Provide storage facilities and protect all work, materials and equipment from damage during process of work. Materials and equipment shall not be stored exposed to weather. Replace all

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BASIC ELECTRICAL MATERIALS AND METHODS

damaged or defective work, materials and equipment without additional cost to the District.

- 3.4 CONDUIT AND WIRING: All conduit and wiring shall be installed concealed in walls, above ceilings and below floor slabs or exposed in accordance with applicable regulations and the Electrical Drawings. All penetrations of fire-rated walls or ceilings to be coordinated with District. Conduit runs are shown diagrammatically. Exact routing and location of the equipment to be determined in the field.
- 3.5 MOISTURE PROTECTION: Where required by regulations, all electrical devices in the spray radius of sprinklers shall be installed with weatherproof enclosures in compliance with these regulations.
- 3.6 FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION
- A. Section 01 4000 - Quality Control: Field testing and inspection.
 - B. Section 18108 Commissioning: Requirements related to Division 16 Commissioning
 - C. Regulatory Requirements:
 - 1. Safety Practices: Include, but not limited to, the following requirements:
 - a. Occupational Safety and Health Act of 1970 - OSHA.
 - b. Accident Prevention Manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
 - c. Applicable State and Local Safety Operating Procedures.
 - d. NETA Safety/Accident Prevention Program.
 - e. NFPA 70E - Electrical Safety Requirements for Employee Workplace.
 - f. American National Standards for Personnel Protection, ANSI Z244.1.
 - 2. Perform tests with apparatus de-energized except where otherwise specifically required herein.
 - 3. Power Circuits: Conductors shorted to ground by a hot line grounded device approved for the purpose.

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- D. Tests and inspections include, but are not limited to the following:
1. Proper operation of lights and equipment.
 2. Continuity of raceway system.
 3. Insulation leakage and impedances.
 4. Sub-system tests indicated in other Sections.

END OF SECTION

SECTION 26 2726
WIRING DEVICE DETAILS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wall switches.
 - 2. Dimmers
 - 3. Receptacles.
 - 4. Device plates and box covers.
- B. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. As specified in Section 26 05 00 - Electrical.

1.2 REFERENCES

- A. As specified in Section 26 05 00 - Electrical.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Device -- Dimensional Requirements.

1.3 SUBMITTALS

- A. As specified in Section 26 05 00 - Electrical.

1.4 QUALITY ASSURANCE

- A. As specified in Section 26 05 00 - Electrical.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.

SECTION 26 2726
WIRING DEVICE DETAILS

PART 2 - PRODUCTS

2.1 WALL SWITCHES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Inc.
 - 2. Leviton Manufacturing, Company, Inc.
 - 3. Pass & Seymour.
 - 4. Division 1 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide 20 Amp, 120/277V, specification grade, flush, single pole toggle switches with side and back wired screw terminals. All switches shall be equipped with grounding screws.
- C. Single Pole Switch:
 - 1. Leviton Cat. No.1221-2.
 - 2. P&S Cat. No. PS20AC1I.
 - 3. Hubbell Cat. No. HBL1221.
- D. Color: White unless indicated otherwise.

2.2 DIMMER SWITCHES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Hubbell, Inc.
 - 2. Leviton Manufacturing, Company, Inc.
 - 3. Pass & Seymour.
 - 4. Division 1 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide 20 Amp, 120/277V, 0-10V DIMMING, specification grade, flush, slide adjustor with single pole toggle switch with side and back wired screw terminals. All dimmers shall be equipped with grounding screws.
- C. Dimmers:
 - 1. Leviton.
 - 2. P&S.
 - 3. Hubbell.

Color: White unless indicated otherwise

SECTION 26 2726
WIRING DEVICE DETAILS

2.3 RECEPTACLES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. Leviton Manufacturing, Company, Inc.
 - 2. Pass & Seymour.
 - 3. Hubbell, Inc.
 - 4. Division 1 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide duplex, specification grade, 20 Amp, 120 Volt, 2 pole, 3 wire receptacles with grounding screw.
- C. Duplex Convenience Receptacle:
 - 1. Leviton Cat. No. 5362.
 - 2. P&S Cat. No. 5362.
 - 3. Hubbell Cat. No. HBL5352.
- D. GFCI Receptacle (Side Wired Feed-Thru):
 - 1. Leviton Cat. No. 6599.
 - 2. P&S Cat. No. 2091-SHG.
 - 3. Hubbell Cat. No. HBLGF5362.
- E. Color: White unless indicated otherwise.

2.4 WALL PLATES

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
 - 1. P&S Sierra.
 - 2. Hubbell.
 - 3. Leviton.
 - 4. Division 1 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Cover Plate: Stainless steel
- C. Weatherproof Cover Plate: Gasketed lockable cast metal with hinged gasketed device, listed as weather proof while in use.
 - 1. Red Dot cast aluminum.

SECTION 26 2726
WIRING DEVICE DETAILS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. As specified in Section 26 05 00 - Electrical.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that outlet boxes are installed at proper height.
 - 2. Verify that wall openings are neatly cut and will be completely covered by wall plates.
 - 3. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- F. Connect wiring devices by wrapping conductor 2/3 of screw diameter in clockwise direction around screw terminal. Tighten screw to 12 pound-inches. Do not use spring pressure devices for wire connections.
- G. Install cover plates on switch, receptacle, and blank outlets.

SECTION 26 2726
WIRING DEVICE DETAILS

3.4 CONSTRUCTION

- A. Interface with other work:
 - 1. Coordinate locations of outlet boxes provided under Division 26 to obtain mounting heights indicated on Drawings.

3.5 FIELD QUALITY CONTROL

- A. As specified in Section 26 05 00 –Electrical.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush, level and plumb with wall.

3.7 CLEANING

- A. Division 1 - Execution: Cleaning installed work.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

**SECTION 26 5010
SOLID STATE (LED) LIGHTING**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and exterior luminaires and accessories.
2. Drivers.
3. Luminaire accessories.

B. Substitutions:

Or approved equal if permitted in Section 01 6000 - Product Requirements: Product options and substitutions.

C. Related Documents: The Contract Documents, as defined in Section 01 1000 - Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.

D. Related Sections:

Division 26.

1.02 REFERENCES

E. American National Standards Institute (ANSI):

F. National Electrical Manufacturers Association (NEMA):

1. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

G. Federal Communications Commission Parts 18.305, 18.307 (EMI RFI)

1.03 SUBMITTALS

A. Section 01 3300 – Submittal Procedures: Procedures for submittals.

B. As specified in Section 26 0500 – Common Work Results for Electrical.

1. Product Data: Provide dimensions, ratings, and performance data for each fixture specified.

**SECTION 26 5010
SOLID STATE (LED) LIGHTING**

2. Assurance/Control Submittals:

- a. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

C. Section 01 7704 - Closeout Procedures and Training: Procedures for closeout submittals:

- 1. Operation and Maintenance Data: Submit manufacturer's operation and maintenance instructions for each type of fixture.

1.04 QUALITY ASSURANCE

- A. As specified in Section 26 0500 - Common Work Results for Electrical.

1.05 MAINTENANCE

- A. Section 01 7704 - Closeout Procedures and Training: Procedures for closeout submittals.

- B. Extra Products: At completion of installation, deliver to Engineer. Two of each luminaire lens type.

1.6 WARRANTY

- A. Comply with Division 1 requirements.
- B. General Warranty: Special warranty specified in this Section shall not deprive the City of other Rights the City may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by this Contractor under requirements of the Contract Documents.
- C. Special Warranty for LEDs' and Drivers: Manufacturers standard form in which manufacturer of LED's and drivers agrees to replace components that fails in materials or workmanship within specified warranty period.
 - 1. LED arrays: 10 years from date of Beneficial Occupancy.
 - 2. Drivers: 10 years from date of Beneficial Occupancy.

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SOLID STATE (LED) LIGHTING

PART 2 - PRODUCTS

2.1 LUMINARIES – See Drawings

2.2 LAMPS

A. LED Lamp Manufacturers:

1. Deco Digital.
2. General Electric Company.
3. Philips Lighting Company.
4. Osram/Sylvania.
5. Or approved equal

B. Lamp Types: As specified for luminaire. Refer to Section 01 3300 & 01 6000 for substitutions and product options.

2.3 DRIVERS

A. Drivers shall be compatible with occupancy sensors and shall be U.L. approved and certified per CEC 2-5314

B. Dimming ballast shall be 0-10 volt and shall be compatible with 0-10 volt dimming switches provided for control.

2.4 LED LUMINAIRES

A. General: Except as otherwise indicated, provide LED luminaires, of types and sizes indicated on fixture schedules.

B. Material and specifications for each luminaire are as follows:

1. Each luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).
2. Each luminaire shall be rated for a minimum operational life of 50,000 hours at an average operating time of 12.0 hours per day. This life rating must be conducted 40C ambient temperature.
3. The rated operating temperature range shall be -30°C to +40°C.
4. Each luminaire is capable of operating above 100°F [37°C], but not expected to comply with photometric requirements at elevated temperatures.
5. Photometry must be compliant with IESNA LM-79 and shall be conducted at 25°C ambient temperature.
6. The individual LEDs shall be constructed such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.

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7. Luminaire shall be constructed such that LED modules may be replaced or repaired without replacement of whole luminaire.
 8. Each luminaire shall be listed with Underwriters Laboratory, Inc. under UL1598 for luminaires, or an equivalent standard from a nationally recognized testing laboratory.
- C.

PART 3 - EXECUTION

3.01 EXAMINATION

As specified in Section 26 0500 - Common Work Results for Electrical.

3.02 INSTALLATION

- A. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement. Outlet box for ceiling mounted exit signs: Connect to rigid conduit system.
- B. Install accessories furnished with each luminaire.
- C. Bond products and metal accessories to branch circuit equipment grounding conductor.

3.03 FIELD QUALITY CONTROL

- A. As specified in Section 26 0500 - Common Work Results for Electrical.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.04 ADJUSTING

- 3.01 Aim and adjust luminaires as directed by the Engineer.

3.05 CLEANING

1. Conform to Section 01 7300 - Execution: Cleaning installed work.
2. Clean electrical parts to remove conductive and deleterious materials.
3. Remove dirt and debris from enclosures.

**SECTION 26 5010
SOLID STATE (LED) LIGHTING**

4. Clean photometric control surfaces as recommended by manufacturer.
5. Clean finishes and touch up damage.
6. Replace any fixtures that is defective or flickers, just prior to Final Acceptance.

END OF SECTION